M Street/Southeast-Southwest Transportation Planning Study

FINAL REPORT

DECEMBER 2012

Submitted by

CH2MHILL

District Department of Transportation

Anacostia Waterfront realizing the vision

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EXECUTIVE SUMMARY

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Executive Summary

The District Department of Transportation (DDOT) has undertaken the M Street / Southeast-Southwest Transportation Planning Study (Study) to prepare for the substantial new growth along M Street and in the Southeast /Southwest waterfront area. At build-out, the Study area will have an additional 36 million (M) square feet (SF) of development concentrated within a 0.78-square–mile core subarea. The premise is to redevelop, reinvent, and reconnect this area by better integrating it with the surrounding neighborhoods and improving multimodal travel and public realm within the neighborhood.

This report presents the results of the analysis performed for the Study, which focused on three major themes: community, connections, and capacity. Within each of these themes, a number of criteria were developed that served as the framework for evaluating the effectiveness of potential solutions. The focus area of this Study encompass a roughly 1.7-square-mile area along the M Street SE/SW corridor, and the Southwest Waterfront from 12th Street SE to 14th Street SW, and from the Southwest/Southeast Freeway south to the Anacostia River/Washington Channel. The entire Study area is shown in **Figure ES-1**.

Study Goals and Objectives

The purpose of the Study is to consider current and future transportation conditions, review the planned future land uses, and develop solutions for the transportation network in order to promote livable communities and encourage reinvestment in properties within the Study area. The objectives developed through the public involvement process are outlined in **Table ES-1**.

TABLE ES-1
Goals and Objectives of the M Street SE/SW Waterfront Transportation Planning Study

CRITERIA	DESCRIPTION
COMMUNITY	Promote walkable, safe pedestrian infrastructure
	Provide multimodal access to and mobility within neighborhoods
	Create diverse and balanced transportation options
	Promote sustainable community & infrastructure
	Protect residential parking
CONNECTIONS	Establish and/or Improve pedestrian connectivity to/within communities and to Metro Stations
	Create bicycle lane / cycle tracks connectivity
	Enhance transit connectivity (including inter-neighborhood connectivity and reduction of transfers)
	Provide flexibility for managing parking demand
	Promote shared parking
	Optimize freeway connections (provide for all movements at freeway interchanges where feasible)
	Close gaps in missing street connections
CAPACITY	Provide transit capacity
	Address regional capacity needs
	Shift mode split from vehicular to transit and nonmotorized modes to accommodate increased density
	Promote efficient/safe movement of people & goods to support new retail, restaurants, etc. (incl. Freight/Motor Coach staging areas)
	Balance parking supply between land use demands
	Establish context-sensitive locations for commuter bus and other transit staging areas

Core Areas

The entire study area is part of the Anacostia Waterfront Initiative (AWI) which includes real estate development and multimodal transportation initiatives to better connect Anacostia River communities, support economic development, and improve environmental quality of the watershed. The M Street / Southeast-Southwest Transportation Planning Study focused on identifying and developing improvements in the following core areas, shown in **Figure ES-1**, within the Study area:

The Wharf / Southwest Waterfront

The Wharf / Southwest Waterfront neighborhoods stretch 47 acres from the historic Fish Wharf to Fort McNair. The area is home to marinas (such as the Gangplank and Washington Marinas), theaters, restaurants (such as Phillips Flagship Restaurant), hotels, nightclubs, and the Kastles Tennis Stadium. While located in a prime location along the Potomac River, these neighborhoods have been generally considered isolated from the rest of the city. As such, the Anacostia Waterfront Initiative (AWI) redevelopment calls for approximately 3 million square feet of residential, office, hotel, retail, cultural, and park space.

Buzzard Point

The Buzzard Point neighborhood in the southwest consists of 9 acres bounded by the Southwest waterfront, Fort McNair, Nationals Park, and the Anacostia River. The neighborhood currently contains the Coast Guard headquarters (moving to Historic Anacostia) and has been viewed as a potential landing spot for DC United. As part of the AWI, the plan for Buzzard Point is to grow its population by 200 people while tripling employment (+12,000) over the next 25 years. This is to be accomplished through mixed-use developments of commercial and residential land uses.

Ballpark District / The Yards

The Ballpark District and The Yards in the southeast are home to Nationals Park and the US DOT, respectively. The core area is bounded by South Capitol Street, M Street, the Anacostia River, and the Washington Navy Yard. The most significant development, spanning 42-acres, will occur in The Yards neighborhood including renovation of historic former industrial buildings to accommodate residential and retail projects.

Near Southeast / Capitol Quarter

The Near Southeast / Capitol Quarter neighborhood is bounded by New Jersey Avenue, I-695, M Street, and 11th Street. Currently the area is zoned as a mix of medium- to high-density residential, federal public, open land, and commercial areas. In the future, two main developments are to be completed: Washington Canal Park and the Capper-Carrollsburg Hope VI Redevelopment. The Washington Canal Park development will span three blocks, providing green space to memorialize the Washington Canal, which provided a water-borne connection from northwest Washington to the Anacostia River (along the Tiber Creek watershed). The space will also contain a café and water fountains, with the intent of hosting events such as a farmer's market and holiday events. In the winter, the space will feature ice-skating opportunities. Prior to construction, the area was home to a parking lot.

The Capper-Carrollsburg Redevelopment is a 23-acre project that will convert an isolated and deteriorating public housing complex into a mixed-income neighborhood. The new development is to be surrounded by the Washington Canal Park, as well as retail and office space. As a result of these developments, it is projected that the region will experience an increase of around 2,500 person and 4,900 new jobs over the next 25 years.

Capitol Riverfront Business Improvement District

The Capitol Riverfront Business Improvement District (BID) pertains to the previously described developments as well as the Washington Navy Yard. The "Front," located five blocks south of the US Capitol Building, provides modern amenities in a riverfront setting by retrofitting an area with a distinct industrial heritage. The district of neighborhoods provides multimodal transportation access and new parks and trails in the District. While the current

mixed-use community employs over 35,000 daytime employees, 6.8 million SF of office space, and 3,600 residents, while attracting 2 million annually in tourism and sporting events, additional developments are under way.

M Street Corridor

As described throughout this report, M Street is a six-lane east-west minor arterial that connects Maine Avenue SW to 11th Street SE, with Maine Avenue extending from M Street to 17th Street NW, connecting the Southwest Waterfront and the National Mall. As part of this Study, future developments are to include innovative techniques for integrating transit, bicycling, and walking with motor vehicle traffic while accommodating new development. The intent of the transportation enhancements are to improve safety for drivers, pedestrians, and bicyclists, increase mobility, provide better local connections to the regional transportation network, and support planned development.

South Capitol Street Corridor

South Capitol Street is a principal arterial connecting the Southwest/Southeast Freeway and the Frederick Douglass Memorial Bridge. The corridor is in the process of becoming a symbolic gateway to the central core of Washington, D.C. Redesigning South Capitol Street into an urban boulevard includes replacing the aging Frederick Douglass Bridge and improving connections between the east and west banks of the Anacostia River. With the redesign, the corridor can accommodate multimodal traffic and spur economic development. DDOT has completed a Final Environmental Impact Statement for the project and has initiated designs based on the FEIS.

Overview of Improvements

The M Street / Southeast-Southwest Transportation Planning Study identified improvements for three conditions:

- Near-term conditions (2013-2016),
- Potential mid-term improvements (2015-2021), and
- Long-term conditions/solutions beyond the full build-out for new development (2020 and Beyond).

The near-term solutions would not require the type of environmental review process and project development efforts that are associated with longer-term improvement alternatives. Many of the solutions can be implemented with relatively small costs, while the long-term improvements would require more detailed design effort, and a longer timeframe, though the goals and objectives of both types of solutions remain the same.

The long-term improvements beyond the year of analysis might be implemented sometime after the proposed mid-term improvements are implemented, or potentially beyond the analysis horizon year of 2035. The nature of these types of improvements is such that they may depend on, or are related to, additional redevelopment or separate transportation project development studies. Some of the options discussed in this chapter would require a separate and detailed preliminary engineering/concept feasibility study and also could trigger significant corresponding National Environmental Policy Act (NEPA) efforts.

Future Conditions Overview

Traffic conditions for the Study area were analyzed by applying design and engineering guidelines set by DDOT, the American Association of State Highway and Transportation Officials (AASHTO), the Manual of Uniform Traffic Control Devices (MUTCD), and methodologies from the Highway Capacity Manual (HCM). To be consistent with the latest Metropolitan Washington Council of Governments (MWCOG) regional transportation model, the horizon year of 2035 was selected for the Baseline condition of land use and traffic demand.

Comparisons were made for the 2035 Baseline condition in order to analyze how traffic conditions could be improved with major transportation improvements. Improvement projects were grouped as near-term, mid-term, and long-term (beyond 2035), based on their construction and implementation timeframe.

Based on the evaluation of the Baseline condition, the existing roadway infrastructure as currently configured within the Study area could not handle future traffic demand unless significant capacity improvements are made or new travel patterns emerge. However, the overall system presents several challenges for roadway capacity improvement, including the difficulty of acquiring additional right-of-way and the cost of such improvements. The Study team developed a set of transportation improvements focused on providing a more balanced system that can adequately handle the projected demand for the area's build-out condition. In addition, it is both DDOT's goal and citizen desires that the area become an integral part of an active neighborhood where both transit and non-motorized modes help to create a more livable and sustainable community in which residents, workers, and visitors can walk and bike for basic services and use transit to other destinations. With these objectives in mind, the improvement options focused on:

- Encouraging the use of public transit and non-motorized modes through enhancing and increasing transit, bicycle, and pedestrian facilities within the area;
- Improving vehicular capacity through modest improvements that are feasible for the main corridors in the area;
- Providing a more balanced function for streets in terms of mobility and accessibility within the area with the understanding that all functions cannot be accomplished by a single corridor; and
- Increasing connectivity for all modes within the Study area and to adjacent neighborhoods.

Potential Near-Term Solutions (2013-2016)

The near-term improvements focus on various immediate improvement options that may relieve Study area residents and commuters of current transportation issues and challenges. These actions could be initiated starting next year and implemented by no later than 2016. These solutions would not require the type of environmental review process and project development efforts that are associated with longer-term improvement alternatives, and many of the solutions can implemented with relatively small costs.

The proposed near-term improvements are categorized into several groups: policy updates, TSM / operational and small-scale capital improvements, and sustainability design / LID improvements. Proposed policy updates include: TDM strategies, parking system improvements regulations, transit policies, motor coach and commuter bus staging / parking, freight loading and truck routes, bicycle and pedestrian policies, and sustainable design policies.

Proposed transportation systems management / low-cost operational improvements include: signing and pavement marking improvements, signal timing optimization along M Street, pedestrian and Anacostia Riverwalk Trail connectivity improvements, bicycle network improvements, transit service improvements, and parking modifications.

Sustainability improvements include managing stormwater runoff using low impact development (LID) techniques such as vegetated drainage swales, rain "gardens" (vegetated holding ponds), and/or treatment wetlands. Some of the principal sustainable technologies that hold promise for implementation within the Study area include bioretention, bioslopes, bioswales, vegetated filter strips, and street trees (both with and without tree box filters).

Table ES-2 provides a summary of the proposed near-term projects.

FIGURE ES-1
M Street Study Area and Core Areas Map

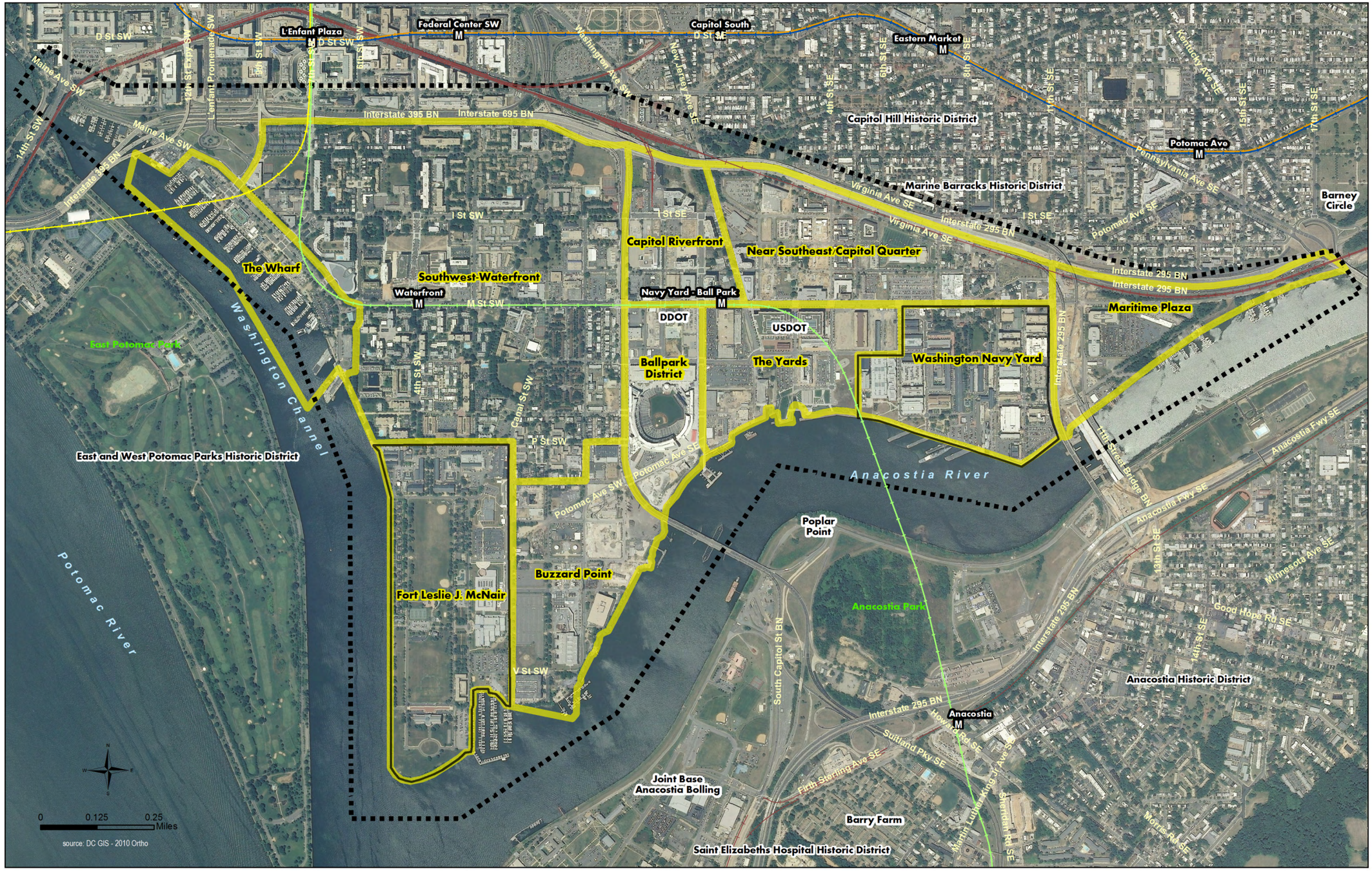


TABLE ES-2
Summary of Potential Near-Term Projects

POLICY UPDATES						
Travel Demand Management (TDM) Strategies	**Parking System Improvements and Parking Regulations**	**Transit Policies**	**Motor Coach and Commuter Bus Staging / Parking**	**Freight Loading and Truck Routes**	**Bicycle and Pedestrian Policies**	**Sustainable Design**
• Form a Transportation Management Association (TMA) to help develop and implement TMPs and serve as an advocacy group to identify sustainable solutions for local area transportation needs • Create position of Area Transportation Coordinator(s) for effectively managing and implementing strategies identified by the TMA • Use commercial office space to enable telework/telecommute options • Implement alternative work schedules strategies such as compressed work week, flexible schedule, and staggered work shifts • Promote car-sharing • Ensure participation in guaranteed ride home to encourage transit use or ride-sharing • Provide resident / employee TDM orientation and education and incentivize the use of use of transit and non-vehicular trips	• Introduce performance-based parking/dynamic pricing to improve efficiency of curbside parking and reduce turnover time for short-term parkers • Implement temporal parking to increase roadway capacity during peak periods • Expand the enforcement powers of traffic control officers • Enhance goDCgo.com to provide real-time information • Increase enforcement of double-parking and rush-hour violations • Extend Residential Parking Permit (RPP) hours • Use technologies to more effectively manage on-street parking • Implement solar-powered parking meters with real-time information and dynamic pricing capability • Improve on-street commercial loading operations through metering, increased enforcement, and better design and placement of loading zones • Encourage shared parking • Monitor and expand performance-based parking districts • Unbundle parking spaces to be rented or sold separately • Use of maximum parking rates • Repurpose on-street parking for bicycle parking • Provide satellite parking locations with transit linkages • Provide transit incentives during event venues to encourage visitors to use transit • Explore congestion pricing methods • Enforce against double parking focusing on truck and motorcoach parking by declaring “double-parking enforcement week”	• Increase transit modes and frequency • Make transit a priority for this community • Identify and improve additional pedestrian access points to transit facilities, particularly the existing Green Line Metro stations: L’Enfant Plaza, Waterfront, and Navy Yard-Ballpark • Improve access to other metro stations adjacent to the Study area such as Federal Triangle, Capitol South, Eastern Market, and Potomac Avenue • Ensure adequate infrastructure/spacing requirements are considered in the Study area to support improved transit services such as car barn, bus staging and lay over areas, dedicated transit lanes, improvements to metro rail stations, etc.	• Maximize off-street parking for motor coaches and commuter buses • Implement/increase fines for parking violations and idling violations, and intensify enforcement • Expand anti-idling educational components and driver recognition program incentives through MWCOG’s regional program • Streamline and standardize regulations/ restrictions within the District’s Commuter Bus Management Plan • Establish an interagency task force consisting of regional transit provides to develop a short-term and long-term service plan • Identify and study the feasibility of candidate locations for intermodal transfer facilities • Coordinate with National Park service and establish a long–term plan for motor coach parking along Maine Avenue • Charge buses for curbside parking via implementation of multi-space “smart” parking meters	• Ensure the use of the current area-wide policy or guidelines for Planned Unit Development (PUD) applications that require rear-side access for freight loading and side-street truck access • Improve on-street loading operations by metering commercial loading-zones • Continue engaging freight and trucking industry to strategize and develop a comprehensive management system for loading zone parameters and usage efficiency	• Continue public service messages and advertisements on safety education and outreach programs to educate transportation facility users • Implement traffic calming measures • Improve traffic control at key intersections within the Study area • Implement the Safe Routes to School program for local schools • Improve area crosswalks • Optimize signal timings • Encourage shifts from single--occupancy vehicles to pedestrian, bicyclist, and transit modes • Install, enhance, and enforce bicycle facilities • Enhance sidewalk connectivity and walkability • Introduce incentives for bicycle commuting • Increase bike racks and provide shower facilities in new developments	• Provide pervious pavers within sidewalks and café spaces • Construct “Green Alleys” by removing gravel, impervious concrete, or asphalt surfaces and replace them with a variety of permeable concrete, asphalt or brick paver materials in areas where the storm sewer and sanitary sewers are separated • Use of extended planting areas with the public space • Standardize street lighting replacement plan and expand incorporating LED technology to reduce energy consumption and increase efficiency • Increase number of street trees along major roadways and reconfigure tree boxes and root zone control

Table ES-2 (cont…)

Summary of Potential Near-Tem Projects

TRANSPORTATION SYSTEM MANAGEMENT / LOW-COST OPERATIONAL IMPROVEMENTS						SUSTAINABILITY IMPROVEMENTS AND LOW-IMPACT DEVELOPMENT
Signing and Pavement Marking Improvements	**Signal Timing Optimization along M Street**	**Pedestrian and Anacostia Riverwalk Trail Connectivity Improvements**	**Bicycle Network Improvements**	**Transit Service Improvements**	**Parking**	
• Unify signage and naming for consistency purposes • Increase the use of rapid flashing beacon signs for safer pedestrian crossings Install speed feedback signs on potential cut-through roadways for traffic calming purposes • Install signs to show cycle tracks (bicycle lanes) and shared-use paths (multi-purpose trails) • Install signs at the intersection approaches to show lane control and turn restrictions • Install way-finding signs (to places of interest and to connect with other intermodal facilities) • Install truck routing signs for all truck trips on Study area arterials • Provide lane usage pavement markings on approaches along major roadways at few key intersections • Implement road diet or “right-sizing” on residential streets by restriping to reduce the number of through travel lanes on a roadway and repurpose it for other uses, such as channelization, pedestrian and bicycle facilities, on-street parking, and/or landscaping • Install pavement markings to indicate Sharrows and promote non-motorized transportation use • Restripe pavement in color and/or install on-pavement speed limit markings for traffic calming purposes • Install school zone pavement markings to ensure Safe Routes to School	• Revise signal timings and offsets • Use new 120-seconds cycle length • Signals - actuated coordinated and optimize splits • Install pedestrian countdown signals • Install priority signal controls for pedestrians and transit vehicles • Expand the use of intelligent transportation systems (ITS) to synchronize traffic signals	• Improve intersection access for people with vision and hearing disabilities by providing audible warnings at intersections and detectable warnings at curb ramps • Install pedestrian countdown walk signals • Provide raised and/or textured pavement for crosswalks, at least near major intermodal facilities • Restripe the crosswalks for better visibility • Provide facilities and amenities for cyclists and pedestrians that include benches, bicycle racks, and well-placed comfort stations • Integrate landscaped trails, particularly for pedestrians and cyclists, into the existing waterfront park access points • Install and/or improve signs for way-finding and connections to other facilities	Improve mobility, safety, and accessibility to activity centers by installing pavement markings, providing lighting, and signs for way-finding	• Increase transit by adding Metro Express Route A9, Route 52, and DC Circulator services • Implement transit traffic signal prioritization • Improve bus stop amenities • Post up-to-date schedules at transit stops • Establish the practice of on-board announcements of bus stop names by the drivers to inform ADA patrons and/or elderly • Provide and promote capabilities to access real-time next bus information • Improve the availability of schedules in buses and at Metrorail stations along route	• Share parking at new waterfront development for its own uses and other destination park activities. • Replace all conventional coin-based parking meters with advanced, solar-powered, multi-space parking meters that can accept credit cards. • Work with the developers of office space to make their weekday parking available to the public on weekends to accommodate special events and weekend visitors to the waterfront • Repurpose on-street parking for bicycle parking • Update goDCgo.com regularly	• Install bioretention cells to remove pollutants and control runoff volume • Install bioslopes to expand the amount of open vegetated areas, improve water quality, and reduce runoff and tendency for erosion • Install bioswales to reduce stormwater runoff through infiltration • Install vegetated filter strips for runoff prevention and runoff treatment, reducing the frequency of discharges and retaining water through infiltration and evapotranspiration • Use of tree canopy for reforestation and rainfall interception to reduce amount of runoff • Use of tree box filters to reduce runoff volume, reduce peak discharge rate, and improve water quality for small, frequently occurring storms. • Minimize the area of soil that is exposed • Mulch/ revegetate exposed areas as quickly as possible after grading

Potential Mid-Term Solutions / Improvement Projects (2015-2021)

Proposed mid-term improvements within the Study area include those out to the year 2021. Three contrasting network alternatives with several transportation elements spread out to different streets within the Study area were considered.

Each of these alternatives was developed around a principal function for the M Street SE/SW corridor that resulted in derived functions for other corridors. General characteristics of the alternatives are described below. More specific details and the evaluation of each alternative in comparison with the Baseline conditions are summarized in Chapter 4.

- **Alternative 1 – M Street "Main Street"**: The main goal for this alternative is to transform the M Street SE/SW corridor from its current condition of serving multi-function transportation modes to a "transit priority" corridor that would prioritize non-automobile transportation and give the corridor a "main street" look and feel. Under this alternative, M Street serves as core premium transit corridor providing east-west connectivity at a mid-point for neighborhoods north and south of M Street. Improvements include:
  - Improved transit connections on M Street with new and enhanced services (streetcar, metro extra, DC Circulator, etc.)
  - Two vehicular lanes each way and one exclusive transit lane per direction for premium transit services (outer lanes)
  - Focus on increased connectivity and utilization of parallel streets to better facilitate vehicular and bicycle flows
- **Alternative 2 – "Balanced Links":** The main goal in this alternative is to achieve a more balanced transit network with wider coverage of the entire area. The alternatives would allocate new transit services to parallel corridors while creating new bicycle facilities on M Street SE/SW. The following improvements are included in this alternative:
  - Pedestrian and cyclist improvements on M Street SE/SW
  - On-street parking on M Street SE/SW
  - Transit concentrated on parallel roads
  - Streetcar on I (Eye) Street (east of 4th Street SW)
  - DC Circulator on Tingey Street / N Street SE and N Street / P Street SW
  - Focus on increased connectivity / multimodal aspects
- **Alternative 3 – M Street "Mobility Arterial"**: The main goal of this alternative is to keep the M Street SE/SW corridor as the main vehicular activity corridor with less emphasis on alternative modes and allowing as many vehicles as possible to use the corridor by implementing modest operational improvements (parking restrictions, signal optimization, and lane channelization) to maximize vehicular throughputs during peak hours. Main elements in this alternative include:
  - Parking restrictions and lane configuration changes to maintain three lanes in each direction on Maine Avenue and M Street SE/SW during peak hours
  - Signal optimization on M Street SE/SW
  - Shared lane for streetcar and transit (outer lanes)
  - Improved pedestrian safety and transit on M Street
  - Aggressive traffic calming on parallel streets to discourage drivers short-cutting through the network
  - Focus on improved vehicular throughput

A summary of what each alternative achieves and the associated trade-offs involved in balancing multimodal demands and the resulting impact on system-wide performance is presented in **Table ES-3**.

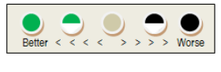
TABLE ES-3
Summary of Mid-Term Projects Impacts and Trade-Offs

Multimodal Alternative	What does this Alternative Achieve?	What are the Trade-Offs?
Multimodal Alternative 1	• Improved transit service and reliability on M Street (streetcar, metro extra, serviced Circulator, etc.) • Expanded sidewalks in several locations and improved boarding/alighting areas with shelters • Bike lanes/facility improvements via increased connectivity/utilization of parallel streets to better facilitate flows	• No on-street parking for most of M Street/Maine Avenue Corridor; could potentially impact retail along M Street/Maine Avenue corridor • No exclusive-lane bike facilities on M Street • Two vehicular travel lanes in each direction along M Street; potential for spill-over to parallel facilities and neighborhood streets leading to traffic calming issues • On-street parking on some parallel facilities may be replaced by travel lanes or bike lanes • Potential right-turn restrictions at a few intersections along M Street will reduce access options to certain developments
Multimodal Alternative 2	• Increased focus on multimodal use of the major corridors like M Street and South Capitol Street • Pedestrian and cyclist improvements on M Street • On-street parking on portions of M Street and Maine Avenue; improves access to retail developments • New transit service concentrated on streets closer to residential neighborhoods	• Premium transit (streetcar, express bus, etc.) could not operate on exclusive lanes on M Street, resulting in longer travel times • Potential issues with the design of streetcar path due to additional turns • On-street parking on some parallel facilities may be replaced by travel lanes or bike lanes • Longer walking distances to access streetcar on I Street for developments south of M Street • Potential impacts to residential nature of some portions of I Street, especially along narrower street segments
Multimodal Alternative 3	• Optimizes major roadways/intersections to reduce vehicular delays and congestion • Provides improved transit services along M Street with more types of transit service without losing the vehicular capacity • Provides traffic calming on some parallel streets through neighborhoods	• Premium transit (streetcar, express bus, etc.) operate on shared lanes, resulting in longer travel times • No on-street parking for most of M Street/Maine Avenue Corridor • No exclusive-lane bike facilities on M Street

Each alternative was compared against criteria developed through public involvement. The summary of the alternative evaluation is presented in **Table ES-4**. The evaluation of each alternative was based on quantitative measures, such as user delay, travel times, capacity/demand ratios, as well as qualitative factors such as convenience of on-street parking or land use-transportation linkage.

TABLE ES-4
Alternatives Performance Evaluation Matrix

CRITERIA	DESCRIPTION	2035 FUTURE SCENARIOS				REASONS
		Baseline	Alt-1	Alt-2	Alt-3	
COMMUNITY	Promote walkable, safe pedestrian infrastructure					* In Alt 2, I (Eye) Street focus on vehicular capacity as well as streetcar use. Higher traffic volumes and streetcar operation will slightly reduce pedestrian safety on the I (Eye) Street corridor. In addition, in Alt 1 and Alt 3, pedestrian facilities along M Street would be improved at transit stops to include expanded sidewalks and shelters
	Provide multimodal access to and mobility within neighborhoods					* Although Alt 2 does provide multimodal access, mobility is sacrificed along M Street (too much vehicle capacity reduction hinders travel time and mobility)
	Create diverse and balanced transportation options					* Alt 2 blends the most modes along M Street and I (Eye) Street * Alt 1 has best transit along M Street but forces bikes to I (Eye) Street * Alt 3 is mostly focused on vehicular capacity, shared bike lanes on M Street not preferrable
	Promote sustainable community and infrastructure					* Alt 3's focus on vehicular capacity is least sustainable of all three multimodal alternatives; however, still better than Baseline because of DC Streetcar along M Street
	Protect residential parking					* All three alternatives will result in some loss of residential parking, although Alt 3 focuses the restrictions on M Street, while Alts 1 and 2 will reduce parking on I (Eye) Street which will have a more significant effect on residential parking
CONNECTIONS	Establish and/or Improve pedestrian connectivity to/within communities and to Metro stations					All alternatives would provide additional pedestian connectivity as a result of the construction of new road segments to connect gaps in the grid system and the conversion of one-way road segments to two-way road segments
	Create bicycle lane / cycle tracks connectivity					* Alt 2 is clear cut winner here with cycle track on M Street and shared bike lane on I (Eye) Street * Alt 3 still provides exclusive bike lane on I (Eye) Street, and shared bike lane on M Street * Alt 1 has no bike facilities on M Street, and shared bike lane on I (Eye) Street
	Enhance transit connectivity (including inter-neighborhood connectivity and reduction of transfers)					* Although all alternatives have DC Streetcar, Alt 2 includes expanded DC Circulator to southwest part of the Study area
	Provide flexibility for managing parking demand					* Alt 2 provides for most on-street parking along M Street
	Promote shared parking					* Shared parking strategies assumed for all the alternatives
	Optimize freeway connections (provide for all movements at freeway interchanges where feasible)					* Alt 3 has most vehicular capacity on EB approach to M Street at 11th Street intersection
	Close gaps in missing street connections					* All three alternatives have same road connection projects that are not assumed in Baseline
CAPACITY	Provide transit capacity					* Alt 1 provides most transit capacity along M Street with exclusive lane, transit signal priority, bus stop consolidation, and lowest transit travel time * Alt 2 and Alt 3 still provide DC Streetcar through the Study area. Although Alt 2 has lower transit travel time on M Street, it does provide DC Circulator expanded service
	Address regional vehicular capacity needs					* Alt 3 provides for the most vehicular capacity along M Street by eliminating on-street parking, providing full 6-lane section, and optimizing signal timings * Alt 1 reduces M Street to 4 lanes, but restricts right turns at some locations and provides transitional right-turn lane at key locations * Alt 2 provides least vehicular capacity of the three multimodal alternatives because of lack of right-turn lanes, however, still operates better than Baseline due to optimized signal conditions
	Shift mode split from vehicular to transit and nonmotorized modes to accommodate increased density					* Alt 1 provides most transit capacity along M Street, which would cause highest shift to transit mode share * Although Alt 2 would provide the most benefit to bike mode, transit mode with streetcar along I (Eye) Street is further away from the most dense populated area * Alt 3 still provides for streetcar and shared bike lane along M Street, and exclusive bike lanes on I (Eye) Street * Baseline has least transit compared to any alternative
	Promote efficient/safe movement of people and goods to support new retail, restaurants, etc. (incl. Freight/Motor Coach staging areas)					* Alt 2 on-street parking along M Street is the most preferable * Alt 1 and 3 with DC Streetcar along M Street provides advantage over Baseline
	Balance parking supply between landuse demands					* Alt 2 provides for most on-street parking along M Street * Alt 3 restricts the most parking
	Establish context-sensitive locations for commuter bus and other transit staging areas					* Alt 1 consolidates bus stops along M Street for efficiency * Alt 2 provides improved bus stops along M Street compared to Alt 3 and streetcar stops along I (Eye) Street



Each of the alternatives was also vetted by a number of citizens and stakeholders who provided comments and preferences on the various alternatives. Surprisingly, the input provided was broadly split amongst the three multimodal alternatives, with no clear "winner" rising to the top as the preferred choice by the public. A number of respondents indicated a preference for certain elements of two or more alternatives that would be considered more favorable if combined together to form a "hybrid" option. For instance, one comment might recommend moving forward with Alternative 1 but consider a revised concept to include a cycle track along M Street west of South Capitol Street or preservation of the bike lanes on I (Eye) Street. At the same time, other feedback included different combinations, such providing on-street parking as an additional element to Alternative 3 within the specific segments of M Street and Maine Avenue. There were also concerns about M Street/South Capitol Street being brought to grade because of the impact on vehicular congestion and the challenges of the pedestrian crossing distance.

The original intent of this study was to compare and evaluate three contrasting multimodal alternatives in order to determine what major improvement elements could best accommodate the future demands on the transportation system, while at the same time satisfy the most number of evaluation criteria. None of the three alternatives in and of themselves was considered as a candidate to become the "final alternative" that would then be assessed for environmental impacts and pushed forward for design and construction, pending satisfactory compliance with NEPA. However, the results of this study are intended to inform and guide the formal Project Scoping process as the project progresses from preliminary transportation planning to detailed alternatives development and preliminary design engineering. Thus, one outcome from this study was a more informed understanding of the advantages and disadvantages associated with any particular major element of the alternatives in order to next develop/analyze potential "hybrid" alternatives that are feasible, sustainable, flexible, complete streets compliant, and most importantly account for public input.

Long-Term Improvements (2020-2040 and Beyond)

These long-term improvement options focus on potential new connections to complete the street grid within the Study area if future development beyond 2035 (the analysis horizon year) were to occur in areas currently not available. The street network presents several gaps of connectivity that create significant challenges to improve the transportation experience in the area. The nature of these types of improvements is such that they may depend on, or are related to, additional redevelopment or separate transportation project development studies. A summary of the improvements is shown in **Table ES-5**.

- **Buzzard Point Redevelopment / Transportation Network Improvements**: The Buzzard Point development plans include high-density, mixed-use or office space, potentially including:
  - Three blocks between 1st and 2nd Streets, SW,
  - Areas north and east of the Ackridge site,
  - between S and Q Streets, SW, and
  - 1st Street SW and South Capitol Street,

  Additionally, the US Coast Guard headquarters would be relocated from Buzzard Point in 2013, opening up that site for potential redevelopment, and will also reopen 1st and 2nd Streets SW to the Anacostia waterfront. These figures would represent an increase of roughly 135 percent in population and 350 percent in employment between 2020 and 2035.

  Additional long-term transportation improvements would need to consider the following:
  - Extension of north-south transit connectivity
  - Potential site locations for a DC Streetcar car barn
  - Relocation of the existing Buzzard Point motor coach and commuter bus parking lot to a satellite lot location
  - Enhancements to the portion of the Anacostia Riverwalk Trail running along Fort McNair
  - Coordination of on-street parking options, including performance parking
  - Allocation of adequate space and capacity for new Capital Bikeshare stations
  - Potential localized shuttle service (unsubsidized /non-public service) to connect the south half of Buzzard Point with the nearest Metrorail stations
- **East-West Connectivity Improvements:** the Study area is characterized by a noticeable gap in east-west connectivity. Although M Street is the only existing continuous roadway along the east-west axis, several corridors may offer the potential to supplement and balance out the future demands among all modes. In addition to future I (Eye) Street connection improvements in the near term and long term, other street connections that may be considered include L Street SW and K Street SW, and would require the following:
  - K Street SW – Conversion of existing open space at Lansburgh Park to a bicycle boulevard or local street with connecting sidewalks. Would require compliance with NEPA and Section 4(f).
  - L Street SW - Conversion of publicly owned land from existing surface parking to a bicycle boulevard or local street with connecting sidewalks. Would require partial or full demolition of two structures, and would require compliance with NEPA and Section 4(f).
  - Reconnection of N and O Streets SW for all modes via removal of existing facilities and cul-de-sacs, or reconnection of N and O Streets for pedestrians and bicycles only.
  - Bicycle and pedestrian connections on edges of Study area network
- **MetroRail Station Capacity Improvements:** Changes in population and level of activity within the Study area will drive up demand for Metrorail use, which will require capacity enhancements along the current Green Line stations (especially y Waterfront). Capacity enhancements could include:
  - Platform extensions and expansion of escalator access
  - Additional access portals that tie directly into adjacent parcels.
- **MetroRail Yellow Line Improvements:** There are several potential improvements for expanding service along the Yellow line within the Study area, including the following:
  - The interlining of the Yellow Line and the Green Line south of the L'Enfant Plaza station. This would allow the Yellow Line to split east of the Potomac River crossing and to extend through Waterfront station and Navy Yard-Ballpark station toward Anacostia, providing direct access to Northern Virginia.
  - Separating the Yellow and Green Lines by relocating the Yellow to an offset parallel alignment east of its current configuration, beneath either 2nd Street SW/NW or 2nd Street SE/NE. The 2nd Street SW/NW alignment would not entail new stations, but would run through an expanded Waterfront station. The 2nd Street SE/NE alignment would traverse beneath Eye Street SE/SW and could entail two new stations; one located close to 3rd Street SW and one located east of South Capitol Street.
- **Commuter Rail Enhancements:** Regional rail enhancements could provide additional capacity and service within the Study area, especially at L'Enfant Plaza. VRE and MARC are both exploring future long-term improvements within the District, including:
  - Increasing the frequency and extent of service
  - Potential interstate transit line expansions via extensions on each respective service's rail lines.

Improvements to the regional service would provide relief for the projected capacity demands on the Metro Rail system within the metropolitan area. These types of potential long-term improvements could allow the Green Line or the Yellow Line to better serve the localized transit demand in the urban core and within the Study area.

- **Multimodal Transfer Centers**: A permanent solution for motor coach and commuter bus parking that addresses the concerns raised about on-street parking throughout portions of the Study area is needed; future plans for much of the waterfront areas will likely draw substantial tourism.

  Potential solutions centered primarily on consideration of new transit "hubs" that focused on providing for long-term parking or staging, and connecting tourists and/or commuters with other transit modes. In coordination with other ongoing studies being explored by DDOT, the idea of "air-rights" multimodal transfer centers were considered in select areas along the Study area border, specifically:

  – Over the top of I-395 Southwest Freeway, situated somewhere between L'Enfant Plaza and 4th Street SW (occupying a portion, but not all, of this proposed segment).

  – Over top of the decommissioned portion of I-695 Southeast Freeway, just east of 11th Street Bridges. Depending on the ultimate configuration of the proposed Southeast Boulevard that will be reconstructed in place of this obsolete freeway segment, a potential facility may also be considered below the future roadway because the existing facility is at a significantly lower grade than the surrounding land.

  Both of these options would entail substantial costs and require a series of comprehensive engineering analyses, cost-benefit studies, and NEPA studies, as well as significant agency coordination and public involvement.

  Other options could entail a potential partnership with the current owners of the parking lots adjacent to RFK Stadium to develop a future facility with multimodal connections near the stadium. This option would be less costly but would be complicated by the logistics of a public-private partnership, by any potential plans to convert the existing stadium/supporting lots to a completely new land use, and by the longer distance from the Study area and urban core of the District.

TABLE ES-5
Summary of Potential Long-Term Strategic Options

Long-Term Improvement Strategic Option	Location(s)	Possible Implementation
Buzzard Point Transportation Network Improvements	1st St SW, 2nd St SW, Half St SW, Potomac Avenue SW between P St SW and V St SW	2020-2025
East-west Connectivity Improvements	L St / K St SW between Half St SW and Delaware Avenue	2020-2040
MetroRail Station Capacity Improvements	Waterfront and Navy Yard-Ballpark Stations	2020-2040
MetroRail Yellow Line Improvements	Interlining along Green Line or separate alignment beneath 2nd Street SW/NW or SE/NE	2020-2040
Commuter Rail Enhancements	Virginia Rail Express or MARC train alignments through the District	2020-2040
Multimodal Transfer Centers	I-395 west of 4th St SW, I-695 east of 11th St SE, or RFK Stadium Lots	2025-2040

Some of the options would require a separate and detailed preliminary engineering/concept feasibility study and also could trigger significant corresponding National Environmental Policy Act (NEPA) efforts.

Analysis of Event and Stadium Traffic

In order to better understand the context of short-term and long-term effects of event traffic within the study area, a follow-on study is being initiated by DDOT that will identify issues and potential mitigation strategies related to events such as baseball games at Nationals Stadium or performances at Arena Stage. In addition, several potential venues within the study area are in the early stages of the planning process, including a 15,000 seat soccer stadium on Buzzard's Point, a 2,000+ seat movie theater east of Nationals Stadium, and a 6,000 seat concert hall at The Wharf. The purpose of the Special Events Transportation Analysis is to: 1) consider current and future transportation conditions associated with special events and stadium traffic in the study area; 2) review plans for the proposed new event facilities and estimate corresponding future traffic demands (vehicular, pedestrian, bicycle, transit) to determine potential impacts to the transportation system; and 3) develop strategies and solutions for improving conditions on the transportation network, including modifications to existing traffic management plans, to mitigate the impacts of event traffic within the M Street SE-SW study area. The study will be performed in 2013 and will update/build upon the two previous versions of the Traffic Operations and Parking Plan for the Washington Nationals Ballpark.

Implementation and Future Outlook

Based on the evaluation of existing and future transportation network and infrastructure, the Study has identified several near-term, long-term, and strategic long-term projects to cater to the multimodal needs of the Study area. **Table ES-6** presents a feasible timeline for implementing the projects within the Study area.

TABLE ES-6
Project Implementation and Next Steps Timeline

Year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Tasks																												
Secure Funding for Near-Term Projects																												
Design and Construct Near-Term Projects																												
Coordinate Mid-Term Projects																												
Secure Funding for Mid-Term Projects																												
Conduct Environmental Assessments (NEPA) and Design on Mid-Term Projects																												
Construct Mid-Term Multimodal Projects																												
Secure Funding for Long-Term Projects																												
Long-Term Improvement Strategic Option - Buzzard Point Transportation Network Projects																												
Long-Term Improvement Strategic Option - East-west Connectivity Projects																												
Long-Term Improvement Strategic Option - Multi-modal Transfer Centers																												

FINAL Report

M Street / Southeast-Southwest Transportation Planning Study

Prepared for:

District Department of Transportation

December, 2012

Prepared by:

CH2MHILL

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Acronyms and Abbreviations

AASHTO	American Association of State Highway and Transportation Officials
ADA	Americans with Disabilities Act
ADT	average daily trips
ANC	Area Neighborhood Commission
ATC	Area Transportation Coordinator
AWI	Anacostia Waterfront Initiative
AWSC	all-way stop-controlled
BID	Business Improvement District
BLOS	bicycle level of service
BRT	Bus Rapid Transit
CLRP	Constrained Long-Range Transportation Plan
COM	Component Object Model
DDOE	District Department of Environment
DDOH	District Department of Health
DDOT	District Department of Transportation
EIS	Environmental Impact Statement
GIS	Geographic Information Systems
GP	general purpose vehicle
GSA	General Services Administration
HCM	*Highway Capacity Manual*
ITS	Intelligent Transportation Systems
LCT	Loudoun County Transit
LID	low impact development
LOS	level of service
M	million
MMLOS	multimodal level of service
MOE	measures of effectiveness
mph	miles per hour
MPO	Metropolitan Planning Organization
MTA	Maryland Transit Administration
MUTCD	Manual of Uniform Traffic Control Devices
MWATA	Washington Metropolitan Area Transit Authority
MWCOG	Metropolitan Washington Council of Governments
NCHRP	National Cooperative Highway Research Program
NEPA	National Environmental Policy ActNVRC Northern Virginia Regional Commission
O-D	origin-destination
PPSA	DDOT's Planning, Policy and Sustainability Administration
PRTC	Potomac and Rappahannock Transit Commission
PSA	public service announcement
PUD	planned unit development
ROW	right of way
RPP	Residential Parking Permit
SE	Southeast
SF	square feet
Study	M Street / Southeast-Southwest Transportation Planning Study
SW	Southwest
TAZ	Traffic Analysis Zone
TDM	Travel Demand Management
TIP	Transportation Improvement Program
TIS	Traffic/Transportation Impact Study
TMA	Transportation Management Association
TMC	Turning Movement Counts
TMP	Transportation Management Plan
TPB	Transportation Planning Board
TSM	Transportation Systems Management
TSP	transit signal priority
TWSC	two-way stop-controlled
USDOT	United States Department of Transportation
vph	vehicles per hour

Chapter 1
INTRODUCTION

1. Introduction

The District Department of Transportation (DDOT) has undertaken the M Street / Southeast-Southwest Transportation Planning Study (Study) to prepare for the substantial new growth along M Street and in the Southeast /Southwest waterfront area. At build-out, the overall Study area of 1.7 square–mile will have an additional 36 million (M) square feet (SF) of development spread within a 0.78-square–mile subarea, with an anticipated land-use breakdown as follows:

- Office – 16.5 M SF, which translates to 100,000 employees
- Residential – 9,000 units, which translates to 16,000 residents (up to 17.2 M SF)
- Retail/Restaurant – 1 M SF
- Hotel – proposed up to 1,500 rooms (up to 1.3 M SF)

To date, approximately 28 percent of that development has already occurred. For comparison purposes, the NoMa redevelopment area (between New York and Massachusetts Avenues Northeast) has a build-out potential of 32 M SF of mixed-use and transit-oriented development in an area of 0.40-square–mile.

The Southeast/Southwest waterfronts, including the Capitol Riverfront area, will be an integral part of an active and sustainable neighborhood where residents can walk for basic services and utilize transit to other destinations. The premise is to redevelop, reinvent, and reconnect this area by better integrating it with the surrounding neighborhoods and improving multimodal travel and public realm within the Study area.

The purpose of the M Street / Southeast-Southwest Transportation Planning Study is to consider current transportation conditions; review the planned future land uses and developments within the Study area; forecast vehicle, pedestrian, bicycle, and transit demand; and develop transportation solutions for the existing and future transportation demand.

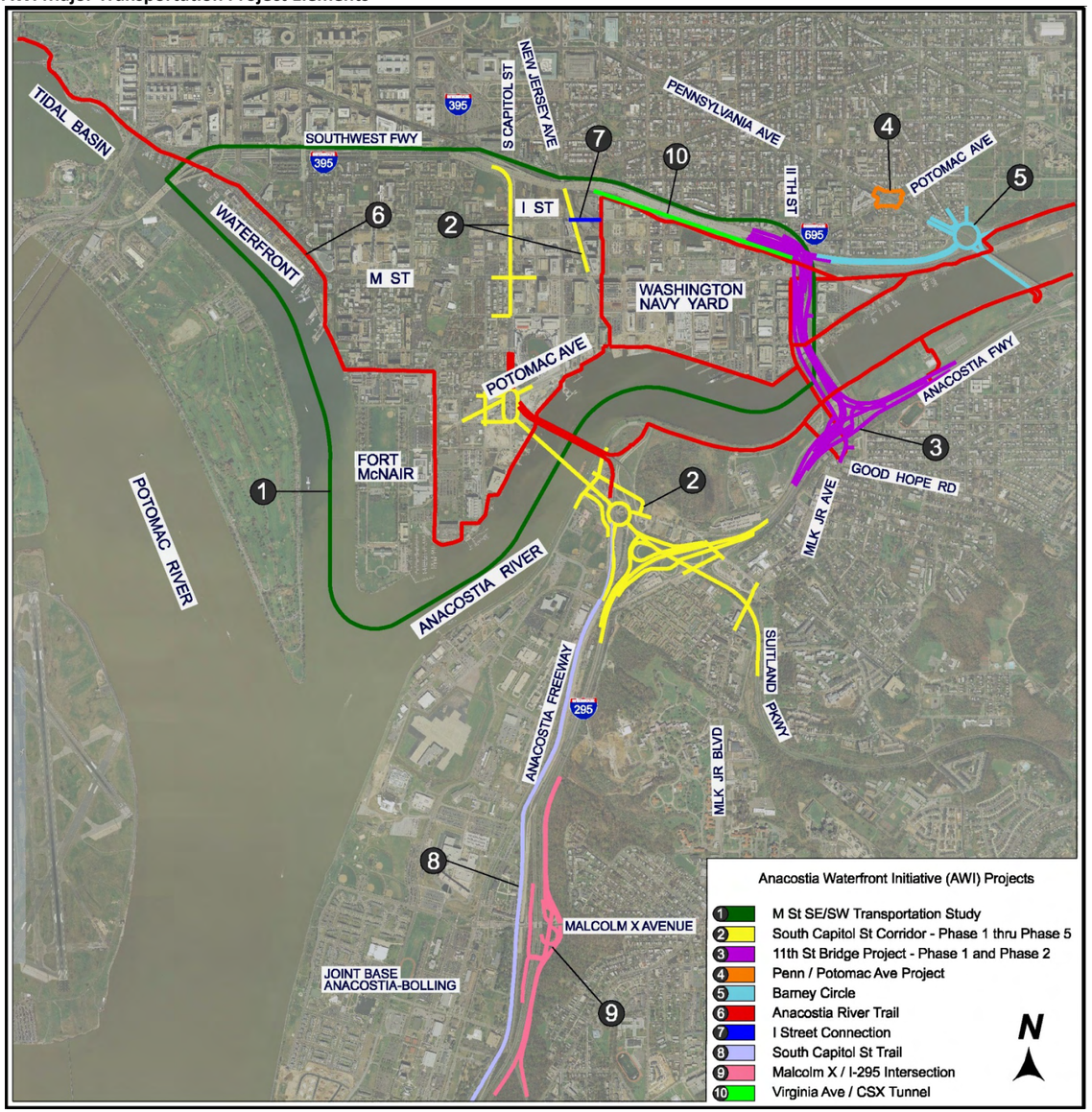
1.1 The Anacostia Waterfront Initiative Overview

In March 2000, federal and District agencies signed an agreement forming the Anacostia Waterfront Initiative (AWI), a 30-year, $10 billion program to transform the areas along the Anacostia River and Washington Channel into a revitalized and world-class urban waterfront. Led by the District of Columbia government and embraced by 19 regional and federal agency partners, the AWI area straddles the Anacostia River and weaves through District Wards 5, 6, 7 and 8, stretching from the Tidal Basin to the District's northeast border with Maryland.

As a supporting sub-element of the AWI, the Anacostia Waterfront Transportation Master Plan describes how DDOT is involved in building the AWI Vision presented in the AWI Framework Plan. The Transportation Master Plan outlines the planning, design, and construction of an improved transportation infrastructure that will support a transformed Anacostia waterfront. A host of DDOT infrastructure projects within the Transportation Master Plan will serve as the spine upon which this renaissance takes hold and thrives. By providing better mobility for walkers, cyclists, transit riders, and drivers, these projects will reconnect communities within the Study area and on both sides of the river. The findings of the M Street / Southeast-Southwest Transportation Study are an integral part of this plan, specifically the long-term improvements associated with the proposed DC Streetcar and future roadway network configurations. Major project elements of the Transportation Master Plan, as shown in **Figure 1-1**, include:

- South Capitol Street Corridor, including the Frederick Douglass Bridge
- Anacostia Riverwalk Trail
- Parkside Pedestrian Bridge
- 11th Street Bridges Project
- Pennsylvania Avenue / Potomac Avenue reconfiguration
- South Capitol Street Trail
- Barney Circle reconfiguration
- Southeast Boulevard (conversion of obsolete I-295/695 east of 11th Street to a local roadway)
- Virginia Avenue / CSX Tunnel reconfiguration

FIGURE 1-1
AWI Major Transportation Project Elements



1.2 M Street / Southeast-Southwest Transportation Planning Study Overview

As a subset of the broader area included under the AWI Plan, the area under study for this transportation planning effort includes the Southeast and Southwest waterfronts from the DC Interstate system south to the confluence of the Anacostia River and the Washington Channel. The Study area is set within the northwest portion of the AWI Plan area and is bounded by the following:

- I-395 and I-695 (known jointly as the Southeast-Southwest Freeway) to the north;
- 12th Street SW and the Washington Channel to the west;
- 12th Street SE and the 11th Street Bridges to the east;
- Anacostia River to the southeast.

M Street SE/SW and Maine Avenue serve as the central east-west axis and South Capitol Street functions as the north-south spine for the Study area.

This report presents the results of the analysis performed for the Study, which focused on three major themes: community, connections, and capacity. Within each of these themes, a number of criteria were developed that served as the framework for evaluating the effectiveness of potential solutions, as discussed later in this chapter and other chapters of the report. The overall Study area lies within a roughly 1.7-square-mile area along the M Street SE/SW corridor, and the Southwest waterfront from 12th Street SE to 14th Street SW, and from the Southwest/Southeast Freeway south to the Anacostia River/Washington Channel, as shown in **Figure 1-2** on the next page.

The purpose of the Study is to consider current and future transportation conditions, review the planned future land uses, and develop solutions for the transportation network in order to promote livable communities and encourage reinvestment in properties within the Study area. Significant issues in the Study area are related to pedestrian and bicycle safety, multimodal mobility, and the quality of local connections to the regional transportation infrastructure. The Study addresses near-term conditions (2012-2015), potential long-term improvements (2015-2020), and conditions/solutions beyond the full build-out for new development (2020-2035).

The Study has focused on understanding the principal transportation issues derived from future growth as well as changes in trip patterns resulting from roadway improvements already planned for the area. The Study team evaluated operations for all transportation modes during the AM and PM peak hours, assuming typical day activity. Given that most of the planned development will be in place by 2020, the analysis year was derived by considering build-out conditions plus 15 years beyond the opening year – yielding an analysis year of 2035. The following chapters summarize the main findings regarding policy and operational issues, as well as challenges that the transportation system will experience with and without additional improvements (roadways, transit, pedestrian and bicycle facilities) to handle the expected demand by 2035. The Study includes an assessment of a Baseline condition (no improvements beyond the projects already in DDOT's Long-Range Plan), as well as three contrasting alternatives for improvements within the Study area.

1.3 Study Goals and Objectives

One of the Study's main goals was to understand and proactively plan for the multimodal transportation impacts within the Study area that will result from the future anticipated development. This goal is built upon several objectives:

- Improve safety, mobility, and access for all modes
- Improve local connections to the regional transportation system
- Support public and private development

Outcomes for the Study, based on an analysis of future Baseline conditions and improvement alternatives, include the following:

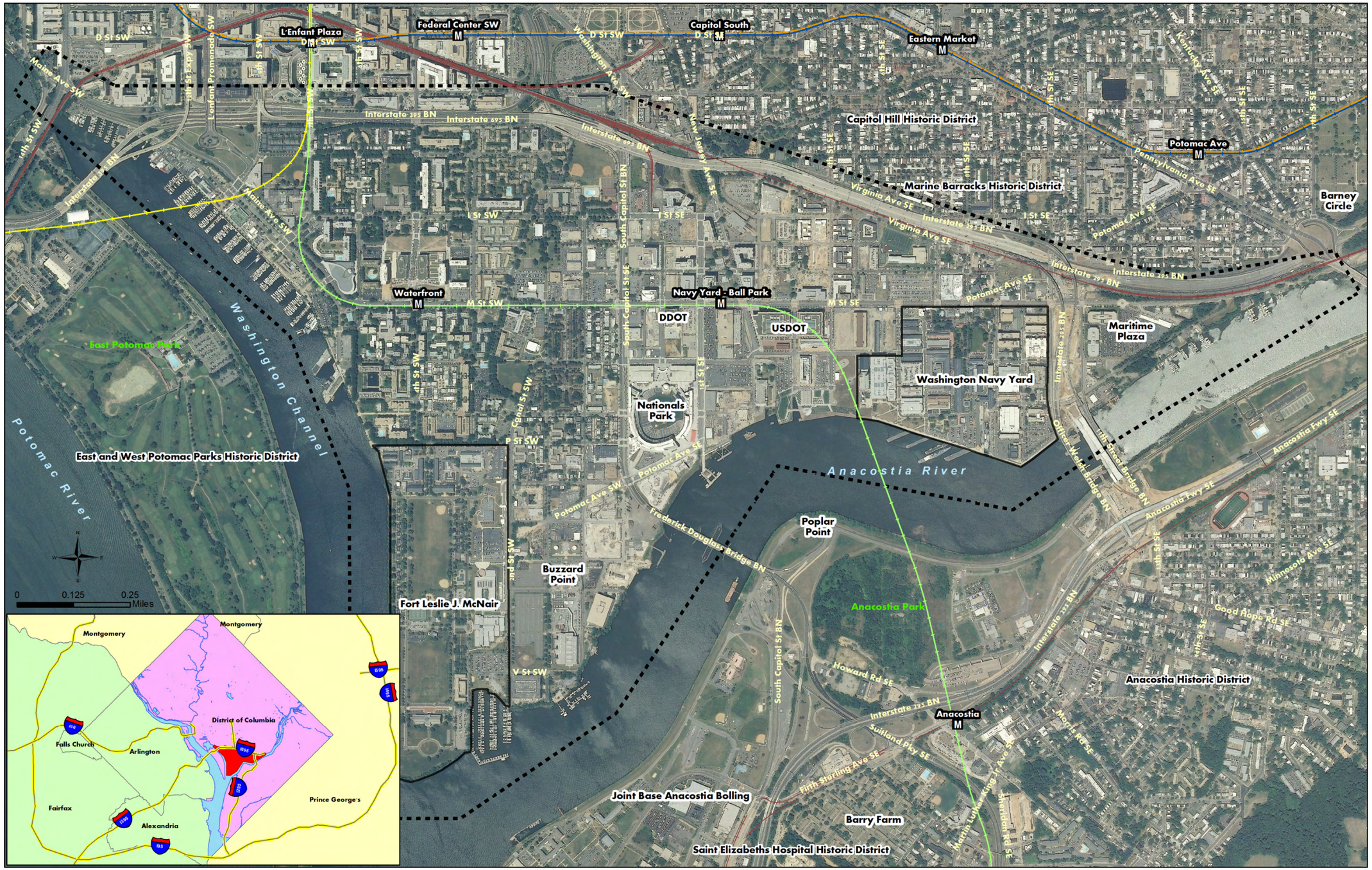
- Identification of future traffic impacts
- Mitigation strategies
  - Parking strategies
  - Bicycle/pedestrian facility plans
  - Transit service improvements
  - Travel Demand Management strategies
  - Signal prioritization options
  - Lane channelization / intersection configuration changes
- Localized physical improvements
  - New street connections
  - Reconfiguration of street cross sections and function

Each alternative was compared against criteria developed through public involvement, as shown in **Table 1-1**.

TABLE 1-1
Goals and Objectives of the M Street / SE-SW Transportation Planning Study

CRITERIA	DESCRIPTION
COMMUNITY	Promote walkable, safe pedestrian infrastructure
	Provide multimodal access to and mobility within neighborhoods
	Create diverse and balanced transportation options
	Promote sustainable community & infrastructure
	Protect residential parking
CONNECTIONS	Establish and/or Improve pedestrian connectivity to/within communities and to Metro Stations
	Create bicycle lane / cycle tracks connectivity
	Enhance transit connectivity (including inter-neighborhood connectivity and reduction of transfers)
	Provide flexibility for managing parking demand
	Promote shared parking
	Optimize freeway connections (provide for all movements at freeway interchanges where feasible)
	Close gaps in missing street connections
CAPACITY	Provide transit capacity
	Address regional capacity needs
	Shift mode split from vehicular to transit and nonmotorized modes to accommodate increased density
	Promote efficient/safe movement of people & goods to support new retail, restaurants, etc. (incl. Freight/Motor Coach staging areas)
	Balance parking supply between land use demands
	Establish context-sensitive locations for commuter bus and other transit staging areas

FIGURE 1-2
Regional View and Study Area Map



1.4 Methodology and Analysis

The Study methodology entailed a multi-step process (shown in **Figure 1-3**) that begins with consideration of future land use and travel demand forecasting. The proposed land-use type and density within the Study area and surrounding region were input into a travel demand forecast model. The model used in this Study was the Metropolitan Washington Council of Governments (MWCOG) Travel Demand Forecast Model, Version 2.2, Round 8.0 Cooperative Land Use forecast data. The software platform used for the MWCOG model is the CUBE modeling software package. The travel demand forecast model was then run for a baseline future condition and three contrasting transportation improvement alternatives in order to generate the following four steps:

- Trip Generation (how many trips)
- Trip Distribution (from what origin to what destination)
- Mode Choice (what means of travel - automobile, transit, bike, walk)
- Trip Assignment (what streets, roadways, or transit lines are used to complete the trip)

Once initial daily traffic assignments were forecast, the demand volumes were input into a post-processing model, which was used to refine the forecast data from a regional level to a more localized area-specific trip forecast. Post-processing entailed comparing differences in roadway segment volumes or intersection volumes between Baseline conditions (no project-related improvements) and existing conditions from one location to the next to "smooth out" volume differences that may be seen in the forecast data due to a localized traffic impedances or due to impacts of traffic generator within a mid-block location. Peak hour traffic volumes for the AM and PM peaks were generated using data collected in the field and from information provided in the MWCOG model.

Following the post-processing step, mesoscopic modeling (intermediate step modeling) was performed to arrive at localized origin-destination (O-D) estimation, to further refine traffic assignment for intersection turning movements, and to perform transit planning and scenario testing. The planning model used in this step was VISUM.

The last steps in the process entailed use of detailed modeling or microscopic modeling to assess operational performance of a network or transportation system element. A number of tools may be used to perform this type of analysis, including SYNCHRO (traffic capacity analysis software), VISSIM (multimodal traffic simulation software), and (MMLOS) MultiModal Level of Service Analysis models for urban streets. For this Study, all three analysis models were used in a coordinated fashion to achieve the most comprehensive understanding of operational performance across multiple modes. SYNCHRO was used to optimize signal timings across various modes for future scenarios, and then the output was utilized as input to the VISSIM models that were created for each alternative evaluated. Finally, simulation output from VISSIM was used as input to the MMLOS Analysis. Models used for the analysis include the Urban Street methods contained in the 2010 *Highway Capacity Manual* (HCM) for the auto and transit modes, and models developed using data from the National Cooperative Highway Research Program (NCHRP) publication 3-70, *Multimodal Level of Service Analysis,* for the pedestrian and bicycle modes. Details on the methodology and analysis for MMLOS are included in the **Appendix G**.

The factors influencing bicycle level of service (LOS) are:

- Number of travel lanes
- Speed limit
- Presence of bicycle lanes
- Number of conflicts from unsignalized intersections on the segment in question

FIGURE 1-3
Demand Estimation and Methodology

The primary contributors to pedestrian LOS are:

- Vehicular volume, vehicles per hour (vph)
- Vehicular speed limit
- Number of through lanes for vehicle traffic
- Sidewalk width

The factors found to most influence transit LOS are:

- Pedestrian LOS
- Transit frequency (buses/hour)
- Passenger load weighting factor
- Average speed of bus over segment
- Average trip length
- Proportion of stops with benches
- Proportion of stops with shelters

Far fewer variables influence auto LOS given the "bubble" that auto drivers experience in the comfort of their own vehicles. The primary influences on auto LOS are:

- Average through vehicle speed
- Number of stops per mile
- Presence of left-turning lanes at signalized intersections

1.5 Public Involvement and Agency Coordination Overview

Throughout the various phases of the Study, DDOT has engaged the public and stakeholder agencies to provide updates on the status of the analysis and to solicit their input to inform the next steps of the Study. DDOT worked

with a Technical Committee and an Advisory Committee that were formed for this project. The Technical Committee is made up of technical staff leads from DDOT and from other District agencies, while the Advisory Committee included community leaders, local stakeholders, and Area Neighborhood Commission (ANC) representatives. The alternatives development process and subsequent assessment of alternatives were shaped and refined by the Technical Committee while incorporating input from Advisory Committee. Meetings with these groups occurred a few weeks before each public involvement meeting.

Three public involvement meetings were held during the course of the Study at key milestones, shown in **Table 1-2**. All three meetings included an open-house format at the beginning, followed by a formal presentation, then a follow-up open-house for additional discussion. The first and third meetings incorporated a question-and-answer session following the presentation. All three meetings generated substantial public input via written comments and e-mails.

TABLE 1-2
Public Involvement during the M / Street SE-SW Transportation Planning Study

Meeting	Date	Location	Attendees	Project Milestone
Public Meeting 1	January 12, 2012	Westminster Presbyterian Church	91	Project Initiation
Public Meeting 2	May 24, 2012	Capitol Skyline Hotel	29	Alternatives Development
Public Meeting 3	September 13, 2012	Amidon Elementary School	82	Alternatives Analysis

Based on the Draft Report that was published for public review on November 9, 2012, a number of comments were received from local area residents and from stakeholders. This Final Report incorporates revisions and clarifications in response to those comments. Appendix I includes a summary of the comments received on the Draft Report, both via e-mail and via formal letters, along with responses to the comments. The complete report, including the appendices, is posted for public review, along with animations of the three Multimodal Alternatives, on the project webpage:

http://www.anacostiawaterfront.org/awi-documents/m-street-se-sw-transportation-study-documents/

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Chapter 2
EXISTING CONDITIONS AND CHARACTERISTICS OF CORE AREAS

2. Existing Conditions

This chapter provides an overview of the existing conditions and draws from a combination of sources, including field observations, updated traffic volume data, input from DDOT technical staff / citizens / area stakeholders, and from a number of studies with overlapping analysis study areas. A total of 100 previous planning or transportation studies that had some overlap with, or applicability to, this Study were reviewed and considered at the start of the analysis to inform the assessment of existing conditions, as listed in **Appendix D**.

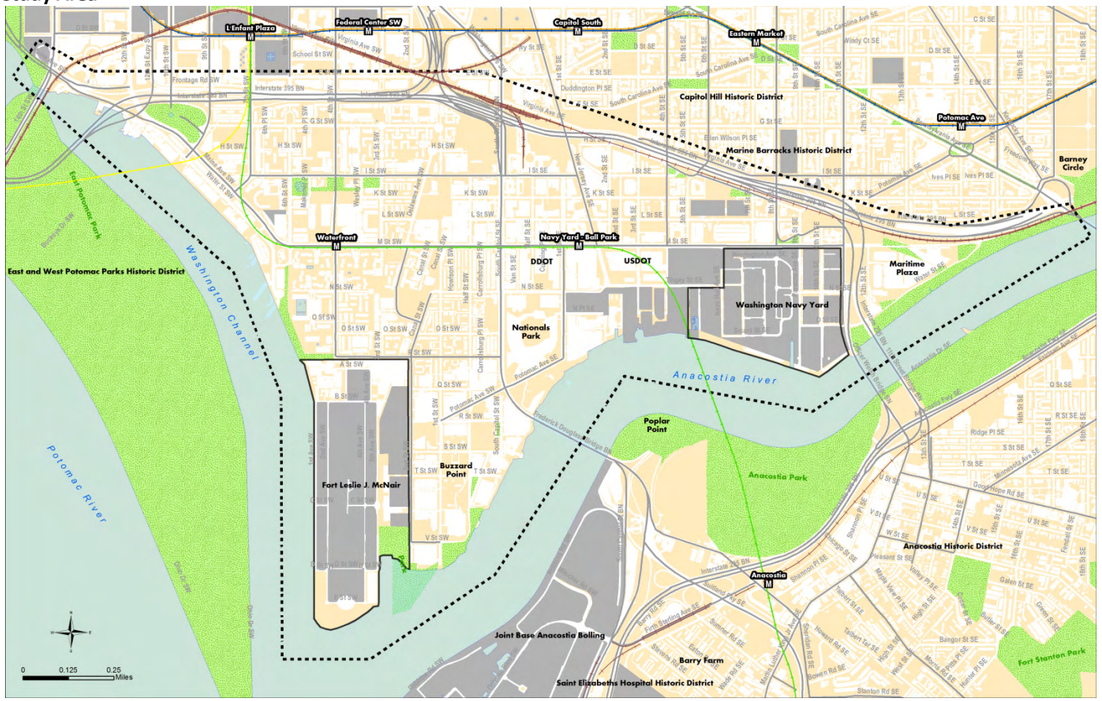
2.1 Land-Use Planning within the Anacostia Waterfront Initiative Area

A major governing principle that has driven land-use planning thus far and shaped much of what exists today within the near Southwest and Southeast areas of the District is the AWI area. The AWI Framework Plan referenced in Chapter 1 identifies a number of goals whose aim is to link the neighborhoods along and within the District's waterfronts with the urban core and to connect the east and west sides of the Anacostia River together. Beginning with the development of the Southeast Federal Center, and followed by the construction of the Nationals Park baseball stadium, the District has worked cooperatively with the private development industry to chart out a path of revitalization and urban renewal in the Southwest and Southeast quadrants of the capital city.

Following upon the heels of those two important anchor projects, a number of nearby parcels have been redeveloped within the past six years at a rapid pace. The AWI Framework Plan continues to evolve into tangible changes today, with a number of public and private infrastructure projects currently under construction. The current trend has been geared toward high-density mixed-used development that is sustainable, walkable, transit-oriented, and geared toward becoming an area that is a destination unto itself.

Figure 2-1 shows the Study area and differentiates between institutional park land in green, federal use in grey (predominately Department of Defense), and privately-owned land in orange and white.

FIGURE 2-1
Study Area



2.2 Existing and Planned Land Uses in the Study Area

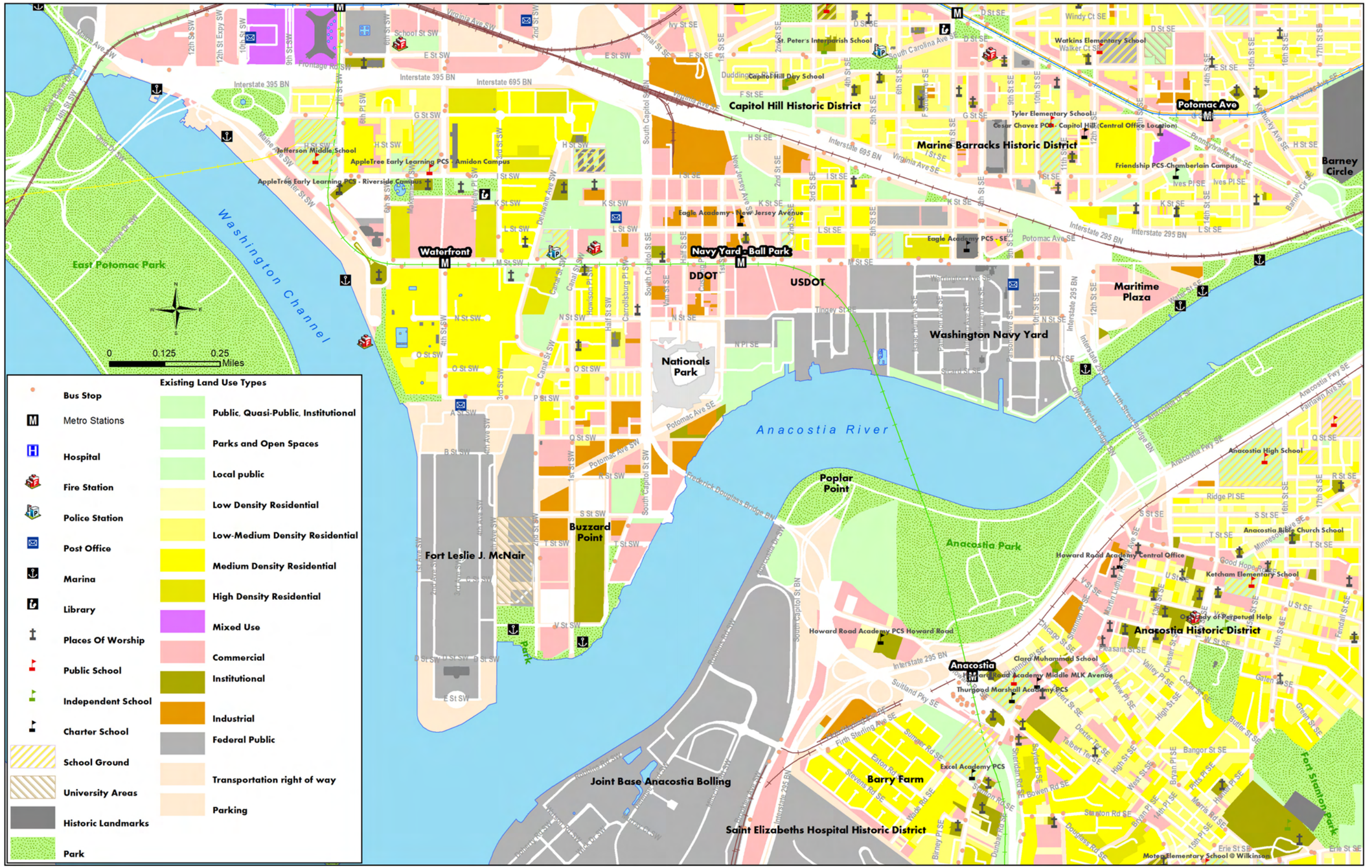
The Study area is mix of older residential neighborhoods, mainly concentrated west of South Capitol Street, secure military campuses in the southwest and southeast corners (Fort McNair and Washington Navy Yard respectively), and new development (commercial office and residential) interspersed with vacant or outdated industrial parcels east of South Capitol Street. Major non-military land-use features include the following notable elements:

- The Wharf/Southwest Waterfront along Water Street SW and Maine Avenue;
- Buzzard Point Park / Marina and James Creek Marina at the southern tip;
- Nationals Park near the heart of the Study area on South Capitol Street;
- US Department of Transportation east of Nationals Park;
- Maritime Plaza at the far east edge of the Study area.

The core areas within the Study area and their characteristics are discussed in the Section 2.2.1.

Also within the Study area are a number of smaller parks, schools, churches, community centers, and public facilities. **Figure 2-2** illustrates the mix of various land uses, along with various community features.

FIGURE 2-2
Existing Land Uses and Community Features within the Study Area



2.2.1 Characteristics of Core Areas, Corridors and the Business Improvement District within the Study Area

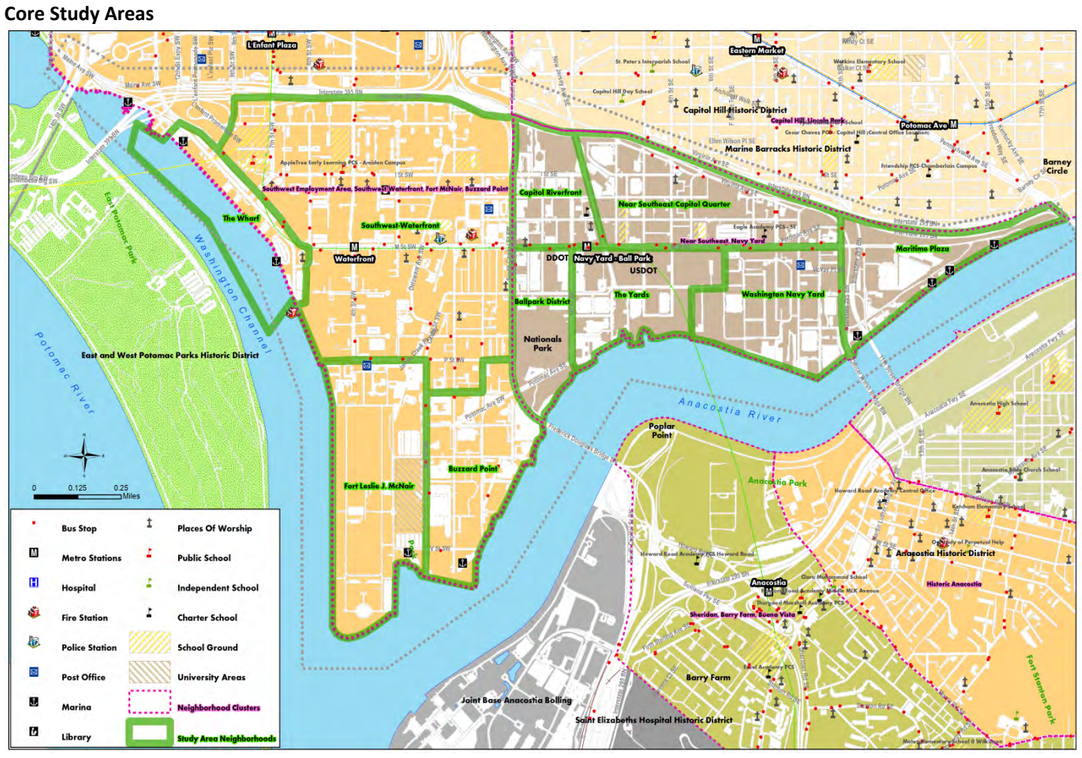
The Anacostia Waterfront Initiative (AWI) was formed, through a partnership with federal and District government agencies, to aid in the development of a thriving waterfront along the Anacostia River. The goals of the AWI are to:

- Charter a course for the environmental healing and rejuvenation of water-dependent activities on the Anacostia River.
- Reconstruct transportation infrastructure to improve access to waterfront lands and better serve waterfront neighborhoods.
- Create a system of interconnected and continuous waterfront parks joined together by a trail system along the river.
- Enliven the waterfront to celebrate and explore the cultural heritage of both Washington, D.C. and the United States of America.
- Promote sustainable economic development by reconnecting the city across the Anacostia River to a vital waterfront that offers residential, recreational, and employment opportunities.

It is the ultimate goal of the AWI to revitalize the region by cultivating cultural waterfront destinations through careful planning and the proper mix of land use and transportation improvements.

The vision of core neighborhoods and commercial districts (**Figure 2-3**) within the Study area are described in the following sections.

FIGURE 2-3
Core Study Areas



Core Area: The Wharf and Southwest Waterfront

The Wharf and Southwest waterfront neighborhoods stretch 47 acres from the historic Fish Wharf in the north to Fort McNair in the south. The area is home to marinas (such as the Gangplank and Washington Marinas), theaters, restaurants (such as Phillips Flagship Restaurant), hotels, nightclubs, and the Kastles Tennis Stadium. While located in a prime location along the Potomac River, these neighborhoods have been generally considered isolated from the rest of the city as they are bordered by I-395 to the north and South Capitol Street to the east.

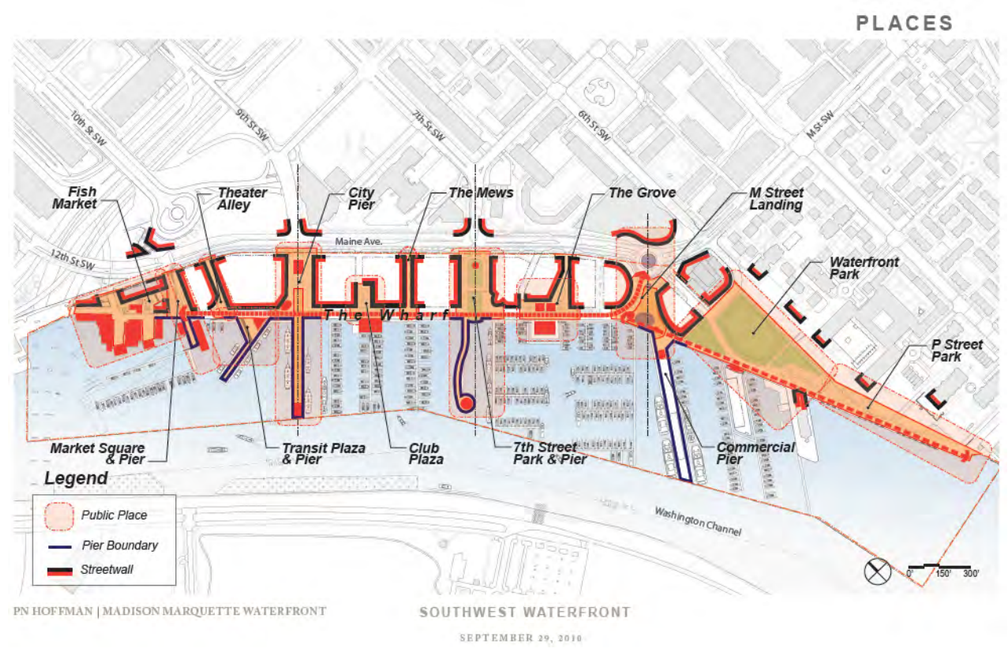
These neighborhoods are connected to the highway network through I-395, Maine Avenue / M Street, 7th Street, 4th Street, and South Capitol Street.

Currently the Southwest waterfront neighborhood is mostly comprised of medium- to high-density residential land use. Development has started in the area surrounding the Waterfront Metro station that will shift the area to more mixed land use.

The AWI redevelopment calls for approximately 3 million square feet of residential, office, hotel, retail, cultural, and park space. Over eight acres of open space are planned for, including a waterfront promenade and public piers (**Figure 2-4**). This also includes the restoration of the historic towers on either side of the former Waterfront Mall.

As a result of these proposed developments, the region is expected to grow in population by over 4,100 along The Wharf and 2,400 in the Southwest waterfront over the next 25 years. Along with this growth, approximately 2,800 new jobs are expected to be created in these neighborhoods.

FIGURE 2-4
The Wharf Master Plan



SOURCE: Southwest Waterfront website, www.swdcwaterfront.com

Core Area: Buzzard Point

The Buzzard Point neighborhood in the southwest consists of 9 acres bounded by the Southwest Waterfront to the north, Fort McNair to the west, Nationals Park to the east and the Anacostia River to the east and south.

This neighborhood is primarily served by P Street, Potomac Avenue, 2nd Street, and South Capitol Street. While no Metro access is available within the neighborhood, it is expected that this neighborhood will be the terminus point for two of the planned DDOT streetcar lines. The Anacostia Riverwalk Trail is also expected to extend into the community which will connect non-motorized traffic of this area to the rest of the Anacostia Waterfront.

The neighborhood currently contains the Coast Guard headquarters which is located in the southern portion on the Anacostia River. The rest of the development in the area contributes to an overall even mix of institutional, commercial, and industrial land uses.

Part of the AWI plan for Buzzard Point is to grow its population by 200 people while tripling employment (to reach greater than 17,000 total employees) over the next 25 years. This is to be accomplished through mixed-use developments of commercial and residential land uses as displayed in **Figure 2-5**.

FIGURE 2-5
Buzzard Point Envisioned Development

SOURCE: Capitol Riverfront website, www.capitolriverfront.org / Ackridge – 100 V Street website: www.100vstreet.com

Core Area: Ballpark District and The Yards

The Ballpark District and The Yards in the southeast are home to Nationals Park and the US DOT, respectively. The core area is bounded by South Capitol Street, M Street, the Anacostia River, and the Washington Navy Yard. The area is primarily served by South Capitol Street, M Street, 1st Street (divides the Ballpark District and The Yards), and Tingey Street. The Navy Yard-Ballpark Metro station (Green line) is within walking distance. The area also carries pedestrian and bicycle traffic through the Anacostia Riverwalk Trail.

As currently configured, The Yards is mostly utilized for commercial purposes with some open space and federal public land use. The most notable landmark is the newly constructed 1.35 million square-foot pair of buildings that make up the US Department of Transportation Headquarters. The building is home to the largest green roof in the city. Surrounding the US DOT Headquarters are retail space and an outdoor transportation museum.

The most significant development, spanning 42 acres, occurs in The Yards neighborhood (**Figure 2-6**). Through a public-private partnership, current plans are to renovate historic former industrial buildings to accommodate residential (2,800 units) and retail projects. The main projects call for the construction of the Riverfront Park (5.87 acres), Foundry Lofts, The Boilermaker Shop, and Park Pavilions over three phases (**Figure 2-7**). The Yards Park and Diamond Teague Park are currently open, and are popular local and regional park destinations for both their views and their access to the River and Ballpark.

FIGURE 2-6
The Yards Master Plan

SOURCE: The Yards website, www.dcyards.com

FIGURE 2-7
The Yards Development Plan

SOURCE: The Yards website, www.dcyards.com

Higher density residential and mixed-use units are proposed for the Ballpark District, which, as of today, is mostly a mix of commercial and industrial land uses. These developments will be adjacent to the Nationals Park. The ballpark is a 42,000-seat facility that is the first major US professional sports stadium to become LEED-certified green. The park is home to the Washington Nationals baseball team but is multipurpose, having been used by Pope Benedict for Mass and as a summertime venue for the Washington Opera and other musical concerts.

As a result of the developments, populations are expected to grow by approximately 2,800 in the Ballpark District and by 6,000 in The Yards. Employment is expected to grow by approximately 6,200 in the Ballpark District and by 7,400 in The Yards.

Core Area: Capitol Quarter and Near Southeast

The Capitol Quarter / Near Southeast neighborhood is bounded by New Jersey Avenue, I-695, M Street, and 11th Street. The area is currently served through the transportation network by New Jersey Avenue, 4th Street, Virginia Avenue, M Street, 8th Street, 11th Street, and Potomac Avenue. The western portion (main focus of developments) is within walking distance of the Navy Yard Metro station (Green line).

While currently the area is zoned as a mix of medium- to high-density residential, federal public, open land, and commercial areas. In the future, two main developments are to be completed: Washington Canal Park and the Capper-Carrollsburg Hope VI Redevelopment.

The Washington Canal Park development (**Figure 2-8)** will span three blocks, providing green space to memorialize the Washington Canal, which provided a water-borne connection from northwest Washington to the Anacostia River (along the Tiber Creek watershed). The space will also contain a café and water fountains, with the intent of hosting events such as a farmer's market and holiday events. In the winter, the space will feature ice-skating opportunities. Prior to construction, the area was home to a parking lot.

FIGURE 2-8
Washington Canal Park Development

SOURCE: Southwest Neighborhood assembly, Inc. website, www.swdc.org

The Capper-Carrollsburg Development (**Figure 2-9**) is a 23-acre project that is converting an isolated and deteriorating public housing complex into a mixed-income neighborhood. The new development is to be surrounded by the Washington Canal Park, as well as retail and office space. All 700 units of public housing (300 of which are senior dwellings) are to be replaced in kind, along with the construction of 1,200 market-rate units.

FIGURE 2-9
Capper-Carrollsburg Hope VI Redevelopment

SOURCE: Southwest Neighborhood assembly, Inc. website, www.swdc.org

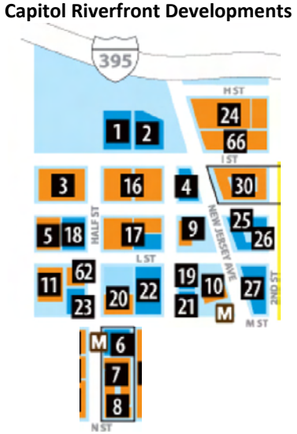
As a result of these developments, it is projected that the neighborhood will experience an increase of approximately 2,500 people and 4,900 new jobs over the next 25 years.

Core Area: Capitol Riverfront

The Capitol Riverfront community in the southeast is bounded by M Street, New Jersey Avenue, South Capitol Street, and I-695. The community is primarily served by South Capitol Street, New Jersey Avenue, I Street, and M Street. The Navy Yard Metro station (Green line) is within walking distance.

The neighborhood is currently a mix of commercial and industrial land uses but is planned to include more mixed-use developments (**Figure 2-10**). As a result of this growth, the population is expected to grow by nearly 3,700 person and 13,750 jobs.

FIGURE 2-10
Capitol Riverfront Developments



SOURCE: Capitol Riverfront website, www.capitolriverfront.org

ID	Development	Features
1	The Jefferson	Residential: 448 apt. units
2	The Axiom	Residential: 246 apt. units
3	23 I Street	Mixed Use: TBD
4	The 909	Residential: 237 units Retail: 6,000 SF
5	1000 South Capitol	Office: 320,000 SF Retail: TBD
6	55 M Street	Office: 275,000 SF Retail: 15,000 SF
7	W Aloft Hotel	Hotel: 196 Rooms Retail: 5,000 SF
8	Monument Residential	Residential: 340 units Retail: 30,000 SF
9	Square 740	Mixed Use: 220,000 SF
10	1111 New Jersey	Office: 203,000 SF Retail: 8,000 SF
11	1100 South Capitol	Office: 350,000 SF Retail: TBD
16	Plaza On K	Office: 795,000 SF Retail: 30,000 SF
17	Velocity Condos	Residential: 200 units Mixed Use: TBD
18	1015 Half Street	Office: 379,000 SF Retail: 21,000 SF
19	Onyx On First	Residential: 266 apt. units
20	50 M Street	Office: 135,000 SF Retail: 5,000 SF
21	100 M Street	Office: 225,000 SF Retail: 15,000 SF
22	80 M Street	Office: 275,352 SF
23	20 M Street	Office: 180,633 SF Retail: 10,000 SF
62	41 L Street	Residential: 84 Units Retail 5,300 SF

Business Improvement District: Capitol Riverfront Business Improvement District

The Capitol Riverfront Business Improvement District (BID) pertains to the previously described developments as well as the Washington Navy Yard. The current BID area employs over 35,000 daytime employees, 6.8 million SF of office space, and 3,600 residents, while attracting 2 million annually in tourism and sporting events, and additional developments are underway. As of the first quarter of 2012, the Capitol Riverfront BID estimated future totals at over 36.7 million square feet of developments (**Table 2-1**).

TABLE 2-1
Capitol Riverfront BID Development Summary

Estimated Delivery	Office Sq. Ft.	Retail Sq. Ft.	Residential Units	Hotel Rooms	Total Sq. Ft.	Estimated Total Cost
Existing/Completed	6,888,040	182,129	2,677	204	11,145,493	$2.6 billion
Under Construction	362,000	154,500	584	0	1,251,500	$644 million
Planned	8,148,130	645,487	6,271	921	24,329,935*	$5.9 billion
Totals	15,398,170	982,116	9,532	1,125	36,726,928*	$9.1 billion

Source: Capitol Riverfront BID 1Q 2012
* Total sq. ft. numbers include the allowed zoning by right on lots where a building program has not yet been determined

Corridor: South Capitol Street

South Capitol Street is a principal arterial connecting the Southwest/Southeast Freeway and the Frederick Douglass Memorial Bridge. The corridor is in the process of becoming a symbolic gateway to the central core of Washington, D.C. Redesigning South Capitol Street into an urban boulevard will accommodate multimodal traffic and spur economic development. Redesigning the corridor, by replacing the aging Frederick Douglass Memorial Bridge, will improve connections between the east and west banks of the Anacostia River. DDOT has completed a Final Environmental Impact Statement for the project and has initiated design based on the FEIS.

The conceptual plan (**Figure 2-11**) is the result of the 2003 South Capitol Street Gateway and Improvement Study and the South Capitol Street Urban Design Study.

FIGURE 2-11
South Capitol Street Conceptual Plan

SOURCE: Southwest Neighborhood assembly, Inc. website, www.swdc.org

As part of the plans, the South Capitol Street bridge was lowered to be at-grade with the Potomac Avenue and South Capitol Street intersection, as well as enhancing the pedestrian environment. The study will also result in a new signature Frederick Douglass Bridge and a large oval rotary approach to the structure.

Core Areas Summary

As part of the Anacostia Waterfront Initiative and the Capitol Riverfront Business Improvement District, the M Street/ Southeast-Southwest portions of the District are envisioned to undergo significant development efforts. The M Street and South Capitol Street Corridors will be enhanced to support the developments within the core areas described in this chapter. **Table 2- 2** summarizes the core areas in the Study area.

TABLE 2-2
Summary of Study Area Developments

	The Wharf / Southwest Waterfront	Buzzard Point	Ballpark District / The Yards	Capitol Quarter / Near Southeast	Capitol Riverfront
Existing Primary Land use(s)	Medium- to high-density residential	Institutional / Commercial / industrial	Ballpark District: Commercial / Industrial The Yards: Commercial / Open Space / Federal Public	Medium- to high-density residential / Federal Public / Open Space / Commercial	Commercial / Industrial
Notable Planned Development(s)	Waterfront Station Improvements	Mixed-Use Developments	Riverfront Park / Mixed-Use Developments	Washington Canal Park Development / Capper-Carrollsburg Hope VI Redevelopment	Mixed-Use Developments
Projected Population and Employment Growth (2011→2035)	Population: + 6,500 Employment: + 2,800	Population: + 200 Employment: + 12,000	Population: + 8,800 Employment: +13,600	Population: + 2,500 Employment: +4,900	Population: + 3,700 Employment: +13,750

2.2.2 Recent Changes in Land Use

In general, recent changes in land use have been almost exclusively concentrated east of South Capitol Street, with the notable exceptions of Area Stage at Maine Avenue and 6th Street SW (completed in 2010) and Waterfront Station (formerly Waterfront Mall). The Nationals Park Stadium, with a seating capacity of nearly 42,000, first opened on March 30, 2008. In 2003, the General Services Administration initiated a major planning effort to redevelop 44 acres of riverfront around the Navy Yard Annex (between M Street SE, New Jersey Avenue, and Isaac Hull Avenue) known as the Southeast Federal Center.

Following completion of the new US Department of Transportation Headquarters, GSA awarded a private developer the development rights to complete an urban mixed-use, riverfront redevelopment consisting of up to 2,800 residential units, 1.8 M SF of commercial office space, and up to 400,000 SF of commercial retail space. The new development, renamed The Yards, includes a major riverfront park that is the capstone of the redevelopment efforts. The Yards are partially completed with construction still under way. North of The Yards and M Street SE, a sizeable new residential development has been completed consisting of townhomes to the east and high-rise condominiums to the west. Immediately north of Nationals Park, a number of new commercial office buildings have been completed, including the current headquarters for DDOT. Between M Street and the Southeast Freeway, several high-rise condominium complexes have just recently been erected and are now open for occupancy. Most of these new structures include below-grade parking garages for residents or tenants, with limited on-street parking immediately adjacent to the building – generally 2-hour or 3-hour metered parking.

2.3 Community Features and Characteristics within the Study Area

A number of churches and schools are located within the Study area. **Tables 2-3** and **2-4** respectively provide an inventory of each of these.

TABLE 2-3
Places of Worship within the Study Area

Place of Worship	Address
Bethel Pentecostal Tabernacle	60 I (Eye) Street Southwest
Christ United Methodist Church	900 4th Street Southwest
Friendship Baptist Church	900 Delaware Avenue Southwest
National Association of Evangelicals	701 G Street Southwest
Riverside Baptist Church	680 I (Eye) Street Southwest
Second Baptist Church SW	1200 Canal Street Southwest
Second Union Baptist Church	1107 Delaware Avenue Southwest
St. Matthew's Baptist Church	1105 New Jersey Avenue Southeast
St. Augustine's Episcopal Church	600 M Street Southwest
St. Paul's AUMP church	434 I (Eye) Street Southeast
St. Vincent De Paul	M Street (and South Capitol Street) Southeast
Westminster Presbyterian Church	400 I (Eye) Street Southwest

TABLE 2-4
Schools within the Study Area

School	Address	School Type
Amidon-Bowen Elementary School	401 I (Eye) Street Southwest	Public
AppleTree Early Learning Public Charter	401 I (Eye) Street Southwest	Public Charter
AppleTree Early Learning Public Charter	680 I (Eye) Street Southwest	Public Charter
Eagle Academy Public Charter	1017 New Jersey Avenue Southeast	Public Charter
Eagle Academy Public Charter	770 M Street Southeast	Public Charter
High Road Middle School	1530 1st Street Southwest	Private
Jefferson Middle School	801 7th Street Southwest	Public

Another important characteristic of the Study area is the proportion of unused land (including the presence of some brownfields) and vacant older buildings or abandoned industrial sites. Future plans call for redevelopment of these areas, but the patchwork of developed versus undeveloped areas creates some challenges when it comes to connectivity of non-motorized facilities and transit service coverage areas.

Finally, the Washington Navy Yard to the east and Fort McNair to the west present challenges to the comprehensive land-use plan and the transportation network due to the impacts of their respective security requirements. Multiple streets dead-end at secure perimeters and several transit lines must travel along circuitous routes in order navigate through the lower Southwest and Southeast portions of the Study area.

2.4 Transportation Network in the Study Area

In general, the transportation network is in a period of transition, in that the land use that it originally was designed to serve is rapidly changing. Thus, the function of the existing system is no longer adequate for the change in travel patterns that is discussed in detail in Chapter 4. An overarching characteristic of the current transportation network is the lack of connectivity for practically every mode. This next section provides a general overview of the various components of the existing transportation network, including the vehicular network, transit service, pedestrian facilities, bicycle facilities, parking /freight loading, motor coach / tour bus lay-by areas, and waterways / water taxis.

2.4.1 Existing Vehicular Network

The Study Area is accessed by many regional roadways including Interstate 395 (I-395), Interstate 695 (I-695), Interstate 295 (I-295), and Anacostia Freeway (MD 295). Arterials providing main access and mobility to the area include:

- **Maine Avenue SW**: Maine Avenue extends from M Street SW to 17th Street NW and serves as a connection between the Southwest Waterfront and the National Mall. DDOT classifies Maine Avenue as a minor arterial. Maine Avenue has a six lane cross section with a median, which is converted into center turn lanes at several intersections. Four-hour restricted residential parking is available along the southern side of the roadway, as well as metered parking. An area of on-street curbside parking is also currently provided for tour bus parking along the northern side of the roadway. Some of the on-street parking is prohibited in these locations during peak hours. The posted speed limit is 25 mph. **Figure 2-12** depicts typical view of this roadway.

FIGURE 2-12
Maine Avenue Typical View (looking East)

- **M Street SW/SE**: M Street is a six-lane east-west minor arterial that connects Maine Avenue SW to 11th Street SE. On the southwest portion of the corridor, M Street has a six-lane cross section with a median, which is converted into center turn lanes at several intersections. East of South Capitol Street, the M Street SE cross section has no median and no turn lanes. Limited parking is available along both sides of the street, but parking is generally prohibited at these locations during peak hours. The posted speed limit is 25 mph. **Figure 2-13** shows a typical view of the M Street SE section. **Figure 2-14** shows a typical view of the M Street SW section.

FIGURE 2-13
M Street SE Typical View (looking East)

FIGURE 2-14
M Street SW Typical View (looking West)

- **I (Eye) Street SW/SE**: DDOT classifies I (Eye) Street as a minor arterial. I (Eye) Street has a two-lane cross section and operates east-west between 7th Street SW to New Jersey Avenue SE with some turn lanes. **Figure 2-15** shows a typical view of this street. Restricted residential parking and limited public parking is available along both sides of the roadway. The posted speed limit is 25 mph. DDOT recently implemented I (Eye) Street bicycle lanes between 6th Street SW and New Jersey Avenue SE. **Figure 2-16** shows a typical view of this section. I (Eye) Street SE is disconnected between New Jersey Avenue and 2nd Street SE, but a development project currently underway will restore this link.

FIGURE 2-15
I (Eye) Street Typical View (looking East)

FIGURE 2-16
I (Eye) Street SE Typical View (looking East)

- **9th Street SW:** Ninth Street SW is classified as a principal arterial between Maine Avenue and the Southwest Freeway. This segment of 9th Street has a five-lane cross section that connects Maine Avenue with the 9th Street Tunnel. No on-street parking is permitted along the segment of 9th Street in the Study area. The posted speed limit is 25 mph.
- **7th Street SW:** Seventh Street SW is a minor arterial that has a six-lane cross section and connects Maine Avenue with the National Mall, downtown Washington, and beyond. Metered parking and limited free parking line on both sides of the roadway. The posted speed limit is 25 mph.
- **4th Street SW:** DDOT classifies 4th Street SW as a minor arterial that has a two- to four-lane cross section and operates continuously between P Street SW and Pennsylvania Avenue NW. Restricted residential parking is available on both sides of the roadway. The posted speed limit is 25 mph. **Figure 2-17** shows a typical view of a four-lane cross section of this street. DDOT recently installed bicycle lanes between M Street SW and Virginia Avenue SW.

FIGURE 2-17
4th Street SW Typical View (looking South)

- **South Capitol Street SW:** South Capitol Street is a principal arterial between the Southwest/Southeast Freeway and Potomac Avenue connecting on to the Frederick Douglass Memorial Bridge. Between I (Eye) Street and N Street the center four lanes of South Capitol Street are grade separated, which allows northbound and southbound through traffic to pass under M Street. One northbound and one southbound travel lane are provided between I (Eye) Street and N Street for local traffic and provide access to K, L, and M Streets. No parking is permitted along South Capitol Street. The posted speed limit is 25 mph. **Figure 2-18** shows a typical view of this arterial in a section just south of M Street (underpass and frontage road).

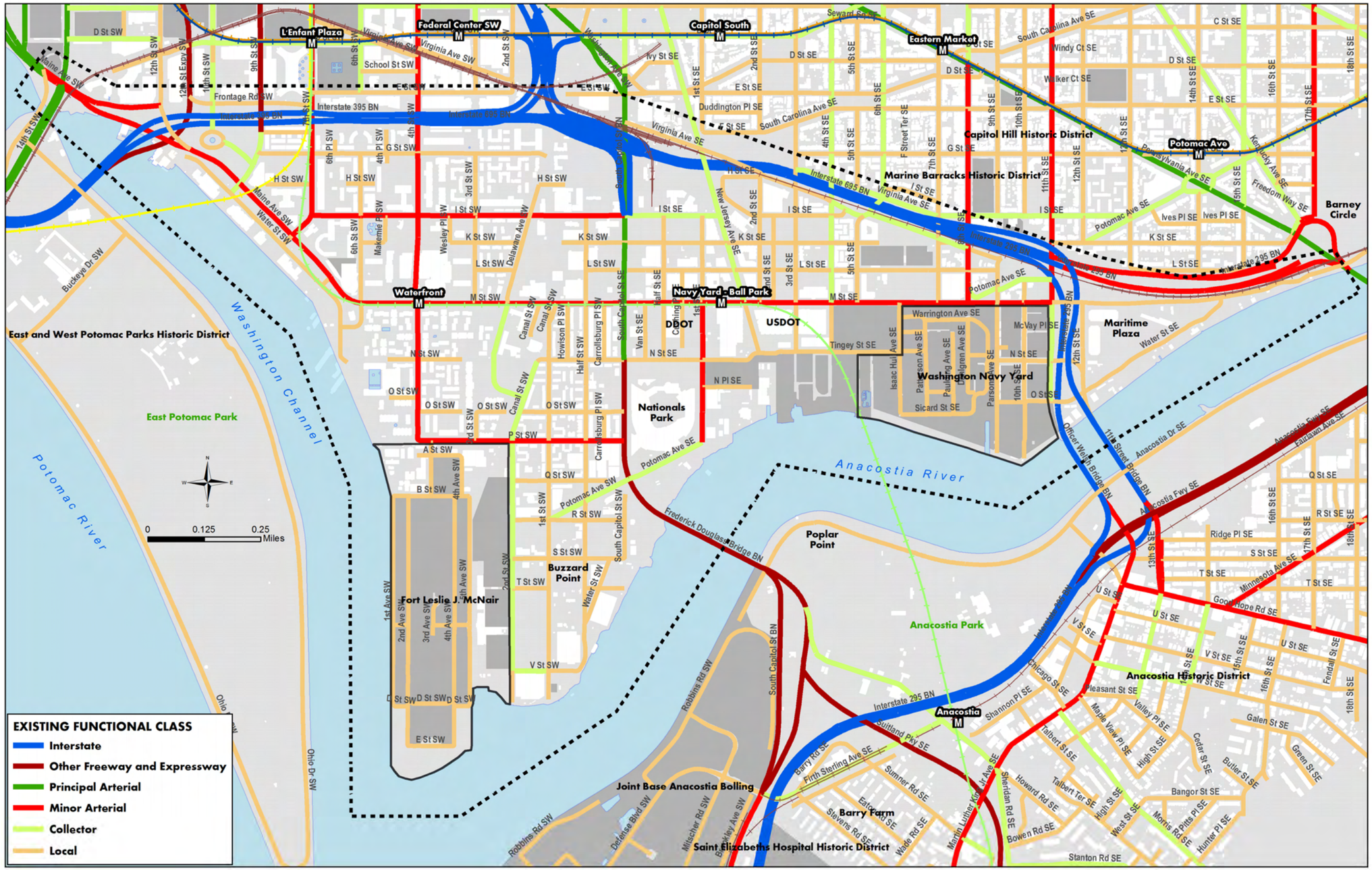
FIGURE 2-18
South Capitol Street Typical View South of M Street (looking North)

- **P Street SW:** DDOT classifies P Street SW as a minor arterial that operates continuously between 4th Street SW and South Capitol Street. P Street SW has a two-lane cross section. Restricted residential parking is available on both sides of the roadway. The posted speed limit is 25 mph. **Figure 2-19** shows a typical view of this street.

FIGURE 2-19
P Street SW Typical View (looking West)

Figure 2-20 shows DDOT's functional classification for the entire roadway system within the Study area. In addition to the minor and principal arterials described above, several collector roads and local streets complete the street grid for the area.

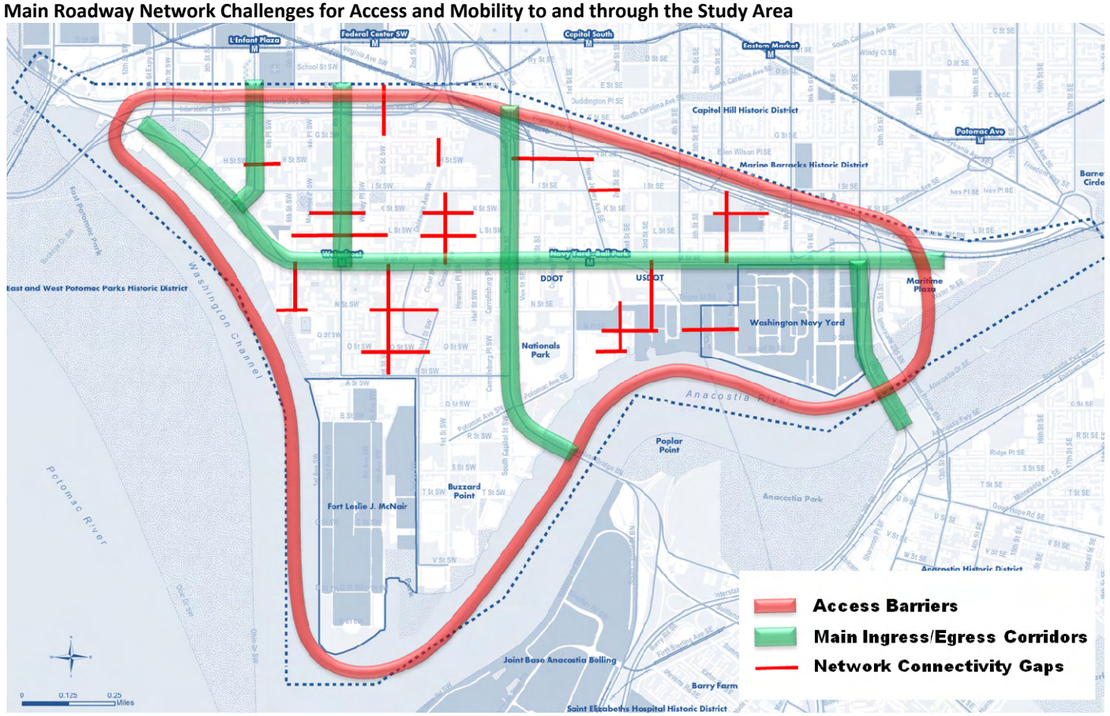
FIGURE 2-20
Existing Roadway Network and Functional Classification (Source: DDOT)



A review of the roadway network shows that several connectivity gaps exist throughout the system preventing vehicular traffic and other modes from traversing the area on a single road except for a few corridors that provide complete connectivity east-west or north-south. **Figure 2-21** depicts main network challenges currently present in the network. These can be summarized as below:

- Access Barriers: The Study Area is encompassed by the Potomac and Anacostia rivers on the west and south sides and by the I-395/I-695 freeway system on the north and west sides. These barriers create an "island" characteristic for the area and significantly constrain the access options to and from the area. As a consequence, very few access points are available for commuters and visitors, resulting in a high concentration of trips at those points.
- Disconnected Network: As shown in **Figure 2-121**, the roadway network presents several gaps in connectivity that prevent drivers from traversing the area. As a consequence, only a few corridors allow travel in both the east-west and north-south directions in the area. This exacerbates the concentration of traffic on the M Street and the South Capitol Street corridors.

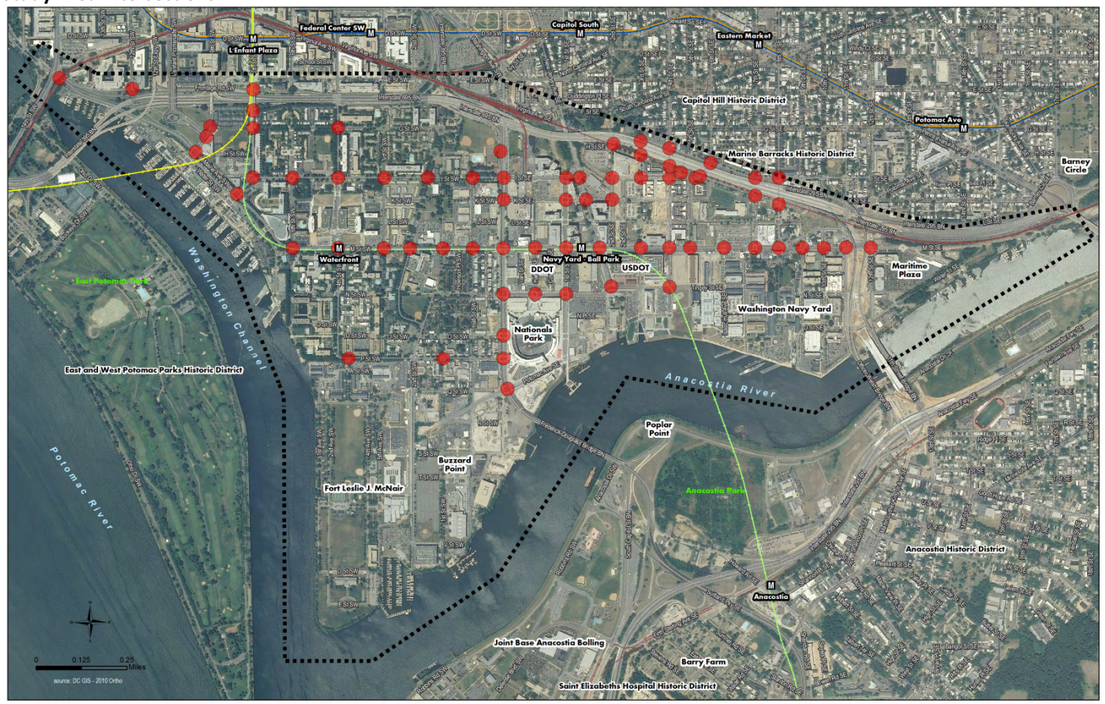
FIGURE 2-21
Main Roadway Network Challenges for Access and Mobility to and through the Study Area



A more detailed summary of traffic conditions is documented in sections below. A review of the existing conditions shows that traffic operation is generally adequate for most roads within the Study Area. The main exception to this is South Capitol Street, which presents congested conditions in both AM and PM peak hours due to heavy volumes crossing the river. In addition, other minor arterials, such as P Street SW, show some queuing and extensive delay at intersections with South Capitol for those movements accessing the arterial. The congestion on South Capitol Street added to the severe congestion on the freeway system (I-395/I-695) induces drivers to shortcut the main commuter options and use local streets and collector roads instead. Shortcut traffic is extremely undesirable given that it generates unnecessary congestion within residential areas as well as safety issues.

The Study area intersections included within the analysis of the roadway network are shown in **Figure 2-22**.

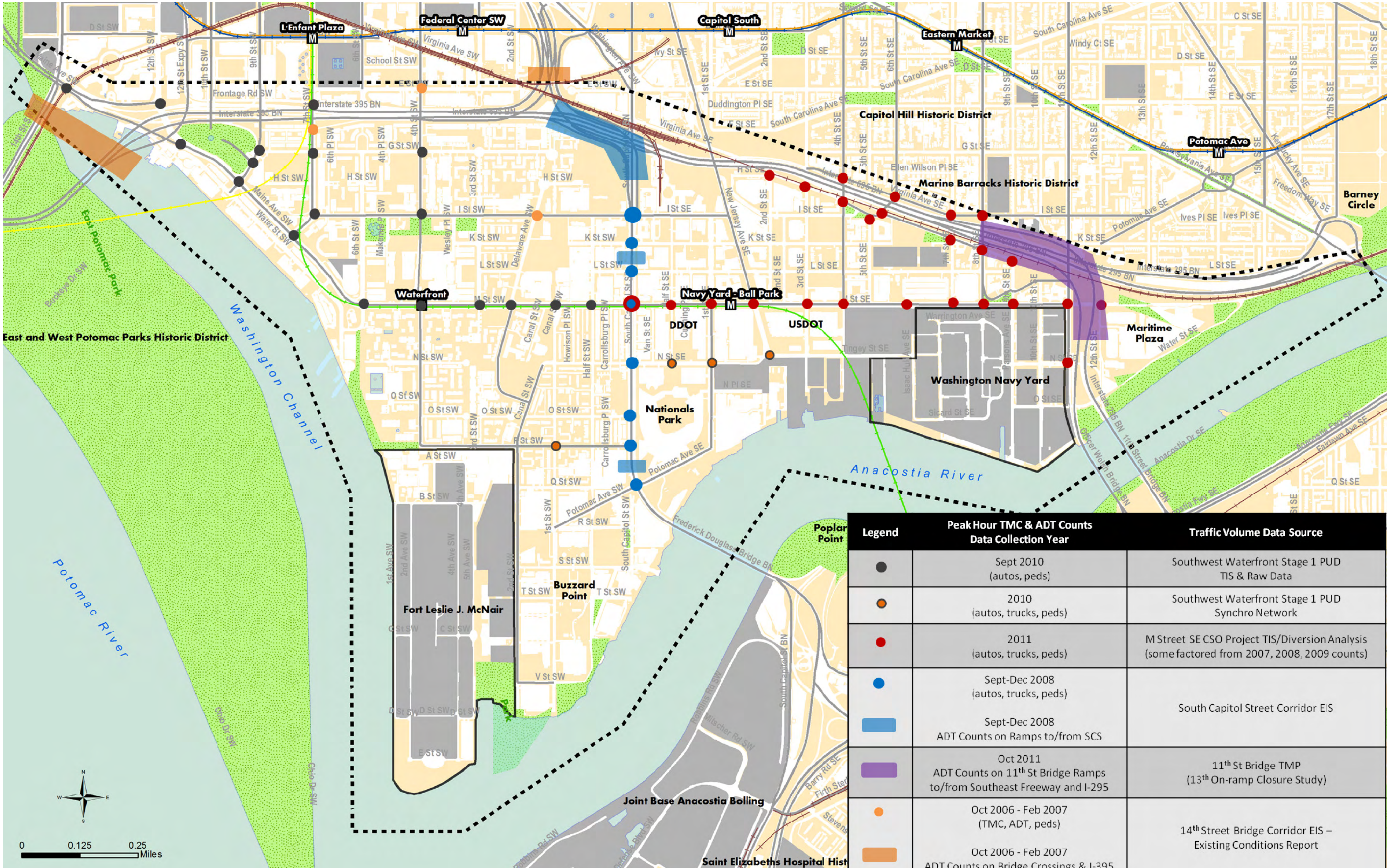
FIGURE 2-22
Study Area Intersections



The available data locations for the existing traffic operations – gathered from previous studies – are shown in **Figure 2-23**. Additional data collection sites to supplement this data are show in **Figure 2-24**. Corresponding intersection capacity analyses results (LOS) for the existing AM and PM peak hours are shown in **Figures 2-25** and **2-26**. Existing raw traffic volume data from all available sources is included in **Appendix A** and these are compared against future year baseline traffic in Chapter 3.

FIGURE 2-23

Existing Conditions Available Traffic Data from Previous Studies



Legend	Peak Hour TMC & ADT Counts Data Collection Year	Traffic Volume Data Source
● (dark grey circle)	Sept 2010 (autos, peds)	Southwest Waterfront Stage 1 PUD TIS & Raw Data
● (orange circle, dark outline)	2010 (autos, trucks, peds)	Southwest Waterfront Stage 1 PUD Synchro Network
● (red circle)	2011 (autos, trucks, peds)	M Street SE CSO Project TIS/Diversion Analysis (some factored from 2007, 2008, 2009 counts)
● (blue circle)	Sept-Dec 2008 (autos, trucks, peds)	South Capitol Street Corridor EIS
▬ (blue bar)	Sept-Dec 2008 ADT Counts on Ramps to/from SCS	
▬ (purple bar)	Oct 2011 ADT Counts on 11th St Bridge Ramps to/from Southeast Freeway and I-295	11th St Bridge TMP (13th On-ramp Closure Study)
● (light orange circle)	Oct 2006 - Feb 2007 (TMC, ADT, peds)	14th Street Bridge Corridor EIS – Existing Conditions Report
▬ (light orange bar)	Oct 2006 - Feb 2007 ADT Counts on Bridge Crossings & I-395	

FIGURE 2-24
Additional Traffic Data Collection

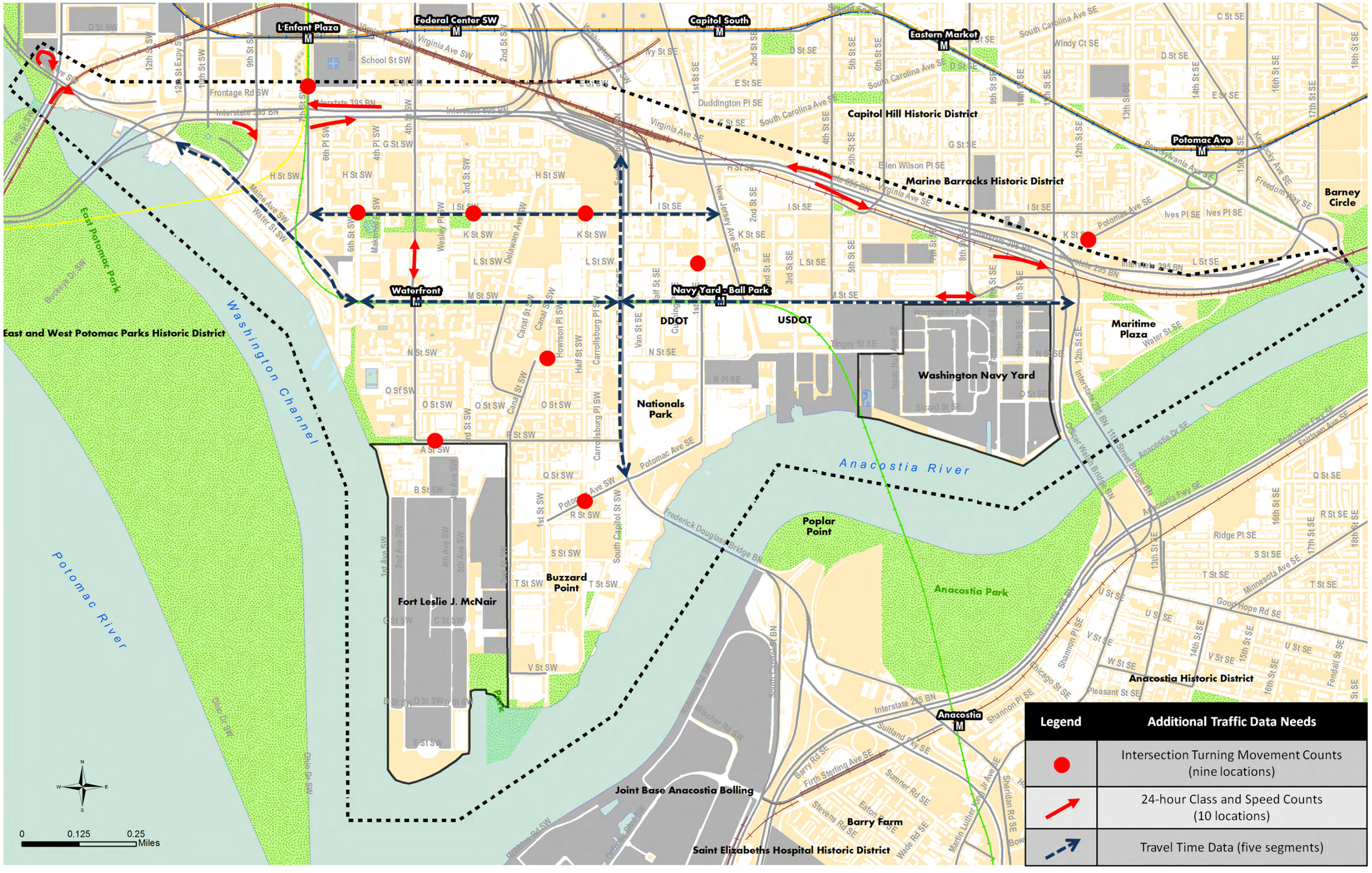


FIGURE 2-25
Existing Conditions Intersection Capacity Analysis - AM Peak Hour

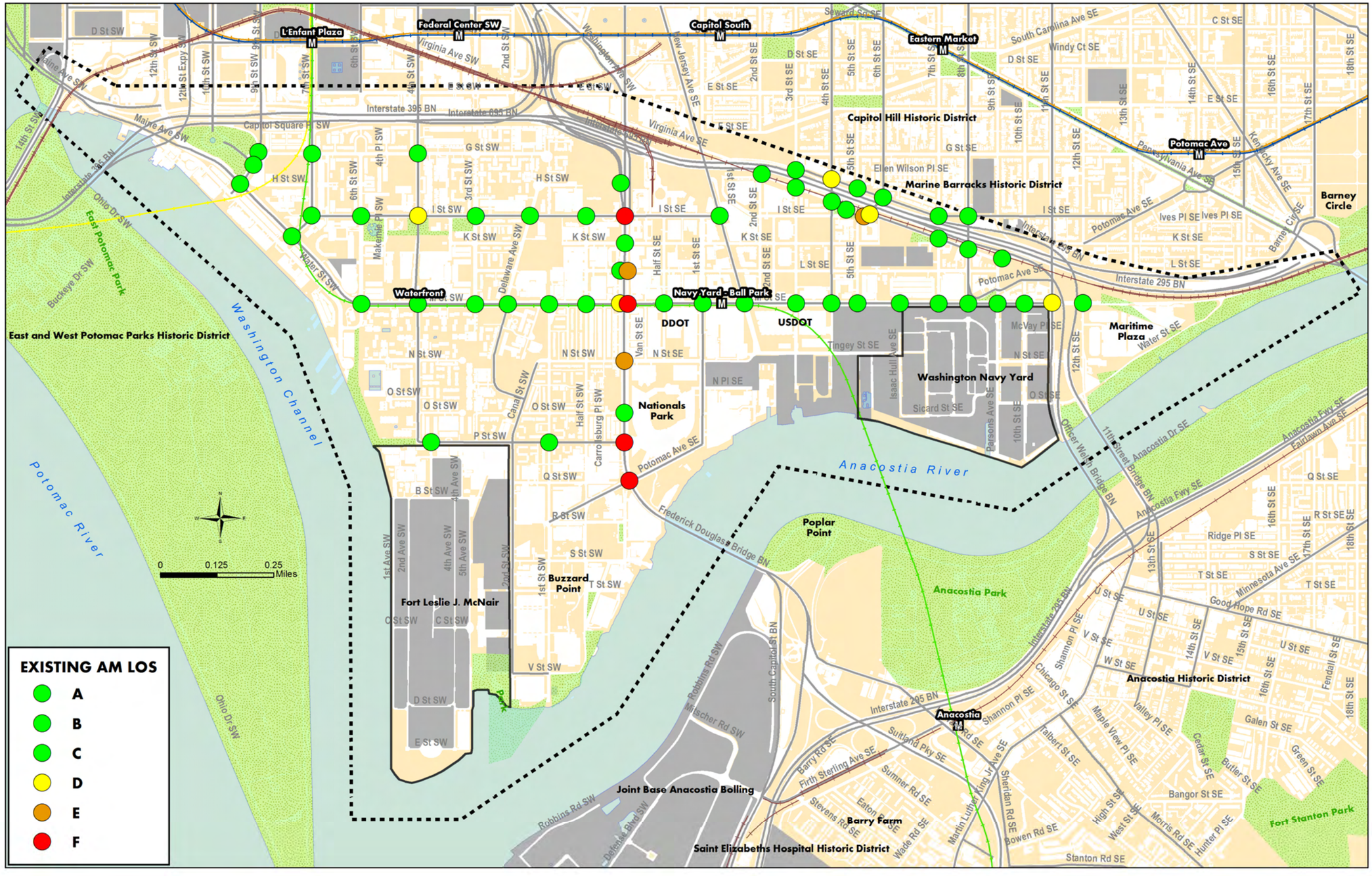
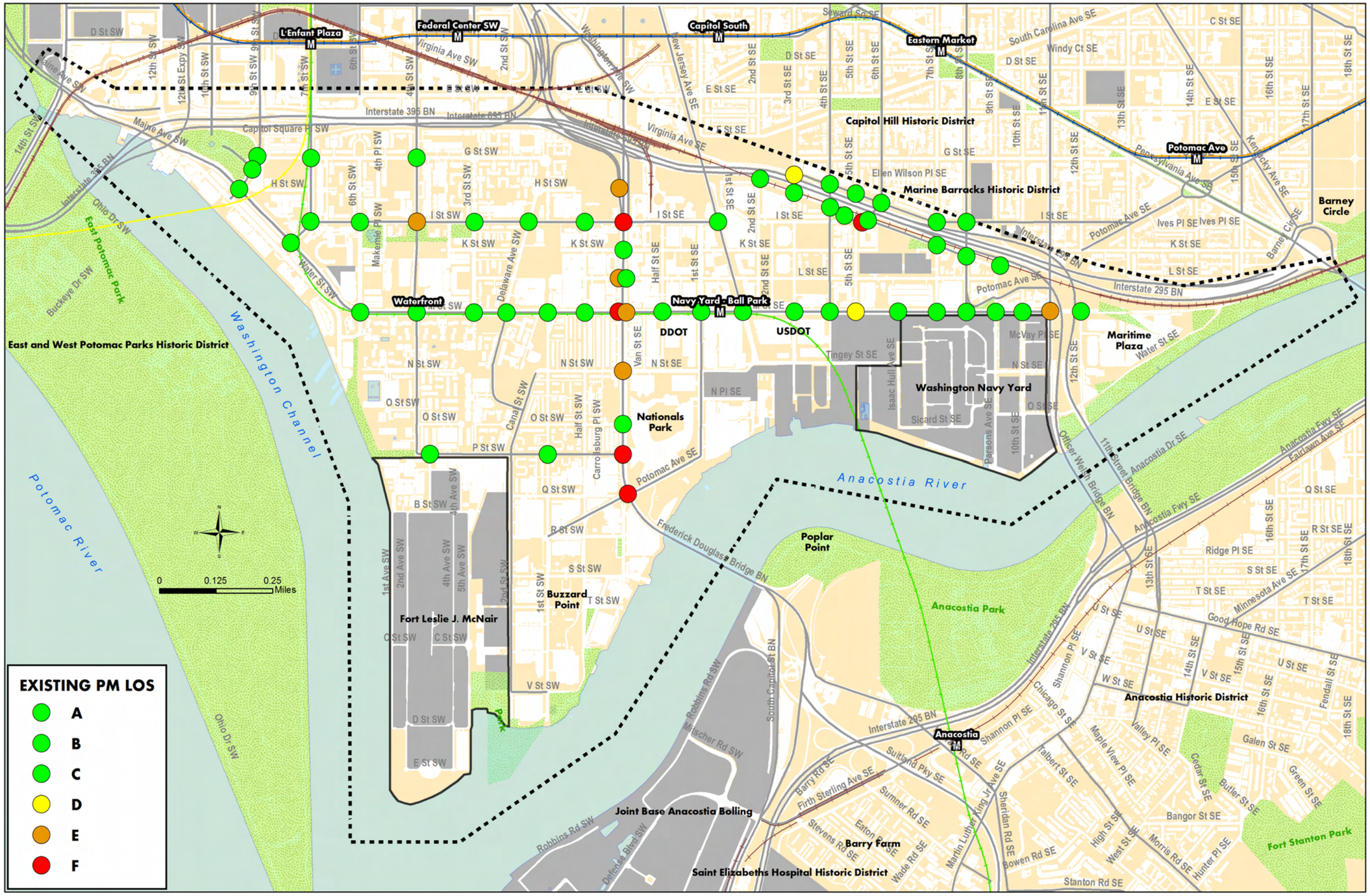


FIGURE 2-26


L'Enfant Plaza
Federal Center SW
Capitol South
Eastern Market
Potomac Ave
Waterfront
Navy Yard - Ball Park
Nationals Park
Barney Circle
Capitol Hill Historic District
Marine Barracks Historic District
East and West Potomac Parks Historic District
Washington Navy Yard
Maritime Plaza
Anacostia Historic District
Poplar Point
Anacostia Park
Buzzard Point
Fort Leslie J. McNair
Joint Base Anacostia Bolling
Barry Farm
Saint Elizabeths Hospital Historic District
Fort Stanton Park
DDOT
USDOT
Anacostia River
Potomac River
Washington Channel
Virginia Ave SW
Virginia Ave SE
Potomac Ave SE
Interstate 395 BN
Interstate 295 BN
Frederick Douglass Bridge BN
11th Street Bridge BN
Anacostia Dr SE
Anacostia Fwy SE
Fairlawn Ave SE
Pennsylvania Ave SE
Kentucky Ave SE
Maine Ave SW
Ohio Dr SW
East Potomac Park
Buckeye Dr SW
Water St SW
Delaware Ave SW
Makemie Pl SW
Canal St SW
Half St SW
Carrollsburg Pl SW
Van St SE
Tingey St SE
Isaac Hull Ave SE
Sicard St SE
Persons Ave SE
Officer Welch Bridge BN
Robbins Rd SW
Mitscher Rd SW
Defense Blvd SW
South Capitol St BN
Suitland Pky SE
Firth Sterling Ave SE
Barry Rd SE
Stevens Rd SE
Sumner Rd SE
Wade Rd SE
Martin Luther King Jr Ave SE
Sheridan Rd SE
Bowen Rd SE
Stanton Rd SE
Morris Rd SE
Hunter Pl SE
Bangor St SE
Galen St SE
Green St SE
Cedar St SE
Butler St SE
Valley Pl SE
Maple View Pl SE
Talbert St SE
Chicago St SE
Shannon Pl SE
Ives Pl SE
Ridge Pl SE
Minnesota Ave SE
Good Hope Rd SE
Water St SE
McVay Pl SE
Tingey St SE
Ellen Wilson Pl SE
Seward Sq SE
Windy Ct SE
South Carolina Ave SE
Kenilworth Ave NE
Anacostia
Potomac Ave
Navy Yard
Eastern Market
Federal Center SW
L'Enfant Plaza
Capitol South
0 0.125 0.25 Miles
EXISTING PM LOS
A
B
C
D
E
F

2.4.2 Transit Service

The M Street SE/SW corridor is served by Metrorail, Metrobus, DC Circulator, regional commuter buses and local private shuttles. The majority of the transit service is focused along M Street as the major east-west arterial in the Study area, although local feeder routes serve outlying portions of the Study area such as southern Buzzard Point. The surface routes along M Street generally connect to and from the north via Maine Ave and 7th Street and to the south over the Anacostia River via the Frederick Douglass Bridge or the 11th Street Bridges. The area is served by two Metrorail stations (Waterfront and the Navy Yard-Ballpark) on the Green Line, 16 Metrobus routes, two DC Circulator Routes, and two regional commuter routes, as shown in **Figure 2-27**.

WMATA Metrorail Service

Metrorail service to the Study area is provided on the Green Line at the Waterfront and Navy Yard-Ballpark stations. The Waterfront Metrorail station has car-sharing and bike-sharing facilities and is served by 11 surface street transit lines. It is served by nine local Metrobus routes (74, A9, A42, A46, A48, P6, V7, V8, V9), and two commuter bus companies (Maryland Transit Administration (MTA) and Potomac and Rappahannock Transit Commission (PRTC)).

The Navy Yard-Ballpark Metrorail station has car-sharing and bike-sharing facilities as well as 12 bike racks. It is served by eight local Metrobus routes (A9, A42, A46, A48, P6, V7,V8, V9), the DC Circulator (Union Station-Navy Yard route), and three commuter bus companies (Loudoun County Transit, Maryland Transit Administration (MTA), and Potomac and Rappahannock Transit Commission (PRTC)).

WMATA Metrobus Service

Surface transit is available along numerous routes in the Study corridor. The majority of routes use Maine Ave and M Street as the east-west facility and South Capitol Street as the north-south facility on their paths though the Study area. There are 12 separate buses that serve the M Street Corridor over nine basic routes including the Convention Center – Southwest Waterfront Line (74), Anacostia-Congress Heights Line (A42, A46, A48), Anacostia-Eckington Line (P6), Oxon Hill-Fort Washington Line (P17, P19), Fairfax Village-L'Enfant Plaza Line (V5), Minnesota Ave-M Street Line (V7, V9), Bock Road Line (W13, W14).

DC Circulator

Two DC Circulator routes serve the Study area. The Union Station–Navy Yard Metro Line and the Potomac Ave Metro–Skyland via Barracks Row serve sections of the corridor. Both routes run from 6:00 AM to 7:00 PM on weekdays with Saturday service and longer operating hours in the summer months. The DC Circulator service is $1 and operates on 10-minute headways throughout the day.

Commuter Bus Service

The corridor is served by commuter bus service from southern and western Virginia by the Potomac and Rappahannock Transit Commission (PRTC) and Loudoun County Transit (LCT)) and from Maryland by the Maryland Transit Administration (MTA). The commuter bus service provides limited-stop long-distance bus transportation from the outer suburbs to employment centers in the M Street Corridor such as the Navy Yard and US Department of Transportation headquarters. These buses are peak direction only and do not provide local transit opportunities.

2.4.3 Pedestrian Facilities

Given the number of employment centers and major attractions within the Study area, such as Nationals Park, the Washington Navy Yard, and Fort McNair, the M Street corridor is a critical hub of pedestrian activity even today. Field conditions surveys conducted on pedestrian facilities throughout the Study area indicated that in a number of areas, there is a need to increase connectivity, widen sidewalks, remove obstructions in the walkway, resurface uneven or cracked concrete, install pedestrian signals, and install curb ramps per Americans with Disabilities Act (ADA) specifications in order to support pedestrian traffic.

Figure 2-28 provides a graphic of sidewalk conditions in the Study area at the time of the field survey. [Note that the dynamic nature of infrastructure improvements in this area has resulted in some recent changes within isolated spots along certain corridors.] During the field condition surveys, it was observed that the Southwest region had the most pedestrian facility issues and problems. Much of the infrastructure in that area, especially in residential areas, is aging and showing signs of deterioration. Multiple segments were identified to require possible improvements along Maine Avenue / M Street, 4th Street, P Street, and Half Street SW. These findings are consistent with the 2009 Pedestrian Master Plan assessment that compared high pedestrian activity against high-deficiency roadways. In that study, the M Street corridor was identified as one of the eight priority corridors for pedestrian improvements in the District.

Missing sidewalks were found to be problematic in the Buzzard Point vicinity, particularly around 1st, 2nd, and Half Streets, SW. Sidewalk connections were also observed as missing along 3rd Street, 9th Street, and L Street, SW and along the following roadways in Southeast: 2nd Street, 4th Street, 7th Street, 11th Street, Half Street, I Street, K Street, L Street, and Tingey Street. The details of these survey observations by each roadway segment within the Study area are documented in **Appendix C**.

FIGURE 2-27
Existing Transit Service within the Study Area

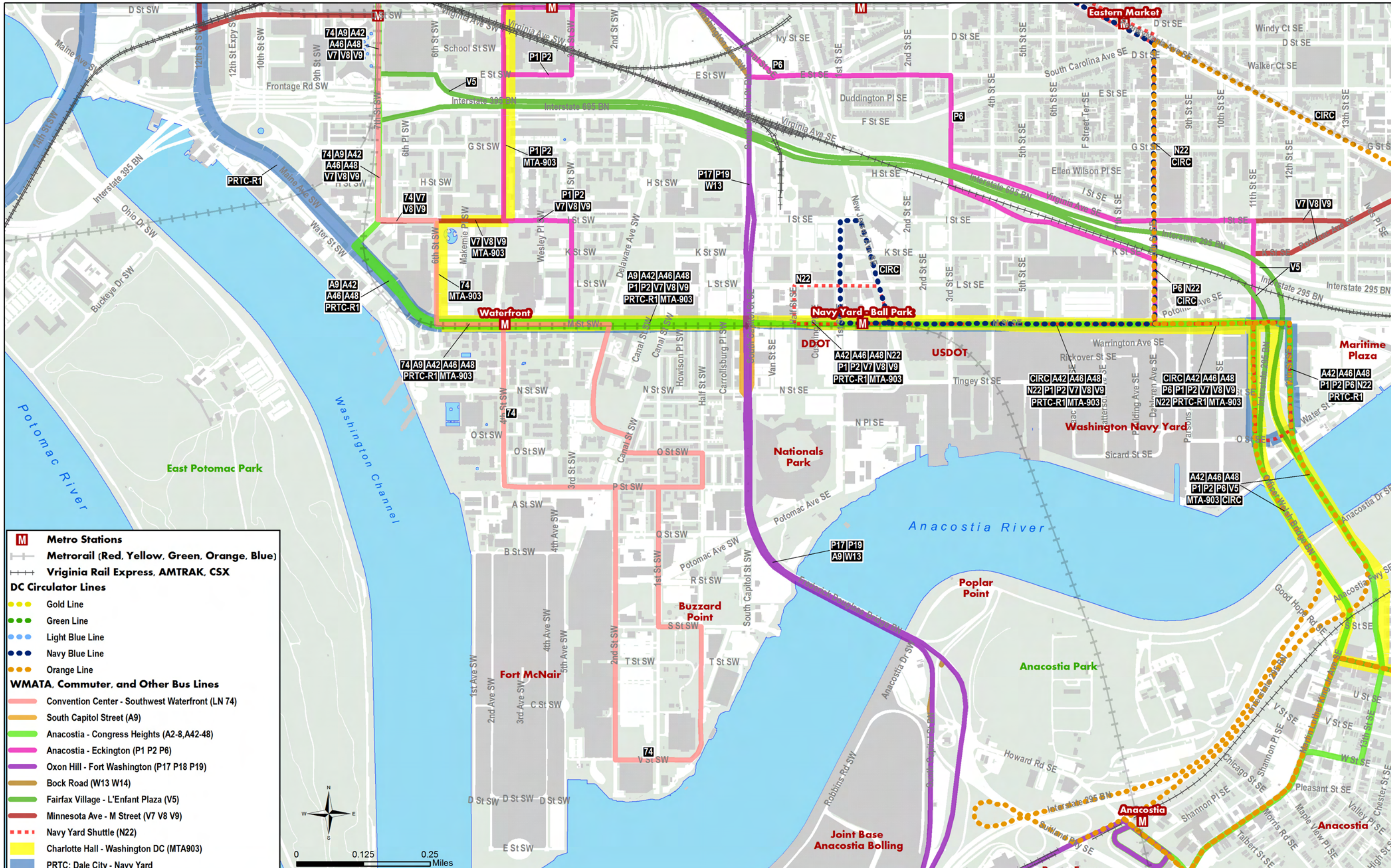
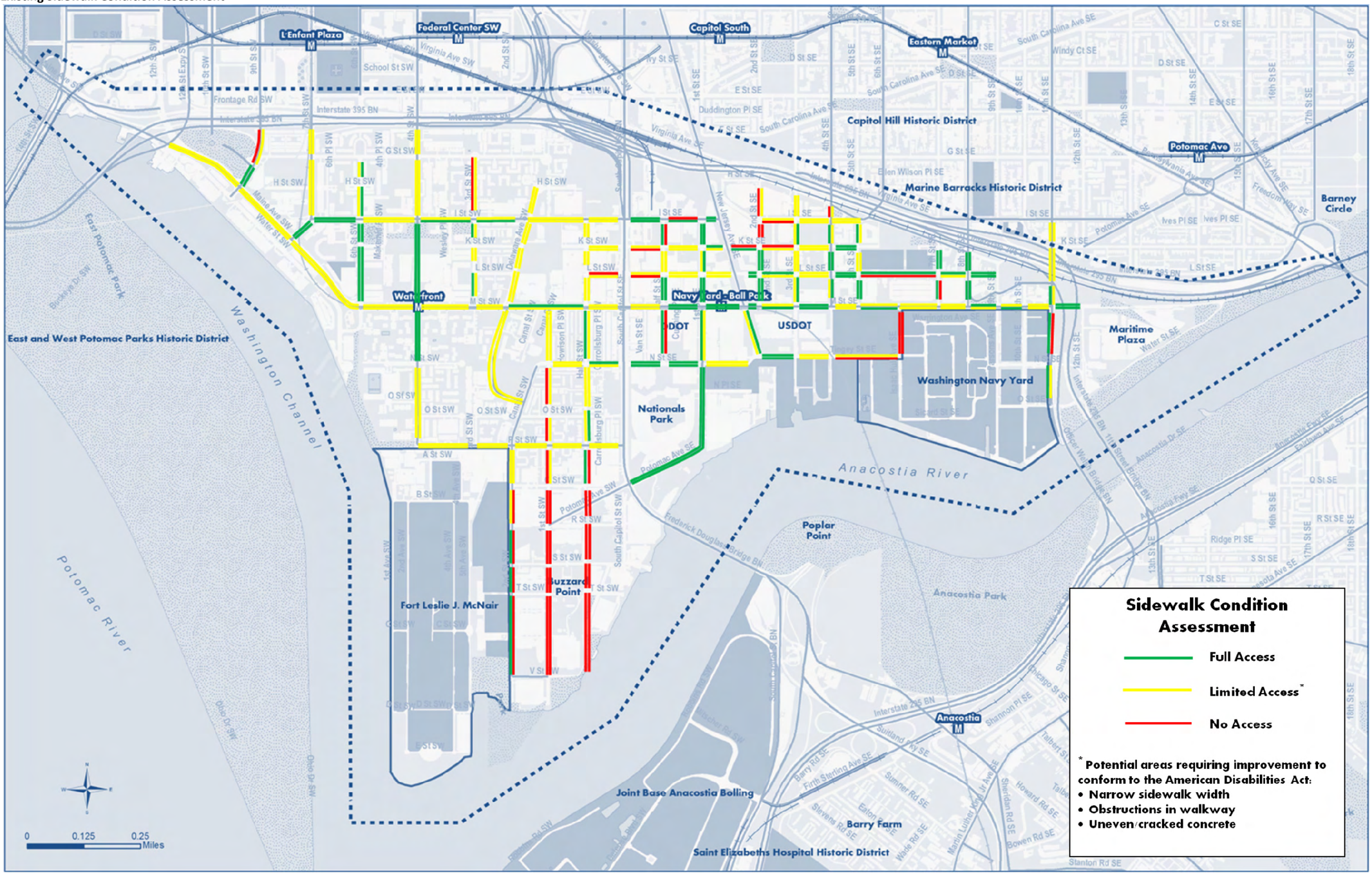


FIGURE 2-28
Existing Sidewalk Condition Assessment

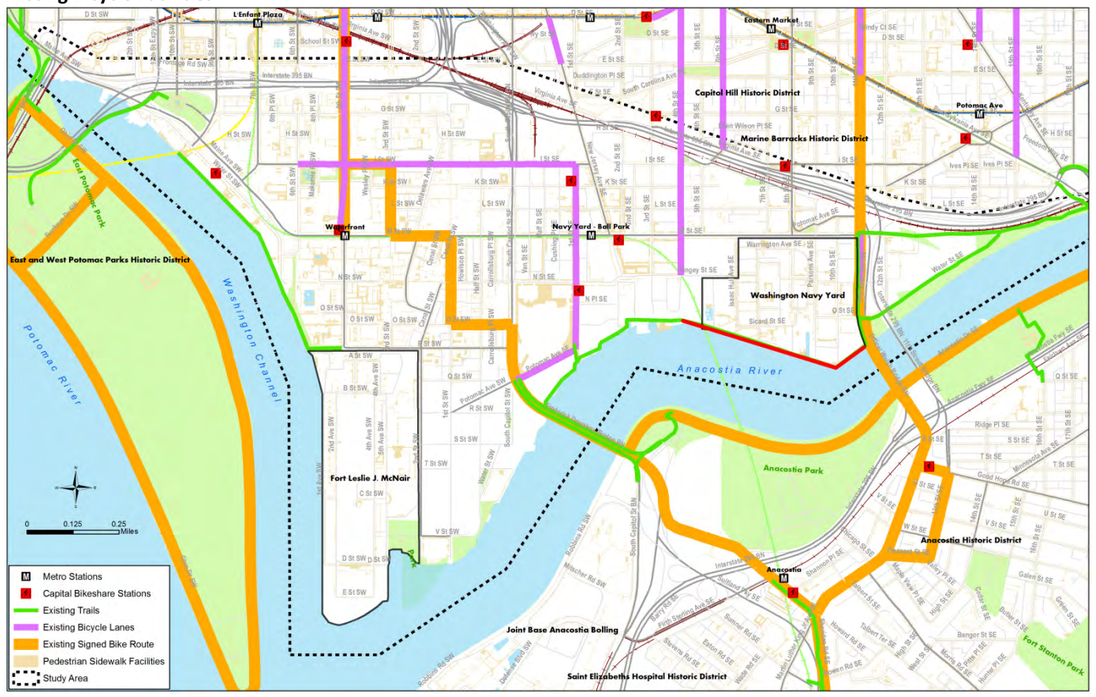


2.4.4 Bicycle Facilities

While the recent Capital Bikeshare program has increased access to bicycles (**Figure 2-29**), corridor facilities designed for bicycle use are generally limited within the Study area, compared with other parts of the District. Areas with bicycle routes include:

- Bicycle lanes along Potomac Avenue spanning two blocks west and east of South Capitol Street;
- Bicycle lanes along I (Eye) Street SW and portions of I (Eye) Street SE (up to New Jersey Avenue);
- Multi-use trails connecting P Street and Water Street SW and across the Frederick Douglass and Frances Case Memorial Bridges;
- Signed bicycle routes in the Southwest quadrant running in a "step-wise" fashion: along O Street SW from South Capitol Street to 1st Street SW, along 1st Street to M Street SW, along M Street to 3rd Street SW, along 3rd Street to I (Eye) Street SW, along I (Eye) Street to 4th Street SW, and along 4th street towards the National Mall.

FIGURE 2-29
Existing Bicycle Facilities



General barriers to bicycle improvements within the Study area include:

- Inadequate space for bicycling on streets;
- Lack of visible bicycle facilities on many roadways;
- Complex intersections with vehicles turning in many directions;
- Conflicts with parked vehicles, transit and taxi services (curbside management issues);
- Lack of ability to accommodate bicycles on Metrorail during peak periods; and
- Unmarked bicycle routes.

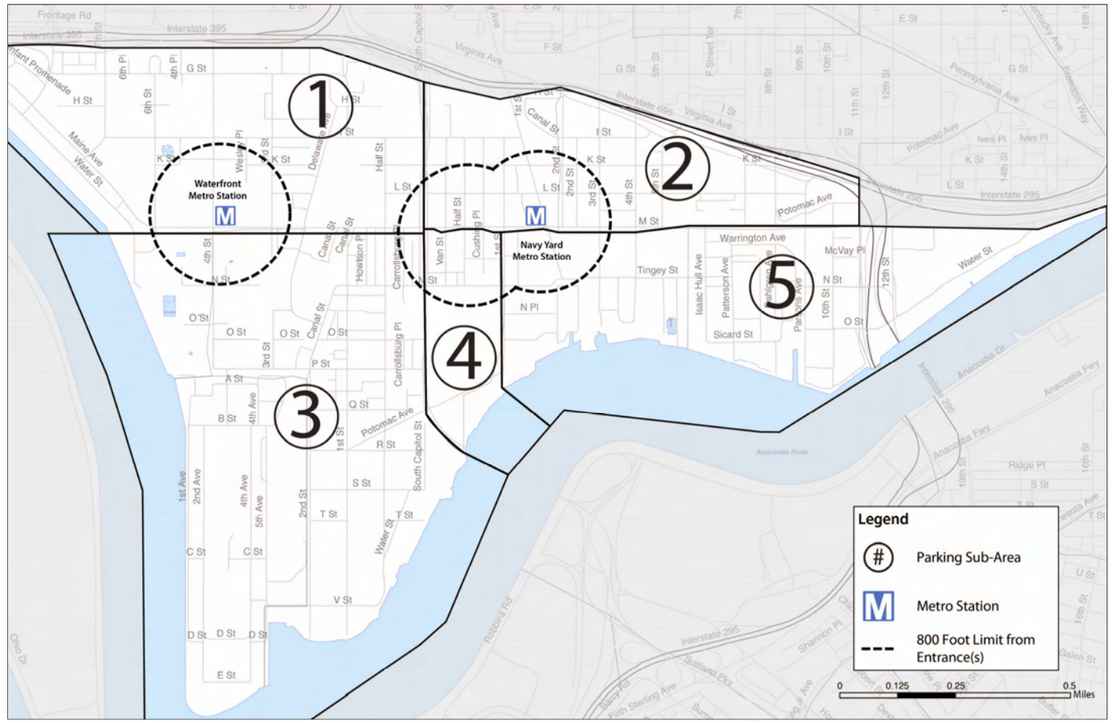
Given that approximately 8.5 percent of commuters utilize bicycles in the Southwest region (highest density contained within the boundary of I (Eye) Street, South Capitol Street, M Street, and 3rd Street SW), there is significant demand within the region to expand and improve bicycle facilities.

As part of DDOT's 2005 Bicycle Master Plan, a bicycle level-of-service (BLOS) score was assigned roadways within the Study area as a function of traffic volume, number of through lanes, lane width and lane striping changes, traffic volume variations, pavement surface, and percentage of heavy vehicles. This methodology, ultimately published by Bruce Landis in NCHRP Report 616, found that Potomac Avenue had a BLOS of F, South Capitol Street had a BLOS of E, M Street had a BLOS of D (primarily in Southwest) and C (in Southeast), I (Eye) Street varied between a BLOS of C and D, and New Jersey Avenue, 4th Street, and 2nd Street, SW had a typical BLOS of C.

2.4.5 Parking /Freight Loading

In an effort to more efficiently view the parking supply and use data, the Study area has been subdivided into Subarea Parking Districts, which are shown in **Figure 2-30**. These Subareas are built upon the Metropolitan Washington Council of Governments (MWCOG) Traffic Analysis Zones. The Districts divide the Study area into quadrants bounded by M Street and South Capitol Street and with a fifth smaller district (representing the stadium area) sub-divided out from the Southeastern quadrant.

FIGURE 2-30
Subarea Parking Districts



2.5 Existing Parking Supply

Over 19,000 parking spaces have been identified in the Study area. About 22 percent of these spaces are in off-street surface lots and about 19 percent are on the street. The total existing parking supply is outlined in **Table 2-5**.

Most of the parking inventory (76 percent) is east of South Capitol Street. Other characteristics of current parking supply are outlined below:

- More than half of on-street parking is restricted by Residential Permit Parking (RPP)
- Parking turnover of on-street parking in the vicinity of the ballpark averages approximately 2 hours per vehicle
- Structured parking is the largest single category of parking (59 percent)
- Rush hour restrictions

TABLE 2-5
Total Existing Parking Supply

Subarea	On-street	Off-street (Structured)	Off-street (Surface)	Total	Percent of Total Study Area
1	1,275	1,160	230	2,665	13.7
2	1,100	4,400	1,250	6,750	34.6
3	1,200	0	800	2,000	10.3
4	15	1,200	500	1,715	8.8
5	100	4,700	1,550	6,350	32.6
Total	**3,690**	**11,460**	**4,330**	**19,480**	**100**
Percent of Total	**18.9**	**58.9**	**22.2**	**100**	**--**

2.5.1 Existing On-Street Parking

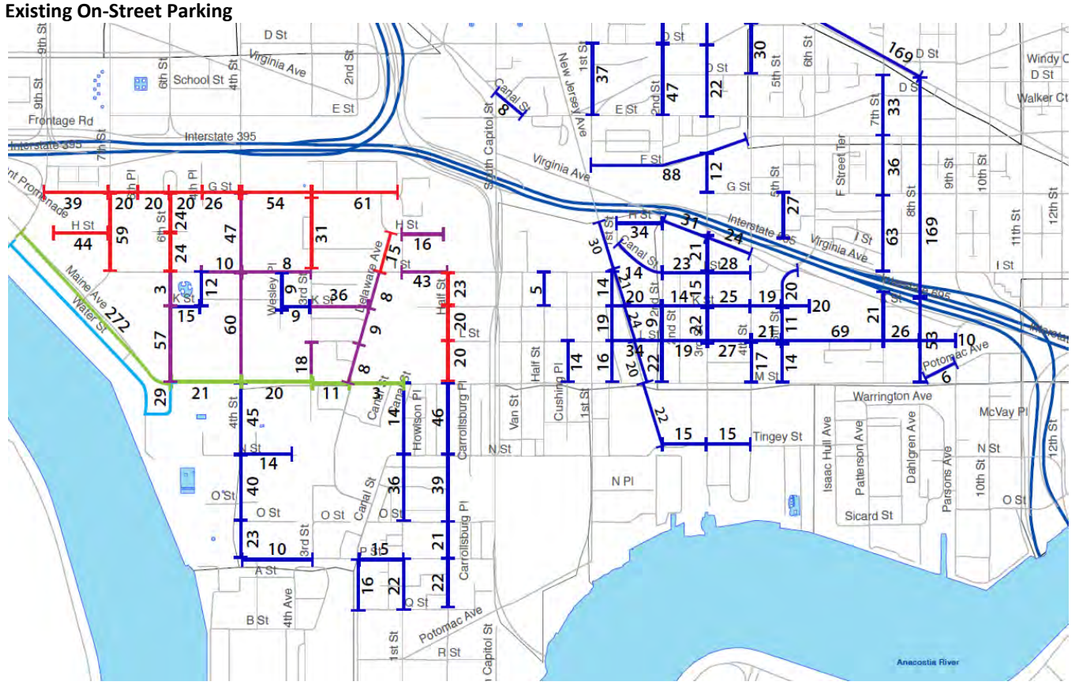
The inventory of on-street parking was based upon a compilation of available inventories from other resources, a review of aerial surveys, and field verification in the Study area. On-street parking is primarily distributed amongst Subareas 1, 2, and 3. Half of the on-street parking is restricted to RPP in those three areas. The location and quantities of existing on-street parking are detailed in **Figure 2-31**, and quantities by type are detailed in **Table 2-6**.

TABLE 2-6
Existing On-Street Parking Supply

Subarea	Metered spaces	RPP	Other	Total	Percent of Total Study Area
1	150	820	315	1,275	34.5
2	600	450	40	1,100	29.9
3	250	600	350	1,200	32.5
4	15	0	0	15	0.4
5	25	0	75	100	2.7
Total	**1,040**	**1870**	**780**	**3,690**	**100**
Percent of Total	**28.2**	**50.7**	**21.1**	**100**	**--**

.

FIGURE 2-31
Existing On-Street Parking



2.5.2 Existing Off-Street Parking

Off-street parking comprises the largest subgroup of parking in the Study area (80 percent of all spaces). About half of the off-street parking is found in the Southeast quadrant (Subareas 4 and 5) of the Study area.

Nearly three-fourths of off-street parking is structured parking; structured parking represents 59 percent of all parking in the Study area. Approximately 90 percent of the structured parking is located east of South Capitol Street. The parking is available for motorists accessing residential, office and retail land uses as well as stadium activities and non-event periods. The existing off-street parking is detailed in **Table 2-7**.

TABLE 2-7
Existing Off-Street Parking Supply

Subarea	Structured	Surface	Total	Percent of Total Study Area
1	1,160	230	1,390	8.8
2	4,400	1,250	5,650	35.8
3	0	800	800	5.1
4	1,200	500	1,700	10.8
5	4,700	1,550	6250	39.6
Total	**11,460**	**4,330**	**15,790**	**100**
Percent of Total	**72.6**	**27.4**	**100**	**--**

2.6 Existing Parking Utilization

2.6.1 On-Street Parking Utilization

On-street parking has been comprehensively inventoried as part of previous efforts by DDOT for their consideration of Performance Based Parking. The Ward 6 Ballpark District Performance Based Parking Report (2010) contains significant data that summarizes on-street parking utilization and turnover. Field checks of residential activity (June 2012) and a review of the report for The Wharf (Gorove/Slade, May 2012) corroborate the results of the larger area-wide 2010 Performance Based Parking report and its findings. A summary of this data is contained in **Table 2-8**.

TABLE 2-8
On-Street Parking Utilization (Curbside Use)

Subarea Parking District	Existing Parking Spaces	Utilization Occupied Spaces (%)
1	1,275	905 (71%)
2	1,100	725 (66%)
3	1,200	850 (71%)
4	15	10 (66%)
5	100	65 (65%)
Total	**3,690**	**2,555 (69%)**

In many cases, the 2010 on-street block surveys indicated that the maximum number of parked vehicles exceeded the number of parking spaces along certain blocks with higher parking demands (but not on all street segments). This can be attributed to illegally-parked vehicles, increased 'smart car' usage, and the increased efficiency of multi-space meters. However, the maximum utilization for Subarea Parking Districts noted in Table 2-8 is less than 100%, as it reflects existing utilization for all streets (ranging from low to high parking demand) within each Subarea.

A notable concern that was observed in the field and validated by the public is the recurring issue of double parking along major corridors, as well as on cross streets. In particular, 4th Street SW experiences a disproportionate level of illegal double-parking, which results in blocked vehicular lanes and bike lanes, safety issues for pedestrians, and frequent congestion in residential areas. Enforcement of parking violations, especially double parking, is a key issue.

On-Street Parking Turnover

The results of the Performance Based Parking Study in 2010 for DDOT also highlights parking turnover of on-street (curbside) parking throughout the same area as the M Street / SE-SW Transportation Study area. Key findings are as follows:

- On game days, the average turnover rate was 2 hours for all blocks; 1 hour and 49 minutes for metered blocks, and 2 hours and 6 minutes for non-metered blocks.
- On non-game days, the average turnover rate was 1 hour and 38 minutes for all blocks; 1 hour and 31 minutes for metered blocks, and 1 hour and 40 minutes for non-metered blocks.

2.6.2 Off-Street Parking Utilization

Spot surveys were conducted of off-street parking locations around the Study area. Utilization varied significantly from 50 percent at an 800-space surface lot in Subarea 5 to less than 10 percent in a 625-space surface lot in Subarea 3. Most of the spaces reached peak demand during the morning peak or during the game times at the Nationals Stadium.

In general, off-street parking utilization changes throughout a typical weekday. In the Study area, parking utilization for each parking garage or lot will vary depending upon the type of users and costs and restrictions that may be in place. Residential activity displays lowest demand in the midday when retail and office activities are near their highest levels. Office parking demand peaks generally from 10 – 11 AM and 2 – 3 PM. Retail activity typically peaks around 1 PM.

2.6.3 Motor Coach / Tour Bus Lay-by Areas

There are several locations within the Study area where motor coaches and tour buses routinely park or lay-by. In some cases, regional commuter buses also temporarily park in some of the same locations. Along westbound Maine Avenue (700-900 block), there are seven curbside spaces that are dedicated for tour bus parking (7:00am-6:30pm, with a four hour limit), and are almost continually in use. Similarly, there are four dedicated curbside spaces for sightseeing and tour buses along Maine Avenue (900-1200 block) – owned by National Park Service – at the foot of Banneker Park. Because some motor carriers chose to idle in theses area while temporarily waiting for the start of another route or return trip, buses may circle through the area multiple times looking for an open space. Some buses resort to parking or idling temporarily along Water Street one block to the west. The resulting operational impacts create sporadic lane blockages on adjacent lanes of Maine Avenue, creating confusion for motorists traveling along Maine Avenue. The issue is most problematic in the afternoon peak period.

Additional bus parking facilities are provided in a lot between 1st and 2nd Streets SW, in Buzzard Point, as well as at the RFK Stadium Parking Lot (which provides unlimited entry and exit during the day for a flat fee). However, due to the isolated nature of both facilities, the lack of any convenient transit or pedestrian connectivity to those lots, and the relatively inexpensive cost of parking on-street along Maine Avenue, the majority of motor coaches and tour buses avoid the satellite lots in favor of Maine Avenue.

2.6.4 Waterways / Water Taxis

The Study area has access to multiple marina and boarding locations, including several along the Washington Channel, two locations at the tip of Buzzard Point, and additional landings just south of Nationals Park baseball stadium along the Anacostia River. A key existing issue that was observed at nearly all locations is the lack of multimodal connectivity or mode options at the interface between the land-based transportation network and the waterways.

The Potomac Riverboat Company currently provides a water taxi service (a.k.a. "The Baseball Boat") between Alexandria, Virginia, and Nationals Stadium (by way of Diamond Teague Park) on days when the Washington Nationals have home games. The trip is approximately 35 minutes from shore to shore and tickets may be purchased to reserve a round trip. Although there is not currently standard regular water taxi service between the Southeast or Southwest waterfronts and Alexandria or National Harbor, Maryland, the projected changes in the land use over the next decade will likely make this mode of travel a more attractive option. However, the Southeast waterfront has poor transit connectivity and non-vehicular facilities between the Anacostia River shoreline and the locations with higher-density office space along the M Street corridor. Therefore, the existing network is not well-suited to encourage commuters from the region to consider using waterways as a regular means of travel to and from the Study area.

2.7 Study Area Crash History

Three-year crash data at available intersections on all major corridors within the Study area were collected and analyzed to evaluate the crash history and patterns. From 2008 to 2010, a total of 635 crashes occurred at the Study intersections including two fatal crashes (at 3rd Street and M Street, SW in 2009 and Half Street and M Street, SE in

2010), 187 injury crashes (consisting of 15 disabling injuries and 266 non-disabling injuries), and 446 property-damage only crashes. This totals to approximately $12.35 million per year in societal cost[1].

As presented in **Table 2-9**, the highest density of intersection crashes occurred along the South Capitol Street corridor (48% of all Study crashes), including 100 crashes at South Capitol Street and I (Eye) Street and 76 crashes at South Capitol Street and M St, over the past three years. The raw crash data and the summary statistics are included in **Appendix B**.

TABLE 2-9
Study Area Crash Statistics by Corridor (2008-2010)

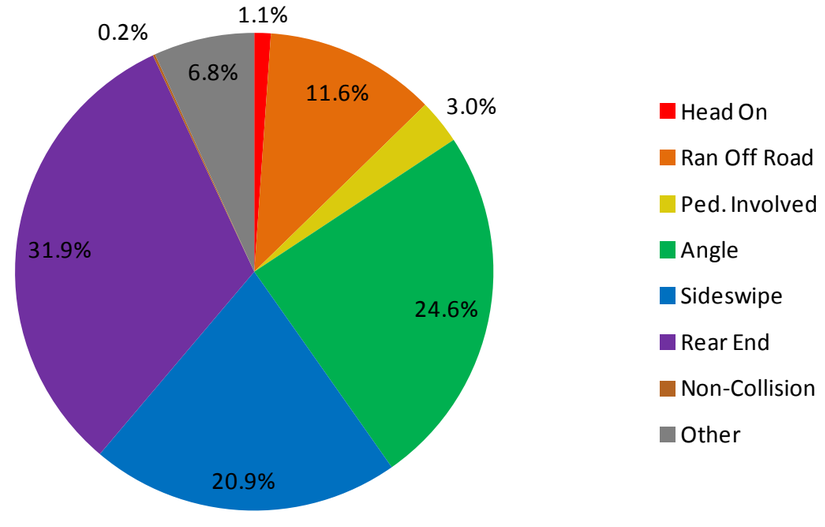
Study Corridor	3-year Total (Injury) Crashes	Average Annual Societal Cost (2012$)	Crash Rate (Crashes / Million Entering Vehicles)
M Street SW	102 (26)	$3.10 M	0.347
M Street SE	113 (28)	$3.20 M	0.323
South Capitol Street	307 (104)	$4.66 M	0.579
I (Eye) Street SW	35 (7)	$0.36 M	0.963
G Street/Maine Avenue, SW	41 (11)	$0.52 M	0.423
Virginia Avenue SE	37 (11)	$0.51 M	0.792
All Corridors	**635 (187)**	**$12.35 M**	**0.469**

In terms of crash rates[2], it was found that the I (Eye) Street SE-SW corridor had the most intersection crashes per million entering vehicles (0.963 as compared to the Study area average of 0.469). However, out of all intersections within the Study area, the most frequent crash rate (5.843) was found to occur at 4th Street and Virginia Avenue SE.

A total of 25 pedestrians and bicyclists were struck at the Study intersections between 2008 and 2010, with the most pedestrians (five) struck at 4th Street and M Street, SW and the most bicyclists (two) struck at South Capitol Street and I Street, while seven motorcyclists were also struck during the analysis period. DDOT has implemented changes in both intersections in response to these issues.

Figure 2-32 illustrates a breakdown of collision types from all the intersection crashes within the Study area. The most common collision type were rear end crashes (32%) followed by angle crashes (25%) and sideswipe crashes (21%). The typical contributing causes for these most common collision types are following too closely, heavy traffic conditions with fewer gaps, significant lane changing, and failure to stop. Ran-off-road crashes (12%) were notably high within the Study area, suggesting safety improvements are needed.

FIGURE 2-32
Study Area Collision Type Breakdown (2008-2010)

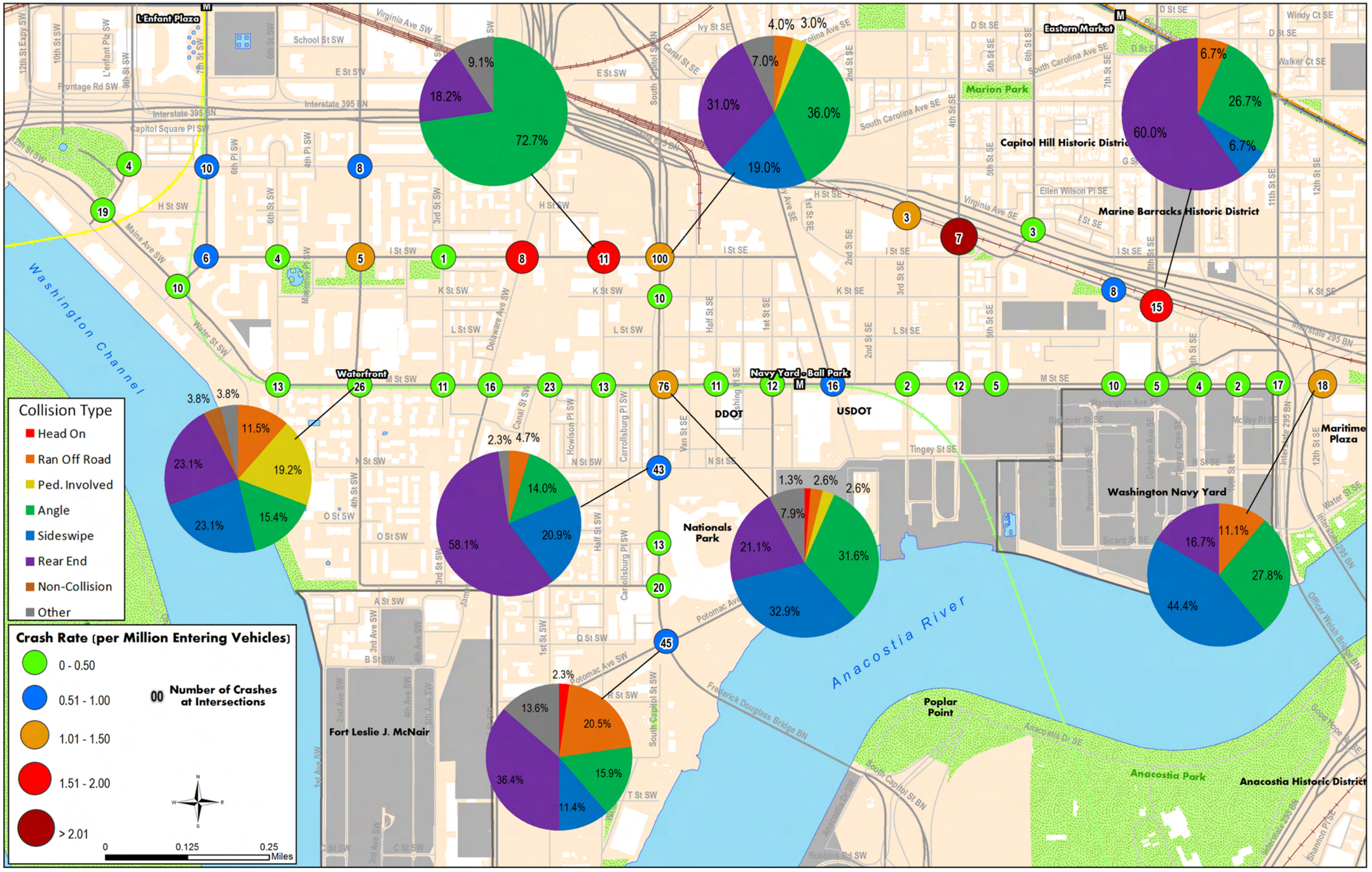


Most intersection crashes occurred in clear, lit, and dry conditions, with approximately 15 percent taking place in adverse weather conditions. A more detailed summary of number of crashes and the crash rate distributions at each of the Study intersections, and the collision type breakdown at some of the key intersections is presented in **Figure 2-33**.

1 Represents the comprehensive cost to society resulting from medical care, emergency services, property damage, and lost productivity (*tort liability damages are not generally included in the analysis). This value is assigned to various crashes based on severity. The Highway Safety Manual provides national estimates which when adjusted to 2012 dollars, can be assessed as Fatal crash – $5,549,255, injury crash – $114,338, and property damage only crash – $10,243.

2 Intersection crash frequency is typically measured by taking the number of crashes for every million vehicles entering the intersection. While the critical crash rate varies by intersection, for this study crash rates can be generally graded by level-of-services (LOS) as LOS A – crash rate between 0 and 0.5, LOS B – crash rate between 0.5 and 1.0, LOS C – crash rate between 1.0 and 1.5, LOS D – crash rate between 1.5 and 2, LOS F – crash rate greater than 2.0.

FIGURE 2-33
Study Area Crash Summary and Crash Rate Distributions (2008-2010)



2.8 Anacostia Waterfront Initiative Projects Currently Underway

There are a number of AWI projects that DDOT is currently implementing in various stages of design and/or construction. Notable projects are shown in **Table 2-10** below:

TABLE 2-10
AWI Projects Currently Underway

AWI Project	Project Status
11th Street Bridges Project	Phase 1 under construction – completion by 2013 Phase 2 anticipated completion by 2015
Anacostia Riverwalk Trail	Partially completed – portions will be built as part of The Wharf redevelopment and the South Capitol Street Project
DC Streetcar	Environmental Study and Preliminary Concept Design underway – Anacostia initial segment track work completed
South Capitol Street Corridor	Environmental Study and Preliminary Design nearing completion – portion adjacent to Nationals Park completed

2.9 Existing Conditions Highlights and Observed Conditions Used to Inform Future Analysis

Existing Study Area Vehicle Trips:

- Inbound: AM Peak Period = 17,000 vehicles per 3-hour peak
- Outbound: AM Peak Period = 7,000 vehicles per 3-hour peak
- Inbound: PM Peak Period = 11,200 vehicles per 3-hour peak
- Outbound: PM Peak Period = 19,500 vehicles per 3-hour peak

Major Issues Traffic Identified Through Public Input:

- 4th Street & I (Eye) Street SW: Existing cut-through traffic
- I (Eye) Street SE: Lack of connectivity beyond New Jersey Avenue
- Maine Ave: Long Queues during peak periods, tour bus blockages
- I (Eye), K, L Streets: East-West connectivity issues
- Along M Street SE: Need for improved signal timing
- 4th Street. SW, south of M Street: Cut-through traffic with long queues in PM peak
- South Capitol Street at M Street: Recurring congestion in peak periods that spills back through multiple intersections
- P Street SW and Potomac Avenue: Long queues during peak periods
- South Capitol Street: Recurring congestion in peak directions
- Local street speeds / cut-through traffic

Chapter 3
FUTURE BASELINE CONDITION AND EVALUATION OF ALTERNATIVES

3. Future Baseline Conditions and Overview of Improvements

This chapter summarizes the development and evaluation of the Baseline transportation conditions for the Study area. The analysis focused on evaluating all transportation modes under the build-out conditions for future development out to the year 2035.

3.1 The Future of the M Street Corridor

The M Street corridor, as well as the overall Study area, will experience tremendous growth over the next five to eight years. The area will hold an additional 36 million SF from the Capitol Riverfront Business Improvement District (BID), as well as other future developments with an anticipated minimum land-use breakdown as follows:

- Office – 16.5 M SF, which translates to 100,000 employees
- Residential – 9,000 units, which translates to 16,000 residents
- Retail/Restaurant – 1 M SF
- Hotel – proposed up to 1,500 rooms
- Plus additional development

Data from 2011 indicates that approximately 28 percent of that development has already occurred. For comparison purposes, the Tysons Corner area currently holds 46 M SF of office and retail in a 4.9-square-mile area. Future planned developments will dramatically transform the area, generating a vibrant destination point with new access to the river and more than 2 miles of river frontage with docks and a future marina. The area will become one of six high-density places to live, work, and play on the water in the DC region. In addition, the M Street SE/SW corridor and Anacostia waterfront areas will become an integral part of an active and vital neighborhood where residents can walk and bike for basic services and use transit to other destinations.

Figure 3-1 graphically depicts the magnitude and location of projected build-out development[1]. In this figure, future buildings within the Study area are shown in blue, and existing development is shown in gray. The magnitude and type of growth planned for the area will drastically change the transportation conditions for local residents, visitors, and commuters. In addition to the massive new development, significant roadway improvements are planned for the freeway system encompassing the Study area—I-395/I-695 and the 11th Street Bridges—as well as for the main north-south arterial corridor—South Capitol Street. The combination of growth, changes in land use, and roadway improvements will significantly affect trip patterns within the area and vicinity. As the M Street SE/SW corridor and other local streets capture increased local activity, commuters will tend to avoid the area and continue using the freeway system. However, while this shift in commuter traffic will alleviate the M Street SE/SW corridor, expected growth in local activity will generate and attract new trips, both externally and internally, so several roadways will experience significant growth in traffic volumes.

The Study focused on understanding the principal transportation issues derived from future growth in the Baseline condition and trip pattern changes due to roadway improvements already planned for the area. Operations were evaluated for all transportation modes during AM and PM peak-hour, typical day activity. Given that most of the planned development will be in place by 2020 and looking into build-out conditions plus 15 years beyond the "opening year," the analysis year for the Study is 2035. The following sections of this chapter summarize the main findings regarding operational issues and challenges that the transportation system will experience if no additional improvements (roadways, transit, pedestrian and bicycle facilities) are implemented in the area in order to handle the expected demand by 2035.

[1] Figure 3-1 was generated by Interface Multimedia for the Capitol Riverfront.

FIGURE 3-1
Projected Build-out Development within the Study Area

Source: Capitol Riverfront website, www.capitolriverfront.org

3.2 Travel Demand Forecast

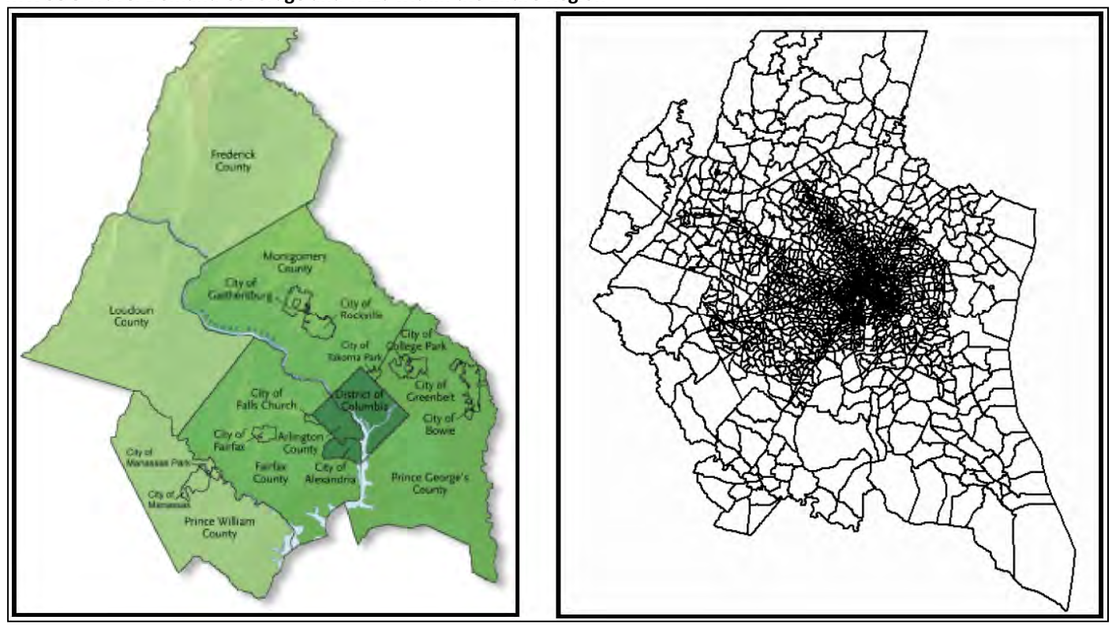
The Washington metropolitan region follows a defined transportation planning process. The Transportation Planning Board (TPB), which is the recognized metropolitan planning organization (MPO) for the Washington metropolitan region, has developed a transportation planning process, based on federal requirements, that forecasts the transportation impacts, needs, and travel patterns over a 20- to 25-year time frame. The TPB, in conjunction with the Metropolitan Washington Council of Governments (MWCOG), uses a regional travel demand model to produce regional travel demand forecasts and air quality assessments in order to support long-range planning and for the development of key planning documents. The model is essential for the development of the Constrained Long-Range Transportation Plan (CLRP) and the 6-year Transportation Improvement Program (TIP). The modeling process produces travel forecasts (in the form of vehicle trips, vehicle miles of travel, transportation mode choice options, and vehicular speed data) that can be used in a variety of decision making opportunities by the local jurisdictions. The MWCOG model was the foundation for determining future traffic volumes and future traffic impacts for this Study.

The MWCOG travel demand model is refined on a periodic basis with newly collected data or with emerging forecasting techniques. For this Study, the travel demand model approved in the TPB version 2.2 with changes relating to current TIP and CLRP publications was used.

Although the analysis focused on the Study area, the MWCOG model covers the entire metropolitan region, consisting of an area of 6,800 square miles, or 22 jurisdictions (counties and cities). This area is divided into about 2,000 traffic analysis zones (TAZs). The overall highway network represents more than 27,000 road segments, and the transit network includes more than 600 routes, encompassing such modes as Metrorail, Metrobus, other local bus, commuter bus, and commuter rail. **Figure 3-2** shows the entire MWCOG model jurisdiction as well as the TAZs

encompassed within the region. On the other hand, the M Street / SE-SW Transportation Planning Study area encompasses only 15 TAZs in its current version. While the Study area is only a small portion of the entire network and the Study focused on understanding the transportation demand within the limits of the Study area, by obtaining O-D data and link volumes from the overall model, the analysis has also captured the regional aspects of trips as well as future changes in trip patterns associated with changes in future land use and future roadway improvements beyond the limits of the Study area.

FIGURE 3-2
MWCOG Travel Demand Coverage and TAZs within the Entire Region

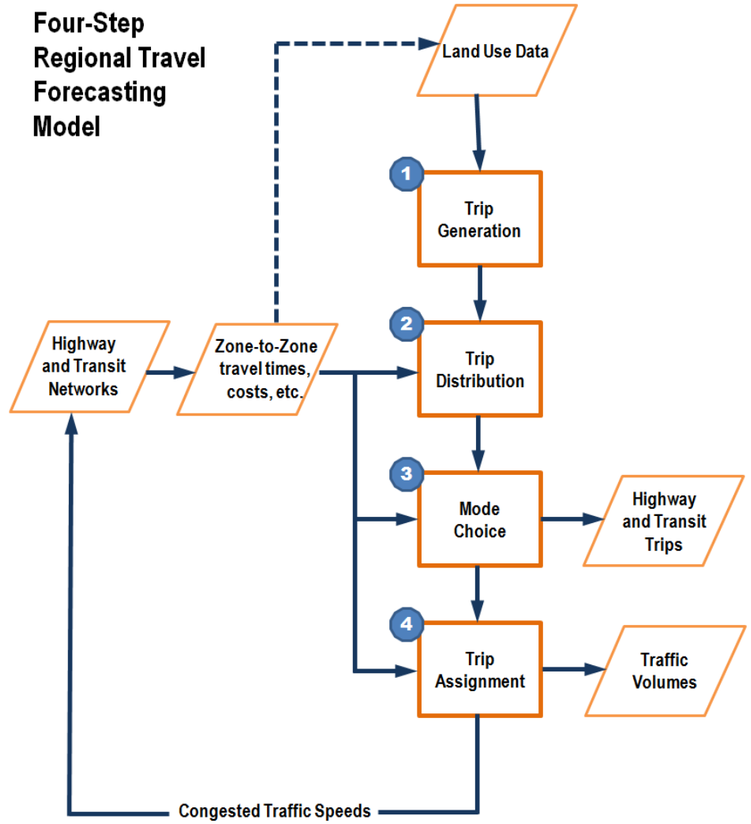


Source: www.mwcog.org, 2012

For its regional travel demand model, MWCOG uses a four-step process to determine travel demand. The four steps of this process are shown in **Figure 3-3** and are described below:

- **Trip generation** – Calculate the number of daily trips that take place in the region by estimating the number of "trip ends" produced in and/or attracted to each TAZ in the region. It is important to note that the methodology used in the trip generation process could result in a slight overestimation of number of trips due to the low sensibility of the model to transit impacts, pedestrian infrastructure, bicycle facilities, and urban settings in general. Nevertheless, travel demand forecast is the best tool available for planning purposes and differences in trip generation are overcome through post-processing and local calibration techniques.
- **Trip distribution** – Identify the geographical linkages between the trips "produced" and those "attracted" to develop complete trips.
- **Mode choice** – Identify the mode of travel for commuters (mass transit, drive alone, or carpooling).
- **Trip assignment** – Identify the routes travelers choose to reach their destinations.

FIGURE 3-3
MWCOG Four-Step Regional Travel Forecasting Model

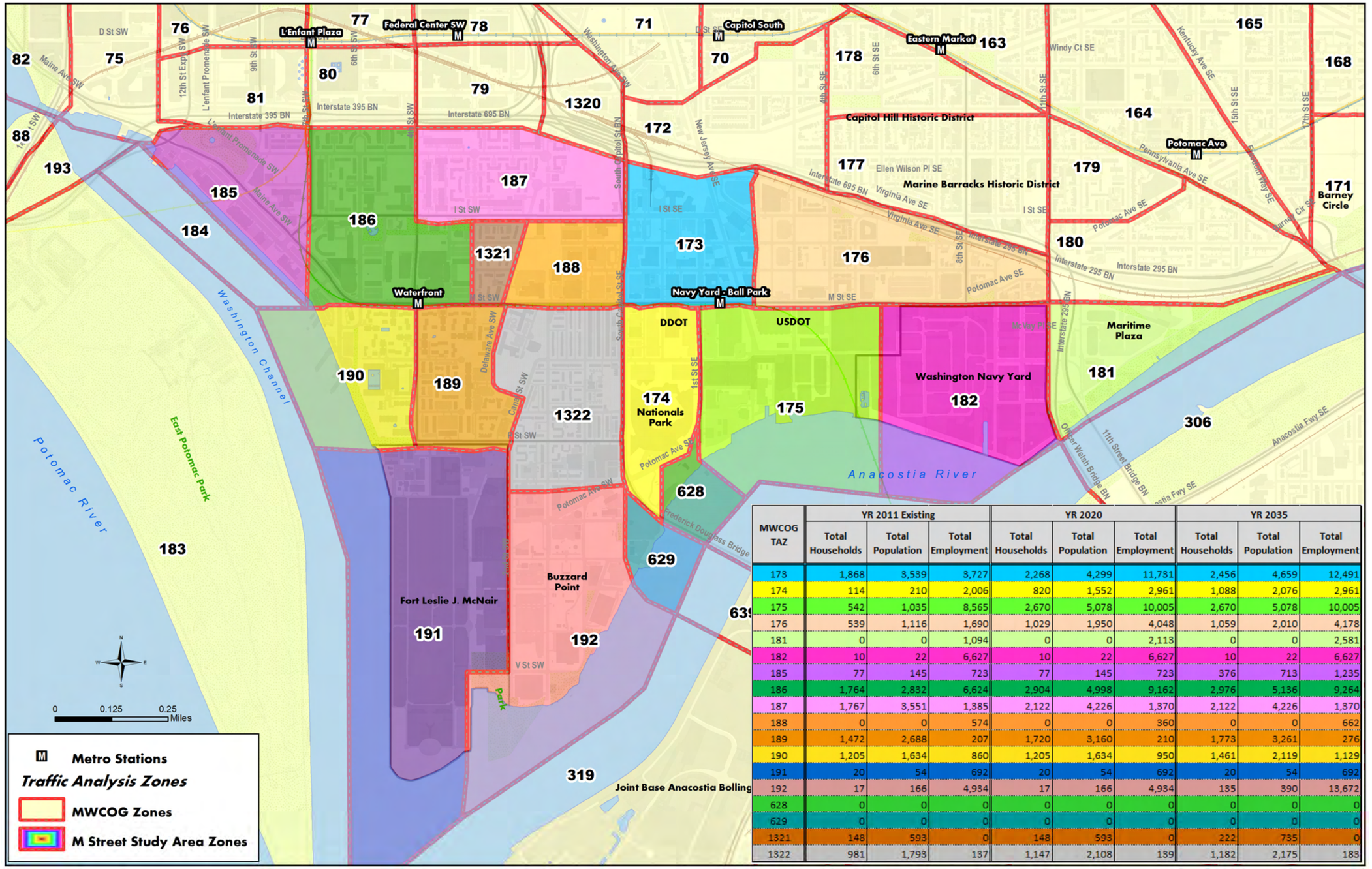


Source: www.mwcog.org, 2012

3.3 Planned Land-Use Changes

Land-use forecasts are one of the important bases upon which travel demand forecasts are built. The Study team completed a thorough review of the 2035 land use for accuracy, reasonableness, and to understand the implications of growth on the transportation forecasts. As described in Chapter 1, one of the Study's principal objectives was to understand the multimodal transportation impacts within the Study area that will result from future development. Therefore, it was of critical importance to confirm the reasonableness of land-use assumptions in order to adequately forecast future trips in the area and predict the trip patterns associated with future activity. As part of the travel demand modeling effort, the Study team reviewed the available land-use data from the MWCOG Round 8.0 Cooperative Forecasting based on years 2010, 2020, and 2035. **Figure 3-4** shows number of households, total employment, and total population by TAZ for each analysis year within the Study area.

FIGURE 3-4
MWCOG Round 8.0 Land Use Cooperative Forecasting



MWCOG TAZ	YR 2011 Existing			YR 2020			YR 2035		
	Total Households	Total Population	Total Employment	Total Households	Total Population	Total Employment	Total Households	Total Population	Total Employment
173	1,868	3,539	3,727	2,268	4,299	11,731	2,456	4,659	12,491
174	114	210	2,006	820	1,552	2,961	1,088	2,076	2,961
175	542	1,035	8,565	2,670	5,078	10,005	2,670	5,078	10,005
176	539	1,116	1,690	1,029	1,950	4,048	1,059	2,010	4,178
181	0	0	1,094	0	0	2,113	0	0	2,581
182	10	22	6,627	10	22	6,627	10	22	6,627
185	77	145	723	77	145	723	376	713	1,235
186	1,764	2,832	6,624	2,904	4,998	9,162	2,976	5,136	9,264
187	1,767	3,551	1,385	2,122	4,226	1,370	2,122	4,226	1,370
188	0	0	574	0	0	360	0	0	662
189	1,472	2,688	207	1,720	3,160	210	1,773	3,261	276
190	1,205	1,634	860	1,205	1,634	950	1,461	2,119	1,129
191	20	54	692	20	54	692	20	54	692
192	17	166	4,934	17	166	4,934	135	390	13,672
628	0	0	0	0	0	0	0	0	0
629	0	0	0	0	0	0	0	0	0
1321	148	593	0	148	593	0	222	735	0
1322	981	1,793	137	1,147	2,108	139	1,182	2,175	183

For each TAZ within the Study area, existing (2011) and future (2020 and 2035) socioeconomic variables from the MWCOG Round 8.0 were compared with similar variables derived from background development data obtained from the sources on future developments planned for the area. Two main data sources were used to compile a comprehensive list of anticipated future developments within the Study area: The Capitol Riverfront BID Project Inventory information as of the first quarter of 2012 from the BID team and the *Transportation Impact Study: Southwest Waterfront (The Wharf) Stage 2 (May 14, 2012) PUD for Phase 1*, prepared by Gorove/Slade. Development data such as number of units and total square feet were converted to number of households, employment, and population using recommended conversion factors obtained from the DC Office of Planning. These efforts resulted in the following key findings:

- There were significant differences for all the socioeconomic variables between the forecasted MWCOG data and the data derived by the Study team. The differences are significant both at the aggregate level and at the individual TAZ level.
- A significant portion of the development is already constructed. The Study team assumed that all developments that have been constructed by 2010 are already incorporated into the 2011 land-use data from MWCOG Round 8.0 forecasts.
- The Study team found that none of the available plans for development within the Study area show a completion year beyond 2020. Therefore, derived land-use data for the Study area TAZs are the same for both 2020 and 2035 planning horizons.
- At the aggregate level for the Study area zones, the MWCOG data are under-predicting households by about 4,800 units and significantly under-predicting total employment by about 26,400.

Based on these findings, the Study team recommended adjusting the land-use data for the 2035 scenario based on the land uses directly derived from the available data on future development planned within the Study area. **Table 3-1** summarizes the recommended values for each socioeconomic variable by each of the 18 Study area TAZs for the year 2035. The detailed land-use assumptions and methodology are provided in **Appendix E**.

Figure 3-5, **Figure 3-6**, and **Figure 3-7** depict the projected growth for population, households, and employment, respectively, in the Study area from existing year to 2035 analysis year. General findings based on these figures are:

- The high growth of land use is more concentrated in the TAZs that are on the east side of South Capitol Street. Several projects contribute to this growth, with key developments including the Capitol Riverfront area as well as The Yards. On the west side of South Capitol Street, TAZs 185 and 192 also demonstrate strong land-use growth resulting from numerous developments by various developers, such as Southwest Waterfront (The Wharf) and Buzzard Point.
- TAZs 173, 175, and 185 have the highest growth in terms of both households and population as a result from dense residential unit development consisting of apartments, townhouses, and condos. The Yards at Southeast Federal Center in TAZ 175 alone will create approximately 2,800 households by 2020.
- TAZs 173 and 192 show the highest employment growth, resulting in approximately 13,000 new jobs in each TAZ.

Figure 3-8 and **Figure 3-9** illustrate the daily person-trip growth at the TAZ level from the existing condition to 2035 analysis year for production and attraction, respectively. The percentages of growth of production and attraction within the entire Study area are 121 percent and 106 percent, respectively. TAZs 175 and 185 each produce more than 10,000 additional person trips daily, which reflect the rapid growth of households and population in these TAZs. TAZs 173, 175, and 192 each attract more than 20,000 additional person trips daily, which reflect the rapid growth of employment in these TAZs.

TABLE 3-1
Proposed Land Use for 2020 and 2035 to be used in M Street / SE-SW Transportation Planning Study

MWCOG TAZ	Modified YR 2035 (MWCOG 2011 + Land-use Growth) by AWI Team								
	Households	Household Population	Group Quarters Population	Total Population	Total Employment	Industrial Employment	Retail Employment	Office Employment	Other Employment
173	3,586	7,228	0	7,228	17,472	607	1,247	14,682	936
174	1,409	3,007	0	3,007	8,206	0	1,394	6,331	480
175	3,377	7,044	0	7,044	16,000	80	1,271	13,067	1,582
176	1,724	3,592	0	3,592	6,572	1,101	415	4,867	188
181	408	774	0	774	4,438	1,004	188	3,047	199
182	10	22	0	22	6,627	1,075	575	2,489	2,488
185	2,096	4,258	0	4,258	3,563	153	765	2,087	558
186	3,029	5,244	0	5,244	9,339	292	857	6,998	1,191
187	1,967	3,806	125	3,931	1,441	317	219	298	606
188	0	0	0	0	574	55	63	243	213
189	1,682	3,087	0	3,087	228	26	20	93	89
190	1,514	2,227	0	2,227	1,204	213	197	400	393
191	20	45	9	54	692	3	1	407	281
192	116	263	117	380	17,217	2,081	99	16,169	198
628	0	0	0	0	0	0	0	0	0
629	0	0	0	0	0	0	0	0	0
1321	148	593	0	593	0	0	0	0	0
1322	1,257	2,317	0	2,317	137	17	14	61	45
Total	**22,343**	**43,508**	**251**	**43,759**	**93,709**	**7,024**	**7,325**	**71,239**	**9,448**

Figure 3-10 shows the total person trips with destinations within the M Street Study area TAZ as well as transit share. In general, the Study area accommodates substantially high transit patrons. As mentioned above, TAZs 173, 175, and 192 are predicted to attract the highest number of person trips as a result of aggressive employment growth. Located in the vicinity of the Navy Yard-Ballpark Metrorail station, TAZs 173 and 175 have a significant transit mode share – 62 percent and 52 percent, respectively. Other TAZs that demonstrate a high transit mode share are TAZs 174 and 186, which are adjacent to Metrorail stations.

FIGURE 3-5
Population Growth from Existing Year to Year 2035

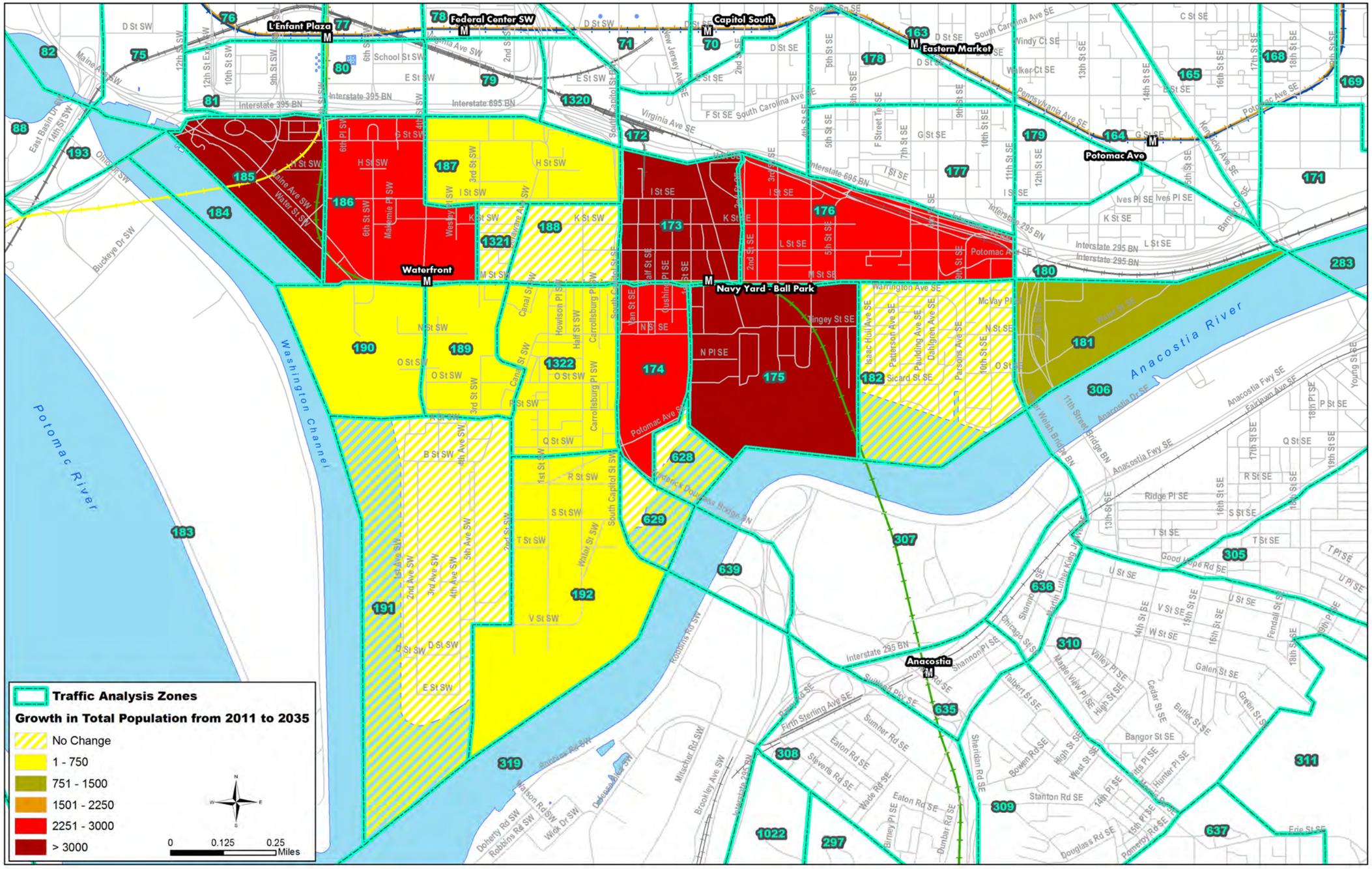


FIGURE 3-6
Household Growth from Existing Year to Year 2035

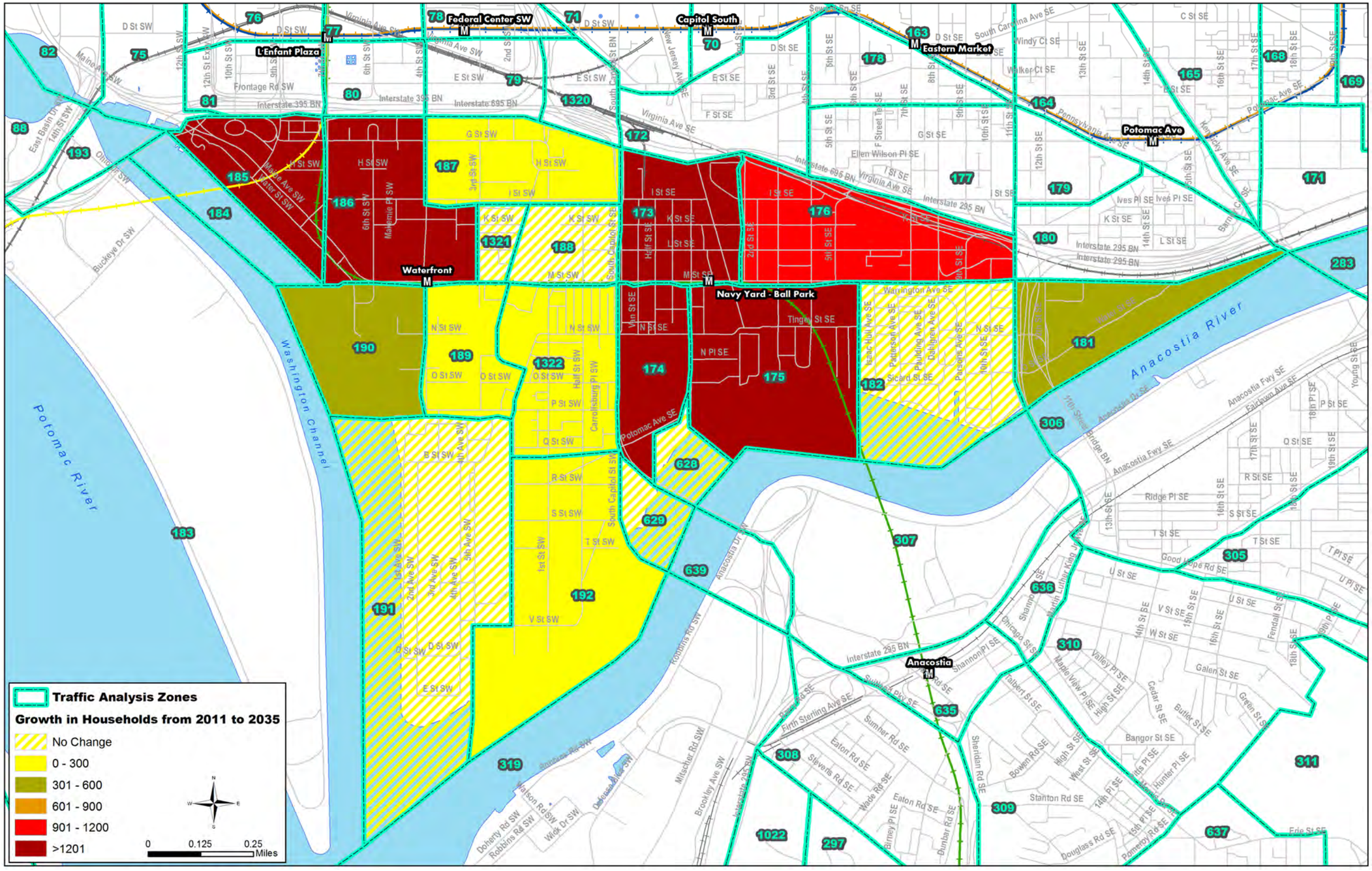


FIGURE 3-7
Employment Growth from Existing Year to Year 2035

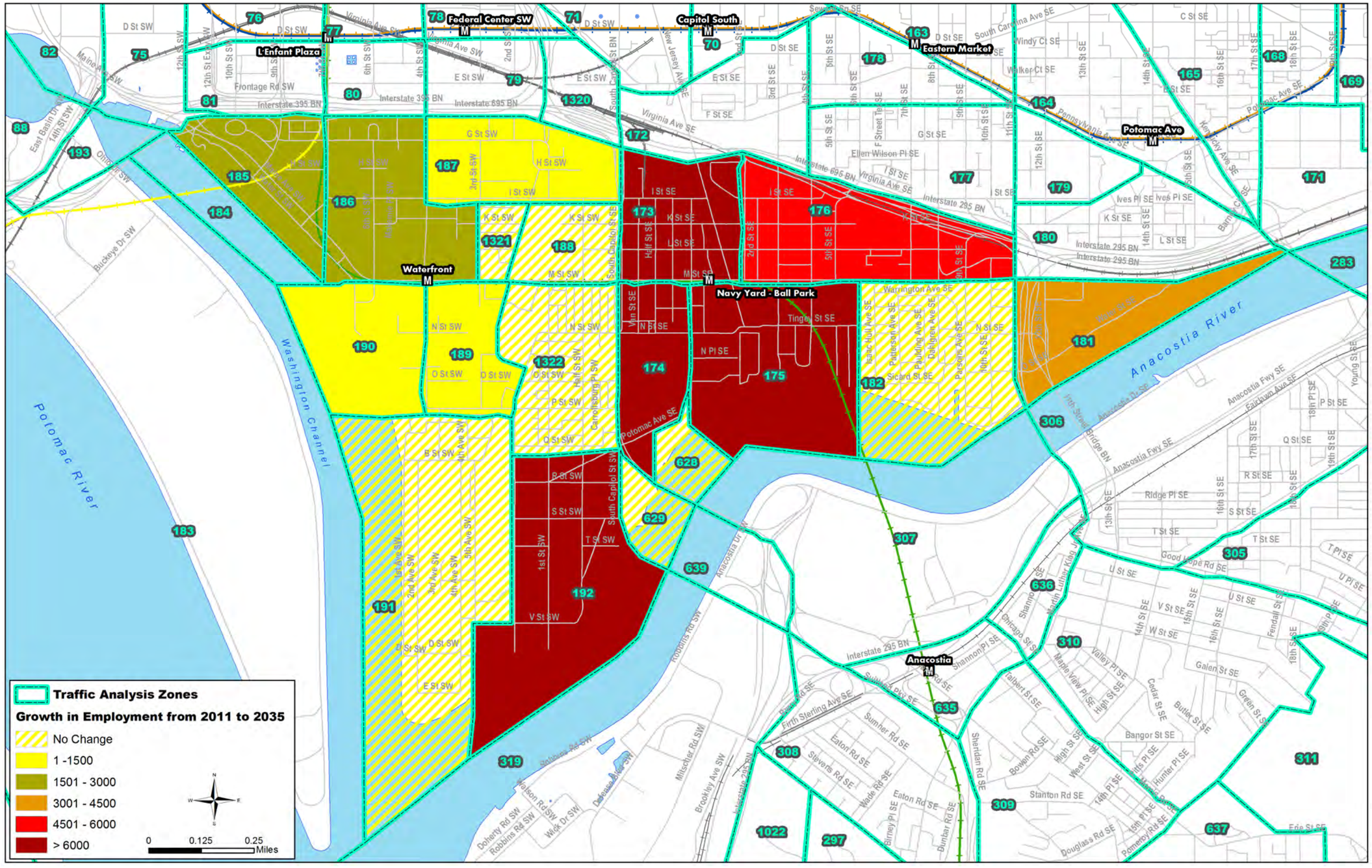


FIGURE 3-8

Daily Person-Trip Production Growth from Existing Year to Year 2035

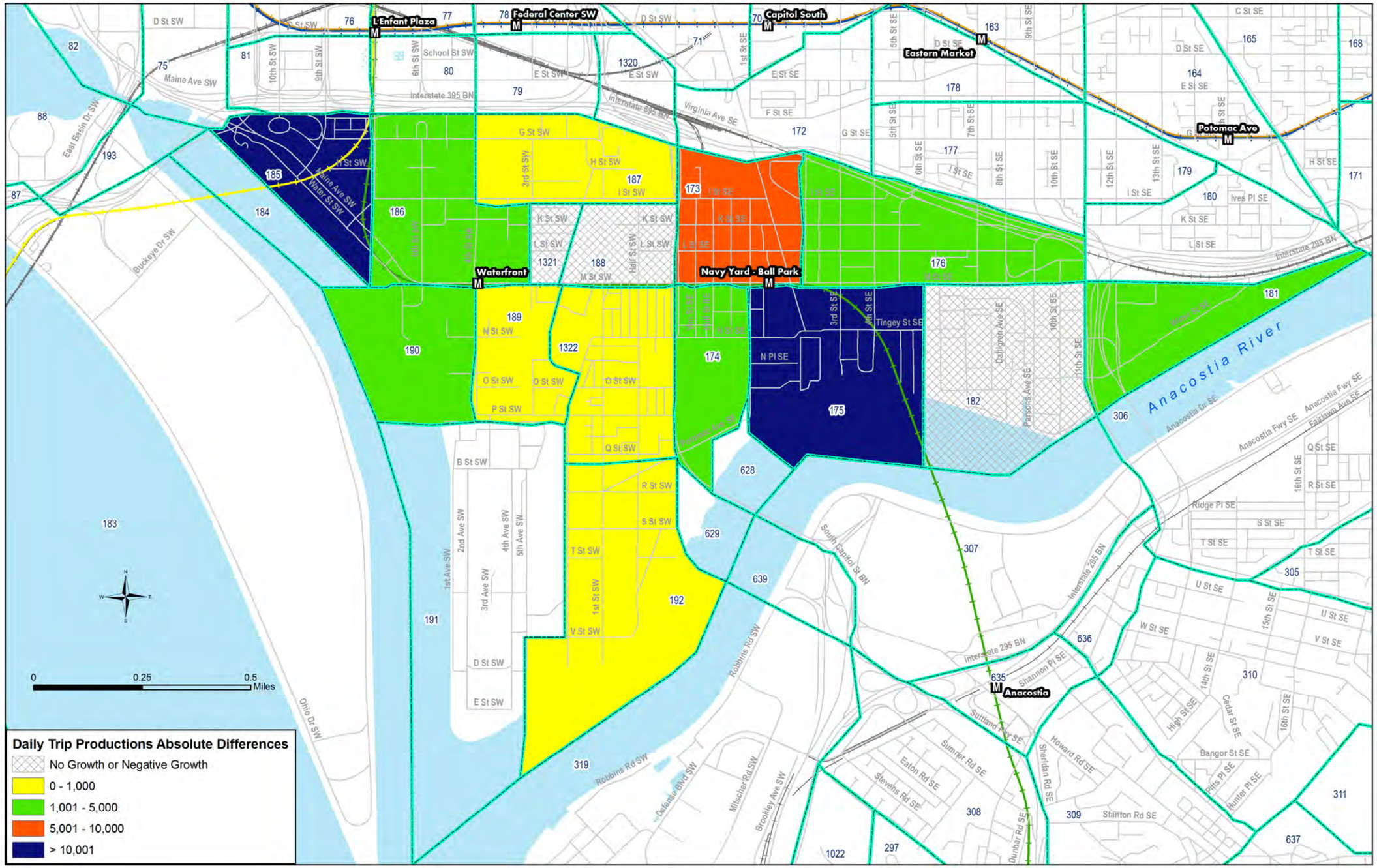


FIGURE 3-9
Daily Person-Trip Attraction Growth from Existing Year to Year 2035

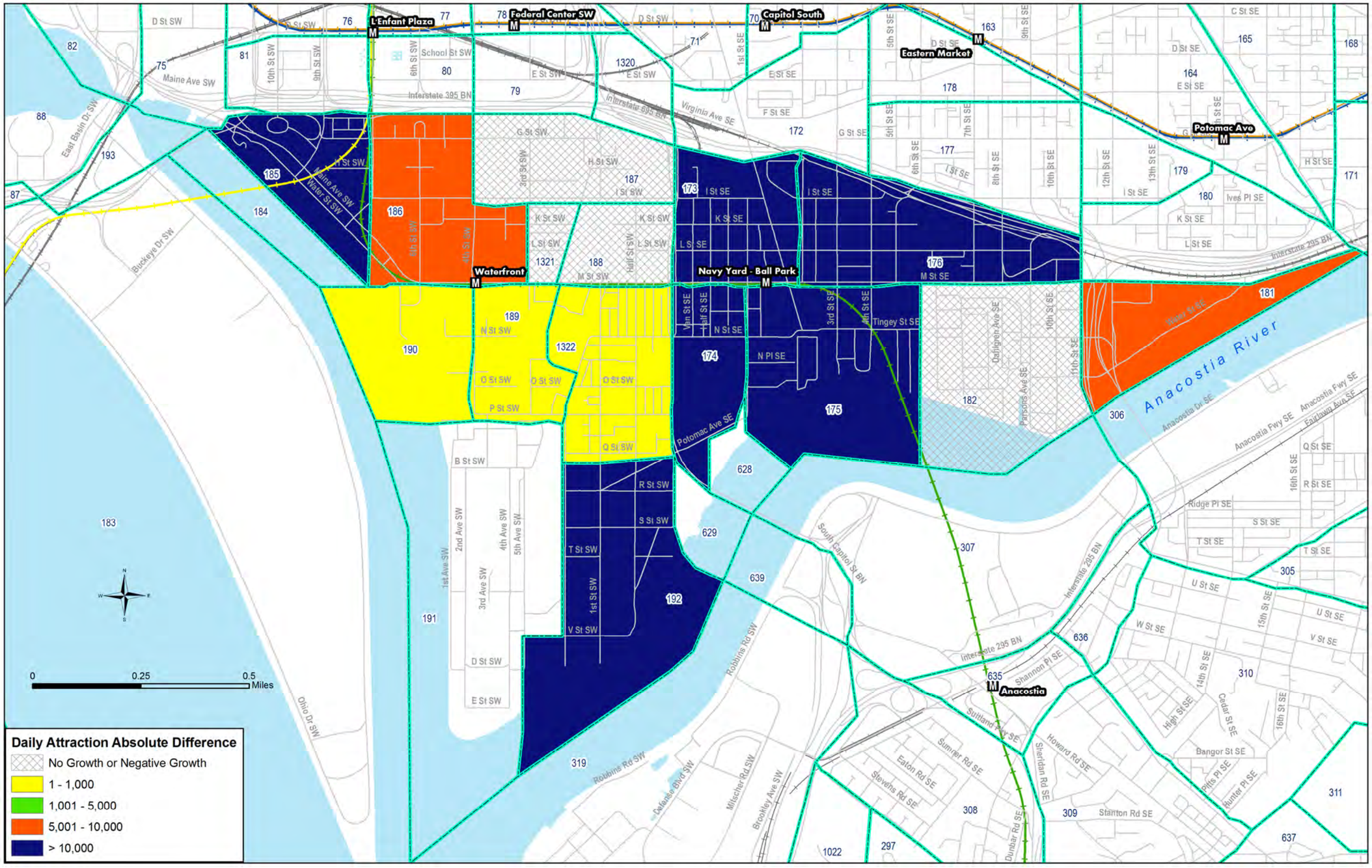
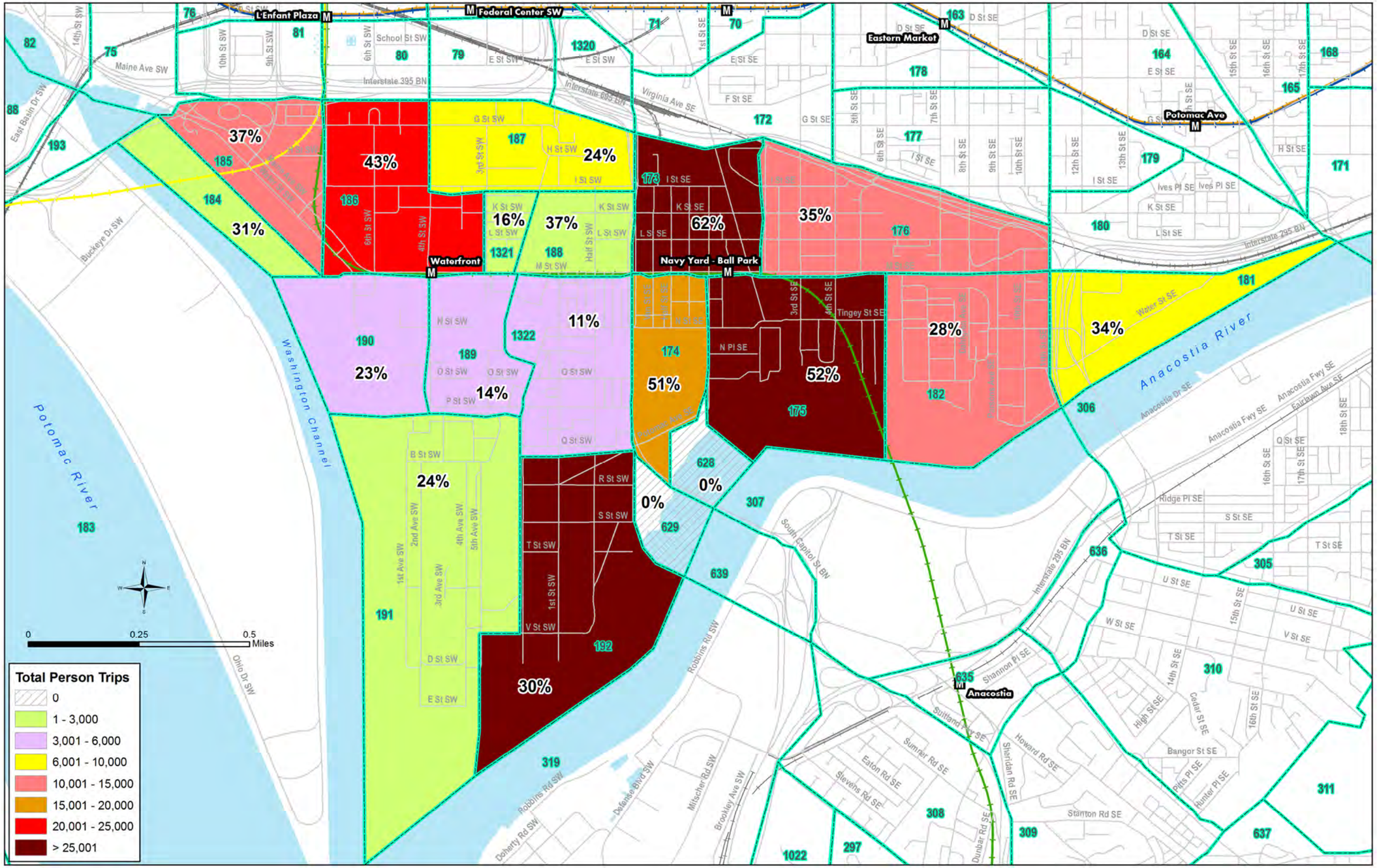


FIGURE 3-10
Future Year 2035 Daily Person Trips and Transit Mode Share



3.4 Evaluation of Future Traffic Conditions – Baseline Condition

Understanding the future traffic conditions under the Baseline condition was one of the main tasks undertaken by the Study team. AM and PM peak-hour volumes were developed for the entire roadway network based on the travel demand forecasts available for the analysis year. This section summarizes the methodology, analysis, and findings resulted from evaluating the future unconstrained demand on the Baseline transportation system. Several analysis tools were applied to assess the future traffic conditions in the Study area. Multimodal analysis was performed using recent empirical models that take into account not only vehicular operation but also transit, bicycle, and pedestrian modes. The models included the urban street methods contained in the 2010 HCM for the auto and transit modes, and models developed using data from NCHRP 3-70 Multimodal Level of Service Analysis for the pedestrian and bicycle modes. In addition, the analysis was complemented with the signal optimization software SYNCHRO, the VISUM planning software, and the VISSIM traffic simulation software.

3.4.1 2035 Peak-hour Demand Estimation

Figure 3-11 depicts steps and methodology used to develop multimodal demand for the Study area, starting from the revised travel demand forecasts generated for 2035.

As described in the previous section, the travel demand modeling included reviewing the land-use data from the MWCOG Round 8.0 Cooperative Forecasting for the years 2010, 2020, and 2035 to incorporate more detailed information on projected growth in population and employment based on available data on future developments planned for the area. In addition, the travel demand models were revised to represent more accurately the roadway network and transit conditions projected for the year 2035. As a result, a refined version of the MWCOG model was run to develop initial AM and PM peak-hour link and turn-movement volumes.

Post-processing of travel demand model output was necessary to develop peak-hour traffic demand to analyze traffic operations during peak-hour conditions. Post-processing followed NCHRP 255 guidelines for estimating balanced 2035 Baseline peak-hour volumes. A combination of sources and tools were used in this process, including available traffic data and data from previous studies within the Study area.

Traffic analysis using the VISSIM traffic simulation model required routing information (O-D data). Peak-hour turn movements and link volumes were converted to O-D data by using the TFlowFuzzy methodology employed in the VISUM planning software. In essence, trip tables obtained from the regional models are used as “seed” matrices in VISUM. These are combined with balanced target volumes for all turn movements in the network under each scenario and post-processed until convergence using the TFlowFuzzy iterative technique. The result from this process is a refined trip table (O-D matrix) for each vehicle class that, based on a degree of tolerance previously determined, reflects the target turn-movement volumes for each particular scenario.

The final step in the process consisted of converting trip-table O-D pairs into class-specific routes in VISSIM. For this, a proprietary component object model (COM) script was used to read every single O-D pair and assign the trip on the network. The script uses procedures for minimum paths available in the VISSIM software. **Figure 3-12** and **Figure 3-13** summarize main link volumes for AM and PM peak-hour conditions. Detailed turning-movement volumes for the entire network are provided in **Appendix F**.

3.4.2 Baseline Vehicular Network

The Baseline condition assumed a future roadway network that included significant changes and improvements to the existing network. **Figure 3-14** shows the major roadway improvements, listed below, that are assumed to be in place by 2035:

- 11th Street Bridges replaced: the ultimate build-out option is assumed to be completed
- Improvements to Malcolm X Avenue at I-295 (Anacostia Freeway): the Preferred Alternative from the St. Elizabeths final Environmental Impact Statement (EIS) is assumed for this improvement
- South Capitol Street improvements as proposed in the Preferred Alternative of the EIS. This includes the reclassification of the corridor from an existing urban freeway to an urban boulevard. Specific improvements include:
  - Conversion of diamond interchange at M Street and South Capitol Street to an at-grade signalized intersection
  - Reconfiguration of intersections at L Street and K Street to allow east-west cross traffic
  - New oval consolidating movements for South Capitol Street intersections with Potomac Avenue, Q Street, and R Street
  - Replacement of existing Frederick Douglass Memorial Bridge at new location
  - Improvements to South Capitol Street south and east of the Anacostia River
  - New traffic circle at eastern approach to the new Frederick Douglass Memorial Bridge to connect to South Capitol Street, Suitland Parkway, and Howard Road
- Replaced existing Suitland Parkway-I-295 interchange
- Reconstruction of the I-295 bridge over South Capitol Street
- Construction of missing segment on I (Eye) Street east of New Jersey Avenue for full connectivity with Virginia Avenue
- New single-point urban interchange at Suitland Parkway and Martin Luther King, Jr. Avenue
- Barney Circle and Potomac Avenue improvements
- Reconfiguration of the Virginia Avenue / CSX rail tunnel and potential improvements to Virginia Avenue south of I-695 at the street level

Figure 3-15 shows the roadway functional classification assumed for the Baseline condition. This classification was based on the available functional classification developed by DDOT for the entire District and adjusted for the Study area to account for future land development as well as the projected roadway improvements described above. The principal changes proposed for the network are:

- Conversion of M Street/Maine Avenue corridor from minor arterial to principal arterial
- Conversion of sections of I (Eye) Street from collector to minor arterial
- Conversion of sections of South Capitol Street from freeway to principal arterial
- Conversion of several existing local roads to collector roads based on future land development

FIGURE 3-11
Transportation Demand Estimation and Methodology for Analysis

FIGURE 3-12
2035 Baseline AM Peak-hour Link Volumes and Comparison with Existing Conditions

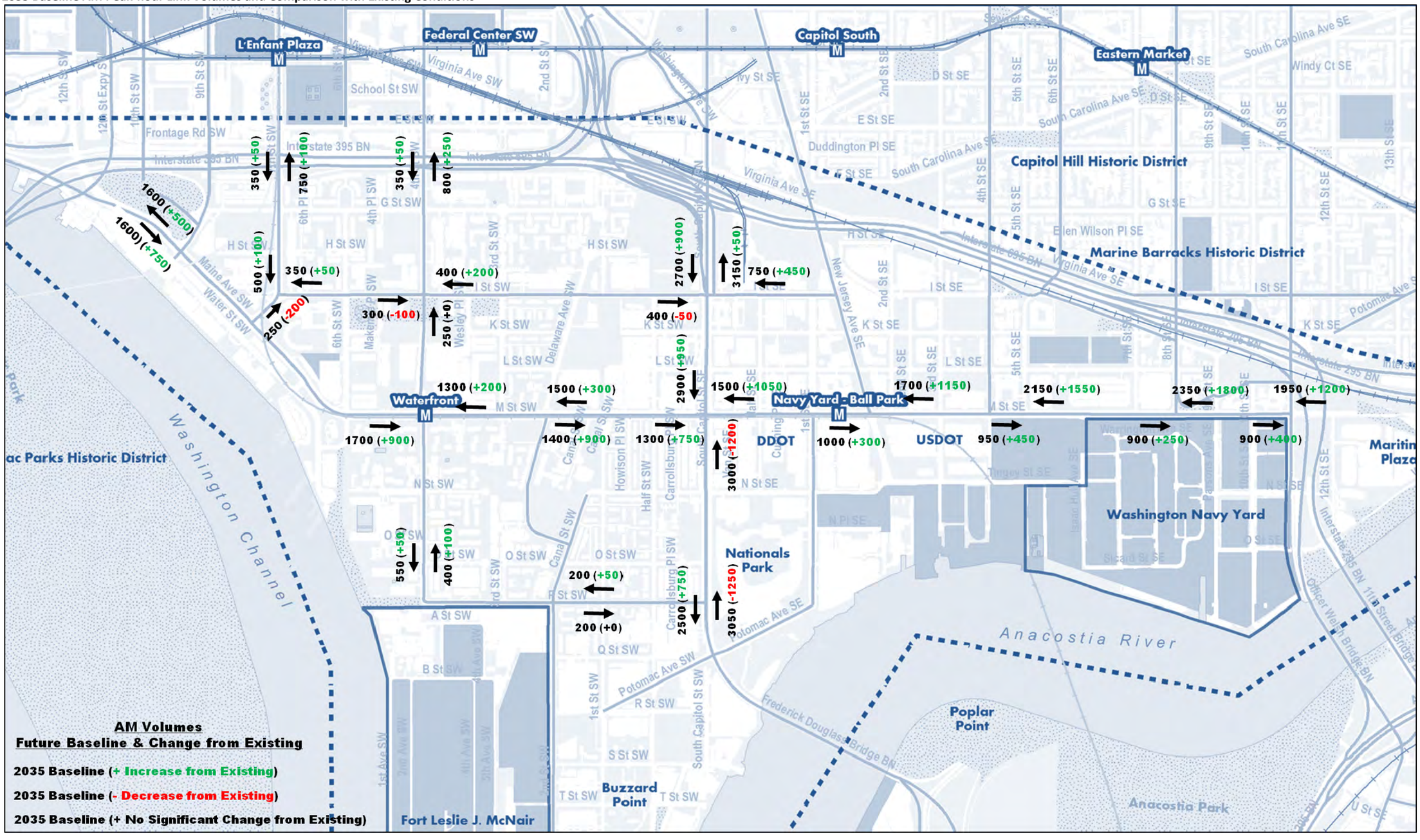


FIGURE 3-13

2035 Baseline PM Peak-hour Link Volumes and Comparison with Existing Conditions

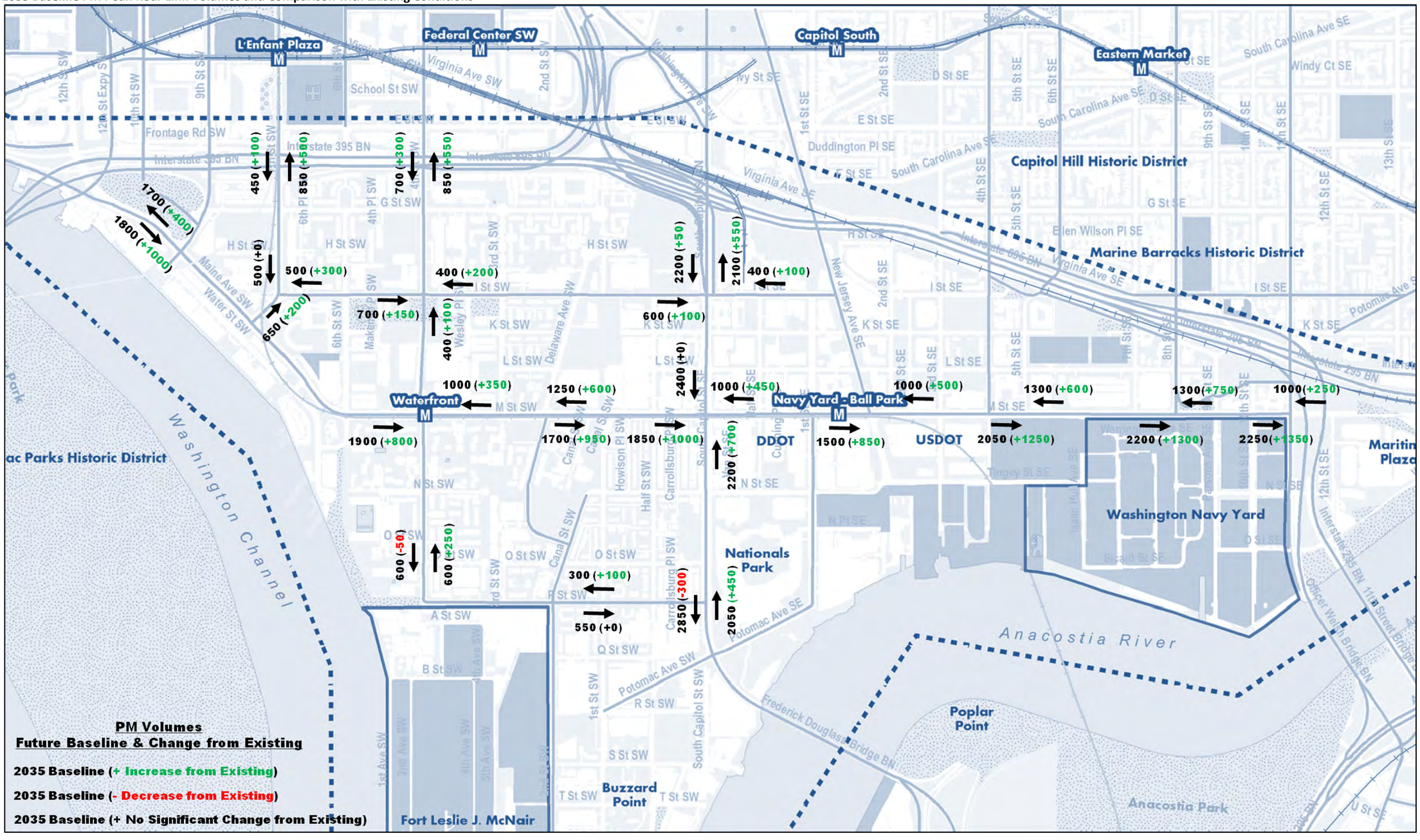


FIGURE 3-14
Assumed 2035 Baseline Roadway Network Improvements

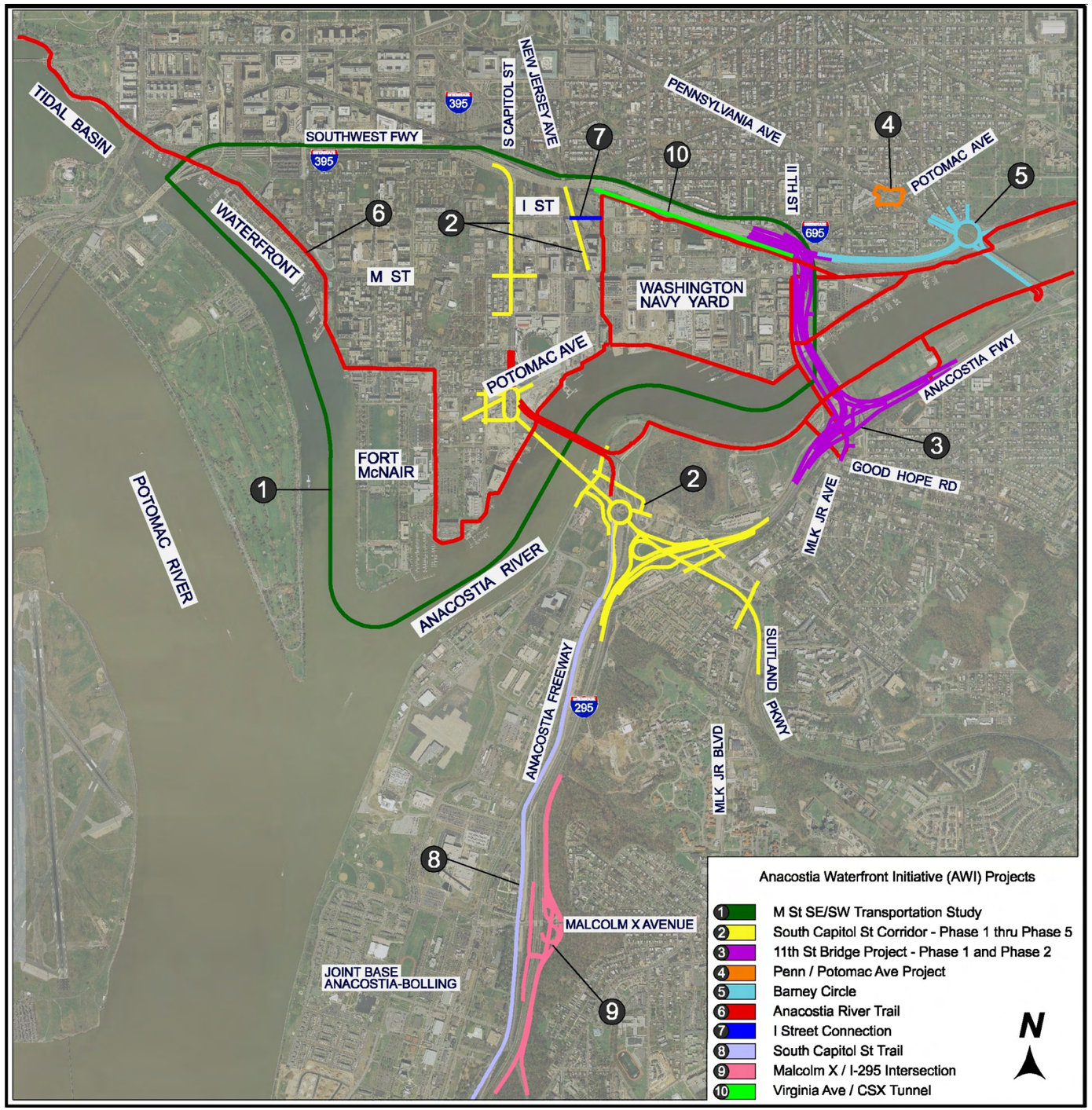
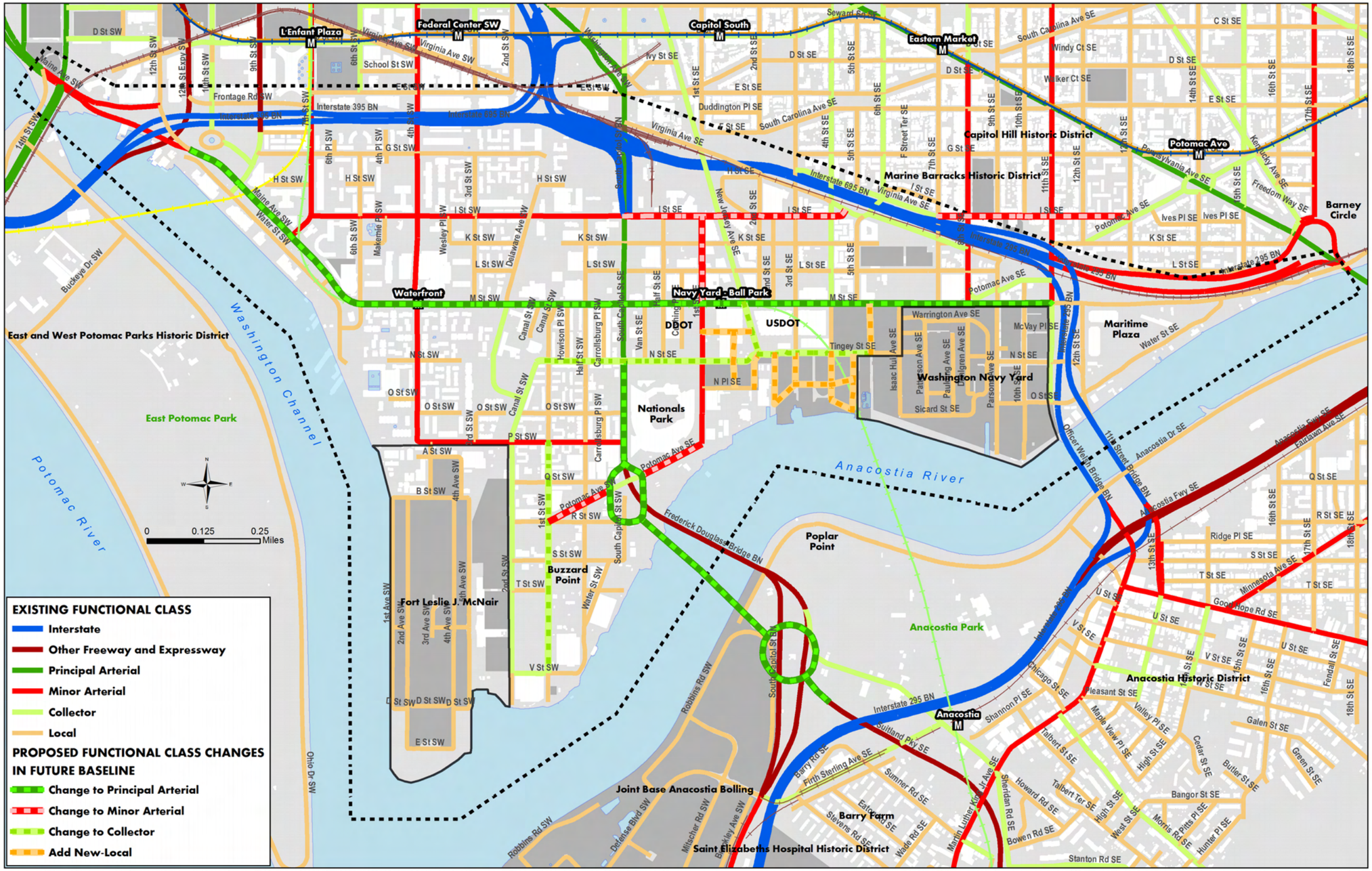


FIGURE 3-15
Future Roadway Functional Classifications for the Study Area



Although all of these improvements are expected to have significant impacts to future traffic operation, modal split, and trip assignment in the network, those improvements being planned for South Capitol Street, combined with the completion of the 11th Street Bridges, are the most significant ones regarding future transportation demand for the Study area. Changes planned for the South Capitol Street segments within the Study area (from the Anacostia River to I-695/I-395 freeways) will substantially transform the corridor from a mostly uninterrupted-flow main arterial that is heavily used by commuter traffic to get to and from the District to an urban boulevard with several new at-grade intersections. The most drastic change will be experienced at the intersection of M Street and South Capitol Street, which will be converted from a grade-separated urban diamond interchange to an at-grade signalized intersection. The implication of these changes is that they will be likely to discourage commuters from using the South Capitol Street corridor because they will experience an increase in vehicle delay due to the new configuration. Furthermore, the completion of the 11th Street Bridges, which will allow separation between local and through traffic as well as new connections between the freeway systems, will significantly improve conditions for commuter traffic, encouraging the use of the freeways to bypass the M Street area altogether. As described, these two factors are expected to affect the trip patterns in and through the Study area and, as a consequence, reduce what is perceived as one of the main traffic problems in the area—commuter traffic using local streets and cutting through the neighborhood to enter or leave the District. Travel demand results confirmed these assumptions by showing a significant diversion of trips from South Capitol Street to the 11th Street Bridges in the future.

On the other hand, local activity within the Study area will drastically increase due to the new development in the area and, as a result, local streets will experience significant increases in traffic volumes caused by the new trips being attracted or generated within the Study area. While many of these will be made via alternative modes, the scale of development does mean significant auto travel as well.

Regardless of future roadway improvements in the network, several current challenges will remain with the Baseline roadway system. **Figure 3-16** depicts some of those challenges, which are summarized below:

- Access Barriers: The M Street/Southeast-Southwest Study area is encompassed by the Potomac and Anacostia rivers on the west and south sides and by the I-395/I-695 freeway system on the north and west sides. These barriers create an "island" characteristic for the area and significantly constrain the access options to and from the area. As a consequence, very few access points are available for commuters and visitors, resulting in a high concentration of trips at those points.
- Disconnected Network: As shown in **Figure 3-16**, the roadway network presents several gaps in connectivity that prevent drivers from traversing the area. As a consequence, only a few corridors allow travel in both the east-west and north-south directions in the area. This exacerbates the concentration of traffic on the M Street and the South Capitol Street corridors.

3.4.3 Baseline Transit Service

The Study assumed some modest improvements to the transit system within the Study area for the Baseline condition. The Washington Metropolitan Area Transit Authority (WMATA) has plans underway to add Metrobus routes within the area as well as to increase the frequency of existing bus lines during peak hours. These improvements were assumed to be in place for the Baseline condition. In addition, the Study assumed all existing and planned routes for the DC Circulator to be in operation. Regarding streetcar operations, only portions of the initial phase were assumed in operation for the Baseline condition. This included the Congress Heights to Washington Circle Line but not the Anacostia initial line segment to Buzzard Point. Therefore, no streetcar service was assumed within the Study area under the Baseline condition. Other existing commuter lines and private shuttle services were also assumed for 2035. **Figure 3-17** summarizes all transit options assumed to be available within the Study area for the Baseline condition.

Two regional Metro stations, Waterfront and Navy Yard-Ballpark, are within the Study area. A third station, L'Enfant Plaza, is in close proximity to the Study area, however, direct access to this station is neither safe nor convenient for pedestrians or bicyclists coming to/from the Study area. In order to provide a direct bicycle connection, bicycle facilities would have to be extended along 7th Street SW. Currently, traffic entering and exiting the Southwest Freeway between E and G Streets introduces weaving conditions to the vehicular traffic flow which results in safety issues for bicycles. Pedestrian connectivity between the L'Enfant Plaza Metro station and the Study area is precarious. Curb ramps and crosswalks are not provided to access the L'Enfant Promenade from either L'Enfant Plaza or Maine Avenue via Benjamin Banneker Park. There is also a noticeable change in elevation between Benjamin Banneker Park and Maine Avenue, with the resulting sidewalk having a slope in places that likely exceeds the ADA-specified maximum ratio of 1:12. **Figure 3-18** shows location and ¼ mile walking distance zones around Metro stations. No improvements to the Metro system (station capacity or improved access) within the Study Area are assumed in the Baseline condition.

3.4.4 Baseline Pedestrian and Bicycle Facilities

As part of the District of Columbia's street network, the Study area will have the population and employment density, mix of land uses, and extensive transit system to provide a foundation for a walkable area. Currently, 12 percent of District residents walk to work – which is nearly twice the national average. The District government intends to achieve similar conditions as a minimum in the Study area. Several bicycle and pedestrian projects will generate a relatively comprehensive network of sidewalks, crosswalks, and curb ramps at most intersections; and pedestrian signal heads will be installed at most signalized intersections. Many corridors, including Main Avenue and M Street SW, will have wide planted buffers with street trees that will maintain or improve the pedestrian experience. **Figure 3-19** summarizes the Baseline pedestrian and bicycle conditions assumed for the Baseline condition. Future facilities included several Capital BikeShare locations and completion of the Anacostia Riverwalk Trail – a 16-mile, multi-use trail along the east and west banks of the Anacostia River. The trail will vary in width from 10 to 12 feet to provide for a wide range of users, including bicyclists, in-line skaters, pedestrians, disabled persons, and others. Wayside stations will provide seating, system maps, bike racks and interpretive exhibits. In addition, there will be significant improvements in pedestrian safety for South Capitol Street within the Study area, including new or improved signalized crossings at M Street, K Street, L Street, and other locations.

FIGURE 3-16
Main Roadway Network Challenges for the M Street/Southeast-Southwest Study Area

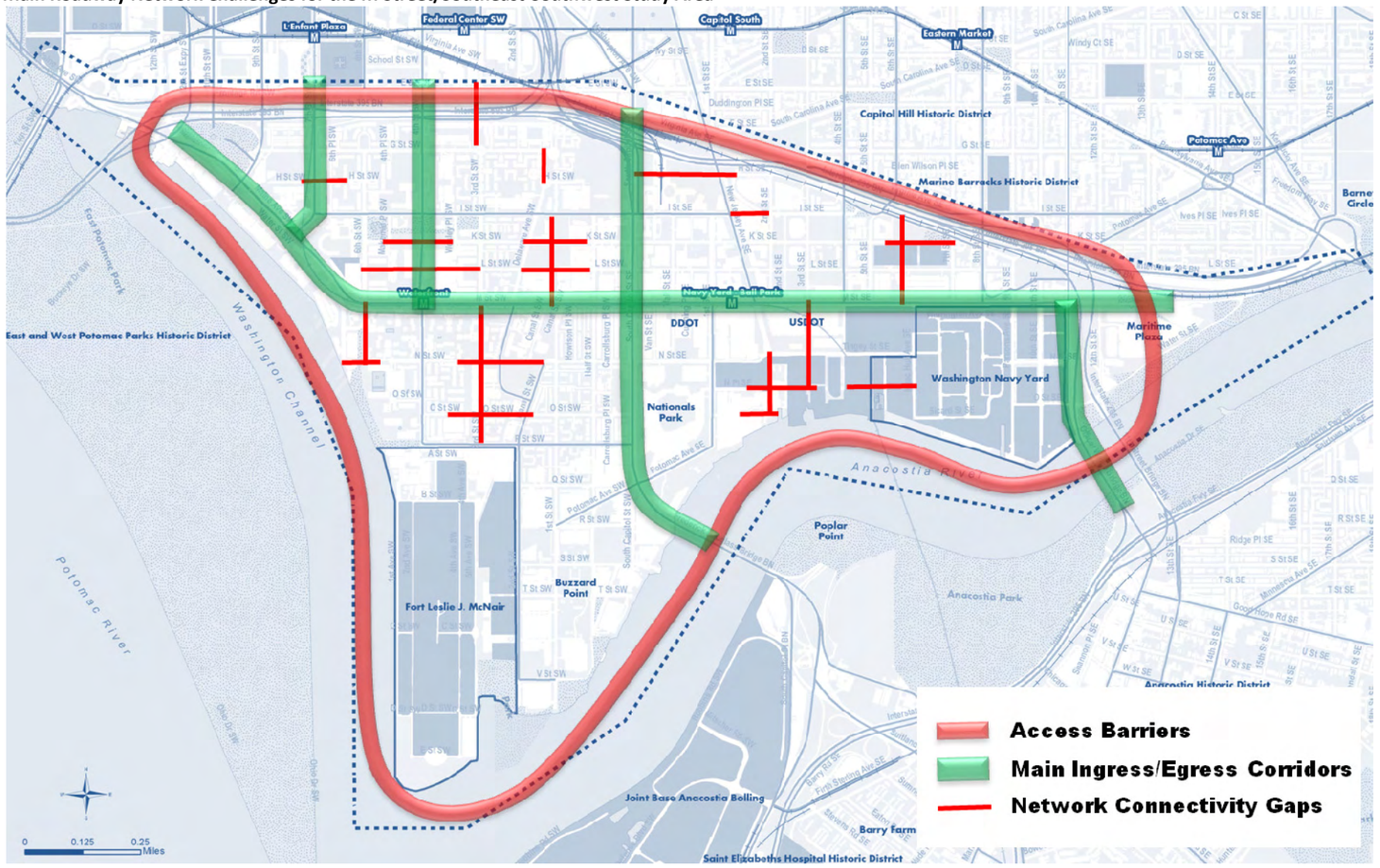


FIGURE 3-17
Existing and Proposed Transit Options within the Study Area

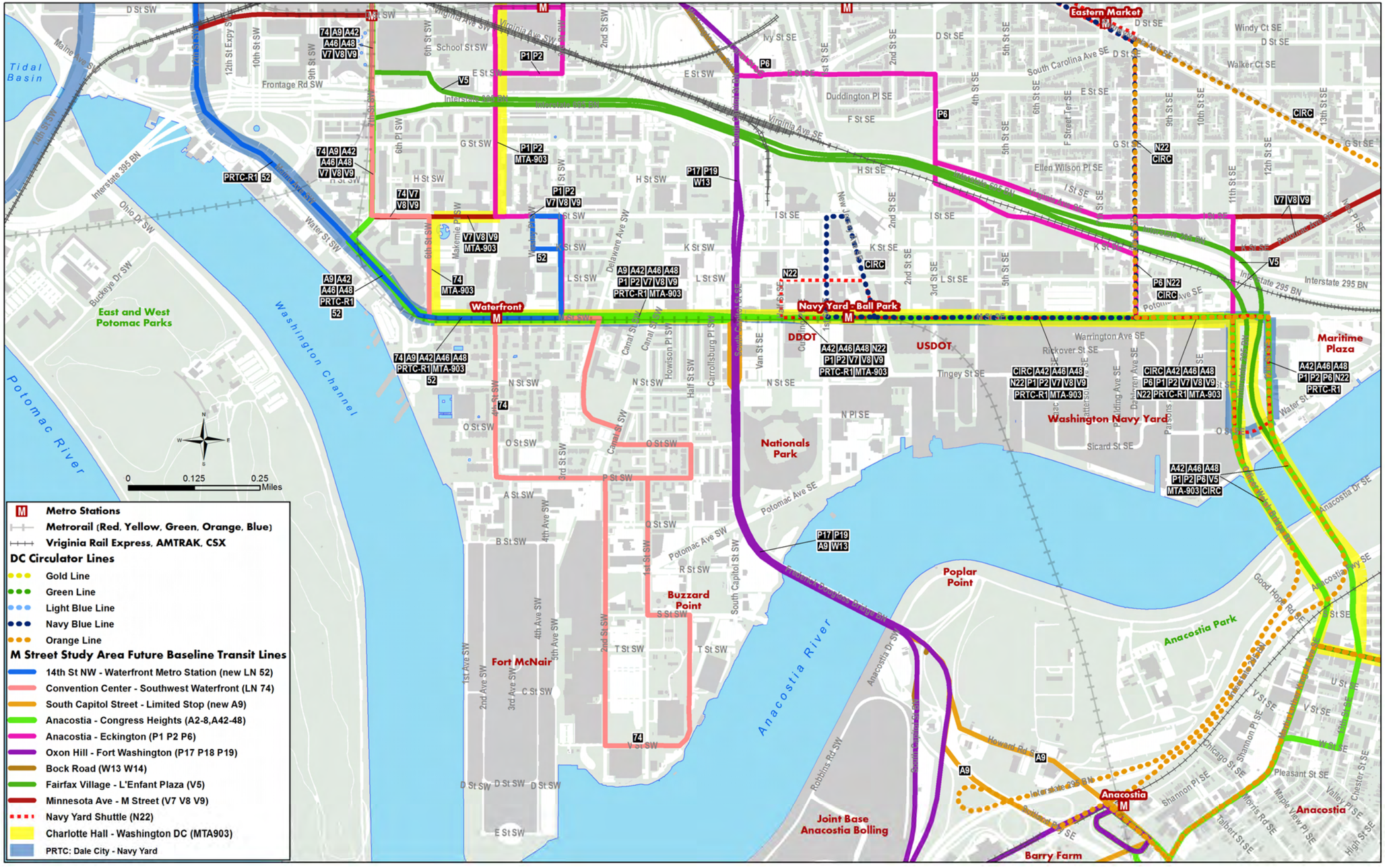


FIGURE 3-18

Baseline Metrorail Service and ¼ mile Walking Distance Zones from Metro Stations

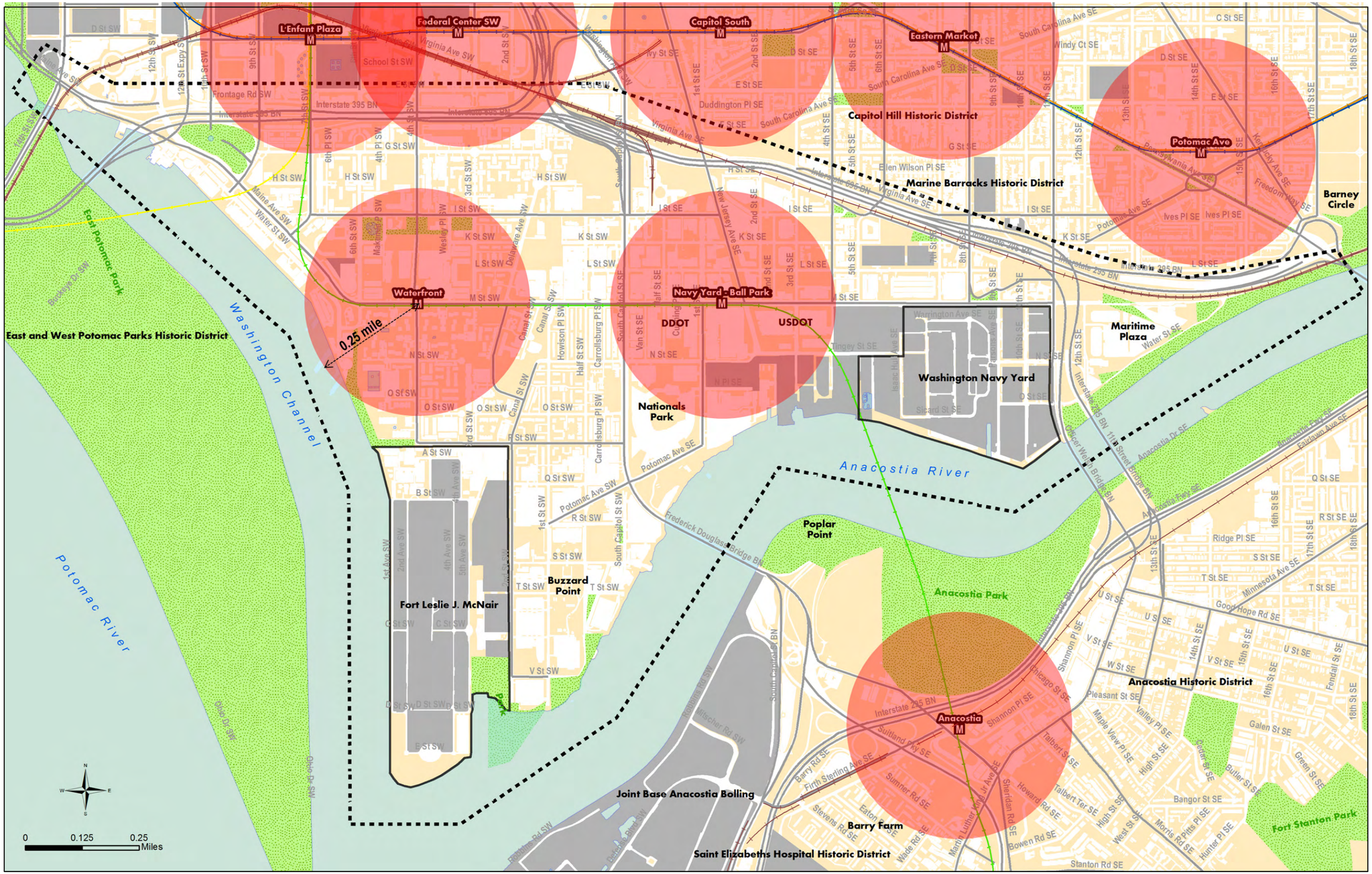
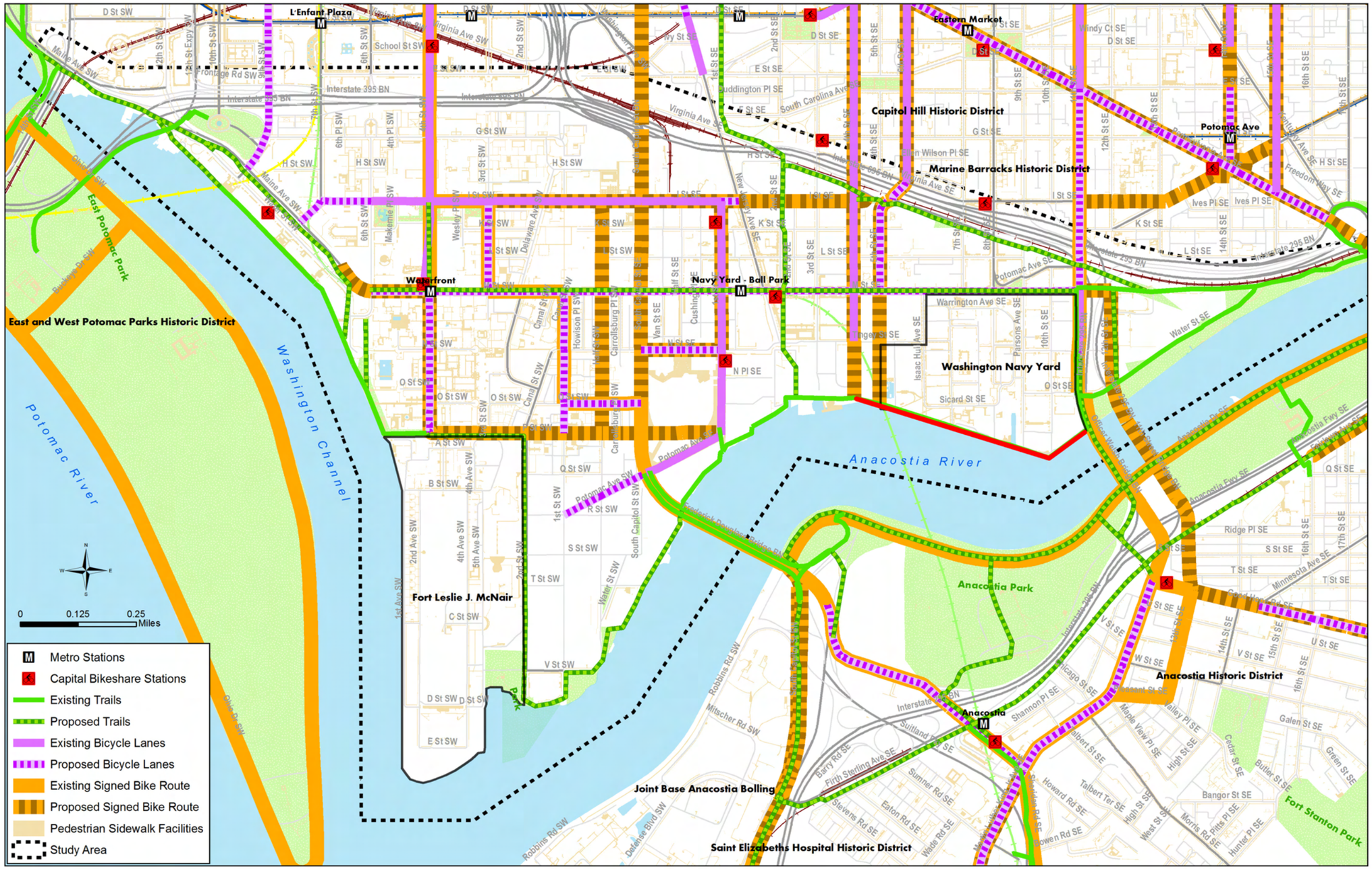


FIGURE 3-19
Baseline Pedestrian and Bicycle Facilities

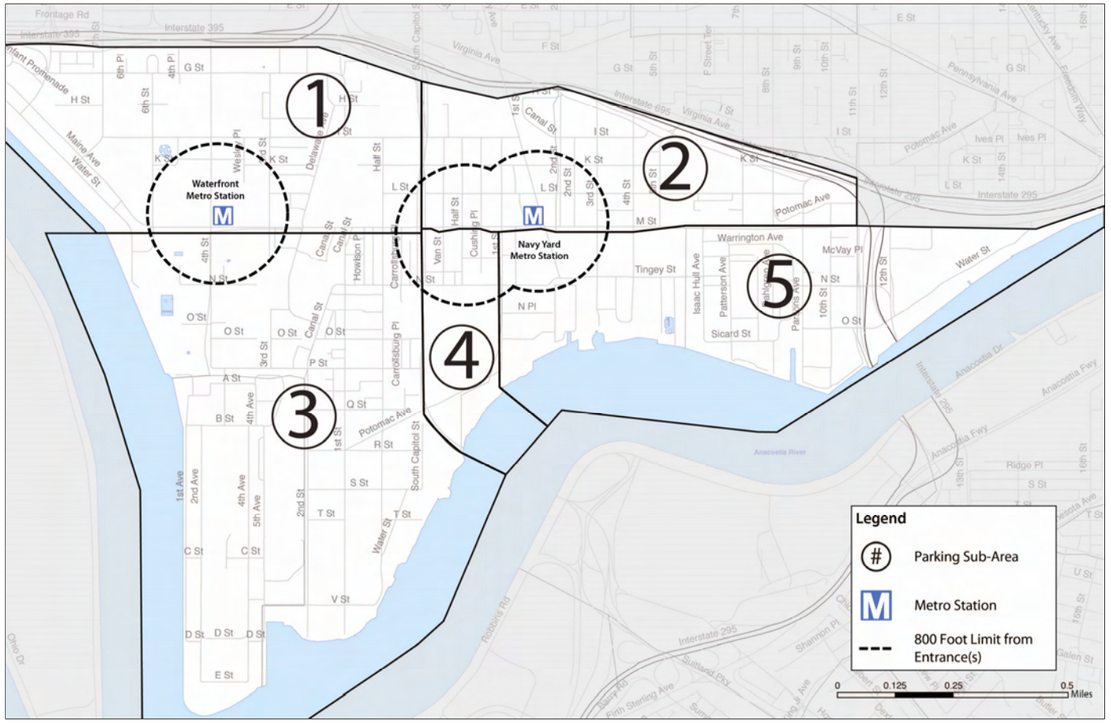


3.4.5 Baseline Parking / Freight Loading

Future Parking Demand

Future parking demand based on expected new growth in land development was estimated based upon the computation of current zoning requirements, the Urban Land Institute's (ULI) shared parking approach, and the use of the Institute of Transportation Engineers (ITE) *Parking Generation Manual*. Parking demand was estimated by districts within the Study area. **Figure 3-20** shows the geographic location of each of the five districts used to analyze parking conditions. **Table 3-2** summarizes the ranges of parking space demand by district and based on each of the above-mentioned approaches.

FIGURE 3-20
Subarea Parking Districts



Future Parking Supply

Future parking supply will be affected by losses as on- and off-street parking is converted to other uses and by gains as on- and off-street parking is either newly defined along curbsides or built in off-street locations. On-street parking is assumed to remain roughly the same as existing facilities, with some minor variations introduced by curb treatments along new developments. For the purpose of this Study, the Baseline condition for on-street parking was assumed similar to existing conditions. However, as discussed in the previous chapter, double parking will continue to be a major issue along both major corridors and residential cross streets unless increased enforcement can be provided in the study area. This issue is especially of concern for the 4th Street SW corridor, which already experiences recurring problems with double-parking.

TABLE 3-2
Estimated Demand for Parking Spaces

	Estimated Demand for Parking Spaces			
District	Zoning Regs [a]	ULI Approach [b]	ITE Parking Manual [b]	Range
1	688	1,025	1,107	700 - 1,100
2	4,585	5,020	5,329	4,600 – 5,300
3	1,014	3,941	3,946	1,000 – 3,950
4	1,720	1,626	1,685	1,600 – 1,700
5	2,763	1,453	4,216	1,450 – 4,200
Total	**10,770**	**13,066**	**16,283**	**9,350 -16,250**

[a] Estimate is based on proposed and expected applications for new development and requirements specified in the zoning regulations; new pending legislative changes are not incorporated.
[b] Estimates based upon mid-afternoon demands and use mode split transit reductions.

Off-street parking will also have losses and gains in supply as surface lots are converted to other building and/or parking structures. **Table 3-3** identifies estimates of losses in surface parking lots and expected increases in new structured parking in the respective districts.

TABLE 3-3
Gains and Losses in Off-Street Parking Supply

	Supply of Off-Street Spaces			
District	Existing	Changes[a]	New Structures[a]	Future
1	1,390	-230	550	1,710
2	5,650	-1,250	4,390	8,790
3	800	-600	850	1,050
4	1,700	0	--	1,700
5	6,250	-1,160	450	5,540
Total	**15,790**	**-3,240**	**6,240**	**18,790**

[a] Assumed that 100% of surface spaces would be displaced (by buildings or structured parking) north of M Street and 75% south of M Street; no change at stadium. New structures have been identified by Capitol Riverfront BID and The Wharf Phase-1 Transportation Impact Study.

Baseline Parking Space Deficiencies

Based on projected parking demands and expected parking supply, a range of parking deficiency was estimated for the Study area and the respective districts. Parking deficiencies are highlighted in **Table 3-4**. Because shared parking strategies are not currently in place throughout, even though **Table 3-3** shows an excess in supply over demand, there are still some potentially substantial deficiencies in available parking. This analysis does not assume full build out of parking is necessary for the anticipated land use build out but does suggest proactive management will be necessary.

TABLE 3-4
Parking Demand and Range of Supply Deficiencies

	Future Parking Demand	Baseline Available Parking Supply	
District	Net Increase from New Growth	Total	Range of Surplus or Deficiency
1	700 to 1,100	500 to 770	-600 to +70
2	4,600 to 5,300	1,925 to 2,105	-3,375 to -2,495
3	1,000 to 3,950	625	-3,325 to -375
4	1,600 to 1,700	855	-845 to -745
5	1,450 to 4,200	3,245	-955 to +1,795
Total	**9,350 to 16,250**	**7,150 to 7,600**	**-9,100 to -1,750**

Baseline Freight Loading Conditions

Commercial retail and office space depends heavily on access to freight loading zones for the transfer of goods and materials. Among the many effects derived from future growth will be an increase in the demand for products—and the freight traffic to deliver them. In addition to more traffic, there will be increased competition for street space among transit vehicles, trucks, pedestrians, bicyclists, and motor vehicles. A major challenge for retail can arise if rear loading is not available within the block in which the commercial retail or office space is located. Along M Street and South Capitol Street, the demands for multiple modes and competing uses within the right-of-way may significantly impact the establishment of loading zones within the travel way. In addition, residential streets in Southwest DC between M Street and Buzzard Point will continue to be posted with through-truck restrictions, and several other streets, such as I (Eye) Street SE in near Southeast, will maintain a residential character; thus truck restrictions will likely be in place in future years.

As a result of the factors mentioned above, future freight loading in the Study area will become challenging without new and innovative strategies put in place by the District. Viable freight loading will be crucial to maintain the current quality of life in this area due, in part, to convenient access to goods and services. It will also be important in order to ensure that long-term business is viable and that economic development can depend on efficient freight movement within the area without affecting transportation mobility and safety.

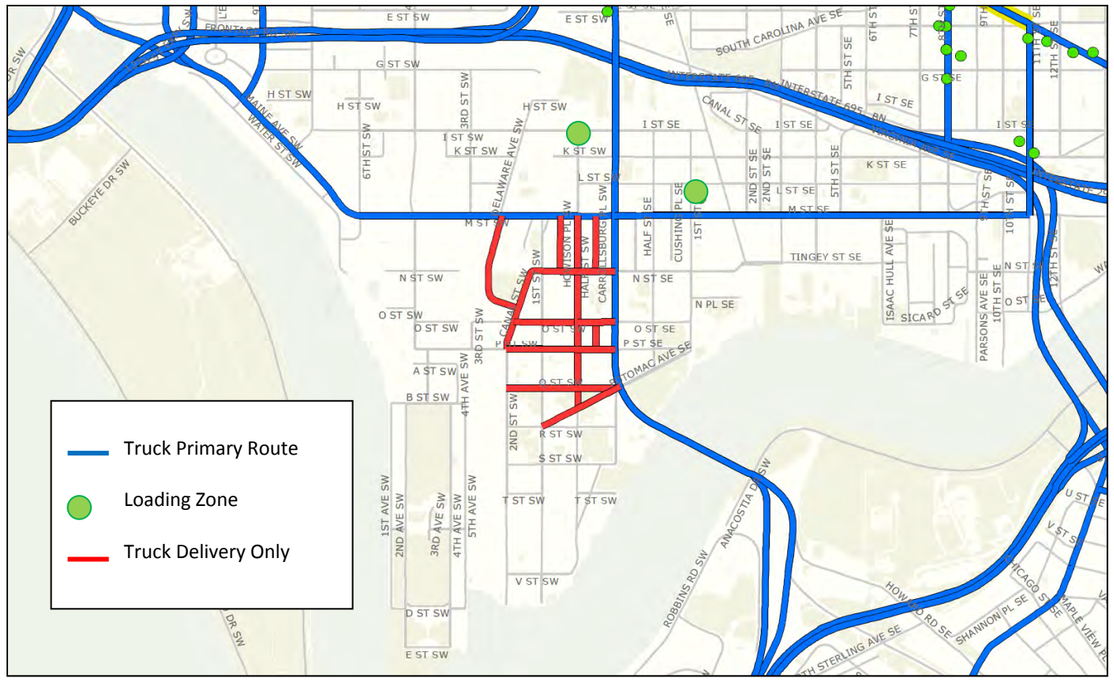
Currently, few streets within the study area are specifically designated for truck delivery and curb loading. **Figure 3-21** shows an area south of M Street SW and west of South Capitol Street which includes portions of Potomac Avenue, N Street, O Street, P Street, and Q Street as designated by the District for this function. However, significant changes in future land use and density will necessitate that additional roadways be designated for truck routes to facilitate delivery of goods and use of curb space for loading and unloading.

Under the Baseline conditions, it is assumed that most, if not all, future truck deliveries related to new development would be handled internally within the premises of each site. While this strategy is highly desirable and normally required from DDOT for new developments, it may not necessarily handle the expected freight loading future demand within the study area. If off-street loading facilities are not configured to adequately provide sufficient freight capacity or do not exist, delivery vehicles will use on-street curb space. As a result, double parking and conflicts with passenger traffic could likely occur when freight carriers cannot find legal curb parking adjacent to or reasonably close to their delivery location. Double parking or parking on through lanes will affect traffic flow, significantly reduce capacity, and create conflicts for all modes of passenger transportation.

Considering that many businesses will be located along M Street, which will also be highly dedicated for passenger access and mobility, the issue of truck access becomes even more critical given competing priorities between these two functions.

Chapter 5 addresses short-term strategies for managing future freight delivery within the Study area and specifically focuses on M Street which, as a multimodal urban corridor, will be significantly challenged for use of curb space for deliveries. Considerations include strategies to manage the time and place of freight loading (including both regulations and enforcement strategies) and ways of consolidating deliveries away from the main passenger mobility corridors.

FIGURE 3-21
Existing Truck Routes, Truck Delivery, and Loading Zones

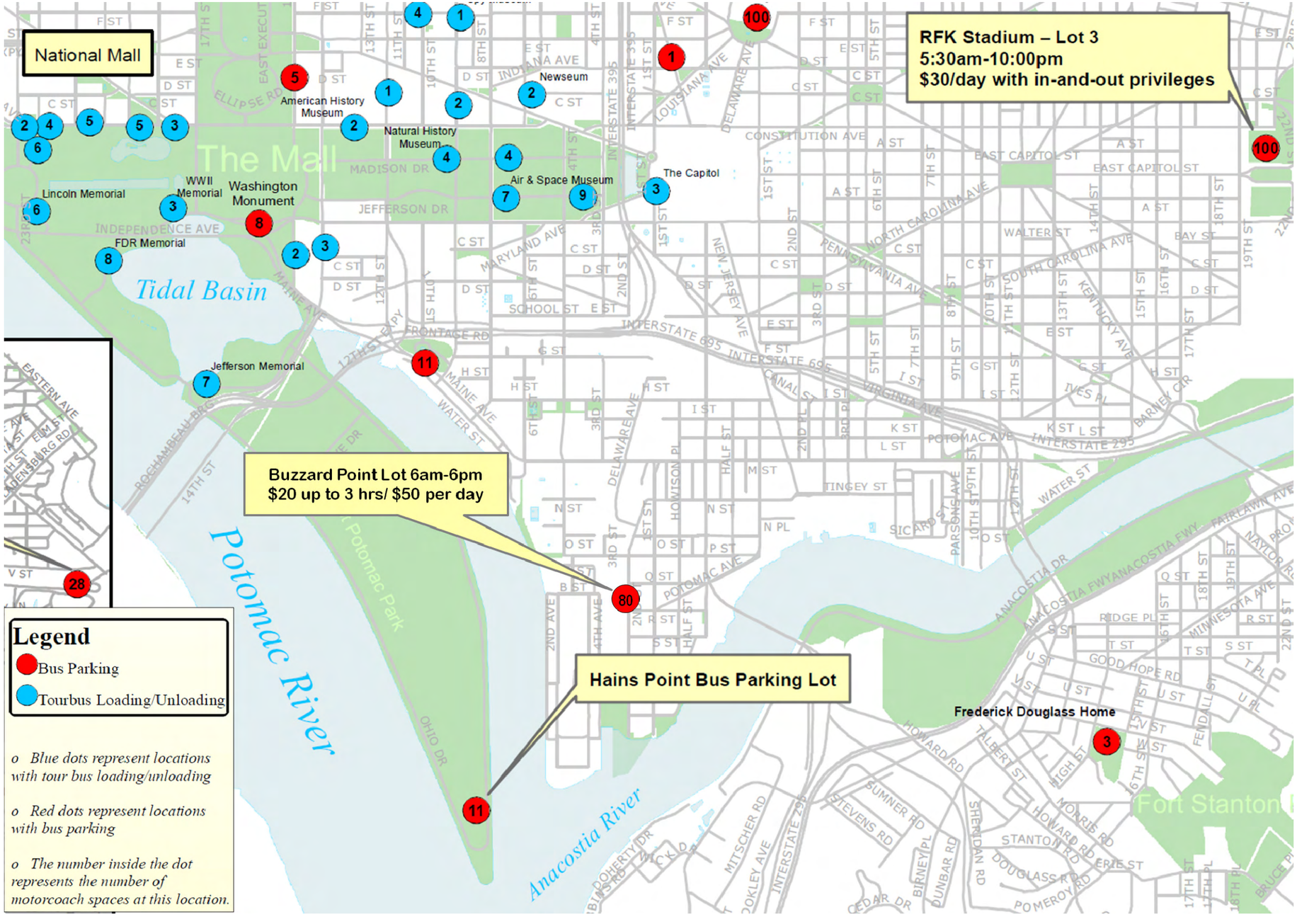


Source: DDOT, 2010 Draft Truck Routes – May 2010

3.4.6 Baseline Motor Coach /Tour Bus Lay-by Areas

DDOT continues to increase the amount of parking available to motor coach operators. The latest facility currently available is the off-street parking at Buzzard Point in Southwest, which is within the Study area. Additional motor coach parking is available throughout the District in specific locations. Tour bus operators can park in curbside tour bus zones subject to time limits posted on signage at each location. Tour bus parking is also available at several privately owned off-street facilities throughout the city. **Figure 3-22** shows the location of loading/unloading facilities as well as parking available both in the Study area as well as in its vicinity. The Baseline condition for the Study assumed no changes to the available parking and loading/unloading locations for the year 2035.

FIGURE 3-22
Motor Coach/ Tour Bus Lay-by Areas
Source: DDOT



3.5 Findings from Evaluation of Baseline Condition

As described earlier, one of the principal objectives of the Study was to evaluate the ability of the Baseline transportation system to handle the future demand without any additional improvements or changes. This section describes the results and findings from the evaluation and provides a summary of results for the Baseline condition. More detailed results and comparison with proposed alternatives are presented in Chapter 4.

3.5.1 Methodology of Analysis

Levels of Service for Automobile

Several tools were used to measure the performance of automobiles in the Study area, including VISSIM, SYNCHRO, and the HCM 2010 urban streets methodology. Each tool has strengths and weaknesses in evaluating conditions for automobiles, therefore, a blend of tools was chosen to provide the best description of future conditions. All three tools were used in the analysis of intersections and arterials; however, only the SYNCHRO results are reported in the section describing intersection LOS results. The Study team selected SYNCHRO for reporting intersection delay results and corresponding HCM LOS in order to assess the full impact of traffic demand on each intersection without the effect of upstream and downstream conditions. SYNCHRO is a deterministic model based on demand volumes that does not account for upstream and downstream effects at each intersection. VISSIM was used to provide measures of effectiveness (MOEs) such as network performance, travel time, and vehicles served (or throughput). VISSIM is a stochastic micro-simulation model that simulates vehicle operation along the entire roadway network and, as such, it accounts for both downstream queuing and upstream capacity constraints that result in traffic metering.

Results from SYNCHRO and VISSIM tend to be similar under low- to mid-range demand volumes. However, under high volumes and over-saturated conditions, results from SYNCHRO and VISSIM may deviate from those expected due to service volumes (throughputs) being significantly different from the actual demand because of either upstream metering (demand starvation) or downstream queue spillover. In summary, SYNCHRO results were reported for individual intersections because they depict a more conservative scenario, which is more adequate for planning purposes, while VISSIM results were reported for corridor and system MOEs. The HCM 2010 urban streets methodology was chosen to provide corridor-specific LOS and midblock conditions that correlate to the multimodal approach used in the Study.

LOS is defined in the HCM as a qualitative measurement of intersection operation. LOS for both unsignalized and signalized intersections is based on control delay. In general, control delay is the difference between the travel time actually experienced and the travel time expected under ideal traffic conditions in the absence of traffic control delays, geometric delay, incidents, and other vehicles. **Table 3-5** shows the LOS thresholds for signalized and unsignalized intersections. In general, DDOT considers LOS D or better as acceptable for existing conditions and considers LOS E as the threshold for future conditions, reflecting that growth of traffic in an urban environment is constrained.

Signalized Intersection LOS

Based on average control delay, LOS is defined for the intersection as a whole at signalized intersections. Control delay is defined as the total elapsed time from when a vehicle stops at the end of the queue until the vehicle departs from the stop line; this time includes the time required for the vehicle to travel from the last-in-queue position to the first-in-queue position. Control delay is a complex measure and is subject to a number of variables, including the quality of progression, the cycle length, the deceleration and acceleration delay, the stopped delay, and the volume-to-capacity ratio for the lane group or approach in question. The LOS of an intersection falls into one of six categories, A through F. LOS A represents the best operating conditions; and LOS F represents the worst conditions, which is a facility operating under force traffic flow with standing queues and stop-and-go operations. A motorist can expect to wait through several signal cycles at an LOS F intersection.

Unsignalized Intersection LOS

LOS for all-way stop-controlled (AWSC) intersections is defined as average control delay for the whole intersection. Two-way stop-controlled (TWSC) intersections apply the same methodology but only provide delay for the worst movement at the intersection - normally a stop-controlled left turn movement on a minor street. LOS for TWSC intersections is not defined for the intersection as a whole.

TABLE 3-5
Intersection Level of Service Criteria

Level of Service	Average Control Delay (seconds per vehicle)	Traffic Flow Characteristics
Signalized Intersections		
A	≤ 10	Most vehicles arrive during the green phase and don't stop.
B	> 10 - < 20	More vehicles stop, causing higher delay.
C	> 20 - < 35	Vehicle stopping is significant, but many still pass through the intersection without stopping.
D	> 35 - < 55	Many vehicles stop, and the influence of congestion becomes more noticeable.
E	> 55 - < 80	Very few vehicles pass through without stopping.
F	> 80	Considered unacceptable to most drivers. Intersection is not necessarily over capacity, even though arrivals exceed capacity of lane groups.
Unsignalized Intersections		
A	< 10	Free flow
B	> 10 - < 15	Stable flow (slight delays)
C	> 15 - < 25	Stable flow (acceptable delays)
D	> 25 - < 35	Approaching unstable flow (tolerable delays)
E	> 35 - < 50	Unstable flow (intolerable delays)
F	> 50	Queuing on minor approaches and not enough gaps of suitable size to allow safe crossing of major streets. Signalization should be investigated at this point, but warrants must be satisfied before implementation.

Source: HCM (2000).

LOS for other Modes (Transit, Bicycle, and Pedestrian)

As described in previous sections, non-automobile modes were analyzed using a multimodal technique. Models used for the analysis include the Urban Street methods contained in the 2010 HCM for the auto and transit modes, and models developed using data from NCHRP 3-70 MMLOS for the pedestrian and bicycle modes. Details on the methodology and analysis for MMLOS are included in **Appendix G**. NCHRP 3-70 methods have been adopted by the Highway Capacity and Quality of Service Committee of the Transportation Research Board and have been included in the 2010 HCM. Of note from the NCHRP 3-70 methods is the intensive data requirement to analyze pedestrian and bicycle LOS. The models for the pedestrian and bicycle modes are based primarily on previous studies and require in the range of 12 to 15 variables to model both pedestrian and bicycle LOS. A modified version of the models was used for this Study. The modified models require only 3 to 4 variables and have been found to be as accurate as the NCHRP 3-70 pedestrian and bicycle LOS models with far less data collection required[2]. The models, referred to as Complete Street Pedestrian LOS and Bicycle LOS models, allow the analyst to estimate the full range of perceived LOS instead of the mean LOS as in the NCHRP 3-70 model.

The factors influencing bicycle LOS include number of travel lanes, speed limit, presence of bicycle lanes, and number of conflicts from unsignalized intersections on the segment in question.

The primary contributors of pedestrian LOS include vehicular volume, vph, vehicular speed limit, number of through lanes for vehicle traffic, and sidewalk width.

The factors found to most influence transit LOS are pedestrian LOS, transit frequency (buses/hour), passenger load weighting factor, average speed of bus over segment, excess wait time, average trip length, proportion of stops with benches, and proportion of stops with shelters.

A detailed description and explanation of the MMLOS models is found in **Appendix G**.

Automobile Mode Baseline Performance

Figure 3-23 and **Figure 3-24** depict intersection LOS for 2035 AM and PM peak conditions in the Study area, respectively. A cursory review shows that in both peak hours, several intersections operate at LOS “E” or worse. This implies that several intersections will experience significant vehicle delay during peak operations and consequently the overall automobile mode operation is not adequate for the Baseline condition. Additional MOEs and comparison with proposed alternatives are described in Chapter 4.

[2] Dr. Aimee Flannery, a member of the AWI Study Team and President of Working Energy Enterprise, was also a member of the NCHRP 3-70 team and led national data collection efforts and modeling efforts for that study. As a follow-on effort to NCHRP 3-70, Dr. Flannery led efforts to simplify the data requirements through the development of cumulative logistic models for the pedestrian and bicycle modes. These simplified models were applied in analysis of multimodal facilities within the Study area.

FIGURE 3-23
2035 Baseline AM Intersection Levels of Service

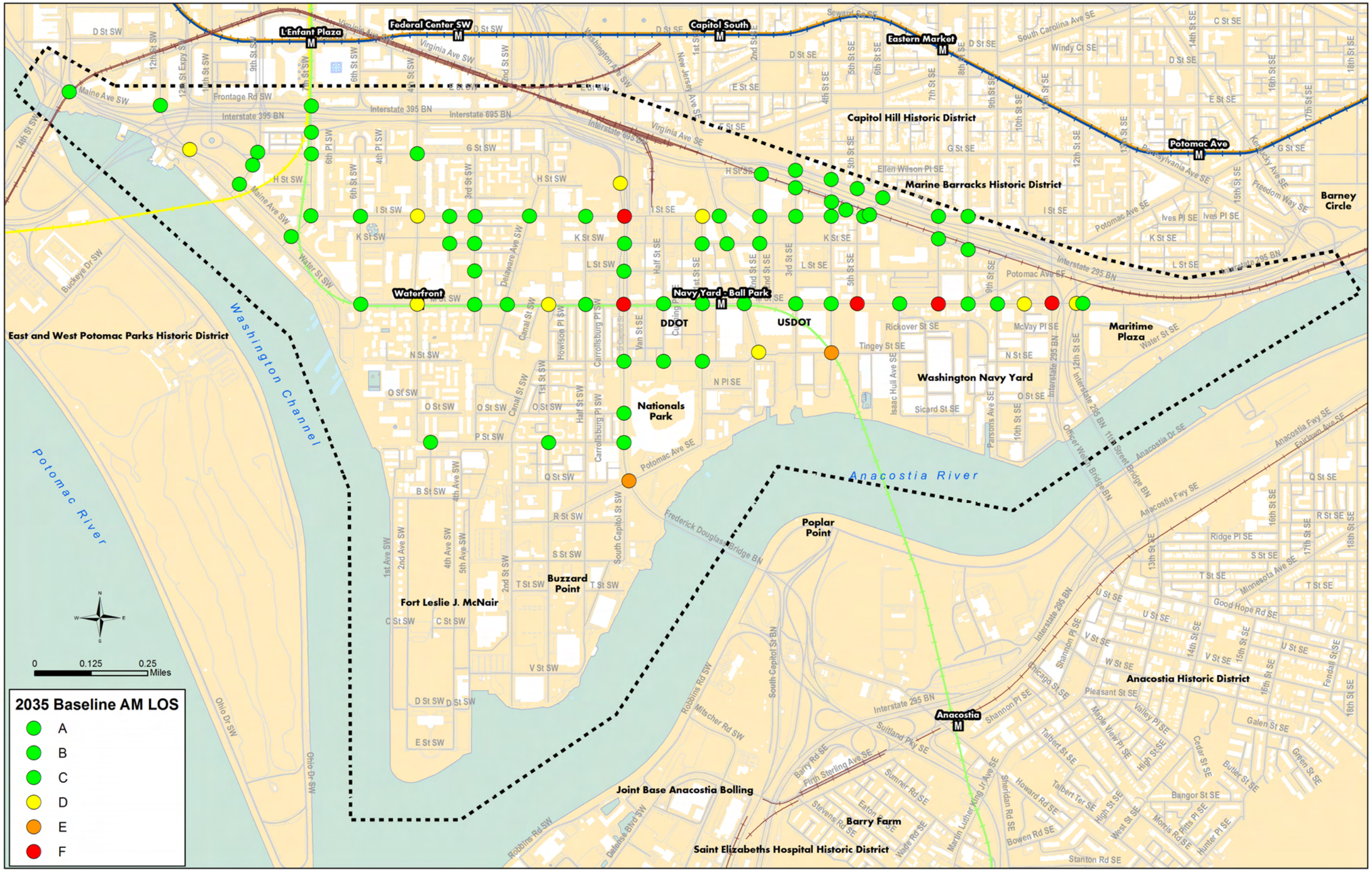
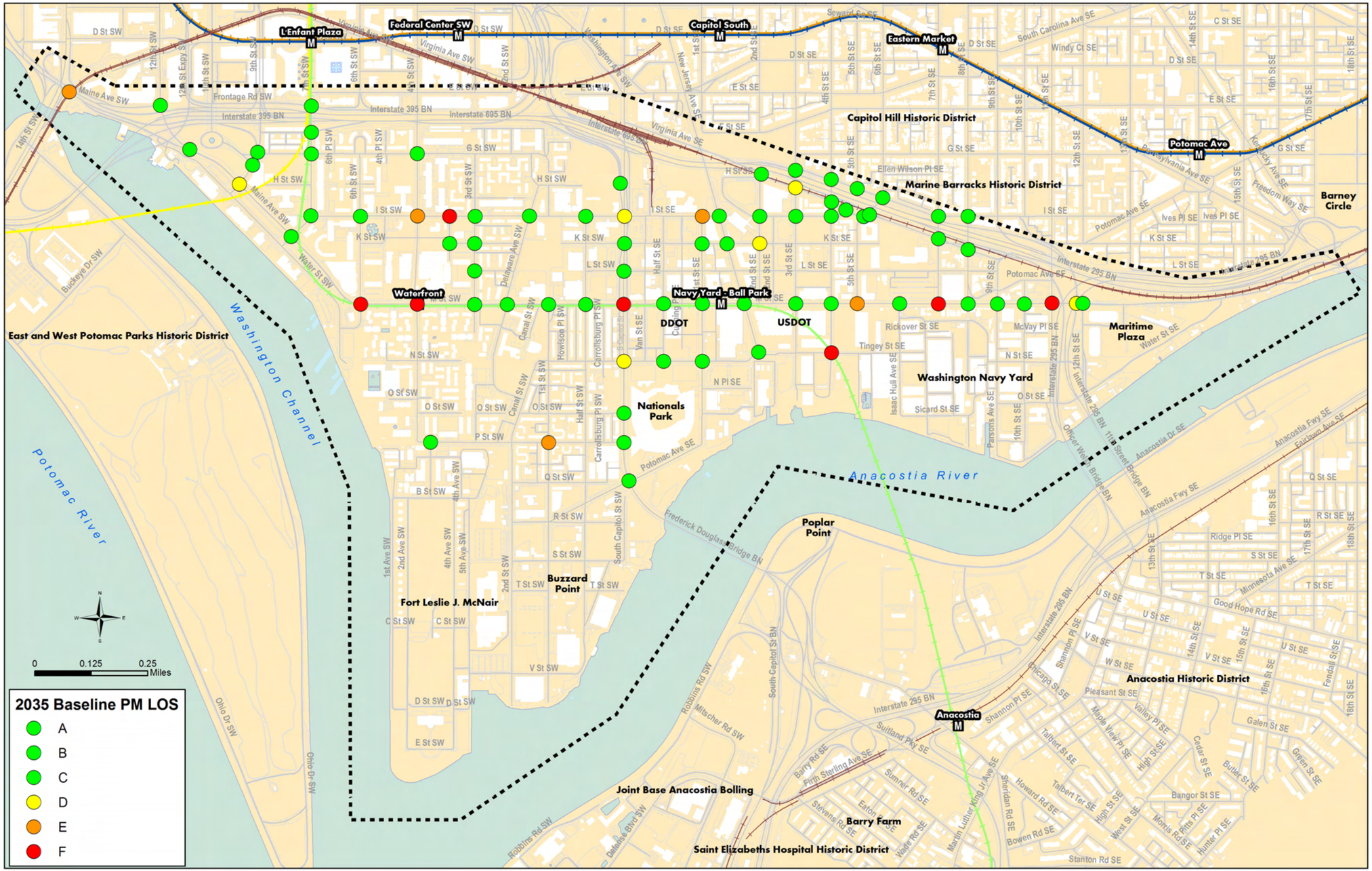


FIGURE 3-24
2035 Baseline PM Intersection Levels of Service



Transit Mode Performance Evaluation

Table 3-6 summarizes the MMLOS for the transit mode on the main corridors of the system—M Street SW/SW, I (Eye) Street SE/SW, and South Capitol Street. As shown, transit on M Street would operate at LOS F in several segments of the corridor in both directions and peak periods.

Transit on I (Eye) Street would operate at LOS C or better in both directions and peak periods.

Transit service on South Capitol Street is extremely limited, with only one bus stop in each direction near M Street. Therefore, the transit LOS along South Capitol Street is primarily influenced by the LOS and travel time for the automobile mode. In the AM peak, South Capitol Street experiences LOS C and F in the northbound and southbound directions, respectively. In the PM peak, South Capitol Street experiences LOS F and E in the northbound and southbound directions, respectively.

Metrorail Capacity and Accessibility Evaluation

The Metrorail Access and Capacity Study developed by WMATA in 2008 showed that eight-car trains will be needed on most Metrorail lines by 2020. In addition, by 2030, if Metro operates all eight-car trains, the maximum load at main Metro stations will be reached. It is important to note, however, that the above referenced WMATA Study generally shows the Green line as being under capacity for the year 2030 with only modest growth in ridership for those stations within the Study Area. For instance, the WMATA Study only predicts roughly 10,000 daily passengers traveling to and from the Waterfront Station. The validity and applicability of these forecasts to the Study Area is questionable given that ridership forecasts were based on a conservative approach and used MWCOG land-use data that at the time did not completely reflect the expected future development within Study Area. As explained in previous sections of this chapter, the expected growth in population, employment, and households within the Study area is significantly higher than that of the current version of the MWCOG regional model. While these differences could drastically increase ridership projections for the Navy Yard-Ballpark, Waterfront, and L'Enfant Plaza stations, ridership increase would probably not reach the capacity of the Green Line system.

A key factor in determining Metrorail's capability to serve the future demand within the Study area is related to station capacity and accessibility. As previously shown in **Figure 3-18,** significant portions of the entire Study area fall well outside the walking distance range from Metro stations. Similarly, as described in Section 3.3.3, there are physical and safety constrains preventing both pedestrian and bicyclist access to the L'Enfant Plaza station. Furthermore, current Metro station configurations for both the Navy Yard-Ballpark and the Waterfront stations may be inadequate to handle the projected demand associated with new development. As such, the Metro system could be constrained within the Study area, not by line capacity (number of cars per train and headways), but by lack of accessibility and station capacity, not only preventing transit commuters from getting to the Metro stations but also preventing them from accessing the trains quickly enough once they reach the desired station.

Pedestrian and Bicycle Facilities

Table 3-6 summarizes the MMLOS for bicycle and pedestrian segments along the M Street SE/SW, I (Eye) Street SE/SW, and South Capitol Street corridors. Bicycle LOS on all corridors results in LOS D or better for all segments in all directions and for both peak hours. On the other hand, pedestrian LOS varies by time of the day and direction. Although M Street shows adequate LOS D or better on all segments in the eastbound direction in the AM peak, several segments are at LOS E in the westbound direction. For the South Capitol Street corridor, most segments show LOS E in both directions and both peak periods. The I (Eye) Street corridor operates at LOS C or better for all segments, both directions, and both peak hours.

3.5.2 Summary of Findings

The following findings are the result of the Baseline evaluation for all modes:

- Automobile mode: The Baseline roadway system does not provide enough capacity, connections, or redundancy to handle future traffic demand that is derived primarily from growth in local activity as a result of new development within the Study area. This is reflected by poor LOS at several intersections. In addition, the conversion of South Capitol Street to an at-grade intersection at M Street generates a major bottleneck for all approaches (M Street and South Capitol Street) that will result in significant delays and queues spilling over to other intersections because of the high volumes traveling in both corridors. The I (Eye) Street corridor also presents significant congestion as a result of increased demand, but not as significant as congestion in the M Street and South Capitol Street corridors. Finally, several isolated intersections show LOS E or worse.
- Transit Mode: The MMLOS analysis shows that the transit system will not operate at an adequate LOS on the M Street corridor, which handles almost all of the transit supply in the Study area. The assumed transit service for the Baseline condition does not have enough capacity to handle the increased demand by 2035. In addition, the system lacks adequate connectivity throughout the network and users cannot traverse the entire corridor in a single line. The system does not provide adequate coverage of the Study area, which results in long walking distance for many users. **Figure 3-25** superimposes future employment growth, projected transit usage, and available transit service. **Figure 3-26** superimposes future household growth, projected transit usage, and available transit service. These figures clearly depicts that some of areas with the highest transit mode split are completely underserved by future transit services.
- Pedestrian and Bicycle Modes: The MMLOS analysis shows that the overall operation on M Street and I (Eye) Street is adequate but very close to being marginal (LOS D or E). South Capitol Street shows LOS F for pedestrians as a result of high traffic volume, narrow sidewalks, and lack of connectivity. In addition, several other places in the network do not have adequate width for sidewalks or lack connectivity, thereby preventing pedestrians and bicyclists from traversing the area. **Figure 3-27** shows sidewalk and pedestrian connectivity characteristics for the entire network. Finally, the following factors summarize the major challenges with pedestrian and bicycle facilities in the area:
  - Connectivity gaps
    - Disconnected street grid
    - Incomplete bike lanes, trails, and sidewalks
  - Physical: Fort McNair, Navy Yard, large institutional barriers, visual and real safety barriers
    - Streets: South Capitol, M Street, Maine Avenue, and 11th Street
    - Highways: I-395, I-695 (tunnels, at-grade, and bridge crossings)
  - High Volume/Major Intersections
    - Pedestrian/bike safety balance vs. motorist mobility
    - Peak signal timing vs. non-peak signal timing
  - Overcoming institutional barriers/large sites (Navy Yard, Nationals ParkStadium, Fort McNair, I-395) to create sense of connectedness to parks, retail, community

In summary, based on the comprehensive analysis, the transportation system assumed for the 2035 Baseline condition will not be able to adequately handle the future demand if no improvements are completed to the system. Improvements will need to either increase the capacity of the roadway, transit, and pedestrian/bicycle facilities, or generate a significant modal shift from automobile to an improved transit system as well as to non-motorized modes of travel.

TABLE 3-6
Baseline MMLOS for Transit, Pedestrian, and Bicycle Facilities

	Segment	Direction of Travel	Bike LOS (AM/PM)	Pedestrian LOS (AM/PM)	Transit LOS (AM/PM)
M Street	7th St SW - Maine/Water St Connector	EB	D/D	D/D	F/F
	Maine/Water St Connector - 6th St SW	EB	D/D	D/E	F/F
	6th St SW - 4th St SW	EB	D/D	D/D	F/F
	4th St SW - 3rd St SW	EB	D/D	D/D	F/F
	3rd St SW - Delaware Ave SW	EB	D/D	D/D	F/F
	Delaware Ave SW - 1st St SW	EB	D/D	D/D	D/D
	1st St SW - Half St SW	EB	D/D	D/D	D/D
	Half St SW - S Capitol St SW	EB	D/D	D/D	F/F
	S Capitol St SE - Half St SE	EB	D/D	D/D	D/D
	Half St SE - 1st St SE	EB	D/D	D/D	D/D
	1st St SE - New Jersey Ave SE	EB	D/D	D/D	D/D
	New Jersey Ave SE - 2nd St SE	EB	D/D	D/D	D/D
	2nd St SE - 3rd St SE	EB	D/D	D/D	D/D
	3rd St SE - 4th St SE	EB	D/D	D/D	D/D
	4th St SE - 5th St SE	EB	D/D	D/D	D/D
	5th St SE - Navy Yard	EB	D/D	D/E	C/C
	Navy Yard - 7th St SE	EB	D/D	D/E	C/C
	7th St SE - 8th St SE	EB	D/D	D/E	C/C
	8th St SE - 9th St SE/Parsons Ave	EB	D/D	D/E	C/C
	9th St SE/Parsons Ave - 10th St SE	EB	D/D	D/E	D/D
	10th St SE - 11th St SE	EB	D/D	D/D	D/D
	11th St SE - 11th St Bridges Ramp	EB	D/D	C/C	D/D
	11th St Bridges Ramp - 11th St SE	WB	D/D	C/C	D/D
	11th St SE - 10th St SE	WB	D/D	E/D	D/D
	10th St SE - 9th St SE/Parsons Ave	WB	D/D	E/D	D/D
	9th St SE/Parsons Ave - 8th St SE	WB	D/D	E/D	D/E
	8th St SE - 7th St SE	WB	D/D	E/D	C/D
	7th St SE - Navy Yard	WB	D/D	E/D	C/D
	Navy Yard - 5th St SE	WB	D/D	E/D	D/E
	5th St SE - 4th St SE	WB	D/D	E/D	D/E
	4th St SE - 3rd St SE	WB	D/D	E/D	D/E
	3rd St SE - 2nd St SE	WB	D/D	E/D	D/E
	2nd St SE - New Jersey Ave SE	WB	D/D	E/D	D/E
	New Jersey Ave SE - 1st St SE	WB	D/D	D/D	D/E
	1st St SE - Half St SE	WB	D/D	D/D	D/E
	Half St SE - S Capitol St SE	WB	D/D	D/D	D/E
	S Capitol St SW - Half St SW	WB	D/D	D/D	D/E
	Half St SW - 1st St SW	WB	D/D	D/D	F/E
	1st St SW - Delaware Ave SW	WB	D/D	D/D	E/E
	Delaware Ave SW - 3rd St SW	WB	D/D	D/D	E/E
	3rd St SW - 4th St SW	WB	D/D	D/D	F/F
	4th St SW - 6th St SW	WB	D/D	D/D	F/F
	6th St SW - Maine/Water St Connector	WB	D/D	D/D	F/F
	Maine/Water St Connector - 7th St SW	WB	D/D	D/D	F/F

	Segment	Direction of Travel	Bike LOS (AM/PM)	Pedestrian LOS (AM/PM)	Transit LOS (AM/PM)
I Street	7th St SW - 6th St SW	EB	C/C	C/C	C/C
	6th St SW - 4th St SW	EB	C/C	C/C	C/C
	4th St SW - Wesley Pl SW	EB	C/C	C/C	C/C
	Wesley Pl SW - 3rd St SW	EB	C/C	C/C	C/C
	3rd St SW - Delaware Ave SW	EB	C/C	C/C	C/C
	Delaware Ave SW - Half St SW	EB	D/D	C/C	D/D
	Half St SW - S Capitol St SE	EB	C/C	C/C	D/D
	S Capitol St SE - Half St SE	EB	n/a	n/a	F/E
	Half St SE - 1st St SE	EB	C/C	C/C	F/E
	1st St SE - New Jersey Ave SE	EB	C/C	C/C	F/E
	New Jersey Ave SE - 1st St SE	WB	C/C	C/C	D/D
	1st St SE - Half St SE	WB	n/a	n/a	D/D
	Half St SE - S Capitol St SE	WB	C/C	C/C	D/D
	S Capitol St SE - Half St SW	WB	C/C	C/C	C/C
	Half St SW - Delaware Ave SW	WB	C/C	C/C	C/C
	Delaware Ave SW - 3rd St SW	WB	C/C	C/C	B/B
	3rd St SW - Wesley Pl SW	WB	C/C	C/C	B/B
	Wesley Pl SW - 4th St SW	WB	D/D	C/C	B/B
	4th St SW - 6th St SW	WB	C/C	C/C	B/B
	6th St SW - 7th St SW	WB	C/C	C/C	B/B

	Segment	Direction of Travel	Bike LOS (AM/PM)	Pedestrian LOS (AM/PM)	Transit LOS (AM/PM)
South Capitol Street	I St SW - K St SW	SB	D/D	E/E	F/D
	K St SW - L St SW	SB	D/D	E/E	F/D
	L St SW - M St SW	SB	D/D	E/E	F/D
	M St SW - N St SW	SB	D/D	E/E	F/D
	N St SW - O St SW	SB	D/D	E/E	F/D
	O St SW - P St SW	SB	D/D	E/E	F/E
	P St SW - Potomac Ave SW	SB	D/D	D/E	F/E
	Potomac Ave SW - P St SW	NB	D/D	E/E	D/F
	P St SW - O St SW	NB	D/D	E/E	C/F
	O St SW - N St SW	NB	D/D	E/E	C/F
	N St SW - M St SW	NB	D/D	E/D	C/F
	M St SW - L St SW	NB	D/D	D/E	C/F
	L St SW - K St SW	NB	D/D	E/E	C/F
	K St SW - I St SW	NB	D/D	E/E	D/F

FIGURE 3-25
2035 Baseline Employment Growth and Projected Transit Usage

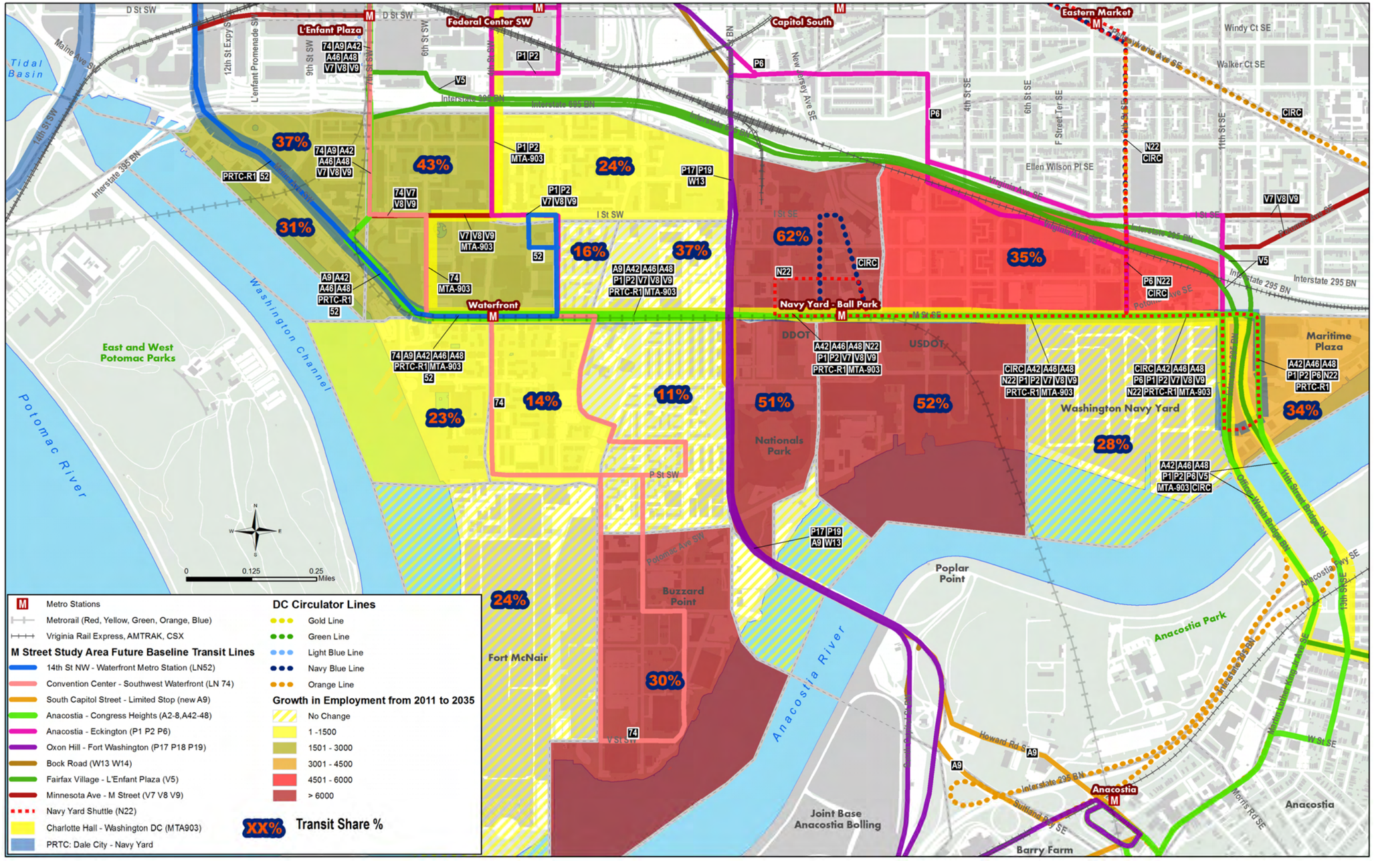


FIGURE 3-26
2035 Baseline Household Growth and Projected Transit Usage

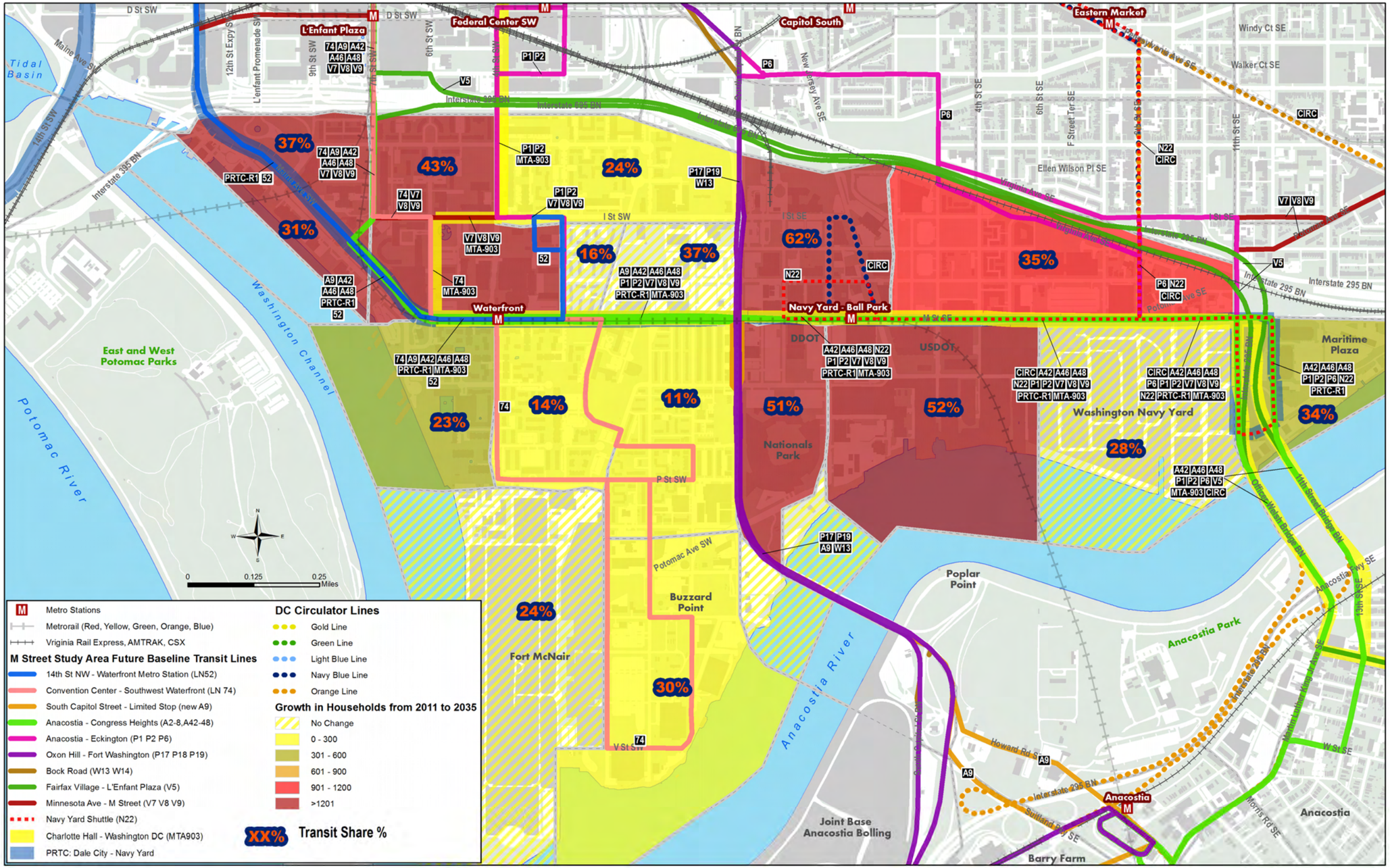
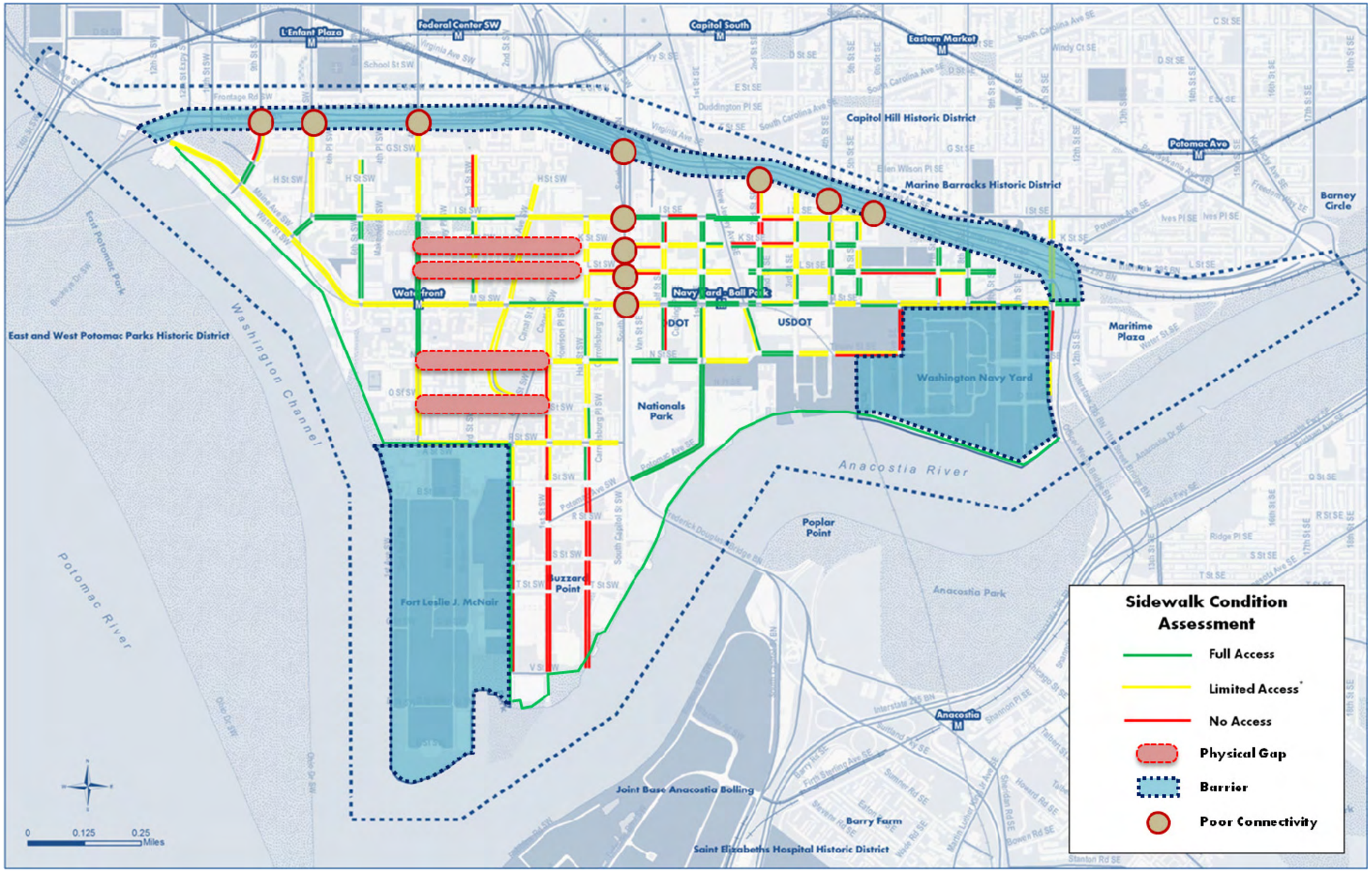


FIGURE 3-27
2035 Baseline Sidewalk and Pedestrian Connectivity Characteristics



3.6 Overview of Future Improvement Strategies Considered

Based on the list of findings described in Section 3.5, the Study team developed a set of transportation improvements focused on providing a more balanced system that can adequately handle the projected demand for the area's build-out condition. As mentioned in the previous section, the roadway infrastructure within the Study area could not handle future traffic demand unless significant capacity improvements are made. However, the overall system presents several challenges for roadway capacity improvement, including the difficulty of acquiring additional right-of-way for major corridors such as the Maine Avenue/M Street SE/SW corridor, as well as the cost of such improvements. In addition, it is both DDOT's goal and citizen desires that the area become an integral part of an active and vital neighborhood where both transit and non-motorized modes help to create a more livable and sustainable community in which residents, workers, and visitors can walk and bike for basic services and use transit to other destinations. With these objectives in mind, the improvement options focused on:

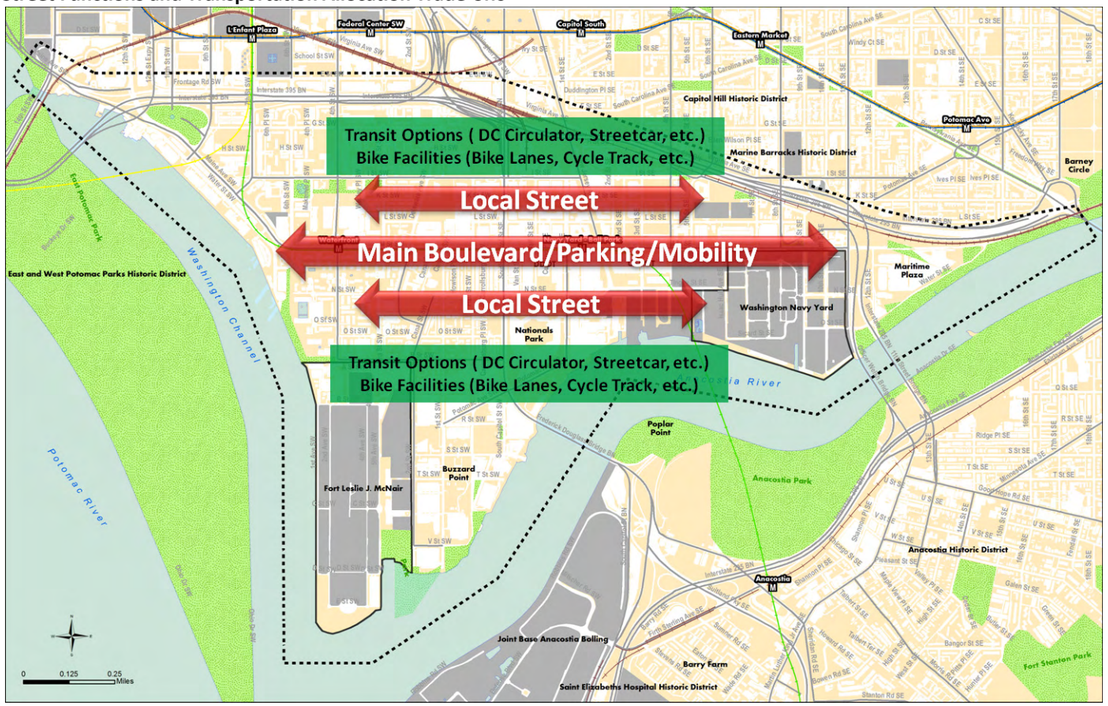
- Encouraging the use of public transit and non-motorized modes through enhancing and increasing transit, bicycle, and pedestrian facilities within the area;
- Improving vehicular capacity through modest roadway improvements that are feasible for the main corridors in the area;
- Providing a more balanced function for streets in terms of mobility and accessibility within the area with the understanding that all functions cannot be accomplished by a single corridor; and
- Increasing connectivity for all modes within the Study area and to adjacent neighborhoods.

Figure 3-28 conceptually exemplifies some of the trade-offs that need to be accounted for when developing potential improvements for the area. For instance, currently (existing conditions and Baseline condition) the M Street SE/SW corridor carries most of the transportation access and mobility functions in the area and also serves as the main corridor for transit services. Although the corridor provides adequate service to the area today, the analysis showed that this is not sustainable for future conditions. As local activity increases due to new development, both traffic conditions as well as transit services will fail to provide adequate access and mobility to the area, creating the need to relocate some of the functions to parallel roadways and achieve a balanced system with adequate coverage of the entire area. In addition, new development will also generate additional activity in areas farther away from the M Street corridor, creating the need for improved access to transportation in those areas. As an example, **Figure 3-28** shows transit options as well as bicycle facilities being allocated on alternate parallel corridors while maintaining parking and throughput functions in the M Street SE/SW corridor. Conversely, converting M Street SE/SW from an "all-transportation-functions" to a transit-priority corridor will likely require allocating additional capacity at parallel corridors for throughput and parking. The overarching goal in the development of improvements was to achieve a more balanced network that is sustainable in the long term and supports modes other than automobile. This goal can be accomplished by designing and providing a balance in physical space and time for all modes. It is important to understand that not every street has to accommodate every function, every amenity, every experience, or every mode. At the same time, within any given urban street, accommodation for pedestrian activity is the building block upon which all other modes and functions are layered.

Three categories of improvements were considered for the Study area:

- Near-term improvements
- Mid-term improvements
- Other long-term improvements beyond the year of analysis (2035)

FIGURE 3-28
Street Functions and Transportation Allocation Trade-offs



Near-term Improvements

The near-term improvements focus on various immediate improvement options that may relieve Study area residents and commuters of current transportation issues and challenges. These actions could be implemented between 2013 and 2016. Chapter 5 of this document details the several options suggested as near-term improvements.

Mid-term Improvements

For the mid term, the Study team focused on improvements grouped in three different alternatives. Each of these alternatives was developed around a principal function for the M Street SE/SW corridor that resulted in derived functions for other corridors. General characteristics of the alternatives are described below. More specific details and the evaluation of each alternative in comparison with the Baseline conditions are summarized in Chapter 6.

- **Alternative 1 – M Street "Main Street"**: The main goal for this alternative is to transform the M Street SE/SW corridor from its current condition of serving multi-function transportation modes to a "transit priority" corridor that would prioritize non-automobile transportation and give the corridor a "main street" look and feel. Under this alternative, M Street serves as core premium transit corridor providing east-west connectivity at a mid-point for neighborhoods north and south of M Street. Improvements include:
  - Improved transit connections on M Street with new and enhanced premium transit services (streetcar, Metrobus Express, DC Circulator, etc.)

  - Two vehicular lanes each way and one exclusive transit lane per direction for premium transit services (outer lanes)
  - Focus on increased connectivity and utilization of parallel streets to better facilitate vehicular and bicycle flows

- **Alternative 2 – "Balanced Linkages"**: The main goal in this alternative is to achieve a more balanced transit network with wider coverage of the entire area. The alternatives would allocate new transit services to parallel corridors while creating new bicycle facilities on M Street SE/SW. The following improvements are included in this alternative:
  - Pedestrian and cyclist improvements on M Street SE/SW
  - On-street parking on M Street SE/SW
  - Transit concentrated on parallel roads
  - Streetcar on I (Eye) Street (east of 4th Street SW)
  - DC Circulator on Tingey Street / N Street SE and N Street / P Street SW
  - Focus on increased connectivity / multimodal aspects
- **Alternative 3 – M Street "Mobility Arterial"**: The main goal of this alternative is to keep the M Street SE/SW corridor as the main vehicular activity corridor with less emphasis on alternative modes and allowing as many vehicles as possible to use the corridor by implementing modest operational improvements (parking restrictions, signal optimization, and lane channelization) to maximize vehicular throughputs during peak hours. Main elements in this alternative include:
  - Parking restrictions and lane configuration changes to maintain three lanes in each direction on Maine Avenue and M Street SE/SW during peak hours
  - Signal optimization on M Street SE/SW
  - Shared lane for streetcar and transit (outer lanes)
  - Improved pedestrian safety and transit on M Street
  - Aggressive traffic calming on parallel streets to discourage drivers short-cutting through the network
  - Focus on improved vehicular throughput

Long-Term Improvements beyond the Analysis Year

These improvement options focus on potential new connections to complete the street grid within the Study area if future development beyond 2035 were to occur on areas currently not available. As discussed in previous sections of this chapter, the street network presents several gaps of connectivity that create significant challenges to improve the transportation experience in the area. Some of these gaps could be connected in the near- or long-term horizons, but most of them are currently off-limits given that land acquisition in those areas seems very unlikely. Chapter 7 provides additional detail and explanation on suggested improvement options beyond 2035.

3.7 Evaluation Criteria Associated with the Improvements and Options

Through several iterations of public and stakeholder involvement, the Study team developed evaluation criteria that were used to compare proposed long-term alternatives and evaluate the merits and flaws of each improvement. The criteria were categorized into three general areas of focus:

- **Community:** These criteria focus on those aspects of transportation that relate to "community livability." Livability is a term that refers to a community's quality of life as experienced by the people who live, work, and recreate in the area. Livability recognizes that strong communities rely on the interplay among the key areas of transportation, urban development, public health, housing, cultural resources, and the natural environment.
- **Connections:** These criteria focus on evaluating how each proposed improvement helps the objective of creating a more balanced and interconnected transportation network throughout the entire Study area and by each mode.
- **Capacity:** These criteria focus on elements that provide additional capacity to the transportation system, either by specific enhancements to facilities or by encouraging a modal shift from automobile to alternative modes.

Table 3-7 shows the specific criteria elements included on each of these components.

TABLE 3-7
Evaluation Criteria

CRITERIA	DESCRIPTION
COMMUNITY	Promote walkable, safe pedestrian infrastructure
	Provide multimodal access to and mobility within neighborhoods
	Create diverse and balanced transportation options
	Promote sustainable community & infrastructure
	Protect residential parking
CONNECTIONS	Establish and/or Improve pedestrian connectivity to/within communities and to Metro Stations
	Create bicycle lane / cycle tracks connectivity
	Enhance transit connectivity (including inter-neighborhood connectivity and reduction of transfers)
	Provide flexibility for managing parking demand
	Promote shared parking
	Optimize freeway connections (provide for all movements at freeway interchanges where feasible)
	Close gaps in missing street connections
CAPACITY	Provide transit capacity
	Address regional capacity needs
	Shift mode split from vehicular to transit and non-motorized modes to accommodate increased density
	Promote efficient/safe movement of people & goods to support new retail, restaurants, etc. (incl. Freight/Motor Coach staging areas)
	Balance parking supply between land use demands
	Establish context-sensitive locations for commuter bus and other transit staging areas

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Chapter 4
FUTURE ALTERNATIVES DEVELOPMENT AND EVALUATION OF ALTERNATIVES (2015-2021)

4 Alternatives Development and Assessment of Future Conditions

This chapter summarizes the proposed mid-term improvements within the Study area out to the year 2021. Three contrasting alternatives with several transportation elements spread out to different streets within the Study area were considered. A description of each alternative is presented below, with a detailed discussion of the following elements for each: vehicular network, transit service, pedestrian facilities, bicycle facilities, parking facilities, and MMLOS performance. A comparison summary of all alternatives is presented at the end of the chapter.

4.1 Improvements Consistent Across All Alternatives

4.1.1 Policy Changes

The following policy changes were considered for all alternatives within the Study area:

- Transit policy to make high-quality premium transit options a priority within the Study area (Chapter 5)
- Smart-meter parking system (Chapter 5)
- Shared parking, performance parking (Chapter 5)
- Enhanced enforcement efforts for residential parking and extension of RPP hours (Chapter 5)
- Motor coach and commuter bus staging and parking areas (Chapter 5)
- Accommodation of freight by establishing truck routes and freight loading areas (Chapter 5)

4.1.2 Vehicular Network

Operational improvements at intersections were included for all alternatives, including:

- New signal installation at the following locations:
  - H Street SE/New Jersey Avenue SE
  - I (Eye) Street SW/Half Street SW
  - I (Eye) Street SE/Half Street SE
  - I (Eye) Street SE/1st Street SE
  - K Street SE/1st Street SE
  - K Street SE/New Jersey Avenue SE
  - N Street SE/Half Street SE
  - P Street SW/1st Street SW
- Lane channelization reconfiguration at the following locations:
  - Removal of approximately 100 feet of parking on the west side of M Street SE/7th Street SE so that an exclusive right-turn lane could be added.
  - Removal of approximately 100 feet of parking on the west side M Street SE/8th Street SE so that an exclusive right-turn lane could be added.
  - Removal of the Q Street SW leg from the intersection of South Capitol Street/Potomac Avenue/R Street Oval. Q Street SW would have a cul-de-sac east of Half Street SW, and trips exiting the Oval headed westbound would use Potomac Avenue SW. Trips entering the Oval from the west would use R Street SW.
- Installation of actuated-coordinated signals with vehicle detection systems at all locations along M Street and South Capitol Street. In addition, cycle lengths at intersections along M Street and South Capitol Street would be modified to be consistent.
- Construction of new road segments to connect gaps in the grid system at the following locations:
  - I (Eye) Street SE between New Jersey Avenue and 2nd Street SE
  - H Street SE between New Jersey Avenue and 2nd Street SE
  - Potomac Avenue SE between 1st Street SE and 3rd Street SE
- Conversion of one-way road segments to two-way road segments at the following locations:
  - Street SW between Canal Street SW and South Capitol Street
  - N Street SW between Half Street SW and South Capitol Street
  - 1st Street SW between P Street SW and V Street SW
  - 2nd Street SW between P Street SW and V Street SW

4.1.3 Transit Service

Transit improvements common to all alternatives include the proposed DC Streetcar, which would connect the Anacostia neighborhood to the south with the downtown area to the north. The DC Streetcar will tentatively operate on 10-minute headways (or six trips per hour per direction) during both the AM and PM peak periods. The DC Streetcar proposes generally accessing the Study area in Southeast via the 11th Street Bridge and in Northwest via Maine Avenue or 7th Street SW. The route alignment through the Study area varies by alternative and will need to be further studied when considering for implementation.

4.2 Multimodal Alternative 1 – M Street "Main Street"

This alternative is referred to as M Street "Main Street" because of its focus on improved transit service and reliability on M Street. A proposed typical cross section of M Street is presented in **Figure 4-1**. M Street would include one 11-foot exclusive premium transit lane (to accommodate a potential streetcar route and bus transit), two 10-foot vehicular travel lanes, and a variable-width median. M Street on the west side of South Capitol Street would include a center turn lane and median barrier. The proposed improvements included in Alternative 1 within the entire Study area are shown in **Figure 4-2**, with more detail for the western and eastern halves in **Figure 4-3** and **Figure 4-4**, respectively.

FIGURE 4-1
Multimodal Alternative 1 - M Street Configuration

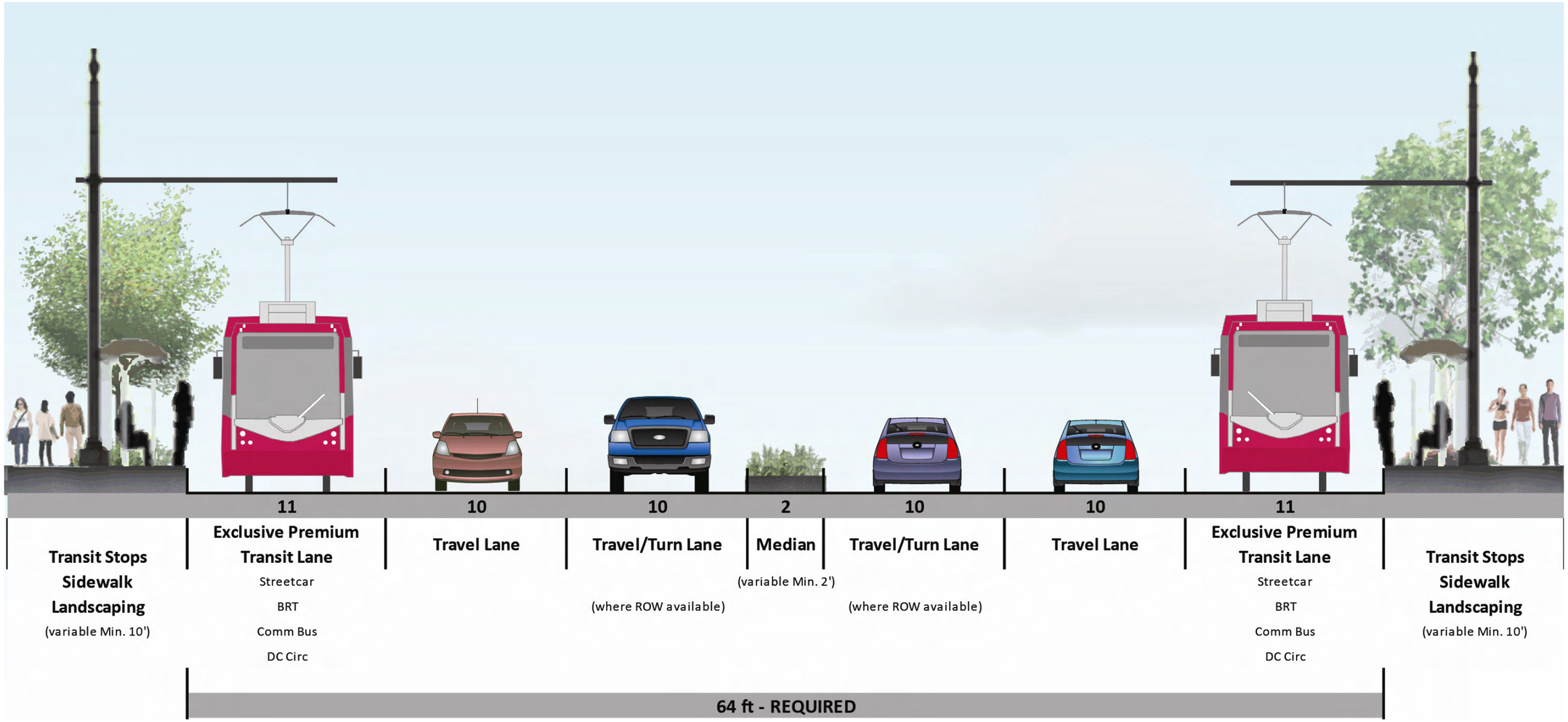


FIGURE 4-2
Multimodal Alternative 1 – M Street "Main Street" Concept (Entire Study Area)

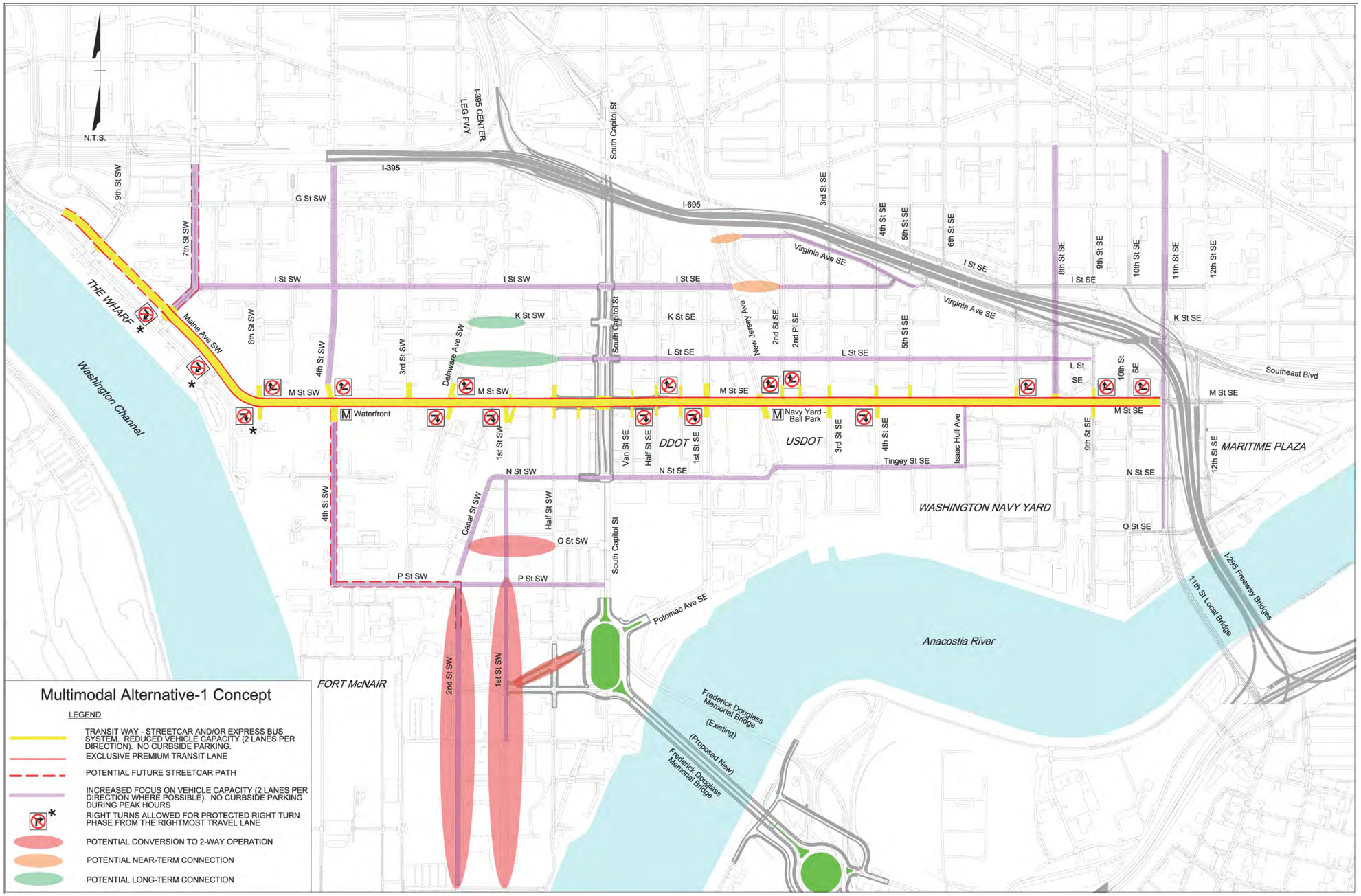


FIGURE 4-3
Multimodal Alternative 1 – M Street "Main Street" Concept (SW Area)

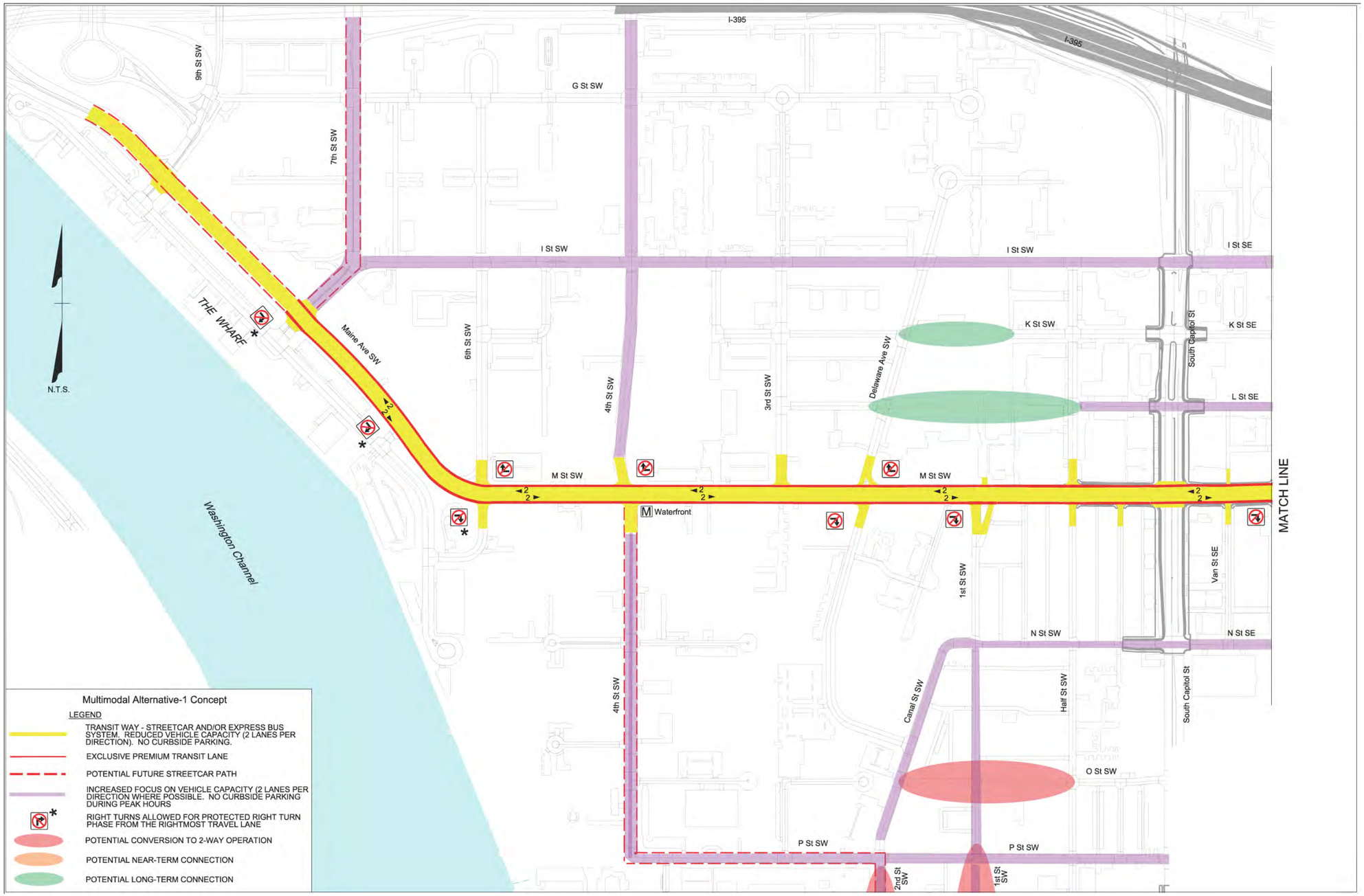
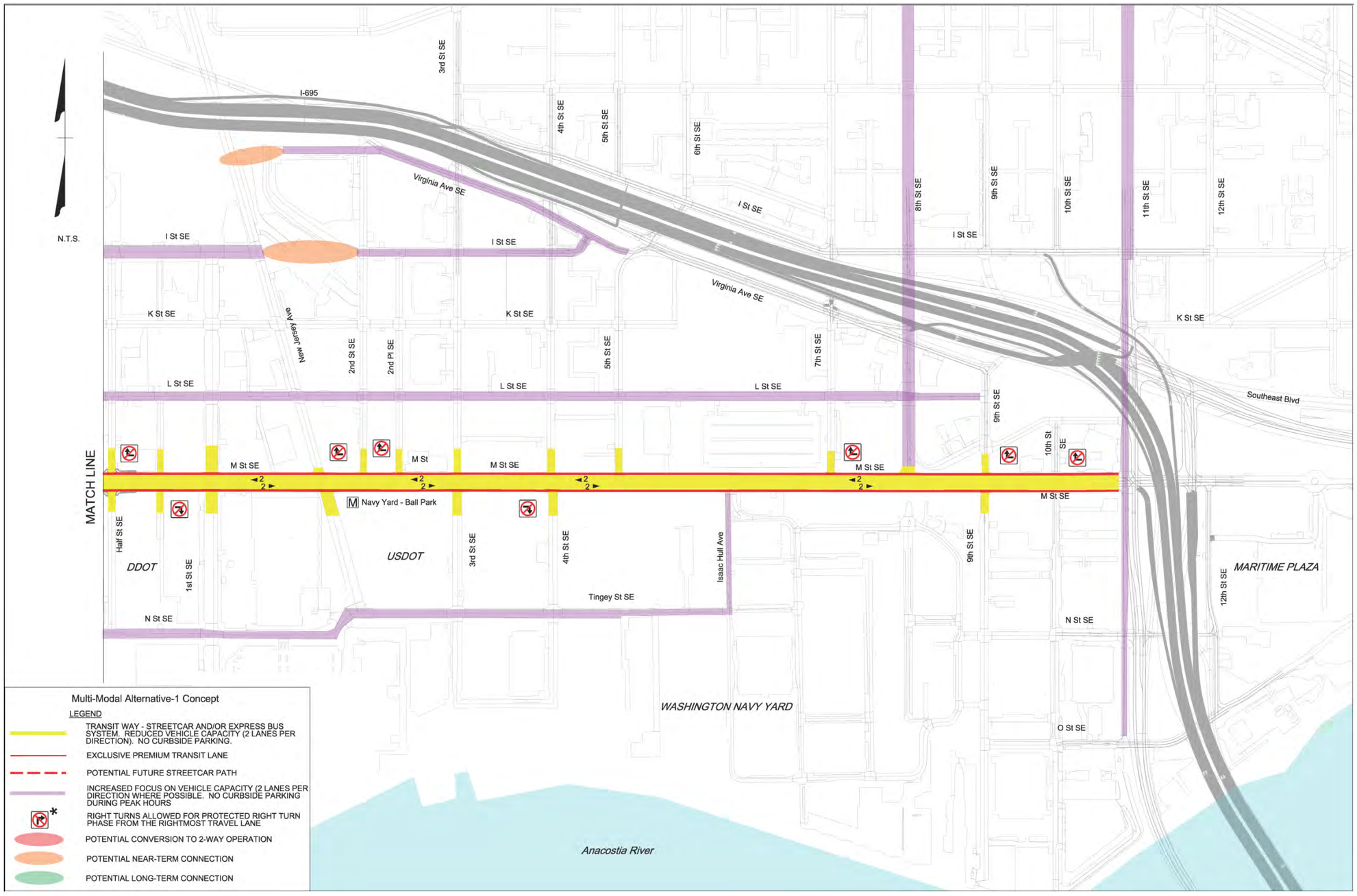


FIGURE 4-4
Multimodal Alternative 1 – M Street "Main Street" Concept (SE Area)



4.2.1 Alternative 1 Vehicular Network

Several operational improvements to the vehicular network proposed in Alternative 1 would affect future travel patterns:

- M Street would be reduced from three to two travel lanes in each direction between 9th Street SW and 11th Street SE. The outside travel lane would be an exclusive premium transit lane intended for buses and streetcar vehicles. At several locations, right-turn access would be restricted for general-purpose (GP) vehicles to help reduce delays to transit vehicles. Potential locations where right-turn restrictions would be considered in Alternative 1 include:
  - Eastbound at 7th Street SW, SW Waterfront Driveway, 6th Street SW, Delaware Avenue SW, 1st Street SW, Half Street SE, 1st Street SE, and 4th Street SE
  - Westbound at 6th Street SW, 4th Street SW, Delaware Avenue SW, 1st Street SW, Half Street SE, New Jersey Avenue SE, 2nd Street SE, 7th Street SE, 9th Street SE, and 10th Street SE
- I (Eye) Street would be widened from one to two travel lanes in each direction between 7th St SW and Virginia Avenue SE by removing on-street parking during peak periods. Besides M Street, I (Eye) Street is the only other east-west road that connects through the Study area on both sides of South Capitol Street. Because of the reduction in vehicle capacity on M Street, increased capacity was added at I (Eye) Street to maintain at least four travel lanes in each direction between the two roads.
- L Street would be widened from one to two travel lanes in each direction between Half Street SW and 8th Street SE wherever possible by removing parking during peak periods.
- N Street SE/Tingey Street SE between 1st Street SW and 4th Street SE would be widened from one to two travel lanes in each direction wherever possible by removing on-street parking during peak periods.
- P Street SW between 4th Street SW and South Capitol Street would be widened from one to two travel lanes in each direction wherever possible by removing on-street parking during peak periods.
- 1st Street SW and 2nd Street SW between P Street SW and the Anacostia River would be converted to two-way operation.
- The eastbound direction of Virginia Avenue SE between I (Eye) Street SE and 8th Street SE would remain in its current configuration.

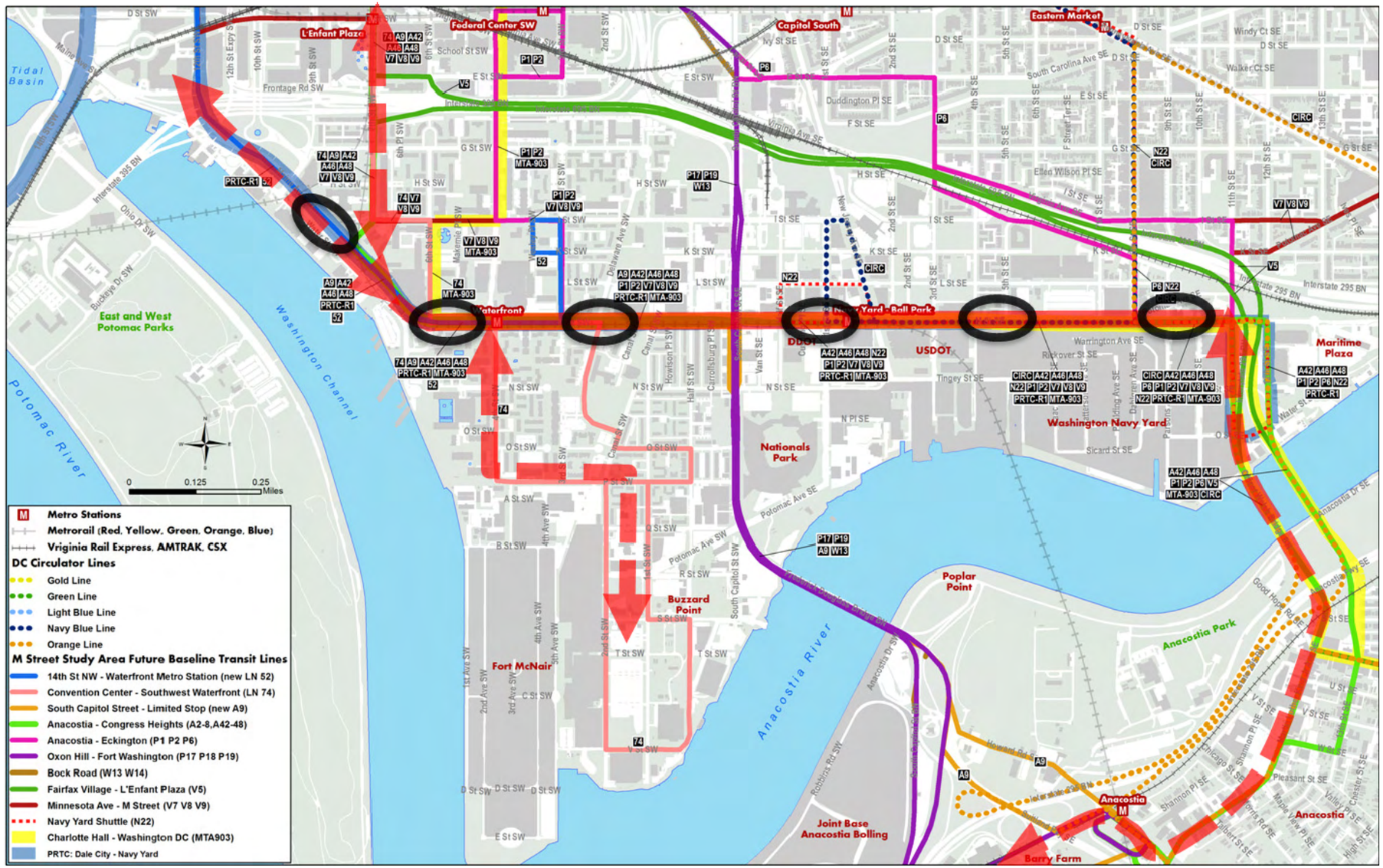
Operational improvements to intersections exclusive to Alternative 1 include:

- M Street SW/4th Street SW would be modified so that the northbound channelization would include a left and shared left-through-right lane. Northbound and southbound movements would be split-phased, and a westbound left-turn protected-permitted phase would be added.
- M Street SE/8th Street SE would have an eastbound left-turn protected-permitted phase added.
- New signals would be installed along I (Eye) Street SE at 2nd Street SE, 3rd Street SE, 4th Street SE, and Virginia Avenue SE.
- South Capitol Street/I (Eye) Street would be modified to include a new crosswalk on the north leg. The eastbound approach lane channelization would be modified to include a shared left-through lane and a shared through-right lane, as well as an eastbound left-turn protected-permitted phase.

4.2.2 Alternative 1 Transit Service

- Exclusive premium transit lane would be provided, with general purpose (GP) vehicles right-turn access restricted at several locations.
- The proposed DC Streetcar line connecting the Anacostia neighborhood to the south and the downtown area to the north would be routed along M Street and would use the exclusive premium transit lane. **Figure 4-5, Proposed Streetcar Route and Stops on M Street**, shows the streetcar accessing M Street on the east side of the Study area via the 11th Street arterial bridge and on the west side via Maine Avenue. The DC Streetcar will tentatively operate on 10-minute headways (or six trips per hour per direction) during both the AM and PM peak periods.
- Transit-Signal-Priority (TSP) for transit vehicles (bus and streetcar) would be added to all signalized intersections along M Street between 9th Street SW and 9th Street SE. TSP would increase the speed and reliability of the transit vehicles by a combination of extending green time or truncating red time on eastbound and westbound movements on M Street or shortening minor street phases.
- The proposed DC Circulator bus would be routed along M Street between 1st Street SE and 8th Street SE and would use the exclusive premium transit lane.
- Bus stop locations within the Study area along M Street would be consolidated to six locations to increase the efficiency of transit vehicles. The current configuration of bus stops along M Street has 15 stops in the eastbound direction and 17 stops in the westbound direction. The proposed consolidation locations are:
  - Between 9th Street SW and 7th Street SW
  - Between 6th Street SW and 4th Street SW
  - Between Delaware Avenue SW and 1st Street SW
  - Between 1st Street SE and New Jersey Avenue SE
  - Between 4th Street SE and 5th Street SE
  - Between 8th Street SE and 10th Street SE
- At the consolidated bus stop locations, expanded sidewalks and improved boarding/alighting areas with shelters would be provided.
- Pending an evaluation of the possible impacts to the premium transit services along the dedicated transit lanes, all existing WMATA Metrobus routes along M Street utilize the exclusive transit lanes and stop at the proposed stop locations listed above. WMATA Metrobus service could be modified to add local routes or shift current routes on streets parallel to M Street, such as I (Eye) Street, N Street/Tingey Street, or P Street.

FIGURE 4-5
Multimodal Alternatives 1 and 3 – Proposed Streetcar Route and Stops on M Street



Proposed Exclusive Premium Transit Lanes in Multimodal Alternative-1
Proposed Shared Transit Lanes (with other modes) in Multimodal Alternative-3

Potential Future DC Streetcar Path

Potential Consolidated Transit Stops

4.2.3 Alternative 1 Pedestrian Facilities

Pedestrian facilities along M Street would be improved at transit stops to include expanded sidewalks and shelters.

4.2.4 Alternative 1 Bicycle Facilities

- East-west bicycle facilities within the Study area would be provided along I (Eye) Street and the Anacostia Riverwalk Trail.
- No bicycle facilities would be provided on M Street because the exclusive premium transit lane and streetcar tracks would conflict with bicycles.
- I (Eye) Street would be restriped from its current configuration (one 8-foot parking lane, one 5-foot bicycle lane, and one 11-foot travel lane in each direction) by removing parking on the curb lane to accommodate one shared travel/bicycle lane and one travel/turn lane in each direction.
- N Street SE/Tingey Street SE would accommodate a shared vehicle/bicycle lane between South Capitol Street and 4th Street SE.
- On the south side of the Study area, the Anacostia Riverwalk Trail would provide an east-west connection.
- North-south bicycle facilities within the Study area are provided along 11th Street SE, 1st Street SE, and 4th Street SW.

4.2.5 Alternative 1 Parking Facilities

- M Street/Maine Avenue SW would have all on-street parking removed to accommodate the exclusive premium transit lane with streetcar tracks.
- I (Eye) Street would have all on-street parking between 7th Street SW and South Capitol Street removed to accommodate the additional shared vehicle/bicycle lane in each direction. On-street parking would remain on I (Eye) Street between South Capitol Street and New Jersey Avenue SE. Between New Jersey Avenue SE and Virginia Avenue SE, on-street parking would likely be eliminated to accommodate the additional shared vehicle/bicycle lane.
- L Street would continue to have limited on-street parking where right-of-way (ROW) allows.
- 1st Street SW and 2nd Street SW south of P Street SW would have on-street parking removed to accommodate two-way operation.
- N Street SE/Tingey Street SE would have limited parking where available.

4.3 Multimodal Alternative 2 – "Balanced Linkages"

This alternative is referred to as "Balanced Linkages" because of its focus on providing a mix of transportation facilities for bicycles and transit on both M Street and I (Eye) Street. The cross section of M Street would vary based on available ROW and curb-to-curb street width, which is 80 to 84 feet on the west side of South Capitol Street and 67 to 71 feet on the east side of South Capitol Street. A proposed typical cross section of M Street west of South Capitol Street is presented in **Figure 4-6** and includes an 8-foot cycle track, 8-foot parking lane, 12-foot shared travel lane for general purpose and transit vehicles, and 11-foot travel/turn lane in each direction. A proposed typical cross section for M Street east of South Capitol Street is presented in **Figure 4-7** and includes an 8-foot bicycle track, an 11-foot shared travel lane for general purpose and transit vehicles, and a 10.5-foot travel/turn lane in each direction. One 8-foot parking lane would be provided at varying locations and directions of M Street. The proposed improvements included in Alternative 2 within the entire Study area are shown in **Figure 4-8**, with more detail for the western and eastern halves in **Figure 4-9** and **Figure 4-10**, respectively.

4.3.1 Alternative 2 Vehicular Network

Several proposed operational improvements to the vehicular network in Alternative 2 would affect future travel patterns:

- M Street would be reduced from three to two travel lanes in each direction between 9th St SW and 11th St SE. The outside travel lane would be converted to an 8-foot cycle track (5-foot lane with a 3-foot buffer). On the west side of South Capitol Street, an 8-foot parking lane would be provided in locations where right-of-way is available. At locations west of South Capitol Street where a turn-lane is required, parking would be restricted. On the east side of South Capitol Street, an 8-foot parking lane would be provided on the north side of M Street SE where right-of-way is available.
- I (Eye) St would be widened from one to two travel lanes in each direction between 7th Street SW and Virginia Avenue SE by removing on-street parking during peak periods. The additional travel lane on I (Eye) Street is intended as a shared vehicle/transit lane. The DC Streetcar would be routed onto I (Eye) Street between 3rd Street SE and 7th Street SW in Alternative 2. Besides M Street, I (Eye) Street is the only other east-west road that connects through the Study area on both sides of South Capitol Street. Because of the reduction in vehicle capacity on M Street, increased capacity would be added at I (Eye) Street to maintain at least four travel lanes in each direction between the two roads.
- L Street would maintain its existing configuration in Alternative 2.
- N Street SE/Tingey Street SE would have on-street parking removed in places to accommodate a shared travel/transit lane in each direction. The DC Circulator bus service would be routed onto N Street/Tingey Street.
- P Street SW would have on-street parking removed in places to accommodate a shared travel/transit lane in each direction. The DC Circulator bus service would be routed onto P Street SW between 4th Street SW and 1st Street SW in Alternative 2.
- 1st Street SW and 2nd Street SW between P Street SW and the Anacostia River would remain in their existing configuration as a one-way pair.
- The eastbound segment of Virginia Avenue SE between I (Eye) Street SE and 8th Street SE would be converted into two-way operation. This conversion would make it easier for motorists originating from 11th Street SE to access I (Eye) Street to travel westbound through the Study area.

Operational improvements to intersections exclusive to Alternative 2 include:

- M Street SE/9th Street SE would have an eastbound left-turn protected-permitted phase added.
- New signals would be installed along I (Eye) Street SE at 2nd Street SE, 3rd Street SE, 4th Street SE, and Virginia Avenue SE.
- South Capitol Street/I (Eye) Street would be modified to include a new crosswalk on the north leg. The eastbound approach lane channelization would be modified to include a shared left-through lane and a shared through-right lane, as well as an eastbound left-turn protected-permitted phase.

FIGURE 4-6
Multimodal Alternative 2 - M Street Configuration West of South Capitol Street

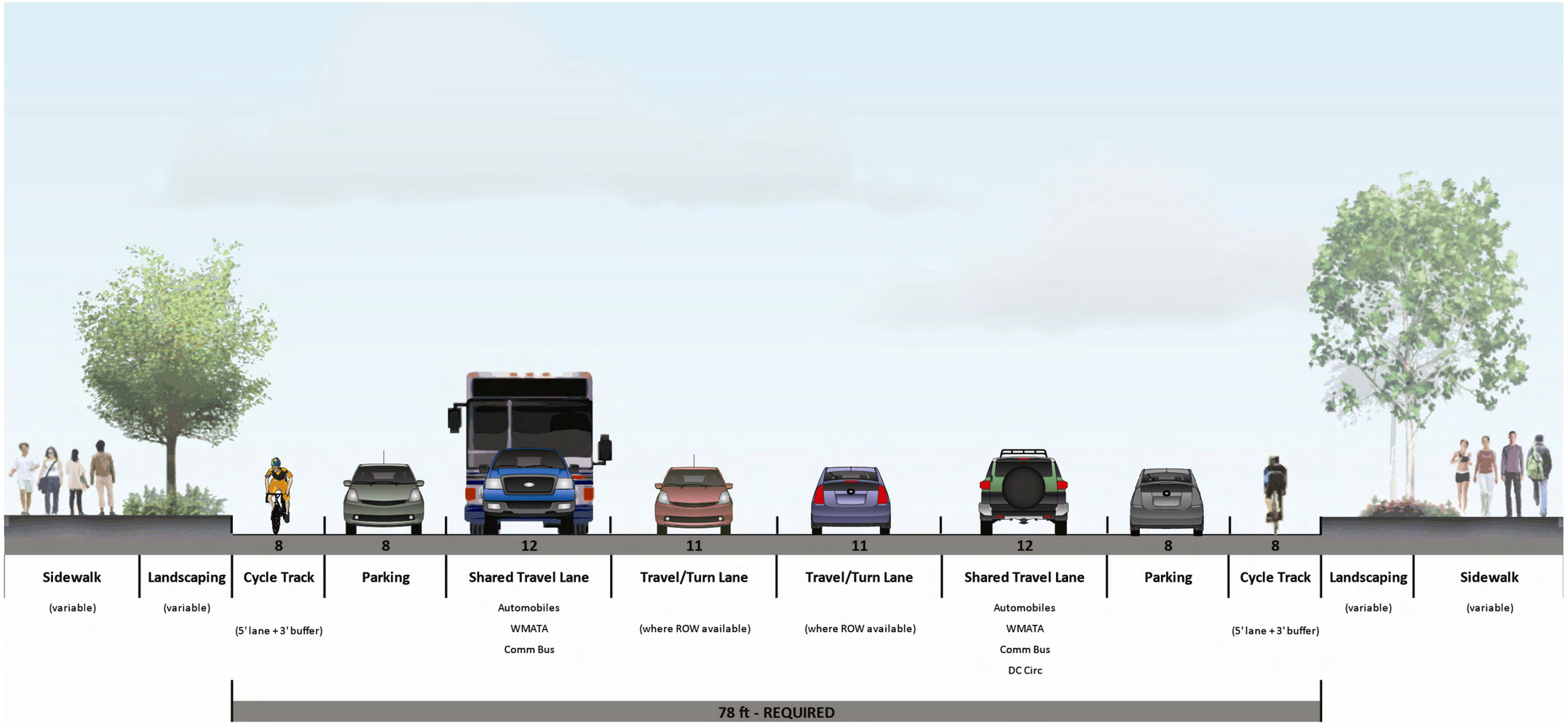


FIGURE 4-7
Multimodal Alternative 2 - M Street Configuration East of South Capitol Street

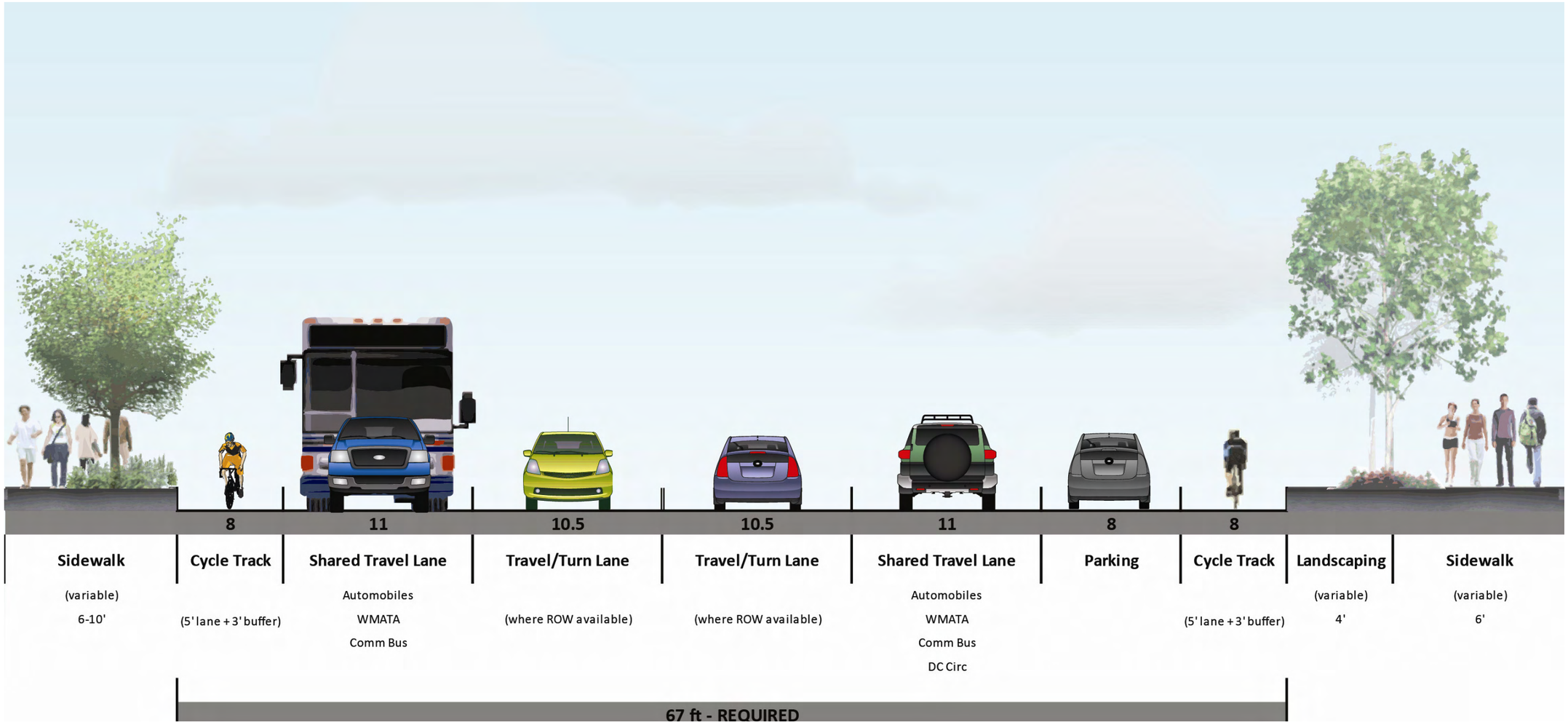


FIGURE 4-8
Multimodal Alternative 2 "Balanced Linkages" Concept (Entire Study Area)

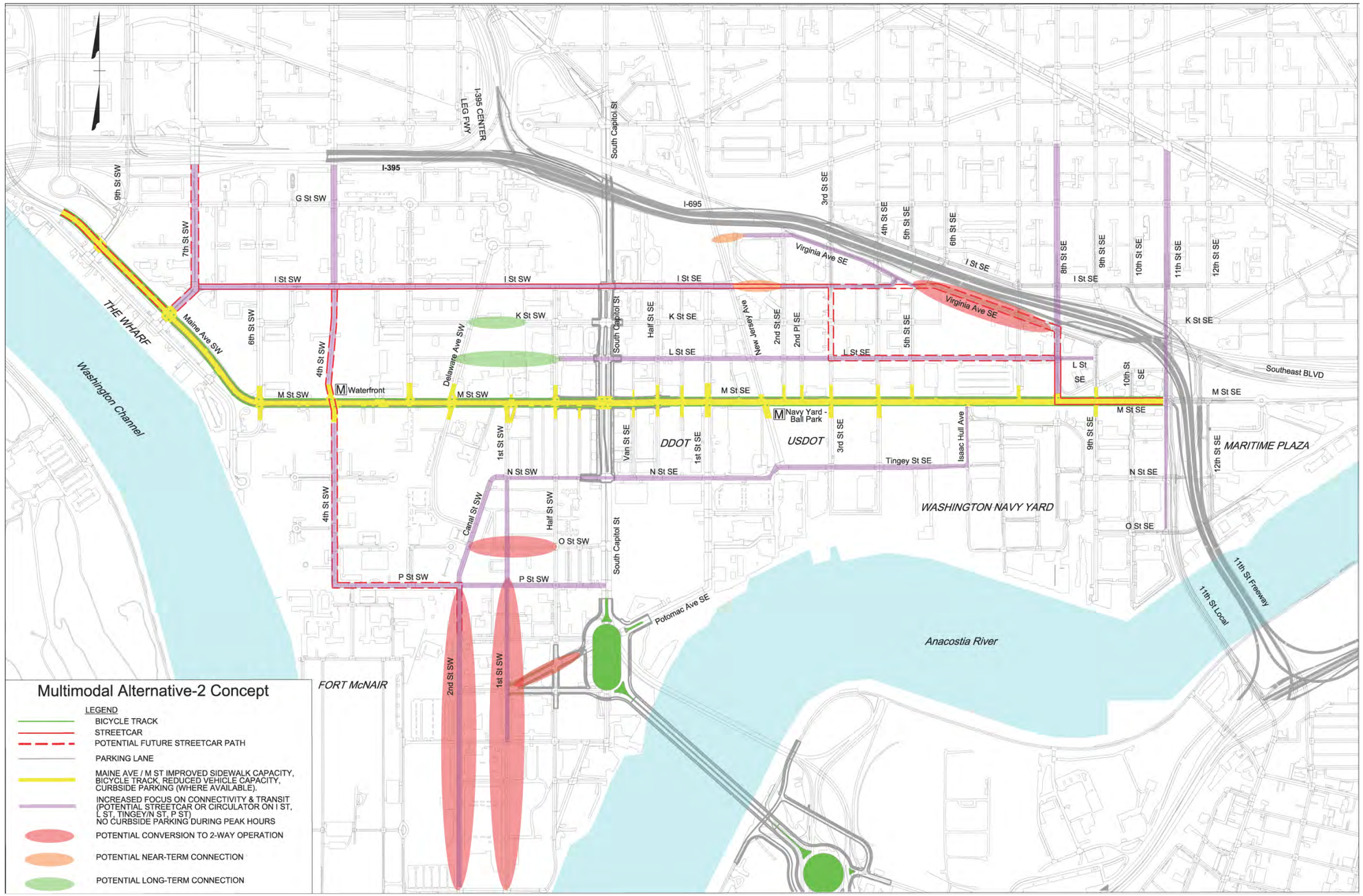


FIGURE 4-9
Multimodal Alternative 2 "Balanced Linkages" Concept (SW Area)

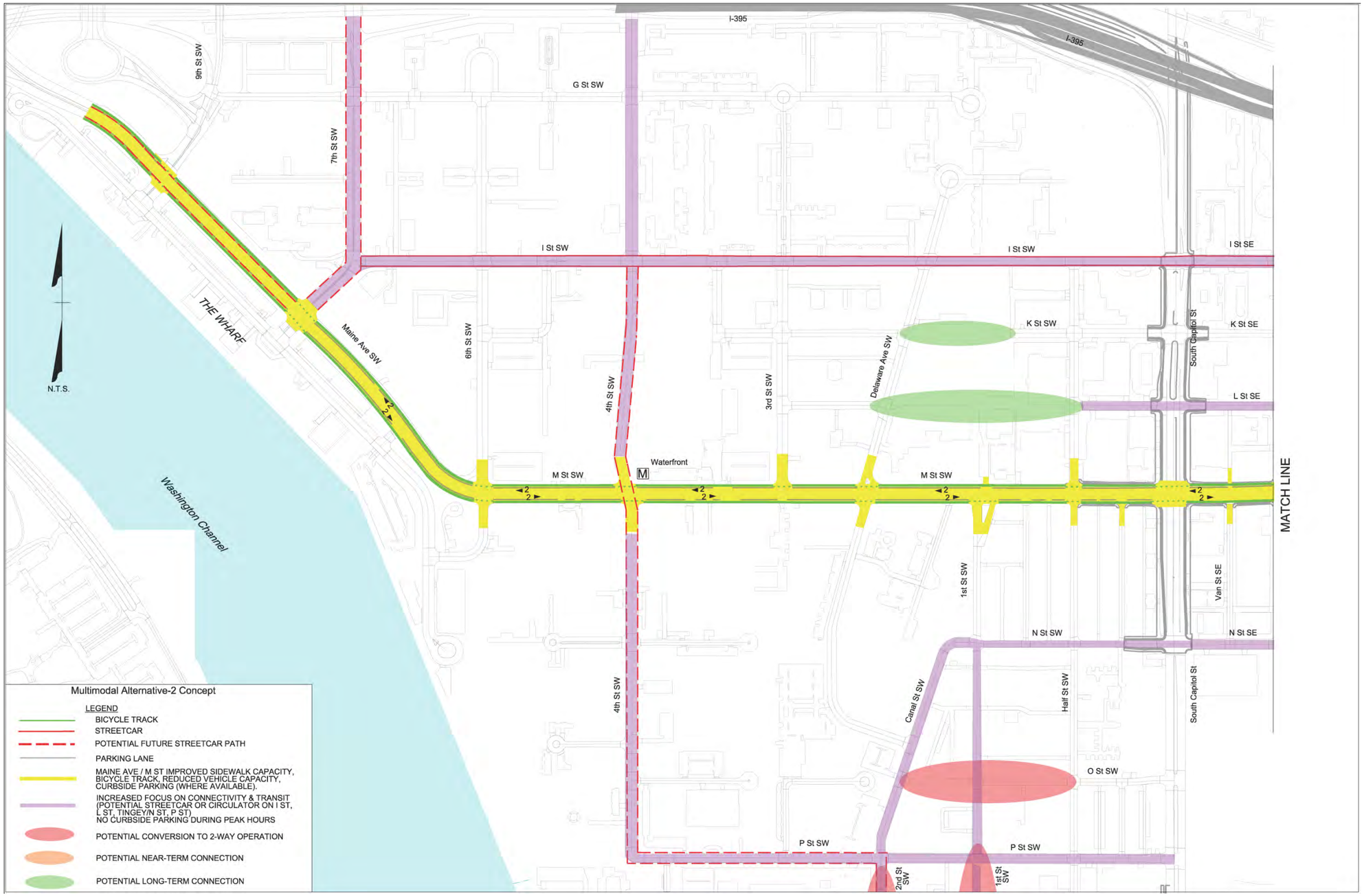
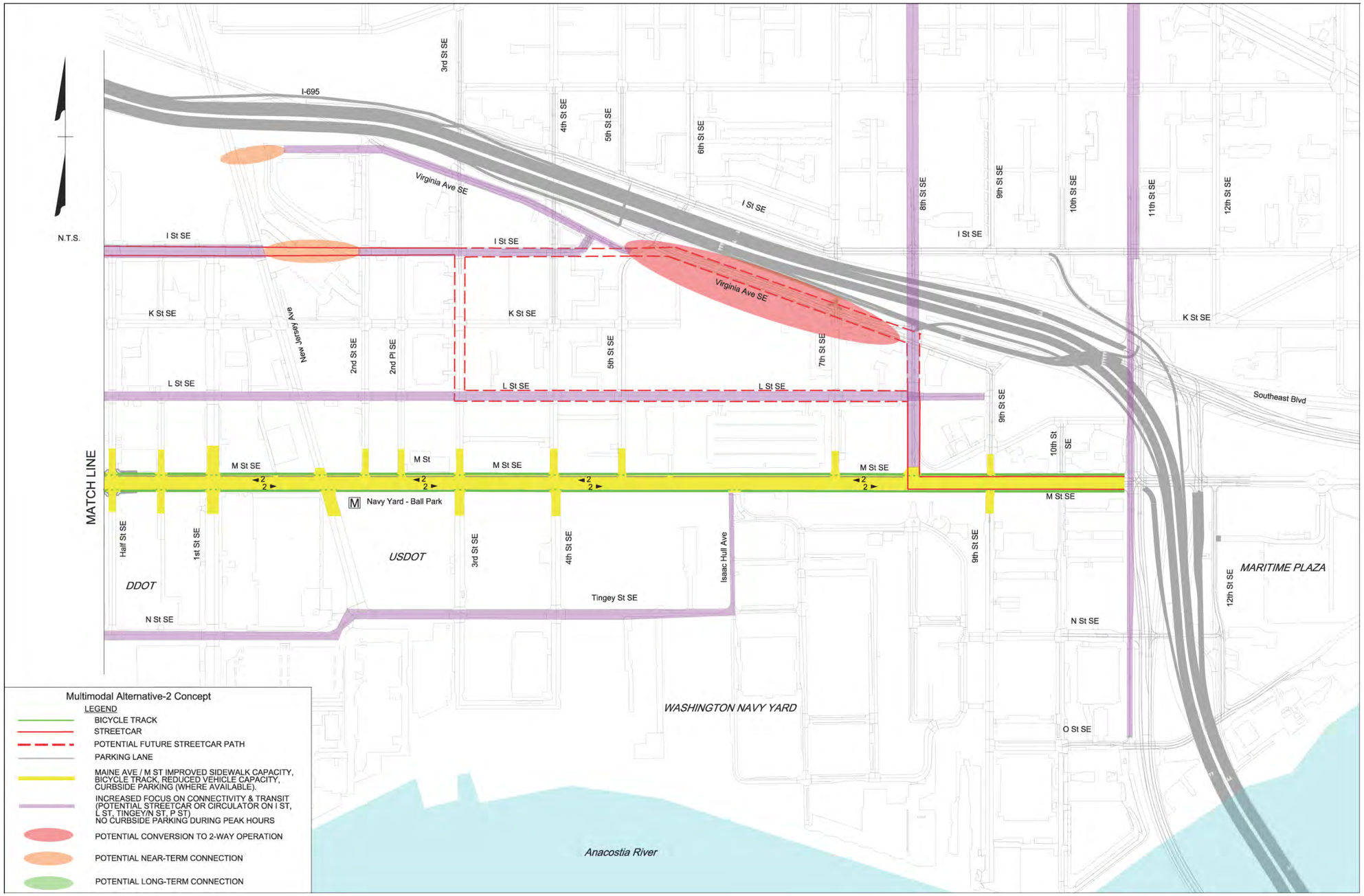


FIGURE 4-10
Multimodal Alternative 2 "Balanced Linkages" Concept (SE Area)



4.3.2 Alternative 2 Transit Service

- M Street would maintain the current transit service and stop locations. The cycle track would be routed around transit stops so that buses can seamlessly board/alight passengers without disrupting bicyclists (as shown in **Figure 4-11**).
- The proposed DC Streetcar line connecting the Anacostia neighborhood to the south and the downtown area to the north would be routed along I (Eye) Street and 7th Street SW. The streetcar would access I (Eye) Street on the east side of the Study area via the 11th Street arterial bridge, M Street SE, 8th Street SE, L Street SE, and 3rd Street SE. The DC Streetcar will tentatively operate on 10-minute headways (or six trips per hour per direction) during both the AM and PM peak periods. The following potential streetcar stop locations are shown in **Figure 4-12, Multimodal Alternative 2 – Potential Streetcar and DC Circulator Routes and Stop Locations**:
  - M Street SE/8th Street SE
  - K Street SE/3rd Street SE
  - I (Eye) Street SE/Half Street SE
  - I (Eye) Street SW/Delaware Avenue SW
  - I (Eye) Street SW/6th Street SW
  - E Street SW/7th Street SW
- The DC Circulator would include additional service in the Buzzard Point neighborhood and would be routed along N Street/Tingey Street, the 1st Street SW/2nd Street SW one-way couplet, and 4th Street SW in Alternative 2. The DC Circulator route and stops are also shown in **Figure 4-12**.
- WMATA Metrobus service could be modified to add local routes on M Street and adjacent streets such as I (Eye) Street, N Street/Tingey Street, or P Street SW.

4.3.2 Alternative 2 Pedestrian Facilities

Pedestrian facilities along M Street would be enhanced by the addition of the cycle track, which would shift some bicyclists away from using the existing sidewalk. At transit stops, the cycle track would be routed to avoid pedestrians waiting to board buses (as shown in **Figure 4-11**). Sidewalk widths would be 6 to 10 feet, with roadside landscaping providing an additional buffer to street traffic.

4.3.3 Alternative 2 Bicycle Facilities

East-west bicycle facilities within the Study area would be provided along M Street, I (Eye) Street, and the Anacostia Riverwalk Trail.

- M Street would include an 8-foot cycle track (5-foot lane with 3-foot buffer) on both sides of the road between 9th Street SW and 11th Street SE.
- I (Eye) Street would be restriped from its current configuration (one 8-foot parking lane, one 5-foot bicycle lane, and one 11-foot travel lane in each direction) by removing parking on the curb lane to accommodate one outside shared travel/transit lane and one inside travel/bicycle/turn lane in each direction. Bicycles would share the inside travel/turn lane with vehicles because the Streetcar tracks installed in the outside shared travel/transit lane may cause a safety concern for bicyclists.
- North-south bicycle facilities within the Study area would be provided along 4th Street SW, 1st Street SW and 2nd Street SW one-way couplet, 1st Street SE, 4th Street SE, and 11th Street SE.

FIGURE 4-11
Multimodal Alternative 2 – Proposed Transit Stop Configuration with Cycle Track on M Street

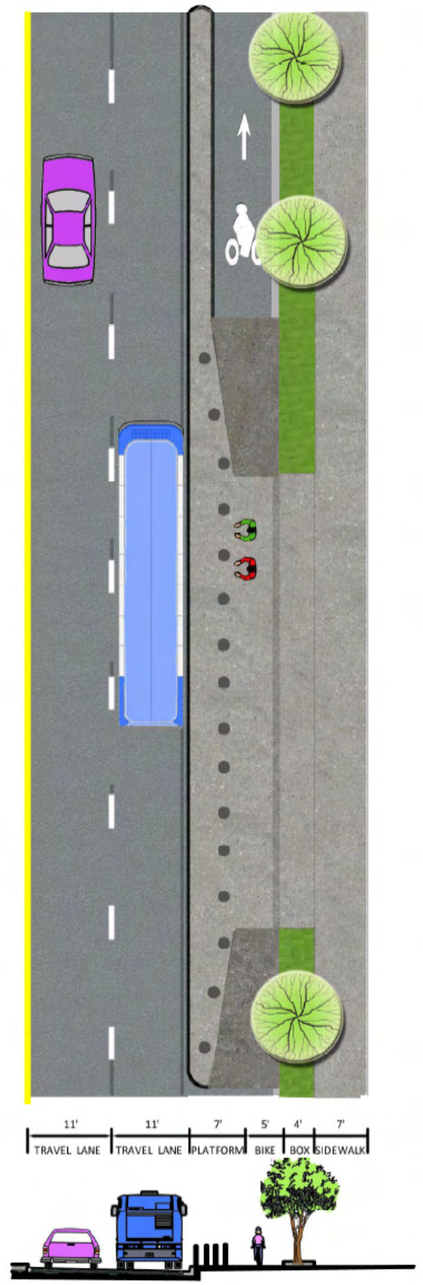
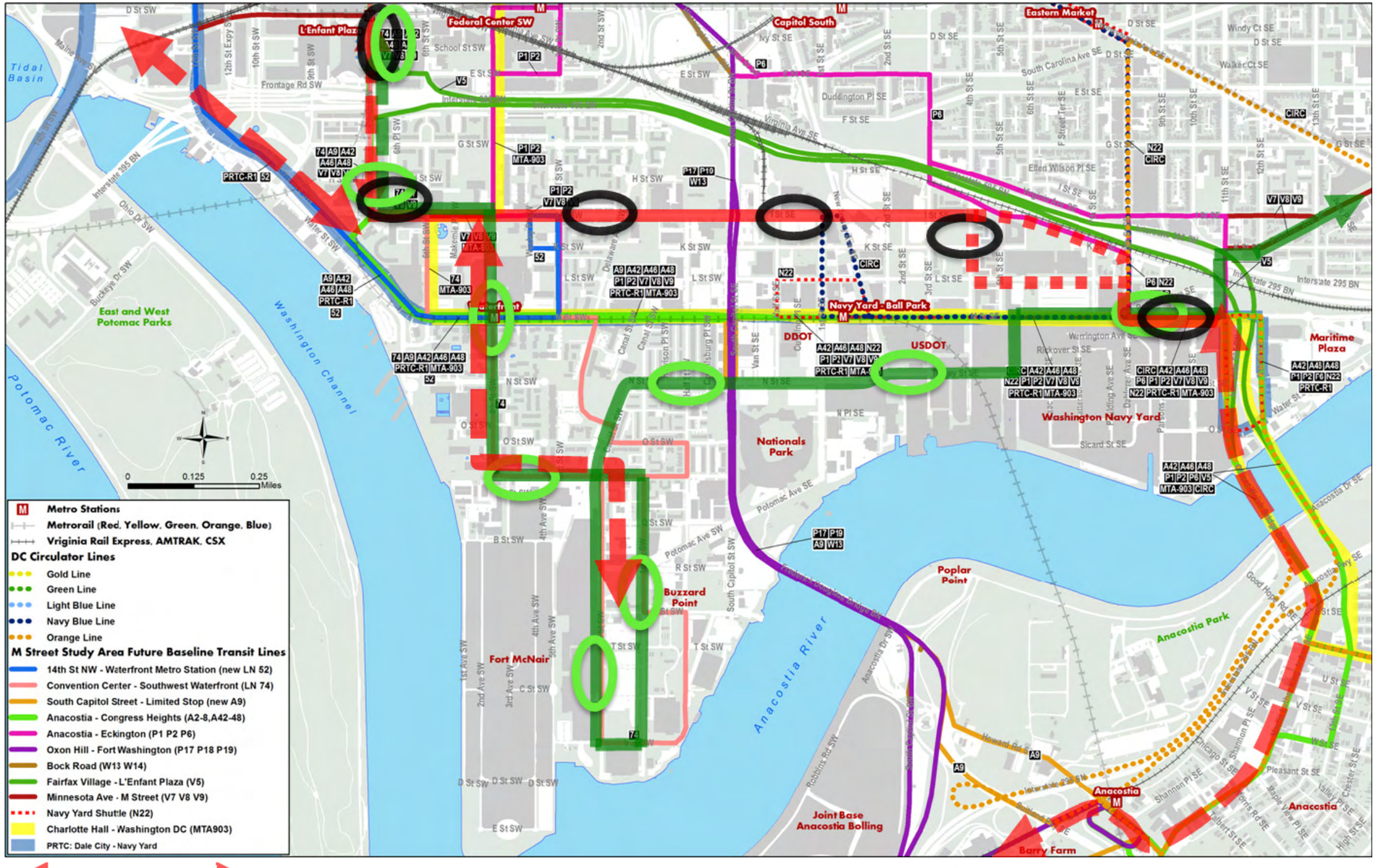


FIGURE 4-12
Multimodal Alternative 2 – Potential Streetcar and DC Circulator Routes and Stop Locations



Proposed DC Streetcar in Multimodal Alternative-2

Potential Future DC Streetcar Path

Proposed DC Streetcar Stops

Proposed DC Circulator in Multimodal Alternative-2

Potential Future DC Circulator Path

Proposed DC Circulator Stops

4.3.3 Alternative 2 Parking Facilities

Changes to parking facilities exclusive to Alternative 2 are:

- M Street would provide additional parking spots on both sides of the road west of South Capitol Street and on one side of the road east of South Capitol Street.
- I (Eye) Street would remove on-street parking to accommodate a shared travel/transit/bicycle lane.
- N Street/Tingey Street SE would restrict on-street parking in some locations during peak hours to accommodate turn lanes.

4.4 Multimodal Alternative 3 – M Street "Mobility Arterial"

This alternative is referred to as M Street "Mobility Arterial" because of its focus on maximizing vehicular capacity on M Street to reduce congestion and delays. A proposed typical cross section of M Street for Alternative 3 is presented in **Figure 4-13**, and includes an 11-foot shared travel/transit lane, 10-foot travel lane, and 10-foot travel/turn lane. On the west side of South Capitol Street, additional roadway width would be available for an 11-foot exclusive left-turn lane. The proposed improvements included in Alternative 3 within the entire Study area are shown in **Figure 4-14**, with more detail for the western and eastern halves in **Figure 4-15** and **Figure 4-16**, respectively.

4.4.1 Alternative 3 Vehicular Network

Several proposed operational improvements to the vehicular network in Alternative 3 would affect future travel patterns:

- M Street would provide three continuous travel lanes in each direction between 9th Street SW and 11th Street SE by removing all on-street parking. Some segments of M Street eastbound between 9th Street SW and 4th Street SW would experience an increase in vehicular capacity due to the restriction of on-street parking.
- I (Eye) Street would maintain its current configuration of one 11-foot travel lane, one 5-foot bicycle lane, and one 8-foot parking lane in each direction.
- L Street, N Street/Tingey Street, and P Street SW would maintain their respective existing configurations, but there would be an increased focus on safety and traffic calming to ensure that M Street is the preferred route for mobility.
- 1st Street SW and 2nd Street SW between P Street SW and the Anacostia River would remain in their existing configuration as a one-way pair.
- The eastbound direction of Virginia Avenue SE between I (Eye) Street SE and 8th Street SE would remain in its current configuration.

Operational improvements to intersections exclusive to Alternative 3 are:

- At the South Capitol Street/M Street, the eastbound approach curb lane would be converted from a shared through-right lane to an exclusive right-turn lane with an overlap phase (to run concurrent with the northbound left-turn phase).
- South Capitol Street/I (Eye) Street would be modified to include a new crosswalk on the north leg. The westbound approach lane channelization would be modified to include a right-turn lane by removing on-street parking on the north side of I (Eye) Street.
- The Maine Avenue SW/9th Street SW eastbound approach curb lane would be converted from a right-turn-only lane to a shared through-right lane.
- The Maine Avenue SW/7th Street SW eastbound approach would have a third travel lane (shared through-right) by removing on-street parking.

4.4.2 Alternative 3 Transit Service

Changes to transit service exclusive to Alternative 3 include:

- The proposed DC Streetcar line connecting the Anacostia neighborhood to the south and the downtown area to the north would be routed along M Street along the outside shared travel/transit lane. **Figure 4-5, Proposed Streetcar Route and Stops on M Street**, shows the streetcar accessing M Street on the east side of the Study area via the 11th Street arterial bridge and on the west side via Maine Avenue. The DC Streetcar will tentatively operate on 10- minute headways (or six trips per hour per direction) during both the AM and PM peak periods.
- Current bus stop locations within the Study area and along M Street would be maintained.
- WMATA Metrobus service could be modified to add local routes on M Street and adjacent streets such as I (Eye) Street, N Street/Tingey Street, or P Street SW.

4.4.3 Alternative 3 Pedestrian Facilities

Pedestrian facilities along M Street would be enhanced by the addition of landscaping, which would provide a buffer between the travel lane and sidewalk.

4.4.4 Alternative 3 Bicycle Facilities

Changes to bicycle facilities exclusive to Alternative 3 include:

- East-west bicycle facilities within the Study area would be provided along M Street, I (Eye) Street, and the Anacostia Riverwalk Trail.
- M Street would have a shared bicycle facility between 9th Street SW and 11th Street SE. Bicycles would share the middle travel lane with vehicles because the Streetcar tracks installed in the outside shared travel/transit lane may cause a safety concern for bicyclists.
- I (Eye) Street would maintain the exclusive 5-foot bicycle lane in each direction, similar to the Baseline condition.
- N Street SE/Tingey Street SE would accommodate a shared vehicle/bicycle lane between South Capitol Street and 4th Street SE.
- On the south side of the Study area, the Anacostia Riverwalk Trail would provide an east-west connection.
- North-south bicycle facilities within the Study area would be provided along 11th Street SE, 1st Street SE, and 4th Street SW.

4.4.5 Alternative 3 Parking Facilities

- M Street/Maine Avenue SW would restrict all on-street parking during peak periods to accommodate vehicular demand.
- I (Eye) Street would maintain all on-street parking locations and hours.
- L Street and K Street would restrict on-street parking at intersections during peak hours to enhance vehicular capacity.
- 1st Street SW and 2nd Street SW south of P Street SW would remove on-street parking to accommodate two-way operation.
- N Street SE/Tingey Street SE would have limited parking where available.

FIGURE 4-13
Multimodal Alternative 3 - M Street Configuration

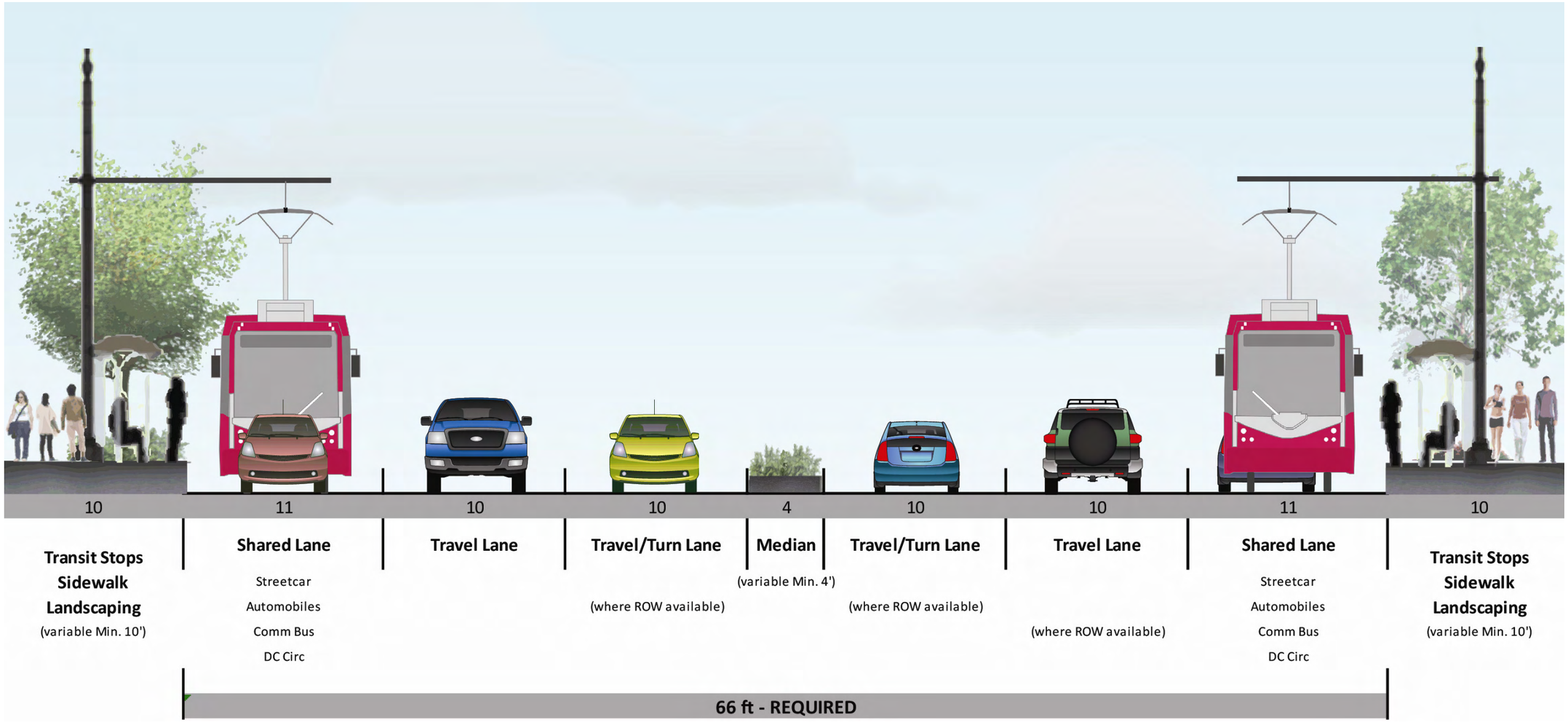


FIGURE 4-14
Multimodal Alternative 3 - M Street "Mobility Arterial" Concept (Entire Study Area)

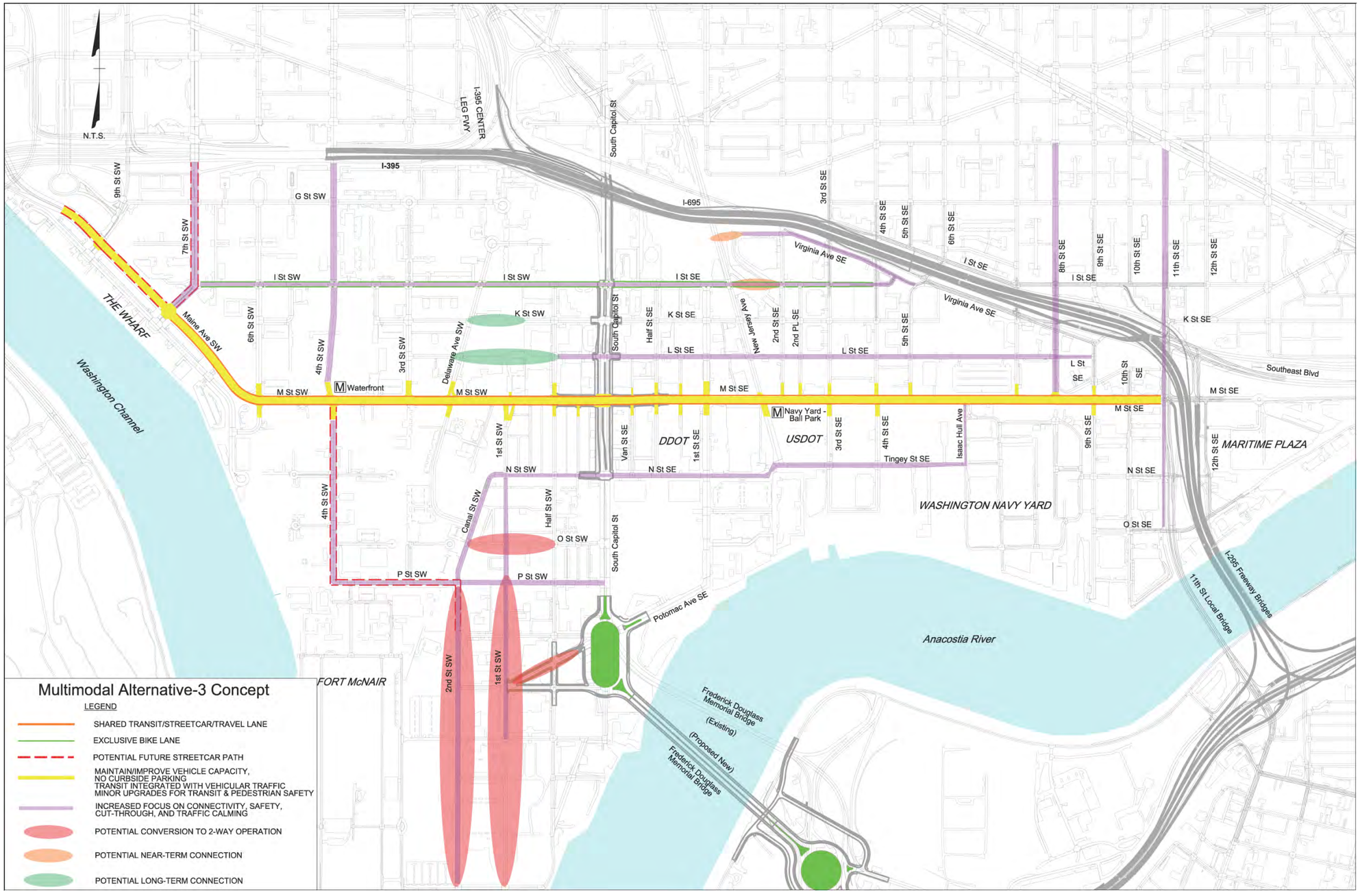


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Figure 4-15
Multimodal Alternative 3 M Street "Mobility Arterial" Concept (SW Area)

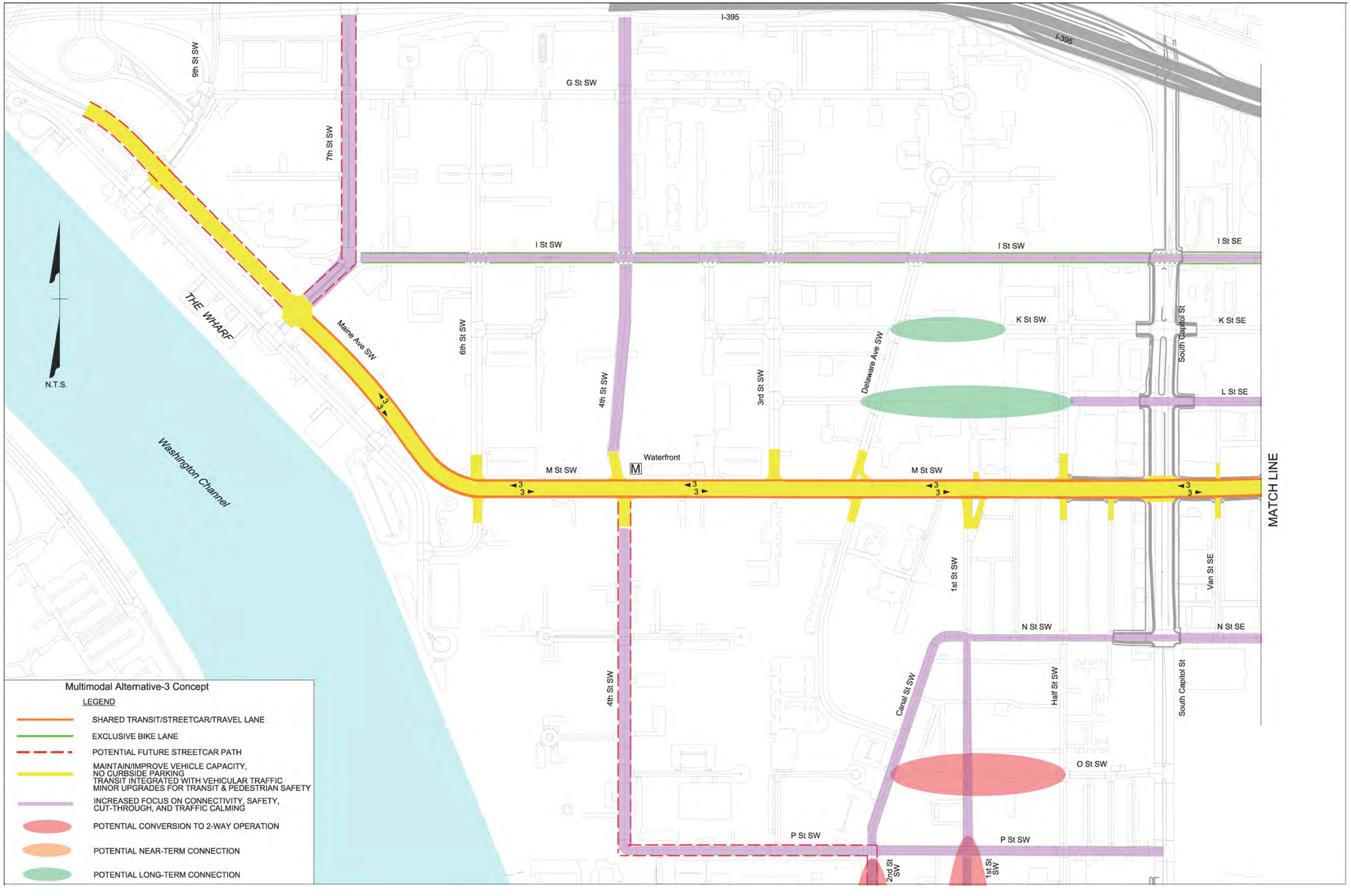
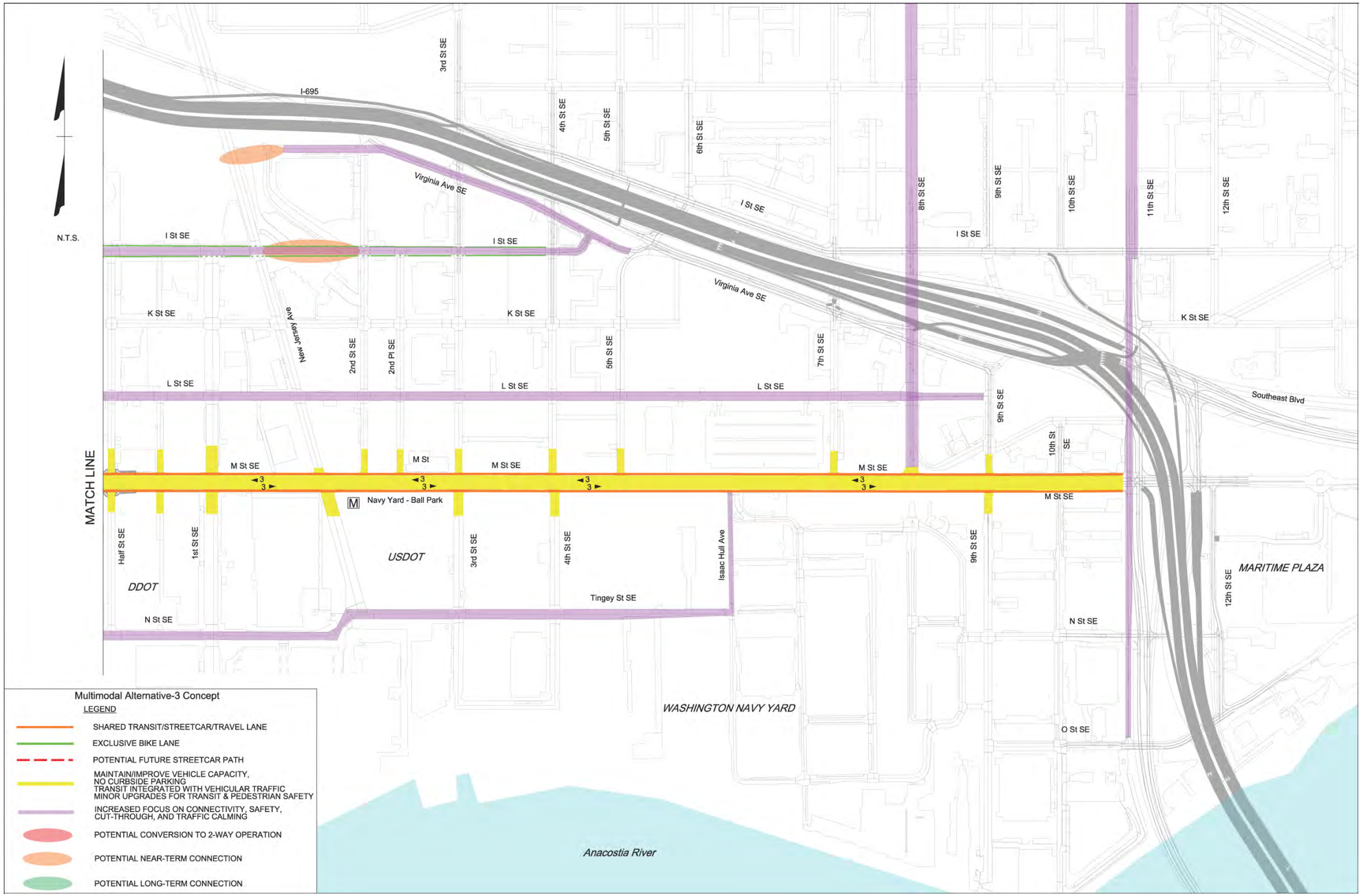


FIGURE 4-16
Multimodal Alternative 3 M Street "Mobility Arterial" Concept (SE Area)



A comparison of the above discussed multimodal alternatives is summarized in **Table 4-1.**

TABLE 4-1
Summary of Alternatives

	TRANSPORTION ELEMENTS	Alternative 1 M Street "Main Street"	Alternative 2 "Balanced Linkages"	Alternative 3 M Street "Mobility Arterial"
TRANSIT	DC Streetcar	On M Street - exclusive lanes	On I (Eye) Street	On M Street - shared lanes
	DC Circulator	On M Street	On I (Eye) Street or N Street / Tingey Street / P Street	On I (Eye) Street or N Street / Tingey Street / P Street
	Metrobus	Add local routes / shift to parallel streets	Add local routes on M Street and adjacent streets	Add local routes on M Street and adjacent streets
	Ribbonflow - Median Alignment	Possible - DDOT dismissed for now	NO	NO
	Outer lanes Alignment	Possible - DDOT carried forward w/ exclusive lanes	YES	YES - Shared Lanes
NETWORK CONFIGURATION & CONNECTIONS	M Street	Reduce to 2 travel lanes per direction	Reduce to 2 travel lanes per direction	Maintain 3 travel lanes per direction
	I (Eye) Street SE & SW	Expand to 2 travel lanes per direction - widening	Convert one lane for shared transit use	Maintain existing configuration
	L Street	Provide 2 travel lanes per direction / capacity	Maintain existing configuration	Increase focus on safety and traffic calming
	Tingey Street / N Street SE	Focus on vehicular capacity	Convert one lane for shared transit use	Increase focus on safety and traffic calming
	P Street SE	Focus on vehicular capacity	Convert one lane for shared transit use	Increase focus on safety and traffic calming
	1st & 2nd Streets SW	Convert to 2-way operations & focus on capacity	Remains as one-way pair	Remains as one-way pair
	Virginia Avenue SE	Remains one-way - extend west to NJ Ave	Convert to two-way - extend west to NJ Ave	Remains one-way - extend west to NJ Ave
PEDESTRIAN / BIKE / PARKING	M Street	No bike lanes; No parking	Pedestrian improvements; cycle track	Pedestrian improvements; shared bike lanes
	I (Eye) Street	Limited parking where available; shared bike lane	Modify existing bike lanes to be shared lanes	Exclusive bike lanes in travel way
	L Street / K Street SE & SW	Limited parking where right-of-way allows	Shared bike lanes; restricted peak-hour parking	Shared bike lanes; restricted peak-hour parking
	1st & 2nd Streets SW	No parking; bikes use new trail (expand existing)	Exclusive bike lanes in travel way where feasible	No parking; bikes use new trail (expand existing)
	Tingey Street / N Street SE	Limited parking where available; shared bike lane	Shared bike lanes; restricted peak-hour parking	Limited parking where available; shared bike lane
	P Street SE	Parking provided; bikes use new trail	Parking provided; bikes use new trail	Parking provided; bikes use new trail

4.5 Multimodal Performance Comparison

"Complete Streets" are envisioned as facilities that provide travelers of all ages with more transportation options, in consideration of their travel needs and perceived levels of service for all modal users. NCHRP Project 3-70 was the first nationally representative study that sought to model user perceptions of service for the pedestrian, bicycle, auto, and transit modes on urban streets. Results from the NCHRP 3-70 study were used to develop the MMLOS evaluation framework shown in NCHRP Report 616: *Multimodal Level-of-Service Analysis for Urban Streets.* NCHRP 3-70 methods have been adopted by the TRB Highway Capacity and Quality of Service Committee and have been included as part of the HCM 2010 Urban Streets methodology.

For this Study, the methodology shown in chapters 17 and 18 of the 2010 HCM was applied directly to calculate MMLOS for the automobile and transit modes. The Complete Streets model was used to calculate pedestrian and bicycle MMLOS. Developed upon completion of the NCHRP 3-70 study by Dr. Aimee Flannery, President of Working Energy Enterprise, the Complete Streets approach applies cumulative logistic regression modeling techniques to evaluate the statistical significance of certain variables on travelers' perceptions in order to reduce the number of input data required for analysis without significantly affecting bicycle and pedestrian MMLOS. The sections below discuss the basic data needs and methodologies used to calculate MMLOS for each travel mode. Automobile, transit, pedestrian, and bicycle MMLOS are compared across alternatives for four Study corridors:

- M Street SW
- M Street SE
- I (Eye) Street SE/SW
- South Capitol Street

Measures of effectiveness (MOEs) for the transit and automobile modes, based on VISSIM micro simulation along with intersection LOS results from Synchro, are also presented for each alternative.

4.5.1 Automobile Mode Performance

Several tools were used to measure the performance of automobiles in the Study area, including VISSIM, SYNCHRO, and the HCM 2010 urban streets methodology. Each tool has strengths and weaknesses in evaluating conditions for automobiles, so a blend of tools was chosen to provide the best description of future conditions. All three tools were used in the analysis of intersections and arterials; however, only the SYNCHRO results are reported in Section 4.5.1.5. The Study team selected SYNCHRO for reporting intersection delay results and corresponding HCM LOS in order to assess the full impact of traffic demand on each intersection without the effect of upstream and downstream conditions. SYNCHRO is a deterministic model based on demand volumes that does not account for upstream and downstream effects at each intersection. VISSIM was used to provide MOEs such as network performance, travel time, and vehicles served (or throughput). VISSIM is a stochastic micro-simulation model that simulates vehicle operation along the entire roadway network and, as such, it accounts for both downstream queuing and upstream capacity constraints that result in traffic metering. Results from SYNCHRO and VISSIM tend to be similar under low- to mid-range demand volumes. However, under high volumes and over-saturated conditions, results from SYNCHRO and VISSIM may deviate from those expected due to service volumes (throughputs) being significantly different from the actual demand because of either upstream metering (demand starvation) or downstream queue spillover. In summary, SYNCHRO results were reported for individual intersections because they depict a more-conservative scenario, which is more adequate for planning purposes, while VISSIM results were reported for corridor and system MOEs. The HCM 2010 urban streets methodology was chosen to provide corridor-specific LOS and midblock conditions that correlate to the multimodal approach used in the Study.

4.5.1.1 VISSIM Network Performance Results for Automobiles

Network performance results from VISSIM were used to compare the overall performance of automobiles in the entire Study area among alternatives. Network performance statistics are used to evaluate several parameters that are aggregated for the whole simulation period and network and can be grouped by vehicle class. **Table 4-2, VISSIM Network Performance Summary**, presents a comparison of each alternative and peak period for the automobile vehicle class (includes cars and trucks but excludes bus and streetcar vehicles) by the following performance measures:

- Average delay per vehicle (seconds)
- Average number of stops per vehicle
- Average speed (mph)

TABLE 4-2
VISSIM Network Performance Summary (Automobile Class)

MOE	AM Peak				PM Peak			
	Baseline	Alt. 1	Alt. 2	Alt. 3	Baseline	Alt. 1	Alt. 2	Alt. 3
Average Delay Per Vehicle (seconds)	158	105	130	105	161	90	115	118
Average Number of Stops Per Vehicle	5.6	3.5	4.1	3.3	5.7	2.9	3.5	3.5
Average Speed (mph)	9.6	12.0	10.8	12.1	9.2	12.7	11.3	11.3

Notes: Results come from VISSIM network performance statistics.

In the AM peak period, results from Alternatives 1 and 3 are very similar and generally have lower delay and stops than Alternative 2 or the Baseline condition. For all measures, Alternative 2 performs worse than Alternatives 1 and 3 but better than the Baseline condition. Alternatives 1 and 3 have 33 percent less delay per vehicle and 25 percent higher average speed than the Baseline condition. Alternative 2 has 18 percent less delay per vehicle and 12 percent higher average speed than the Baseline condition.

In the PM peak period, Alternative 1 has the best performance of any alternative in all measures. Alternatives 2 and 3 have very similar performance, and all three alternatives have better performance than the Baseline condition. Alternative 1 has 44 percent less average delay per vehicle and 38 percent higher average speed than the Baseline condition.

The Baseline condition has the highest average delay per vehicle, highest average number of stops per vehicle, and lowest average speed of any alternative.

4.5.1.2 VISSIM Travel Time Results for Automobiles

Travel time results from VISSIM were used to compare the performance of automobiles on select corridors within the Study area among alternatives. Travel times from the VISSIM model includes delays caused by congestion and signals. Travel time results are shown graphically in **Figure 4-17 (AM) and 4-18 (PM)** as well as in tabular format in **Table 4-3**. The corridors evaluated for travel time were:

- M Street SW between 7th Street SW and South Capitol Street
- M Street SE between South Capitol Street and 11th Street SE
- I (Eye) Street between 7th Street SW and New Jersey Avenue SE
- South Capitol Street between I (Eye) Street and Potomac Avenue

TABLE 4-3
VISSIM Travel Time Results by Corridor (Automobile Class)

Corridor	Direction	Free Flow TT	AM Peak				PM Peak			
			Baseline	Alt. 1	Alt. 2	Alt. 3	Baseline	Alt. 1	Alt. 2	Alt. 3
M Street SW	EB	1.9	7.0	3.9	5.0	3.7	6.1	2.7	4.4	3.9
	WB	1.9	4.4	3.0	3.4	2.9	4.5	3.9	5.2	4.0
M Street SE	EB	2.4	6.7	5.0	6.0	4.7	6.8	3.9	6.1	5.3
	WB	2.4	8.2	4.4	6.0	5.4	5.2	4.6	5.1	5.2
I (Eye) Street	EB	1.7	3.6	3.4	3.8	3.6	6.7	5.0	4.8	5.9
	WB	1.7	4.6	3.6	4.8	4.7	5.1	4.6	4.7	5.8
South Capitol Street	NB	2.2	4.6	5.5	5.6	5.6	5.1	3.8	3.6	3.3
	SB	2.2	4.5	4.0	4.4	3.5	4.6	3.5	3.4	4.2

Notes:
Travel time is in minutes and is extracted from the VISSIM model.
M Street SW is measured between 7th Street SW and South Capitol Street.
M Street SE is measured between South Capitol Street and 11th Street SE.
I (Eye) Street is measured between 7th Street SW and New Jersey Avenue.
South Capitol Street is measured between I (Eye) Street and Potomac Avenue.
Free Flow TT = free flow travel time without any signal delay
EB = eastbound; WB = westbound; NB = northbound; SB = southbound

In the AM peak, both directions of M Street experience the lowest travel time in Alternatives 1 and 3, with slightly higher travel times in Alternative 2. The Baseline condition experiences the highest travel time on M Street, by 1 to 2 minutes over the other alternatives. Travel time on I (Eye) Street is fairly similar between all of the alternatives, although Alternative 1 has the lowest westbound travel time. Along South Capitol Street, travel times are similar for the three multimodal alternatives, with the lowest northbound travel time in the Baseline condition. However, conditions on South Capitol Street in the Baseline condition would be much worse than shown due to the South Capitol Street/Potomac Avenue Oval. The Oval causes congestion on northbound South Capitol Street to queue outside of the Study area across the Frederick Douglass Bridge.

In the PM peak, M Street SW has the lowest travel time in Alternative 1, followed by Alternative 3. Alternative 2 experiences lower eastbound but higher westbound travel time on M Street SW than the Baseline condition. Alternative 2 has reduced vehicle capacity on M Street compared to the Baseline condition, contributing to the higher travel time. On I (Eye) Street, the lowest travel times are in Alternatives 1 and 2 due to the increased vehicle capacity (from 1 to 2 lanes each direction). Alternative 3 has higher travel time on westbound I (Eye) Street than the Baseline condition due to reduced westbound green time at the South Capitol Street/I (Eye) Street signalized intersection (because of an additional eastbound left-turn protected phase added to Alternative 3). South Capitol Street operates fairly similar in the three multimodal alternatives, with the Baseline condition experiencing the highest travel time.

4.5.1.3 VISSIM Demand and Throughput Analysis for Automobiles

The automobile mode demand in the Study network for the Baseline condition was derived using the existing condition traffic counts and automobile trip growth from the regional travel demand forecasting model. Different levels of mode reduction or mode shift were applied to the build Alternatives due to the changes to the roadway geometry or introduction of new transit service such as streetcar. All three alternatives have less automobile demand than the Baseline condition, but Alternative 1 has the highest mode shift from automobile to transit given the exclusive transitway along M Street.

Demand volumes were compared to throughput volumes from VISSIM to measure the percent demand served for each alternative, as shown in **Table 4-4.** The ratio of throughput to demand for automobiles within the entire Study network is higher in the three alternatives than the Baseline condition in both AM and PM peak hours.

In the Baseline condition, the intersections on South Capitol Street experience the lowest throughput volume, ranging from 67 to 77 percent of the demand in the AM peak hour and 83 to 89 percent of the demand in the PM peak hour. With the improved intersection geometry along with the optimized signal timings at the Potomac Avenue/R Street Oval, more vehicles are served by the corridor in the three multimodal alternatives compared to the Baseline condition. Other corridors, such as M Street and I (Eye) Street, also show an increased percentage of demand served in the alternatives over the Baseline condition. Detailed intersection results from VISSIM that show percent demand served are provided in **Appendix H.**

FIGURE 4-17
VISSIM Travel Time Results by Corridor (2035 AM Peak Hour)

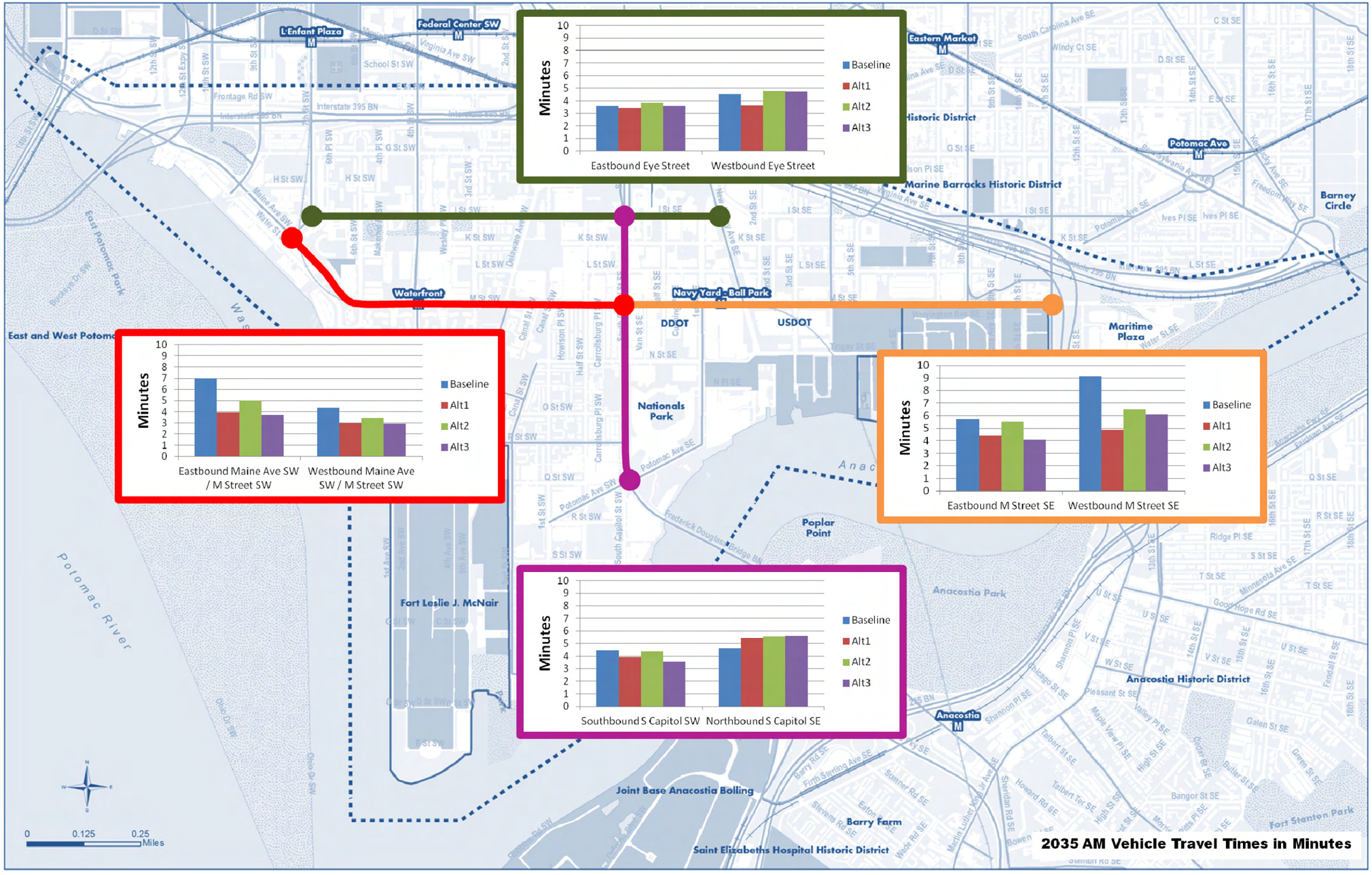


FIGURE 4-18
VISSIM Travel Time Results by Corridor (2035 PM Peak Hour)

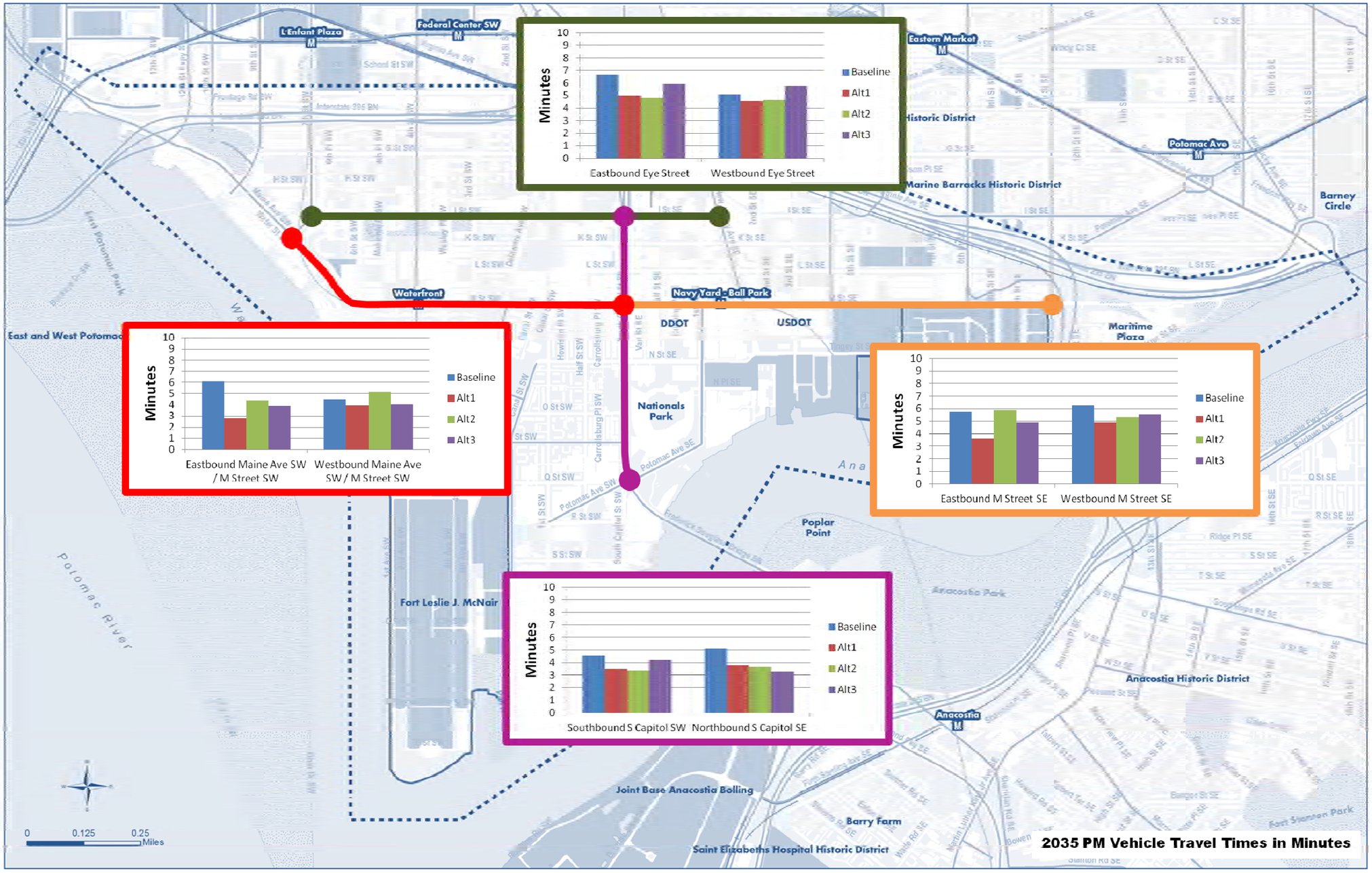


TABLE 4-4
VISSIM Automobile Percent Demand Served Comparison

Time Period	Future Scenarios	Percent of Total Demand Served	Number of Intersections with Less than 90 Percent Demand Served
AM Peak Hour	2035 Baseline Condition	86	36
	2035 Alternative 1	93	14
	2035 Alternative 2	92	17
	2035 Alternative 3	93	15
PM Peak Hour	2035 Baseline Condition	91	26
	2035 Alternative 1	100	0
	2035 Alternative 2	98	0
	2035 Alternative 3	98	0

Notes:
Percent of total demand served is the ratio of total throughput to total demand for all intersections within the Study network.
Intersection demand is the sum of all approach demands at the intersection.

4.5.1.4 HCM 2010 Urban Street Segment LOS

HCM 2010 urban street segment methodology, described in detail in **Appendix G,** was used to evaluate the primary corridors in the Study area among alternatives. Travel time results from the VISSIM simulation model were incorporated into the street segment results. Each primary corridor in the Study area was subdivided by block and direction to create the following individual urban street segments:

- M Street SW between 7th Street SW and South Capitol Street (8 blocks with 16 street segments)
- M Street SE between South Capitol Street and 12th Street SE (14 blocks with 28 street segments)
- I (Eye) Street between 7th Street SW and New Jersey Avenue SE (9 blocks with 18 street segments)
- South Capitol Street between I (Eye) Street and Potomac Avenue (7 blocks with 14 street segments)

Figure 4-19 and **Figure 4-20** show the breakdown of automobile LOS by corridor and alternative for urban street segments in the AM and PM peaks, respectively.

AM Peak

In the AM peak, M Street SW has the lowest number of segments with LOS E or F in Alternative 1 (no segments are LOS F, 1 segment is LOS E, and 15 segments are LOS D or better), followed by Alternative 3 (1 segment is LOS F, 2 segments are LOS E, and 13 segments are LOS D or better). The Baseline condition experiences the worst performance on M Street SW, with 6 segments at LOS F, 3 segments with LOS E, and 7 segments with LOS D or better.

M Street SE experiences the lowest number of segments with LOS E or F in the AM peak in both Alternatives 1 and 3, with the Baseline condition having the most segments with LOS F. Alternatives 1 and 3 generally have 2 to 3 segments with LOS F, 3 segments with LOS E, and 22 to 23 segments with LOS D or better. Alternative 2 has 7 segments with LOS F, 4 segments with LOS E, and 17 segments with LOS D or better. The Baseline condition has the worst auto performance of any alternative with 11 segments at LOS F, 4 segments with LOS E, and 13 segments with LOS D or better.

In the AM peak, I (Eye) Street generally operates well in all alternatives, with slightly worse operations in Alternative 3. Alternative 1 has no segments with LOS F, 3 segments with LOS E (eastbound approaching South Capitol Street), and the other 17 segments at LOS C or better. Although I (Eye) Street would be widened in both Alternatives 1 and 2, additional delays would be experienced in Alternative 2 due to the streetcar stops. Most alternatives have LOS F conditions for the westbound approach to South Capitol Street because of long signal delays, except for Alternative 1.

South Capitol Street experiences poor operations in all alternatives in the AM peak, with 4 to 7 of 14 segments operating at LOS F in all alternatives. Alternative 2 has the most segments with LOS F (7 segments) due to capacity restrictions at the M Street/South Capitol Street intersection.

PM Peak

In the PM peak, M Street SW has the best performance in Alternative 1 (no segments with LOS F, 2 segments with LOS E, and 14 segments with LOS D or better), followed by Alternative 3 (1 segment with LOS F, 3 segments with LOS E, and 12 segments with LOS C or better). The Baseline condition has the most segments at LOS F (5) and LOS E (4). Alternative 2 has 3 segments at LOS F, 2 segments at LOS E, and 11 segments with LOS D or better.

M Street SE has the best performance in Alternative 1 (fewest segments with LOS F with 2, fewest segments with LOS E with 1, and most segments with LOS D or better with 25). Alternative 3 has the next fewest segments with LOS F (4 segments). Alternatives 2 and the Baseline condition have similar operations with 7 segments with LOS F and 3 segments with LOS E.

In the PM peak, I (Eye) Street operates the best in Alternative 1 (1 segment at LOS F, 5 segments with LOS E, and 14 segments with LOS D or better), followed closely by Alternative 2 (2 segments with LOS F, 4 segments with LOS E, and 14 segments with LOS D or better). Alternatives 1 and 2 have increased vehicle capacity on I (Eye) Street compared to the Baseline condition and Alternative 3. The Baseline condition and Alternative 3 operate the worst, with 5 to 6 segments at LOS F and 2 to 3 segments at LOS E. The approaches to South Capitol Street are LOS F in both directions for most all alternatives.

South Capitol Street experiences generally poor operation in the PM peak in the three multimodal alternatives but slightly better performance in Alternative 3. The multimodal alternatives generally have 4 to 5 segments with LOS E or F, and 9 to 10 segments with LOS D or better. The Baseline condition has 7 segments that are LOS E or F.

FIGURE 4-19
Urban Street LOS Breakdown by Corridor (AM Peak)

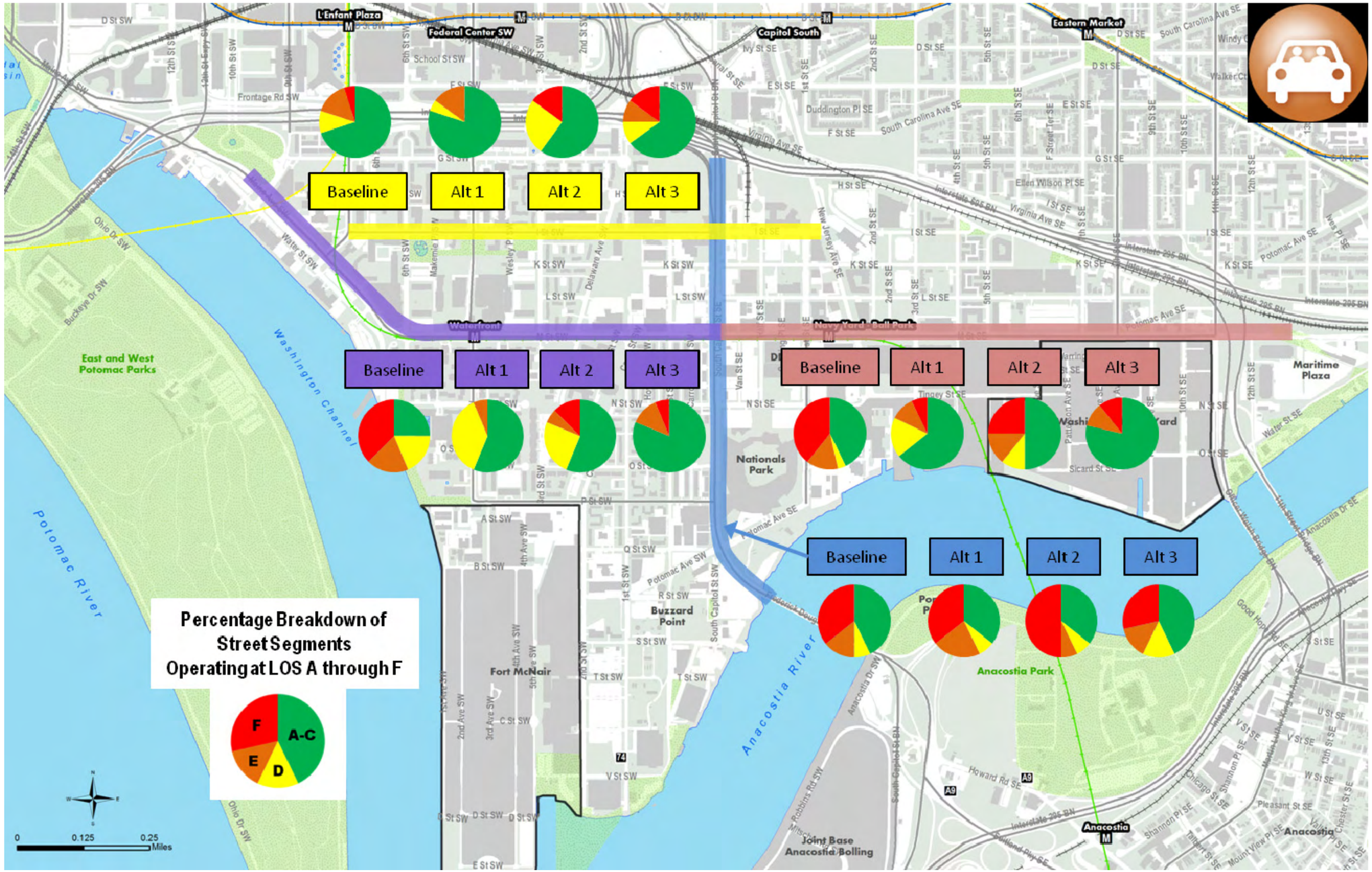
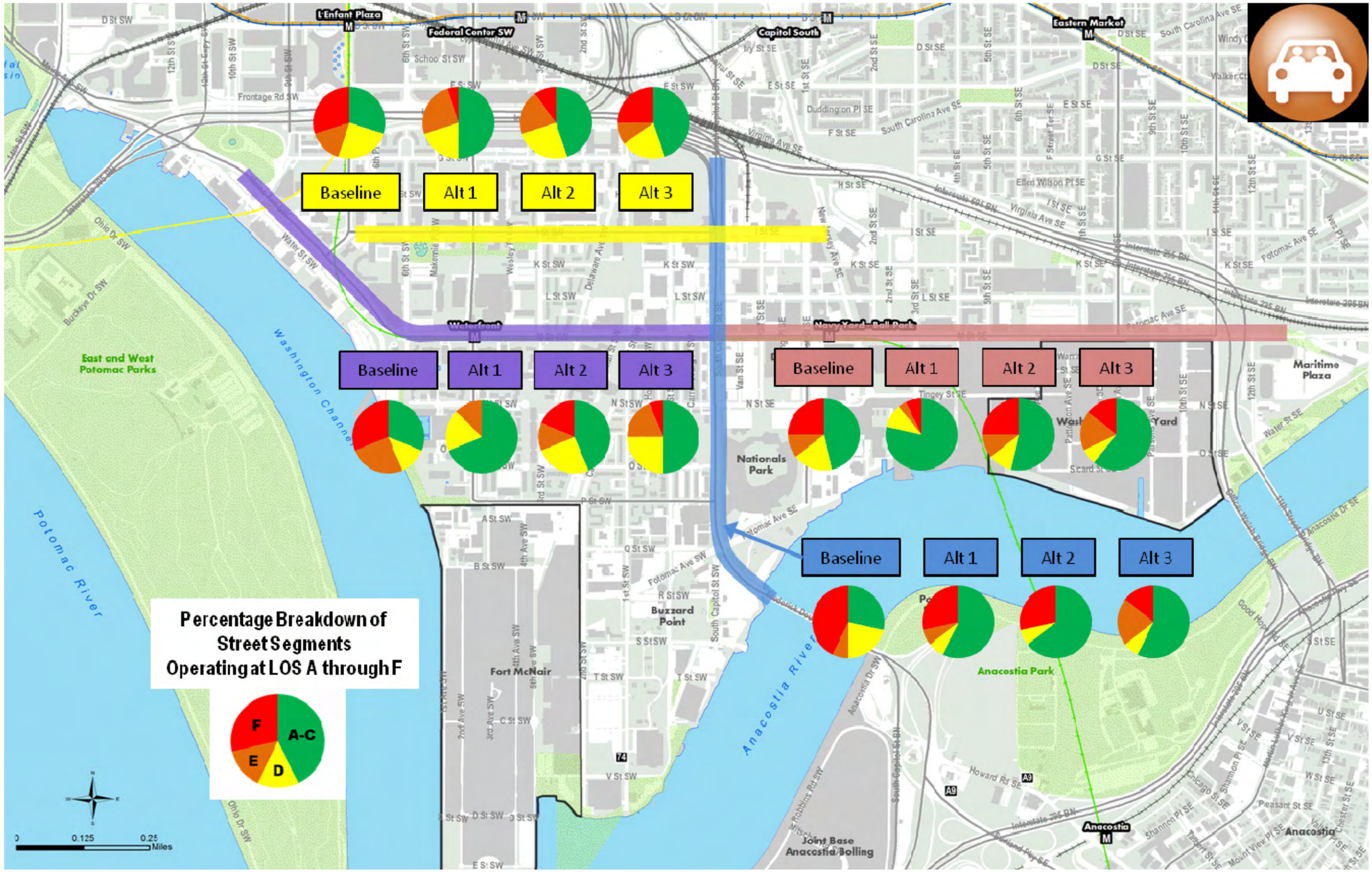


FIGURE 4-20
Urban Street LOS Breakdown by Corridor (PM Peak)



SYNCHRO Intersection LOS and Delay

Intersection LOS and delay results from SYNCHRO HCM reports were used to evaluate the alternatives' intersection operating performance on major corridors within the Study area. The LOS of an intersection falls into one of six categories, A through F, based on control delay for the whole intersection. LOS A represents the best operating condition, with free flow or minimum delay, and LOS F represents the worst condition, with long-standing queues and stop-and-go operations, which is unacceptable to most drivers. In general, the most significant delays are on the primary travel corridors, especially at the entry points to the Study area. Intersections that are projected to operate at or over capacity (LOS E or F) in 2035 under each alternative are presented in **Table 4-5**. **Figures 4-21** and **4-22** show the 2035 AM and PM peak hour SYNCHRO intersection LOS results for Alternative 1. **Figures 4-23** and **4-24** show the 2035 AM and PM peak hour SYNCHRO intersection LOS results for Alternative 2. **Figures 4-25 and 4-26** show the 2035 AM and PM peak hour SYNCHRO intersection LOS results for Alternative 3. SYNCHRO intersection LOS and delay results for all Study intersections and alternatives are presented in **Appendix H**.

For the M Street corridor in the Baseline condition, most intersections operate at LOS D or better, with four intersections at a LOS F and six intersections at a LOS E or F for the AM and PM peak hours, respectively. The intersection of M Street and South Capitol Street creates the biggest bottleneck in the Study network and operates at a LOS F in the peak hours in the Baseline condition and in all alternatives. Although the intersection delay is lower in the alternatives than in the Baseline condition, the overall intersection still falls under LOS F. The poor operating performance at this intersection is attributed to the excessive demand on all four approaches, especially heavy left-turn traffic volumes northbound and southbound South Capitol Street. Because a large portion of the intersection green time is dedicated to the through movements on M Street and South Capitol Street, all movements do not have sufficient green intervals, so all approaches have high average vehicle delays. Another intersection that experiences LOS F in both peak hours in the Baseline condition is the intersection of M Street SE/11th Street SE. The unconventional geometry of the five-legged intersection, the high left-turn volumes on 11th Street local bridge northbound, and the heavy demand in the peak direction on M Street all contribute to the heavy congestion at this location. With less demand as a result of a shift to the transit mode, this intersection operates at LOS D or E in most of the alternatives. This intersection still operates at LOS F in the AM peak hour in Alternative 3. The intersections of M Street SE/5th Street SE and M Street SE/7th Street SE are both one-way stop-controlled intersections that are LOS E or F in most all alternatives.

South Capitol Street has the highest auto demand volume in the Study area, and consequently has generally poor automobile LOS during the peak hours. There are three choke points for traffic along South Capitol Street at the Oval, M Street, and I-695 ramps. In the AM peak hour, northbound South Capitol Street at the southern terminus (the entry point) operates at LOS F in the Baseline condition and at LOS E in all alternatives with operational enhancements. In the PM peak hour, northbound South Capitol Street at Potomac Avenue (part of the Oval) operates at LOS E in the Baseline condition, but improves significantly in the Alternatives, operating at LOS B or C. The northern boundary where South Capitol Street meets I (Eye) Street experiences LOS E or F in the AM peak hour in all alternatives.

I (Eye) Street experiences good intersection LOS, with most intersections operating at LOS C or better in the Baseline condition. The intersections of I (Eye) Street SW/4th Street SW and I (Eye) Street SE/1st Street SE operate at LOS D and LOS E in the AM and PM peak hours, respectively. I (Eye) Street SE/1st Street SE is an unsignalized, all-way stop-controlled intersection in the Baseline condition, which only processes approximately 85 percent of the intersection demand in both peak hours. In the AM peak hour, northbound vehicles have a difficult time finding gaps in the traffic stream on I (Eye) Street due to heavy northbound left-turn volumes. In the PM peak hour, westbound vehicles form a long queue close to the downstream intersection at New Jersey Avenue. The intersection would be converted to signal control in three alternatives, resulting in better traffic progression along I (Eye) Street and reduced intersection delay.

TABLE 4-5
Level of Service "E" or "F" Intersections and Critical Movements

Intersection	Baseline Condition		Alternative 1		Alternative 2		Alternative 3		Critical Movements
	AM	PM	AM	PM	AM	PM	AM	PM	
M Street SE/SW									
M St & SCS	***F***	***F***	***F***	***F***	***F***	***F***	***F***	***F***	All
M St SE & 11th St SE	***F***	***F***	*	*	E	*	***F***	E	AM: WB L+T, NB L PM: EB R, WB L, NB L
M St SE & 7th St SE	***F***	***F***	***F***	***F***	***F***	***F***	***F***	***F***	AM & PM: SBL
M St SE & 5th St SE	***F***	E	***F***	***F***	*	***F***	***F***	***F***	AM: EBL, SBL PM: SBL
M St SE & 4th St SE	*	*	*	*	E	*	*	*	AM: WBT
M St SE & 1st St SE	*	*	*	*	***F***	*	*	*	AM: EBT, WBT
M St SW & 4th St SW	*	***F***	*	*	*	E	*	***F***	PM: EBT, WBL, NBL
M St SW & 6th St SW	*	***F***	*	*	*	*	*	*	PM: EBT
M St SW & 7th St SW	*	*	*	*	*	E	*	*	PM: WBT
South Capitol Street									
SCS & Potomac Ave Oval	E	*	*	*	*	*	*	*	AM: NB T
SCS & I (Eye) St	***F***	*	***F***	*	E	*	E	*	AM: WBT, NBT
I (Eye) Street SE/SW									
I (Eye) St SE & 1st St SE	*	E	*	*	*	*	*	*	PM: EBT
I (Eye) St SW & Wesley Pl SW	*	***F***	*	***F***	*	***F***	*	***F***	PM: NBL
I (Eye) St SW & 4th St SW	*	E	*	*	*	*	*	*	PM: EBT, SBT

Notes:
M St is M Street. SCS is South Capitol Street. I (Eye) St is I Street.
* = LOS D or better.

FIGURE 4-21
SYNCHRO LOS for 2035 AM Peak Multimodal Alternative 1

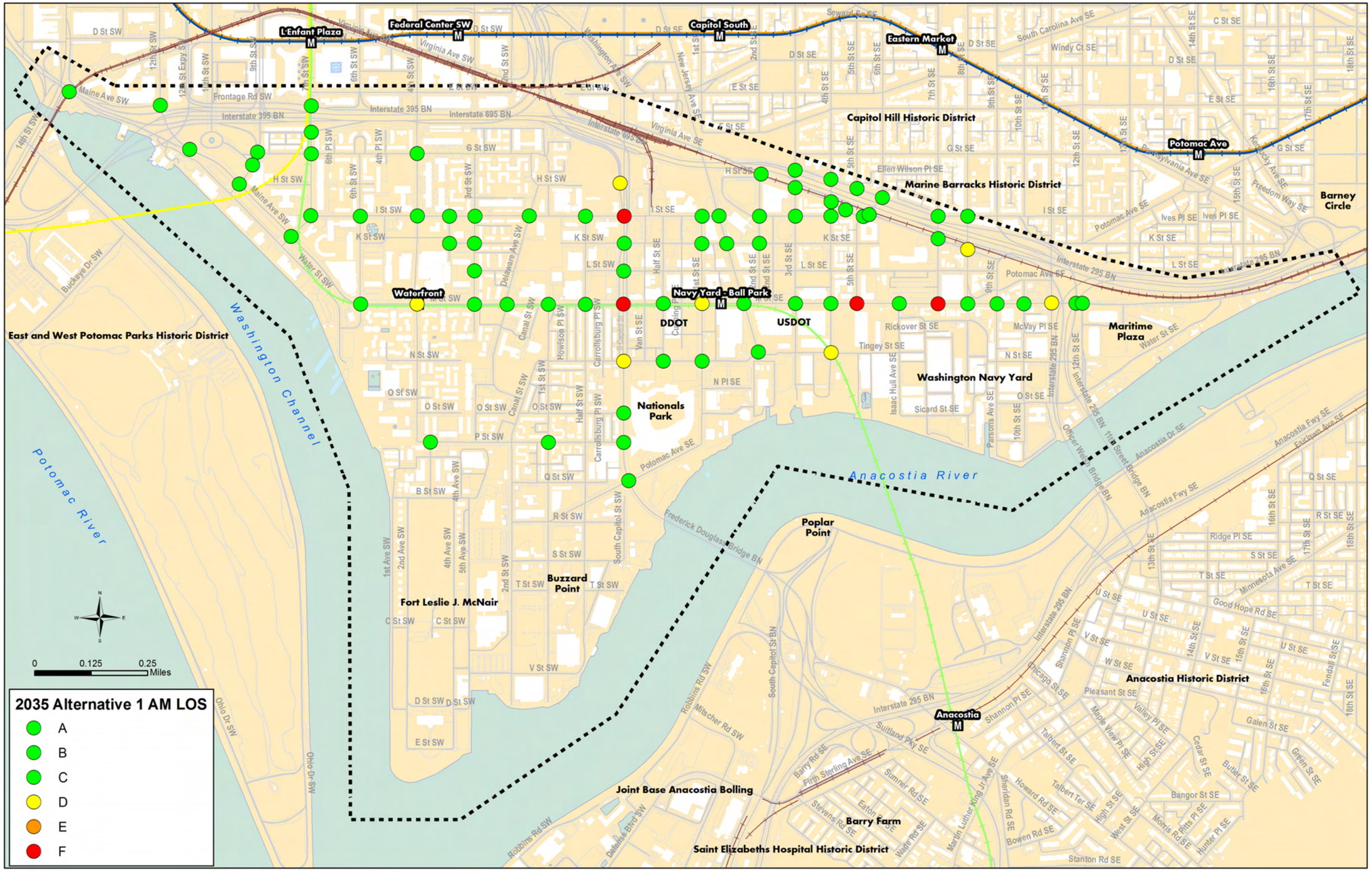


FIGURE 4-22
SYNCHRO LOS for 2035 PM Peak Multimodal Alternative 1

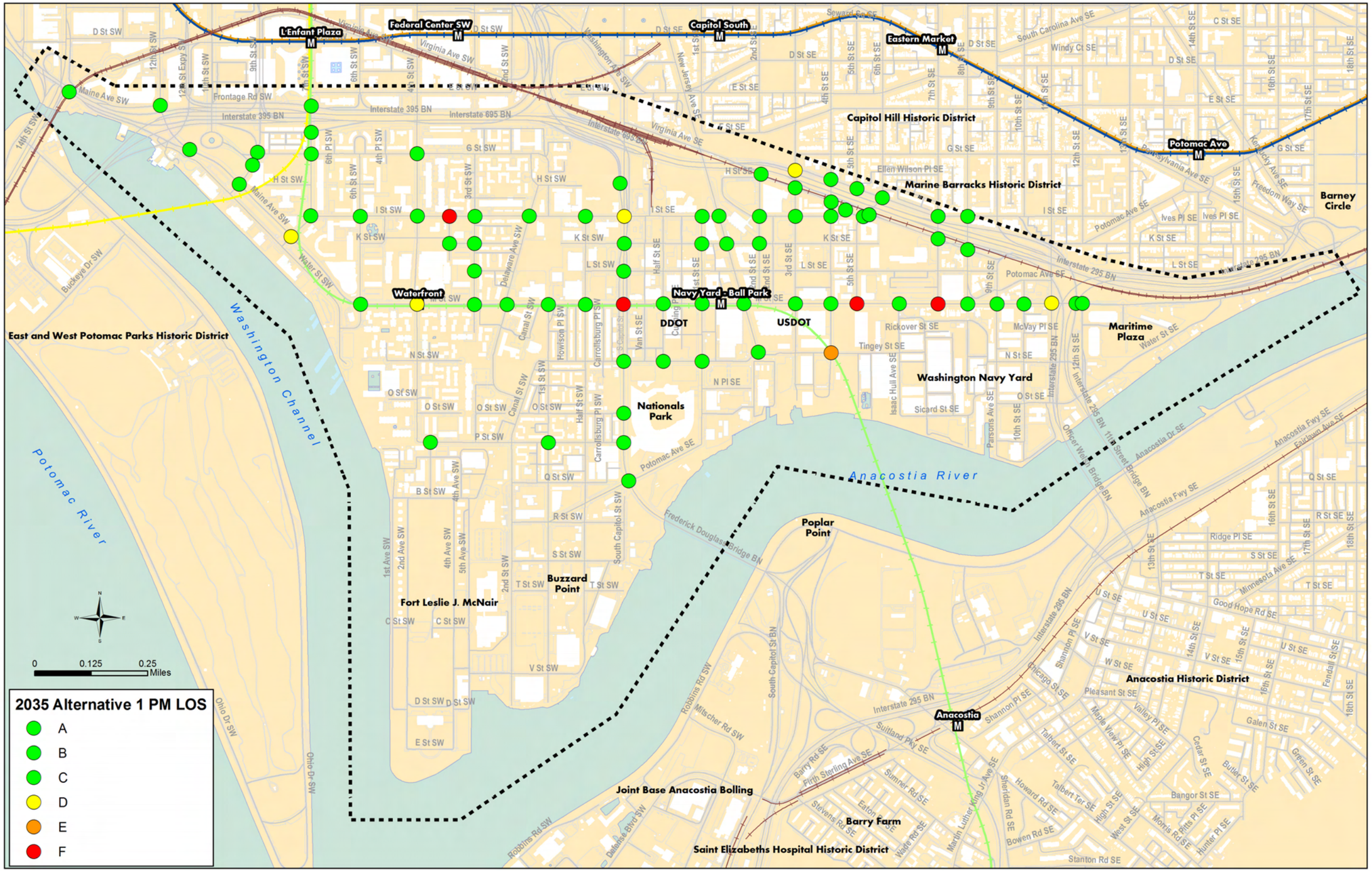


FIGURE 4-23
SYNCHRO LOS for 2035 AM Peak Multimodal Alternative 2

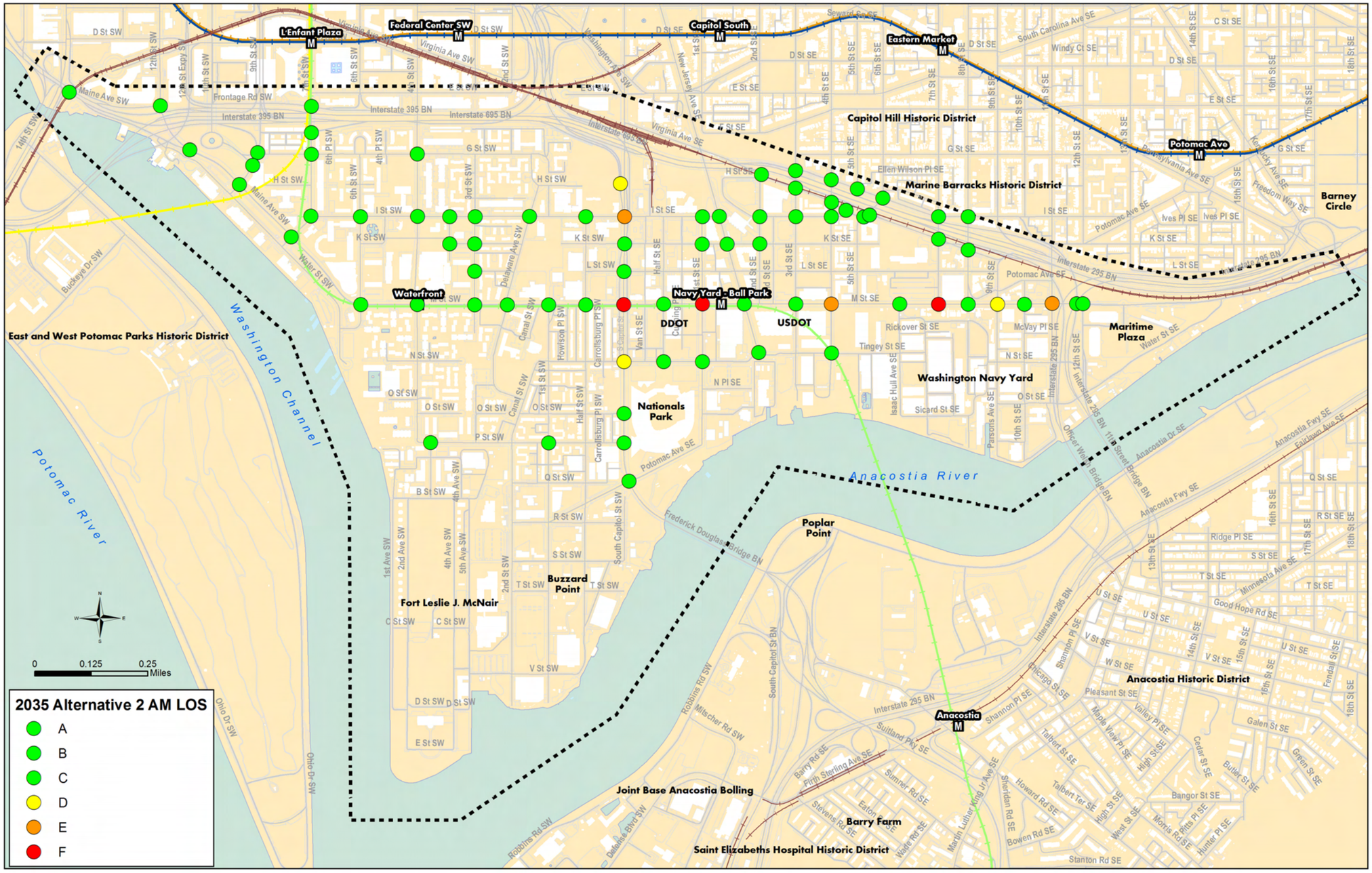


FIGURE 4-24
SYNCHRO LOS for 2035 PM Peak Multimodal Alternative 2

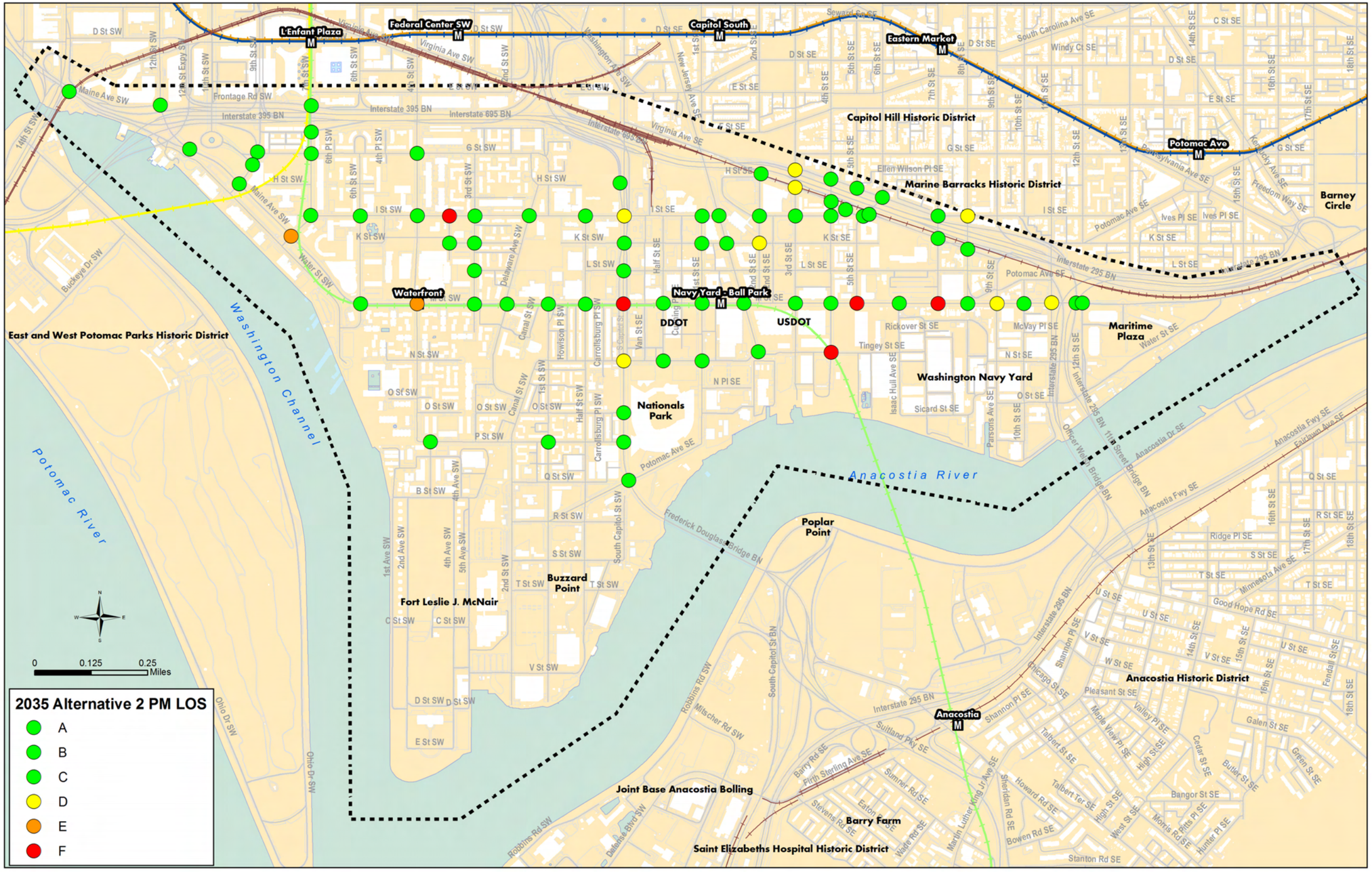


FIGURE 4-25
SYNCHRO LOS for 2035 AM Peak Multimodal Alternative 3

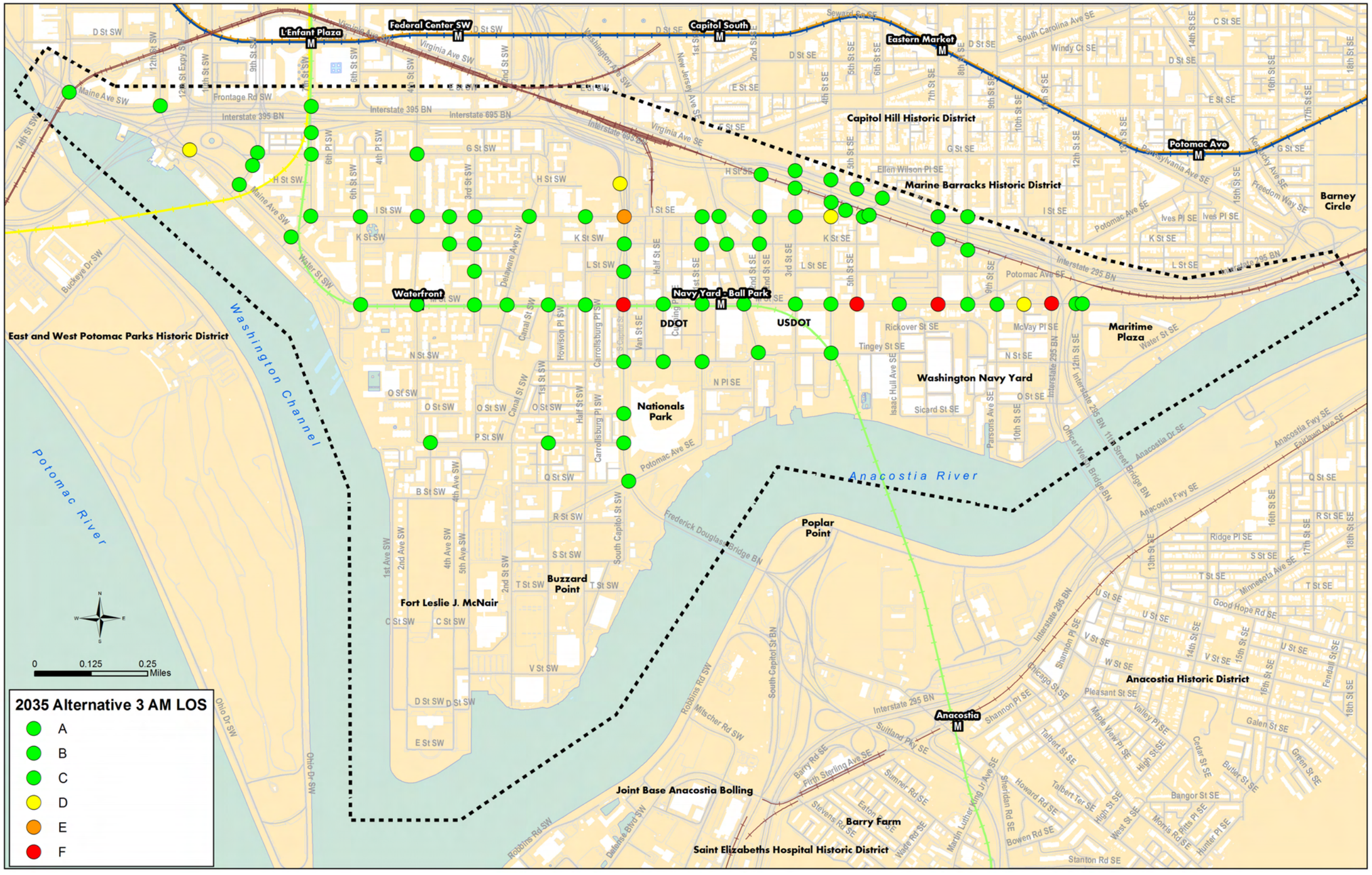
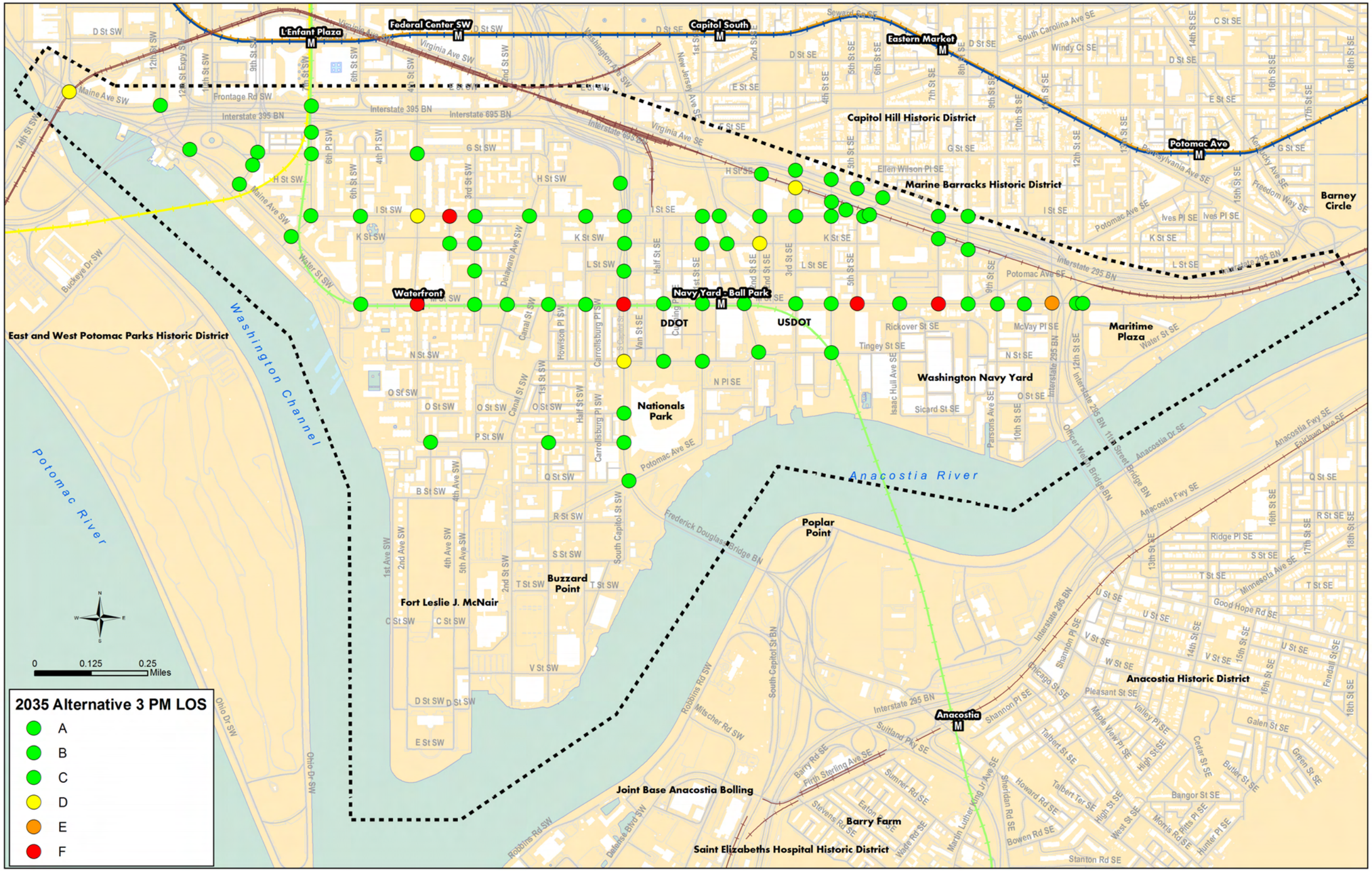


FIGURE 4-26
SYNCHRO LOS for 2035 PM Peak Multimodal Alternative 3



4.5.2 Transit Mode Performance

Transit was evaluated using the VISSIM model and the MMLOS methodology. The VISSIM model was able to provide network-wide performance results as well as travel-time results along M Street. The MMLOS methodology provides a segment-level performance measure based on inputs and concepts in the HCM 2010.

4.5.2.1 VISSIM Network Performance Results for Transit Vehicles

Network performance results from VISSIM were used to compare the overall performance of transit vehicles in the entire Study area among alternatives. Network performance statistics are used to evaluate several parameters that are aggregated for the whole simulation period and network and can be grouped by vehicle class. **Table 4-6, VISSIM Network Performance Summary (Transit Vehicles)**, presents a comparison of each alternative and peak period for the transit vehicle class (includes buses and streetcar vehicles but excludes cars and trucks) by the following performance measures:

- Average delay per vehicle (seconds)
- Average speed (mph)

In the AM peak hour, Alternatives 1 experiences the lowest average delay for transit vehicles, with Alternative 3 as the next lowest. Alternative 1 also experiences the highest average speed for transit vehicles, with both Alternatives 2 and 3 experiencing similar but slightly lower average speed. Alternative 2 has lower delay and higher speed than the Baseline condition.

In the PM peak period, Alternative 1 has the lowest average delay and highest average speed of any alternative. Alternative 3 has lower average delay compared to the Baseline condition and Alternative 2, although average speed is slightly lower than Alternative 2 (8.3 mph in Alternative 3 compared to 8.6 mph in Alternative 2). The Baseline condition has the highest average delay and lowest average speed of any alternative for transit vehicles.

TABLE 4-6
VISSIM Network Performance Summary (Transit Vehicles)

MOE	AM Peak				PM Peak			
	Baseline	Alt. 1	Alt. 2	Alt. 3	Baseline	Alt. 1	Alt. 2	Alt. 3
Average Delay Per Vehicle (seconds)	443	240	360	298	339	222	336	309
Average Speed (mph)	6.4	9.8	8.5	8.6	7.0	9.9	8.6	8.3

Notes:
Results come from VISSIM network performance statistics.

4.5.2.2 VISSIM Travel Time Results for Transit Vehicles

A comparison of travel time for transit vehicles on M Street between all alternatives is shown in **Table 4-7**. Alternative 1 has the lowest transit travel time on M Street of any alternative, with 0.7 to 2.4 minutes lower in the AM peak and 2.8 minutes lower in the PM peak than the next lowest alternative (Alternative 3). Transit service in Alternative 1 benefits from the premium exclusive transit lane on M Street and the addition of TSP to the signalized intersections. Alternative 3 has the next-lowest transit travel time on M Street. The Baseline condition has the highest transit travel time of any alternative, with 2 to 3 minutes more travel time than Alternative 2.

TABLE 4-7
VISSIM Travel Time Comparison for M Street (Transit Vehicles)

Direction	AM Peak				PM Peak			
	Baseline	Alt. 1	Alt. 2	Alt. 3	Baseline	Alt. 1	Alt. 2	Alt. 3
EB	16.8	9.7	13.4	10.4	16.5	9.4	13.8	12.3
WB	15.2	8.9	11.5	11.3	13.4	9.9	11.7	12.7

Notes:
Transit travel time is in minutes and is extracted from the VISSIM model.
Travel time on M Street is measured between 7th Street SW and New Jersey Avenue SE

4.5.2.3 Transit MMLOS Performance

The HCM Urban Streets methodology was used to calculate transit MMLOS. At present, the HCM methodology is not able to capture the affect of transit signal priority or an exclusive transit lane on transit MMLOS. Because this approach does not designate MMLOS A-F for segments that lack transit stops, the following "smoothing" technique was applied:

- If a segment lacking a transit stop is located within ¼-mile from a segment with a transit stop, the segment was assigned the same MMLOS as the segment with a transit stop
- If a segment lacking a transit stop is located more than ¼-mile from a segment with a transit stop, MMLOS for that segment was reduced by one letter grade from the adjacent MMLOS for every ¼- mile increment from the nearest transit stop

Figures 4-27 and **4-28** show the breakdown of transit MMLOS by corridor and alternative for urban street segments in the AM and PM peaks, respectively.

M Street would experience improved transit LOS in Alternatives 1 and 3 compared to the Baseline condition and Alternative 2. The exclusive transit lane provided in Alternative 1 and the shared transit lane provided in Alternative 3 result in similar transit MMLOS in both directions and peak periods. Although Alternative 1 provides transit signal priority and an exclusive transit lane, the effects of both on transit MMLOS are not captured by the current methodology. For some segments along M Street, Alternative 3 results in improved transit LOS over Alternative 1 as a result of increased travel speeds that benefit the streetcar when operating in mixed traffic. In addition, the consolidated bus stops proposed under Alternative 1 result in reduced transit MMLOS for some segments. Although Alternative 1 and Alternative 3 result in similar transit MMLOS along M Street, operating at LOS D or better throughout the corridor in both directions and peak periods, Alternative 1 performs better in terms of transit travel time and overall network performance, as shown in the preceding sections. The Baseline condition and Alternative 2 do not include a streetcar along M Street and result in the worst transit MMLOS along corridor.

Transit on I (Eye) Street is limited in all alternatives except for Alternative 2, which provides for DC Streetcar operation along the rightmost travel lane in both directions. Transit MMLOS on I (Eye) Street would operate the best under Alternative 2 for both directions and peak periods due to increased transit service and additional stops. The Baseline condition, Alternative 1, and Alternative 3 provide only bus service along I (Eye) Street and operate about the same in terms of transit MMLOS for both directions and peak periods.

FIGURE 4-27
Transit LOS Breakdown by Corridor (AM Peak)

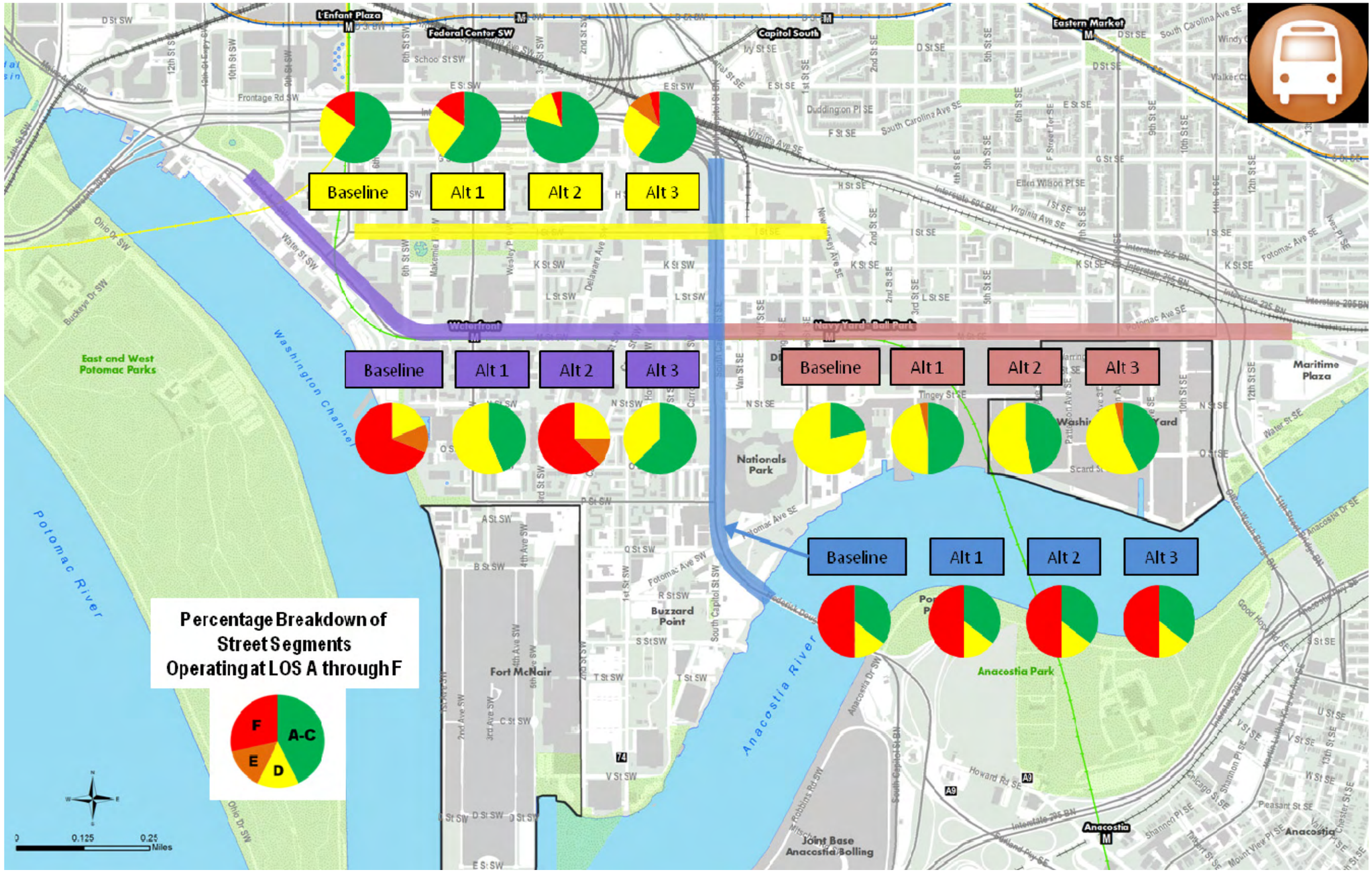
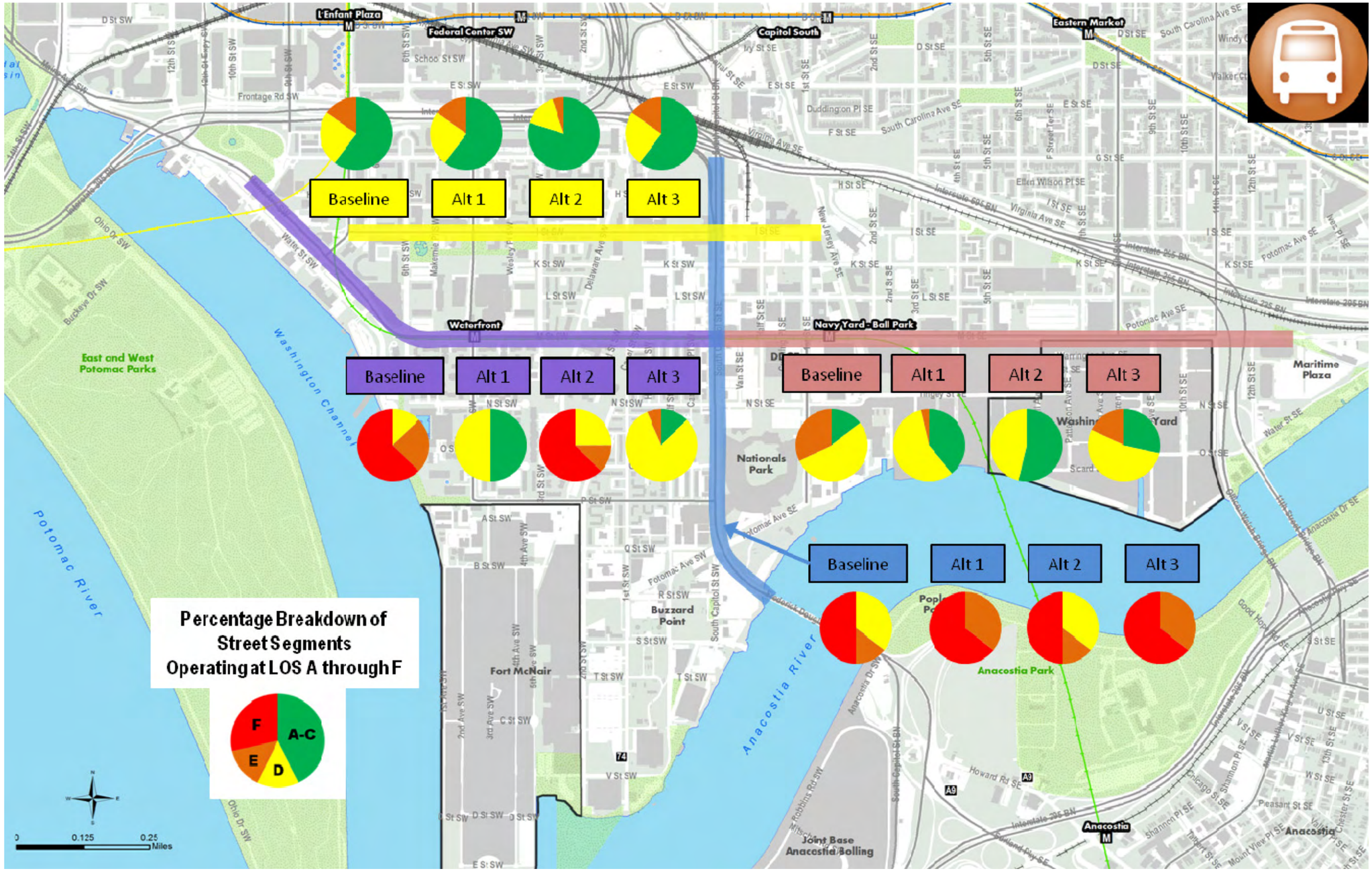


FIGURE 4-28
Transit LOS Breakdown by Corridor (PM Peak)



Transit service on South Capitol Street is extremely limited, with only one bus stop in each direction near M Street common to all alternatives. Therefore, the transit LOS along South Capitol Street is primarily influenced by the LOS and travel time for the automobile mode. South Capitol Street does not benefit from the proposed streetcar in any alternative and experiences very slow travel speeds, as described in Section 4.5.1. In the AM peak, South Capitol Street experiences LOS C and F in the northbound and southbound directions, respectively. In the PM peak, South Capitol Street experiences LOS F and E in the northbound and southbound directions, respectively.

4.5.3 Pedestrian Mode MMLOS Performance

Pedestrian MMLOS is influenced by four categorical factors with thresholds shown below:

- Number of through vehicular travel lanes by direction (1, 2, 3, 4 lanes)
- Traffic volume by direction (0-500 vph; 501-1500 vph; >1500 vph)
- Average sidewalk width (0-5 feet; > 5 feet)
- Speed limit (0-40 mph; >40 mph)

Because the sidewalk widths and speed limits are the same in all alternatives, differences in pedestrian MMLOS described below are a reflection of variations in traffic volumes and the number of through vehicular travel lanes. Design elements—including the provision of improved pedestrian facilities at transit stops under Alternative 1 and the "buffer" formed by the cycle track that separates pedestrians and vehicles under Alternative 2, both along M Street SE and SW—are not accounted for in the pedestrian MMLOS calculation. Similarly, the methodology is not sensitive to the potential effects of premium transit or of bicycle/pedestrian interactions on pedestrian MMLOS. **Table 4-8** describes the approach used to collect input data for the pedestrian MMLOS calculation. The methodology used to calculate pedestrian MMLOS is described in **Appendix G**. **Figures 4-29** and **4-30** provide a breakdown of pedestrian LOS for all alternatives for the 2035 AM and PM peak hours, respectively.

TABLE 4-8
Summary of Pedestrian Methodology and Variables

Step	Approach
Step 1. Determine Number of Through Lanes by Direction	Using available GIS maps for current conditions and potential design approaches for future conditions, determine the number of vehicle through lanes by direction.
Step 2. Determine Average Sidewalk Width by Direction for each Segment	Using available GIS maps for current conditions and potential design approaches for future conditions, determine the average sidewalk width for each segment by direction.
Step 3. Determine Speed Limit for each Segment	Using available data for current conditions and potential design approaches for future conditions, determine the speed limit for each segment by direction.
Step 4. Determine Traffic Volume (vph) by Direction for each Segment	Using available data for current conditions and projections of traffic volume for each of the Study conditions (base, 2017, 2035), determine the traffic volume for each segment by direction.
Step 5. Determine LOS Distribution for the Pedestrian Mode	Using models developed using the cumulative logistic modeling approach, determine the pedestrian LOS for each segment by direction.

GIS = geographic information system

The same pedestrian facilities are provided along South Capitol Street in all alternatives. Compared with other Study corridors, South Capitol Street resulted in the worst overall pedestrian MMLOS for all alternatives during both peak hours because of higher traffic volumes and travel speeds. During the AM and PM peak hours, all segments along South Capitol Street resulted in MMLOS D or E for all alternatives.

For all segments along M Street SE and SW, Alternatives 1 and 2 resulted in improved pedestrian MMLOS overall compared to the Baseline condition and Alternative 3 because of the reduction in vehicular travel lanes in both directions. During both peak hours, Alternative 3 resulted in worse pedestrian MMLOS than the Baseline condition for the eastbound segments between 7th St SW and 4th St SW as a result of converting the rightmost lane from a parking lane to a travel lane. For both peak hours, the slight discrepancies in pedestrian LOS between Alternatives 1 and 2 and between the Baseline condition and Alternative 3 are based on differences in traffic volumes.

For all segments along I (Eye) Street SE and SW, the Baseline condition and Alternative 3 resulted in improved pedestrian MMLOS compared to Alternatives 1 and 2 because of the decreased number of vehicular travel lanes.

FIGURE 4-29
Pedestrian LOS Breakdown by Corridor (AM Peak)

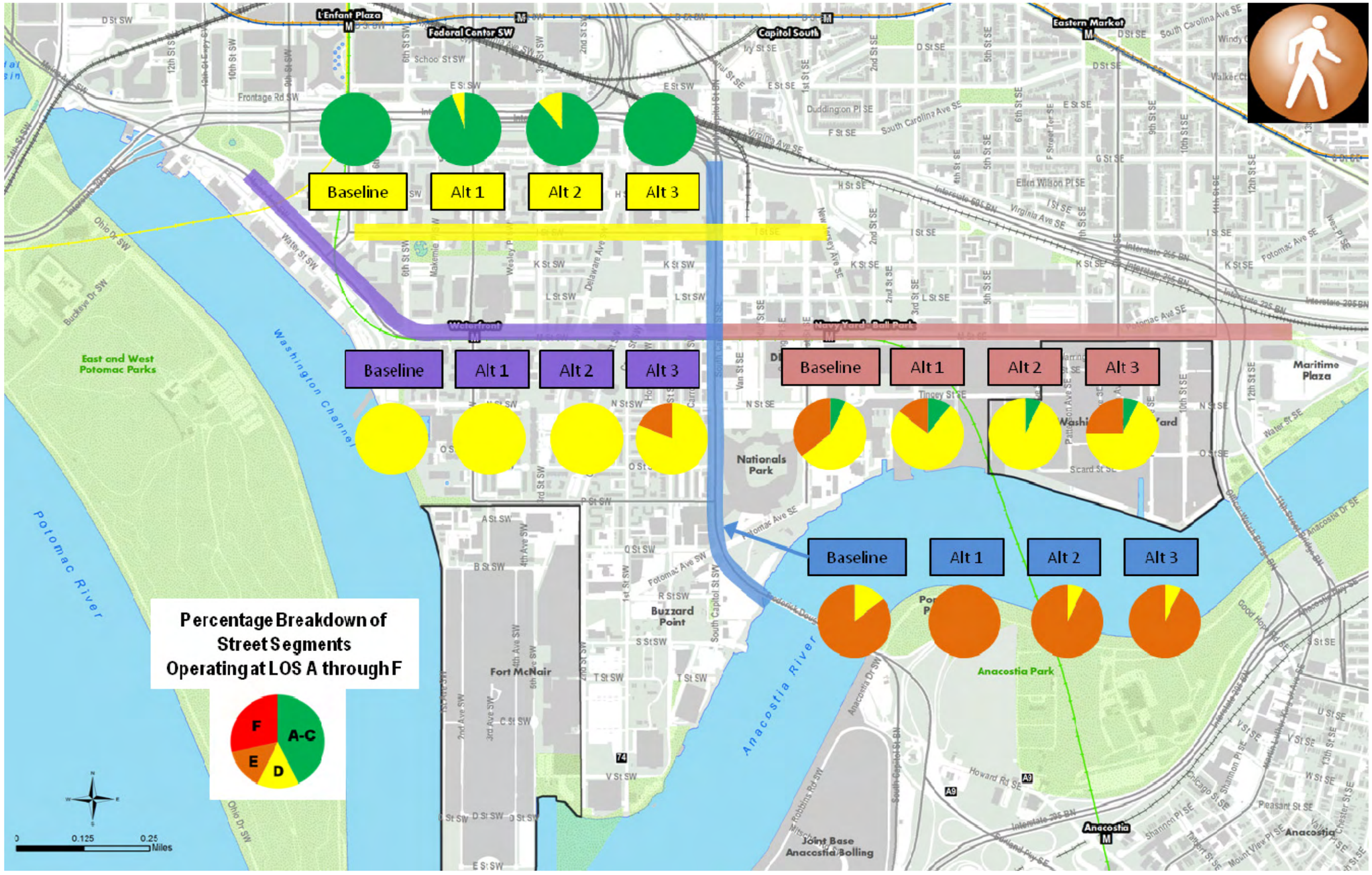
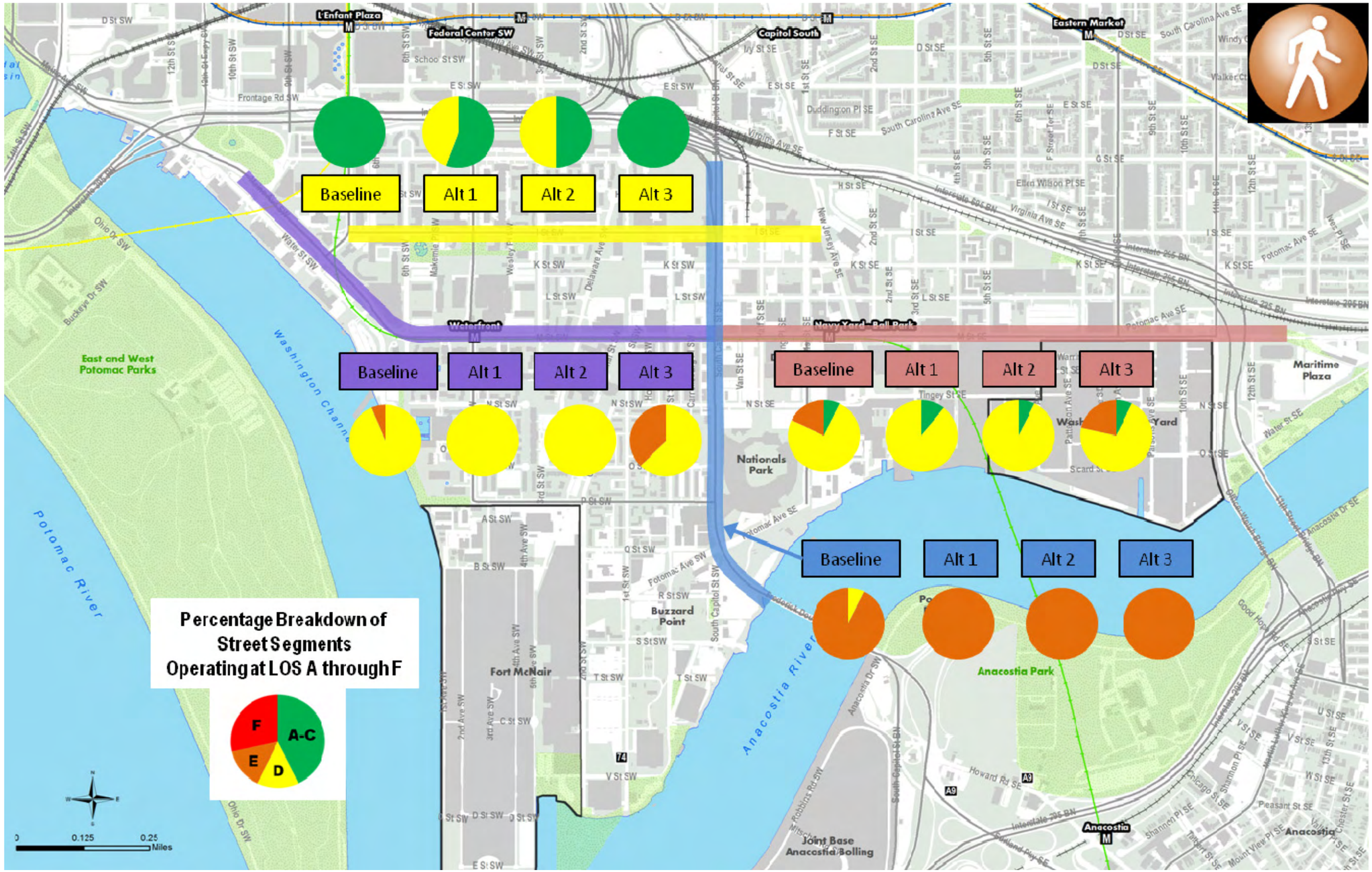


FIGURE 4-30
Pedestrian LOS Breakdown by Corridor (PM Peak)



4.5.4 Bicycle Mode MMLOS Performance

Bicycle LOS is influenced by four categorical factors with thresholds shown below:

- Number of through lanes by direction (one; more than one)
- Speed limit (less than or equal to 30 mph; more than 30 mph)
- Presence or absence of bicycle lanes (yes or no)
- Number of conflicts from unsignalized approaches by direction (zero; More than zero)

Because the speed limits and number of conflicts from unsignalized intersections remain constant across all alternatives, the differences in bicycle MMLOS described below are based on differences in number of through lanes by direction and the presence or absence of dedicated bicycle lanes. Findings from NCHRP Project 3-70 indicate that bicyclists' perceptions of a shared bicycle facility and lack of bicycle facility are the same, so both produce the same effect on MMLOS. **Table 4-9** describes the approach used to collect input data for the bicycle MMLOS calculation. The methodology used to calculate bicycle MMLOS is described in **Appendix G**. **Figures 4-31** and **4-32** provide a breakdown of bicycle LOS between all alternatives for the 2035 AM and PM peak hours, respectively.

TABLE 4-9
Summary of Bicycle Methodology and Variables

Step	Approach
Step 1. Determine Number of Through Lanes by Direction	Using available GIS maps for current conditions and potential design approaches for future conditions, determine the number of vehicle through lanes by direction.
Step 2. Determine Bicycle Lane Presence by Direction for each Segment	Using available GIS maps for current conditions and potential design approaches for future conditions, determine the presence of bicycle lanes for each segment by direction.
Step 3. Determine Speed Limit for each Segment	Using available data for current conditions and potential design approaches for future conditions, determine the speed limit for each segment by direction.
Step 4. Determine Conflicts from Unsignalized Approaches by Direction for each Segment	Using available data for current conditions and potential design approaches for future conditions, determine the conflicts from unsignalized approaches for each segment by direction.
Step 5. Determine LOS Distribution for the Bicycle Mode	Using models developed using the cumulative logistic modeling approach, determine the bicycle LOS for each segment by direction.

M Street provides an exclusive cycle track under Alternative 2, shared bicycle facilities under the Baseline condition and Alternative 3, and no bicycle facility under Alternative 1 because of the exclusive premium transit lane. Alternative 2 results in the best bicycle MMLOS along M Street among all alternatives because of the barrier-separated cycle track. The Baseline condition, Alternative 1, and Alternative 3 do not include the provision of a dedicated bicycle lane along M Street, resulting in MMLOS D for all segments along the corridor. Although not reflected in the MMLOS results because of input data limitations, Alternative 1 would result in the worst experience for bicyclists because the rightmost lane along M Street would be closed off for premium transit.

The Baseline condition and Alternative 3 maintain an exclusive 5-foot bike lane along the length of I (Eye) Street, resulting in bicycle mode MMLOS C for all segments during both peak hours. Alternatives 1 and 2 include the provision of a shared auto/bicycle and auto/streetcar lane along I (Eye) Street SE and SW respectively, resulting in MMLOS D during both peak hours. Although not reflected in the MMLOS results because of input data limitations, Alternative 2 would likely result in the worst overall experience for bicyclists along I (Eye) Street because of interactions with the streetcar itself as well as with tracks embedded in the pavement.

There would be no bicycle facilities along South Capitol Street in any alternative. All alternatives provide LOS D for bicycles along South Capitol Street. Notably, the applied methodology is not sensitive to the effect of congested or free-flow traffic conditions on bicycle MMLOS, even in the case of shared facilities.

FIGURE 4-31
Bicycle LOS Breakdown by Corridor (AM Peak)

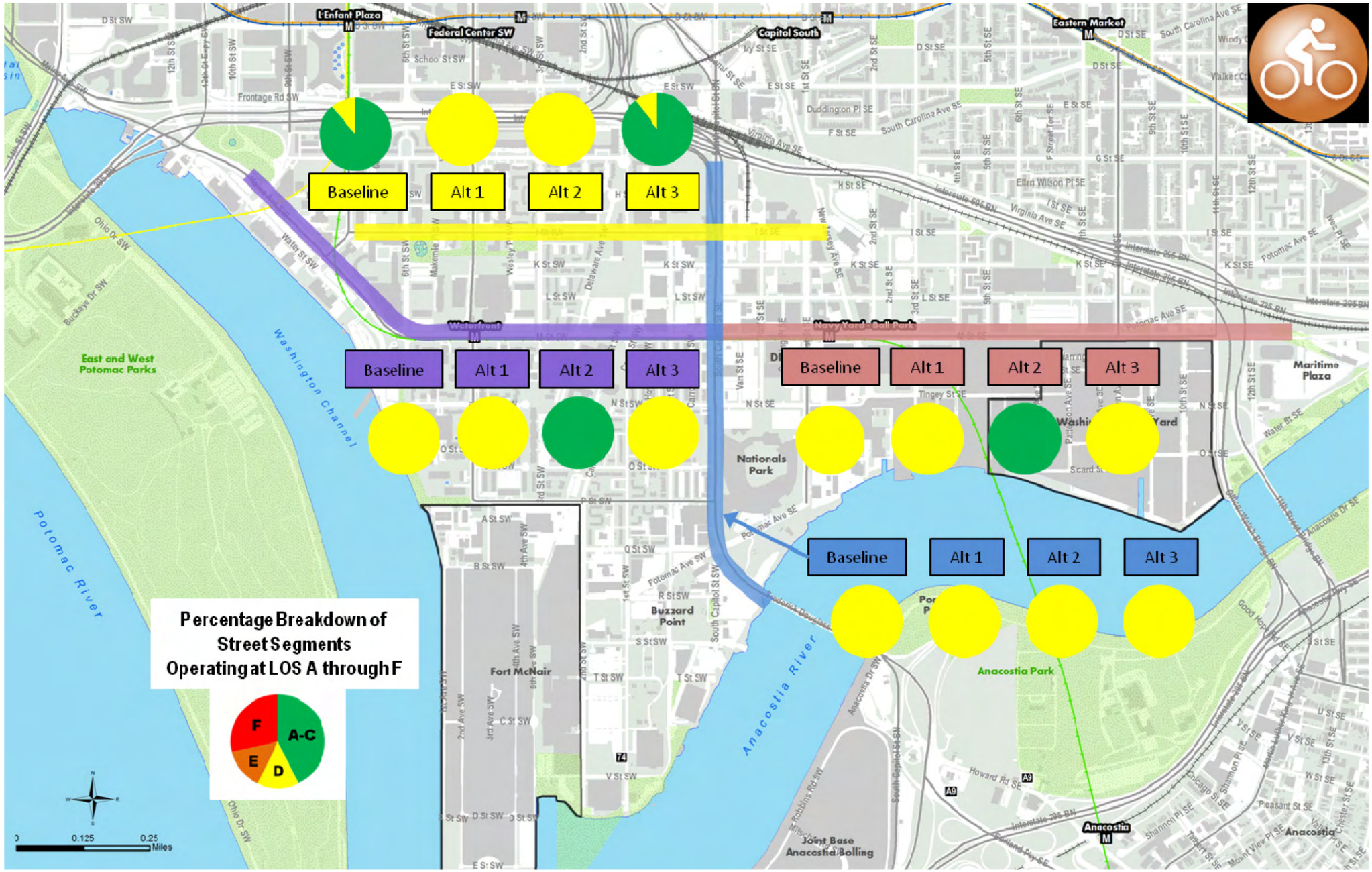
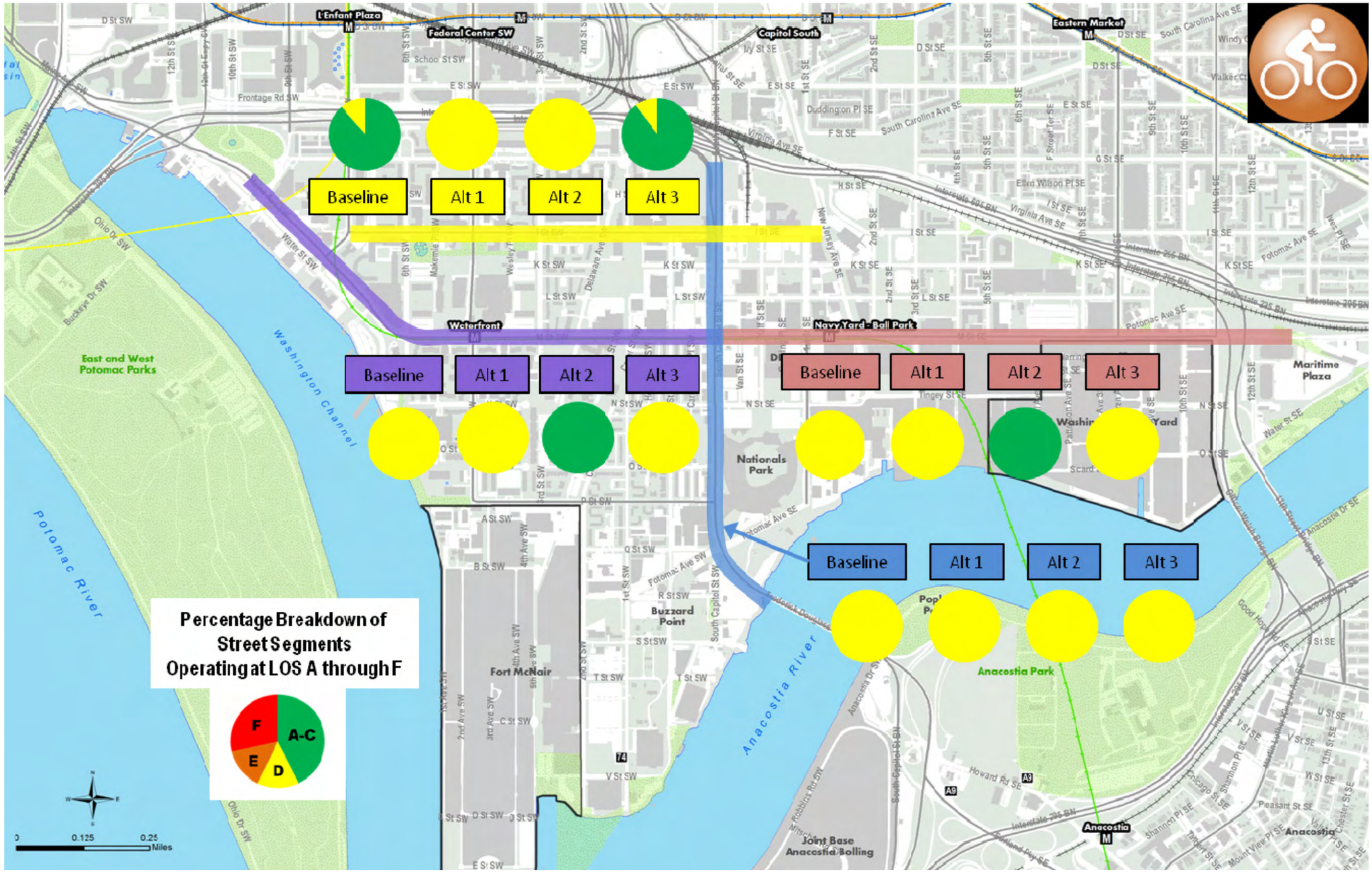


FIGURE 4-32
Bicycle LOS Breakdown by Corridor (PM Peak)



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Chapter 5
FUTURE IMPROVEMENTS ACROSS ALL ALTERNATIVES: NEAR-TERM (2013-2016) AND LONG-TERM (2020 AND BEYOND)

5. Future Improvements Across All Alternatives: Near-Term and Long-Term Solutions

This chapter summarizes proposed solutions that can be implemented within the Study area for any of the alternatives presented in the previous chapters, including the future Baseline conditions. The future improvements presented are categorized by solutions that could be implemented in next few years – Near-Term Solutions (2013-2016) – or solutions that could be implemented further out in the future – Long-Term Solutions (2020-2040). Near-term solutions could be in place prior to, or concurrently with, the alternatives discussed in Chapter 4. Long-term solutions would either be contingent on additional redevelopment or would require significant project development efforts and extended implementation timelines.

5.1 Near-Term Solutions (2013-2016)

Near-term solutions would not require the type of environmental review process and project development efforts that are associated with mid-term or long-term improvement alternatives, and many of the solutions can be implemented with relatively small costs. The proposed near-term improvements are categorized into several groups: policy updates, operational / transportation systems management solutions, small-scale capital improvements, and sustainability improvements.

5.1.1 Policy Updates

DDOT is considering a number of policy initiatives that could be implemented in the immediate or near future to improve the operational and safety characteristics of the transportation network within the Study area. In addition, DDOT is looking to better balance the land use-transportation linkage as development occurs along the M Street corridor and nearby waterfronts. In some cases, the policy options presented below may have already been initiated or were in progress before the completion of this Study, as identified in the most recent DDOT Action Agenda and the *2010 Action Agenda Progress Report*. Policy updates and improvements may be generally grouped in the following categories:

- Travel Demand Management (TDM) Strategies
- Parking System Improvements and Parking Regulations
- Transit Policies
- Motor Coach and Commuter Bus Staging / Parking
- Freight Loading and Truck Routes
- Bicycle and Pedestrian Policies
- Sustainable Design

5.1.1.1 TDM Strategies

TDM strategies are methods or approaches for reducing the total number of trips to and from (as well as within) a specific area. TDM strategies are also used to balance the demand on the transportation system more evenly across various modes to reduce the potential that a single mode is disproportionately overcrowded. Typically, a Transportation Management Plan (TMP) is developed for a designated area for which a number of TDM strategies are identified and implemented as a coordinated effort to strategically address transportation-related issues. DDOT should contrive to implement TDM strategies through the development review process. Within the Study area, a number of strategies should be sponsored by DDOT or implemented through public-private partnerships as part of the TMP to serve as potential mitigation for future traffic and transit congestion:

- **Transportation Management Association** – A Transportation Management Association (TMA) is a non-profit organization whose purpose is to assist with coordination of issues related to transportation logistics, commuter services, and parking management in commercial districts. A TMA may operate as a completely private entity or as a public-private partnership. TMA's can be funded through member dues, such as from businesses or a BID, and/or public agency grants. TMAs can help develop and implement TMPs and serve as an advocacy group to identify sustainable solutions for local area transportation needs. The single greatest advantage of forming a TMA is that it can provide a variety of services and other programs to address commuter and neighborhood transportation issues more effectively than a single business or homeowners association can. In partnership with DDOT and the DC Office of Planning, the Capitol Riverfront BID (the designated BID serving the eastern portion of the Study area) could serve as a sponsoring "umbrella" organization to create and enable a self-sustaining TMA.
- **Area Transportation Coordinator** – As an element of a localized TMP for the M Street corridor and waterfronts, the position of Area Transportation Coordinator (ATC) may be created within the TMA in order to organize and effectively manage various strategies identified for the Study area. The ATC then becomes the designated individual responsible for providing updates to the TMP and for implementing the strategies identified by the TMA. The ATC's office could be supported by additional staff, as needed, to help cover the multiple responsibilities of the ATC position.
- **Telework/Telecommute Options** – An effective strategy for reducing commuter trips and for optimizing use of commercial office space is to enable teleworking/telecommuting, which allows commuters to work one or more days a week from an offsite location (either home or a remote worksite).
- **Alternative Work Schedules** – Similar to telework options, alternative work schedules entail strategies that provide flexibility in work schedules for commuting office employees, such as:
  - Compressed Work Week – employees may work nine hours per day for nine days and take the tenth day off (usually a Monday or Friday);
  - Flextime Schedule – employees may arrive to work and leave from work during multi-hour windows at the beginning and end of the day, with a requirement that employees be present during certain core hours (for example, between 10:30 AM and 3:30 PM). Flextime schedules allow employees to travel to and from work during times other than the peak periods of traffic congestion;
  - Staggered Work Shifts – employees work during an assigned fixed schedule, but arrival and departure times are spread out over 15- or 30-minute increments.
- **Car-sharing** – A strategy that can be equally effective for commuting employees, residents, and commercial retail workers is the use of car-sharing. The most common type of car-sharing program in the District allows registered users to access a short-term rental of a vehicle. This program is used especially by commuters or residents who do not use or own personal automobiles. DDOT's *2010 Action Agenda Progress Report* established new goals/actions on car-sharing to increase the total number of car-sharing vehicles in the District by 30 percent and to increase car-sharing access by providing a car-sharing vehicle within a 10-minute bicycle or transit ride of every household. In some areas, a TMA may operate as the provider of car-sharing for users within its jurisdiction. DDOT could work, in the near term, with the Capitol Riverfront BID and a private car-sharing vendor to establish certain incentives for developers/businesses who offer car-sharing as an option to employees/residents who forgo use of their automobiles in the Study area.
- **Guaranteed Ride Home** – For employees who normally participate in a ridesharing program or take transit, this strategy provides a back-up option in case they are required to work late or need to leave work in an emergency situation. Guaranteed Ride Home options usually entail vouchers for taxis or corporate van-pools. DDOT may work with PUD applicants to ensure participation in a Guaranteed Ride Home program in order to encourage transit use or ride-sharing. The program could be limited to each individual business, the entire BID, or incorporated as part of the region-wide Commuter Connections sponsored by MWCOG.

- **Resident / Employee TDM Orientation and Education** – Education is equally important to a successful TDM program. DDOT may partner with the BID or potential TMA to provide an orientation program for new residents (especially in high-density condos and apartments) and new employees regarding TDM strategies. The program would be targeted to incentivize the use of transit, non-vehicular trips, and other options mentioned above at the onset of a new residential purchase/lease or a new job. Studies nationally have shown that early proactive efforts to educate workers and residents can significantly affect the level of single-occupancy vehicle use. In addition, marketing materials could be widely distributed to commercial retail establishments, employers, and residents to bring awareness of various transportation alternatives and TDM programs to all users of the transportation system. DDOT currently sponsors the web-based information portal, www.godcgo.com, which serves as a major source of information for not only individuals, but also companies and touring groups. This website could be used in combination with community-specific information to keep all users of the transportation system up to date on the latest initiatives and programs available.

5.1.1.2 Parking System Improvements and Parking Regulations

There are more than 19,000 parking spaces within the Study area between the SE/SW Freeway and the Anacostia River/Washington Channel. Approximately 19 percent of these are on-street parking spaces, and more than half of the on-street parking spaces within the Study area are restricted through Residential Permit Parking (RPP). Parking management strategies for the area should balance short-term availability with resident needs. Parking revenues from the area could be put towards capital investments as well. DDOT has many current and in-progress parking-related policies that aim to achieve this balance, which could be developed/augmented as follows:

- Continue to advance performance-based parking/ dynamic pricing: Use Smart Meters to improve the efficiency of curbside parking. The results of DDOT's evaluations of performance parking reveal that the new technology of metered spaces is effective in reducing the turnover time of short-term parkers. However, this strategy is not applicable to residential and RPP areas.
- Temporal parking: No parking during peak hour(s) to increase roadway capacity. Some streets in the Study area already have rush-hour parking restrictions.
- Expand the enforcement powers of traffic control officers: Traffic control officers have been empowered and trained to write both non-moving and moving violations, including double-parking, failure to yield to pedestrians, and improper use of bus or loading zones.
- Enhance goDCgo.com with updated parking regulations, as they are revised or modified: This robust informational website is updated often with current information, such as truck and bus routes and suggested parking locations.
- Increase enforcement of double-parking and rush-hour violations, using automated tools where possible.
- Extend RPP hours in existing neighborhoods with limited residential parking capacity to prevent event parking spillover.
- Employ ongoing development of technologies to more effectively manage on-street parking—thereby reducing traffic congestion and increasing curbside turnover in high-demand areas: DDOT has been running a number of different pilots to test the latest technology, including pay-by-phone, in-car metering, and occupancy sensors.
- Continue to install solar-powered parking meters that are part of an interactive network that will feature real-time information and dynamic pricing capability.
- Improve on-street commercial loading operations through metering, increased enforcement, and better design and placement of loading zones. The DC Council passed legislation allowing for commercial loading-zone metering in 2009, and DDOT has since been meeting with the industry to determine a management system that can assist in loading-zone management and efficient usage.

Additional parking-related policies that DDOT should consider for more widespread use in the District or for future implementation include:

- Shared parking: Allowing a parking facility to have multiple users or multiple destinations, especially for parkers that use different time periods at the facility. Can optimize 'one-stop' approach to conveniently-located and multiple walkable destinations.
- Monitor and expand performance-based parking districts: DDOT is determining the best way to implement performance parking citywide, and the program can be monitored to determine the most efficient way to expand.
- Unbundle parking: Allow/encourage parking spaces to be rented or sold separately from residential or non-residential building space.
- Maximum vehicular trip budget policies: Coordinating with DC Office of Planning to set a maximum vehicular trip generation rate for an individual site or area. Often used for parcels with long-term, single-use parking.
- Repurpose on-street parking for bicycle parking: The Capital Bikeshare Program has been growing in the District and expanding throughout the DC region. Other opportunities exist to encourage bicycle use and take advantage of limited curb space, such as bike corrals providing bike parking for all users between the curbs.
- Satellite parking locations: Provide satellite parking with transit linkages (for example, via the DC Circulator).
- Transit incentives: Consider working with event venues such a Nationals Park to provide transit incentives (such as Metro fare included in ticket prices) to encourage visitors to use transit to travel to events.
- Explore congestion pricing methods with the private sector and other cities: DDOT plans to research congestion pricing in other cities and use technology experts to assist in determining the infrastructure necessary, and the public policy framework, to pursue congestion pricing in the District to enhance mobility and efficiency in the system.
- Declare "double parking enforcement week" blitz campaigns to aggressively enforce against double parking focusing on truck and motor coach parking.

Reducing parking can reduce development costs, reduce impervious areas, and foster a culture oriented toward the increased use of non-automobile transportation alternatives. These benefits are encouraging to consider; however, the more efficient use of existing and new parking supply can assist in balancing the demand and supply and emphasize the multiple use and higher turnover of parking spaces, oftentimes vacant for long periods of time. Before making any policy changes that would result in a reduction of parking, however, DDOT will also assess any impacts the policy change could have on revenue.

5.1.1.3 Transit Policies

Transit service within the Study area entails multiple service providers but generally two modes: Metrorail and bus. The Metro Green Line carriers the largest proportion of transit trips through the Study area but with limited coverage and access. As described in Chapter 2, WMATA operates several Metrobus service lines that pass through the Study area and DDOT operates the DC Circulator. Neither of these modes provides continuous east-west coverage across the entire Study area. As a result, many would-be transit users are forced to transfer at least once. Public input and surveys have indicated a strong demand for east-west service between the Southwest waterfront and Eastern Market, to the northeast.

A policy decision should be made by DDOT in regards to improving transit connections on M Street SE/SW, making premium transit service(s) a priority for this community (including DC Streetcar, DC Circulator, Metro Extra bus service). That decision would then be reflected in the improvements proposed and advanced by DDOT for discussion with the community, in terms of its long-term implications due to the increase in activity/population expected for the area. Any additional service would require both capital expenditure and operating funds. Reinstating DC Circulator service to Southwest is part of the 10-year plan, but extending the existing Union Station-Navy Yard route to the Waterfront station would require the acquisition of two additional vehicles and additional operating funds.

Another policy decision should entail working with WMATA on a plan to actively identify additional pedestrian access points at the existing Green Line Metro stations. These potential additional entry points would coincide with the areas of substantial future development and higher densities:

- L'Enfant Plaza Station – Additional access to/from the south, with better connectivity to future development at the Wharf along the Southwest waterfront.
- Waterfront Station – Second entrance providing access to/from the west, with connectivity to future development at the Wharf along the Southwest waterfront.
- Navy Yard-Ballpark Station – New access to/from the north, in the vicinity of 1st Street SE at L or K streets; new access to/from the south in the vicinity of 1st Street SE at N Street.

5.1.1.4 Motor Coach and Commuter Bus Staging / Parking

A number of new initiatives and policies have very recently been introduced or proposed by DDOT to better manage operational issues related to motor coaches and commuter buses. The following policies or initiatives are recommended for consideration or implementation inside the Study area and within the context of the latest policy framework by DDOT:

- Maximize off-street parking for motor coaches and commuter buses that currently park on-street within the Study area. Identify consolidated off-street staging areas near existing and future tourist sites that allow reasonable proximity between staging areas, boarding/alighting zones, and ultimate destinations (for example, consolidated site within the Wharf development that replaces existing parking on Maine Avenue).
- Implement increased fines for parking violations, and intensify enforcement of both parking and idling violations through cooperative agreements with other enforcement agencies within the District. This is especially crucial to manage the ongoing issue of buses that park at curbside meters illegally.
- Work with the Mayor's Office and the DC Council to establish a means to charge buses for curbside parking via implementation of multi-space "smart" parking meters.
- Expand anti-idling educational components and driver recognition program incentives through MWCOG's regional program (www.turnyourengineoff.com and www.godcgo.com/home/get-my-group-there/motorcoach-operators.aspx).
- Work with other enforcement agencies within the District to streamline and standardize regulations and restrictions, as well as to clarify and better manage curbside activity as envisioned within the District's Commuter Bus Management Plan.
- Establish an interagency task force, incorporating the major regional transit service providers (Loudoun County Transit, Potomac & Rappahannock Transportation Commission (PRTC), Maryland Transit Administration, and WMATA Metro Express Bus), to develop a short-term and long-term service plan that accounts for major changes in demographics and development within the District, and specifically within the Study area. Working with the BID or potential TMA, identify local and regional transit needs that are specific to changes in density/land use within the Southwest waterfront, Buzzard Point, and the Anacostia waterfront, including phasing (similar to what has been done for the 2010 DC Circulator Transit Development Plan).
- Coordinate with the National Park Service to establish a long–term plan and policies for motor coach parking along Maine Avenue immediately adjacent to Banneker Park.
- Identify and study the feasibility of candidate locations for intermodal transfer facilities within the southern half of the District (within reasonable proximity to the Study area). This could allow for consolidation of longer-term bus parking and staging operations.

5.1.1.5 Freight Loading and Truck Routes

Commercial retail and office spaces depend heavily on access to freight loading zones for the transfer of goods and materials. A major challenge for ground-level retail can arise if rear loading is not available within the block in which the space is located. Throughout many parts of the District, arterial streets typically accommodate freight within designated loading zones and established truck routes, although loading zones may be located on streets with most functional classifications. Along M Street and South Capitol Street, the demands for multiple modes and competing uses within the right-of-way precludes establishment of loading zones within the travel way. In addition, a number of local residential streets in Southwest DC between M Street and Buzzard Point have posted truck restrictions, and several other streets, such as I (Eye) Street SE in near Southeast, are residential.

As a result, DDOT continues to use current development review guidelines for PUD applications within the Study area to require rear-side access for freight loading and side-street truck access, ideally without depending on ingress and egress via low-density residential streets. In addition, applicants are required by DDOT to provide freight loading plans and truck access plans within their TDM plans, including monitoring and enforcement initiatives that discourage double-parking and loading outside of designated loading zones.

In 2009, the DC Council passed legislation that provides for commercial loading-zone metering in order to improve on-street loading operations. Since then, DDOT has engaged the freight and trucking industry in order to strategize a way to develop a comprehensive management system for loading-zone parameters and usage efficiency. A pilot program was launched last year for loading-zone metering to test its efficiency and effectiveness. While the program is being considered for District-wide implementation, the Study area could be a potentially effective focus area for consideration because a number of new developments are slated to come online in the coming years.

5.1.1.6 Bicycle and Pedestrian Policies

Several of DDOT's policies, agenda actions, and goals focus on the bicycle and pedestrian modes of travel; however, DDOT's ultimate goal is to ensure that designs and modifications would allow an unaccompanied 12-year old to safely travel the roadways by foot, bicycle, and/or transit. In the 2013-2018 Transportation Improvement Plan, DDOT set aside 5 percent (just under $29 million) of its total capital project expenditures for bicycle and pedestrian projects for Fiscal Year 2012. Through these projects, DDOT intends to reduce fuel costs, pollution, and congestion while improving safety and boosting physical activity. Specific projects to achieve these agency goals are included in the bicycle and pedestrian master plans (www.ddot.dc.gov/DC/DDOT/On+Your+Street/Bicycles+and+Pedestrians).

To build on recent successes in traffic safety (with DC ranking number one nationally in lowest fatality rates in 2009 and experiencing a 23 percent drop in pedestrian-related crashes between 2007 and 2008) and recent mobility improvements, DDOT has implemented various countermeasures. These policies and projects are the basis for the following proposed near-term improvements for pedestrians and bicyclists which should be considered by DDOT:

- **Build on safety education and outreach programs.** DDOT should continue targeting public service messages and advertisements on television, radio, and billboards. DDOT has found recent success through campaigns such as - Click it or Ticket, Smooth Operator, Distracted Driver, Street Smart, Checkpoint Strikeforce, Work Zone Awareness, Motorcycle Safety, Share It, Big Time, and Street Smart. Such public service announcements (PSAs)

have focused on educating transportation facility users about sharing the multimodal roadway, defensive driving training, rules of the road, respecting crosswalks, anticipating bicyclist movements when turning, and the consequences of speeding on public safety. This education is to be provided before receiving a standard driver's license and has been specifically targeted for bus and taxi drivers. Enforcement is also anticipated to be a key educational tool.

- **Implement traffic calming measures.** Through its Livability Program, DDOT has focused on deterring traffic from cutting through neighborhoods and slowing travel speeds. Widening medians for pedestrians and narrowing traffic lanes have also been recommended in the Green Streets initiative from the Livability Program.
- **Expand use of manned traffic control at "hot-spot" locations.** Where effective within the Study area, DDOT may place traffic control officers at key intersections within the Study area to assist pedestrians with crossing high-traffic locations, similar to what is done northwest of the National Mall. Improved pedestrian signal timings are also possible, in accordance with the *Leading Pedestrian Interval* provision that calls for evaluating the pedestrian crossing times at the top 100 high-use intersections. A policy to install bicycle boxes at key signalized intersections within the Study area should be considered.
- **Implement the Safe Routes to School program for local schools.** This program calls for widening sidewalks, encouraging parents to walk or bicycle with children to school, and providing patrol officers. **Encourage shifts from single-occupancy vehicles to pedestrian, bicyclist, and transit modes.** To aid these efforts, DDOT has proposed expanding bicycle parking from 5 percent of vehicle parking to near parity through zoning code updates of vehicle parking maximums. Additionally, public outreach events and programs such as Feet in the Street, Bike Brand your Biz, and Let's Move are encouraged to support shifting transportation mode uses. DDOT has identified a goal that walking trips should be the primary mode for trips under 1 mile and bicycle trips the primary mode for trips under 3 miles.

5.1.2 Operational / Transportation Systems Management Solutions and Small-scale Capital Improvements

In addition to policy updates / related improvements and sustainability, a number of other near-term improvements were identified including implementation of transportation systems management (TSM) solutions and low-cost operational improvements. The aim of TSM is to optimize the safety and efficiency of an existing multimodal transportation system through the use of effective low-cost improvements that have little-to-no environmental impacts and require minimal design, as opposed to high-cost capital improvements. Because a significant number of developments within the Study area are anticipated to be open before 2015, these improvements are expected to provide relief in the near term (2013-2016).

The basic infrastructure in the Baseline condition would not be sufficient to support the future growth of developments and the associated traffic demand in the Study area. To address concerns about congestion, mobility, accessibility, and safety, following are some of the TSM and low-cost operational improvements that DDOT may choose to implement within the Study area.

5.1.2.1 Signing and Pavement Marking Improvements

DDOT could implement a comprehensive, coordinated sign and information system to allow all users of the roadway to reach their destinations safely and efficiently. To assist in accessing points of attractions/interests by all modes, DDOT could:

- Unify signage and naming for consistency purposes
- Increase the use of rapid flashing beacon signs for safer pedestrian crossings at key locations of high pedestrian activity in the future, such as at Maine Avenue/7th Street SW, M Street/4th Street SW, M Street/New Jersey Avenue SE, along South Capitol Street between M Street and the Ballpark district, etc.
- Install speed feedback signs on potential cut-through roadways for traffic calming purposes (display the actual approach speed)
- Install signs to show cycle tracks (bicycle lanes) and shared-use paths (multi-purpose trails)
- Install signs at the intersection approaches to show lane control and turn restrictions
- Install way-finding signs (to places of interest and to connect with other intermodal facilities)
- Install truck routing signs for all truck trips on Study area arterials

DDOT also could choose to make the following low-cost adjustments to pavement markings to improve safety and circulation:

- Lane usage pavement markings on approaches along major roadways at few key intersections. This typically allows motorists to make informed decisions and significantly reduces last-minute lane changes.
- Road diets or "right-sizing" on residential streets by restriping would reduce the number of through travel lanes on a roadway and repurpose it for other uses, such as revised channelization, improved pedestrian and bicycle facilities, on-street parking, and/or landscaping
- Pavement markings to indicate "sharrows" (shared bicycle lanes) and promote non-motorized transportation use
- Colored pavement restriping for traffic calming purposes
- On-pavement speed limit markings and/or colored pavement for traffic calming
- School zone pavement markings to ensure Safe Routes to School

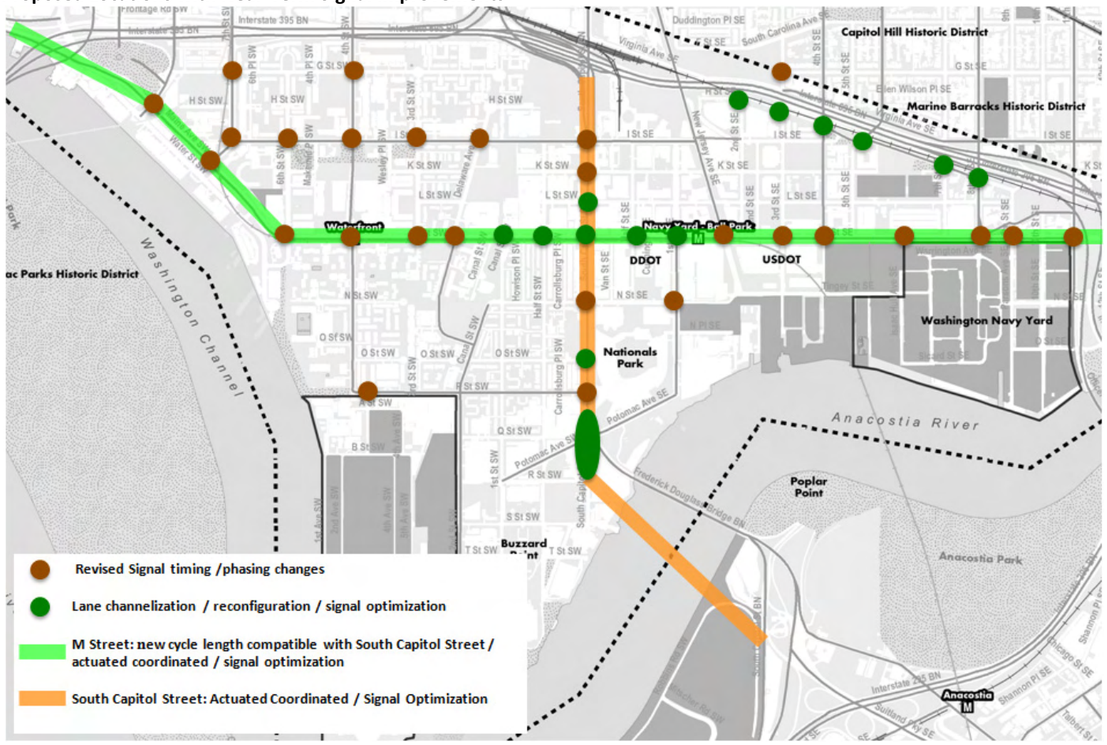
5.1.2.2 Signal Timing Optimization along M Street

Currently, most of the signalized intersections within the Study area operate on pre-timed, uncoordinated signal settings with a cycle length of 100 seconds. With the growth in future traffic demand, DDOT should revise these signal timings and subject them to phase revisions to improve traffic flow and reduce congestion, as part of the ongoing District-wide initiative to upgrade the overall traffic signal system. Five intersections along M Street near the South Capitol Street should undergo lane channelization to reduce queues. As part of the ongoing South Capitol Street EIS, signalized intersections along the South Capitol Street corridor were analyzed as actuated coordinated signals with newer cycle lengths. At intersections along the M Street corridor, DDOT should consider implementing a new cycle length of 120 seconds or a half-cycle of 60 seconds to be compatible with South Capitol Street operations and optimize the splits. **Figure 5-1** shows the proposed locations with near-term signal improvements within the Study area.

Other low-cost options that DDOT should consider are:

- Pedestrian countdown signals
- Priority signal controls for pedestrians and transit vehicles
- Expanded use of intelligent transportation systems (ITS) to synchronize traffic signals, which increases the throughput of vehicles in the corridor and decreases vehicle hours of delay

FIGURE 5-1
Proposed Locations with Near-Term Signal Improvements



5.1.2.3 Pedestrian and Anacostia Riverwalk Trail Connectivity Improvements

A review of the current pedestrian sidewalk facilities within the Study area showed that there are several areas where low-cost, near-term improvements can be implemented to enhance safety and accessibility. As shown in **Figure 2-18***, Existing Sidewalk Conditions Assessment*, and detailed in Appendix C, several segments of sidewalks are out of compliance with ADA. At those locations, DDOT could relocate / remove the obstacles from the middle of the sidewalk, seal all cracks, and even out the concrete surface. DDOT may also consider installing new sidewalks along the segments identified in **Figure 2-18**.

To improve the pedestrian crosswalk facilities at some of the intersections within the Study area, following are some of the low-cost but effective changes that DDOT could implement:

- **Install, enhance, and enforce bicycle facilities.** One of DDOT's goals has been to improve on the 2010 Capital Bikeshare (CaBi) Initiative by continuing to expand stations and bicycles. Additional subsidies are available for local employers, universities, and private development projects to encourage bicycle use through increased access. This can be accomplished by requiring convenient, covered, and secured bicycle parking at new developments. Both bicycle lanes and cycle tracks should be considered (with use of the median as a potential consideration). Enforcement to prevent commercial parking in bicycle lanes is also proposed throughout the Study area. Proposed enhancements to the bicycle network are shown in **Figure 5-2**.
- **Improve area crosswalks.** DDOT could install white zebra stripes at intersections and improve intersection access for people with hearing, vision, and physical disabilities via rapid flashing beacon signs, pedestrian countdown signals with audible warnings (implemented for at least 10 intersections), and curb ramps (implemented for at least 50 intersections).
- **Enhance sidewalk connectivity and walkability.** DDOT should ensure that sidewalks conform to Americans with Disabilities Act (ADA) standards by repairing sidewalks, removing obstructions, widening sidewalks, and placing or completing sidewalks where there is no continuous concrete or pavement from intersection to intersection. Specific locations where these types of improvements are needed are detailed in Appendix C. An example of a location with disrupted connectivity and ADA issues is the area between Virginia Avenue at 2nd Street SE and Garfield Park, which could potentially serve as a major north-south link between neighborhoods north and south of I-695. Proposed enhancements to the pedestrian network are shown in **Figure 5-2**.
- **Improve pedestrian lighting.** Expand the use of light-emitting diode (LED) fixtures to enhance visibility.
- **Enhance ADA elements at key intersections.** Improve intersection access for people with vision and hearing disabilities by providing audible warnings at intersections and detectable warnings at curb ramps, similar to what is used at M Street/New Jersey Avenue SE.
- **Install pedestrian countdown walk signals.**
- **Provide raised and/or textured pavement for crosswalks.** (Especially near major intermodal facilities.)
- **Restripe the crosswalks for better visibility.**

The Anacostia Riverwalk Trail has been considered by many as a transportation commuting alternative for non-motorized modes. As shown in **Figure 3-19***, Baseline Pedestrian and Bicycle Facilities*, once completed, the Anacostia Riverwalk Trail will be a 16-mile continuous, multi-purpose trail along both sides of the Anacostia River that attracts new visitors to the waterfront and provides local residents and commuters with transportation options.

In terms of near-term, low-cost improvements, DDOT could do the following at the Anacostia Riverwalk Trail:

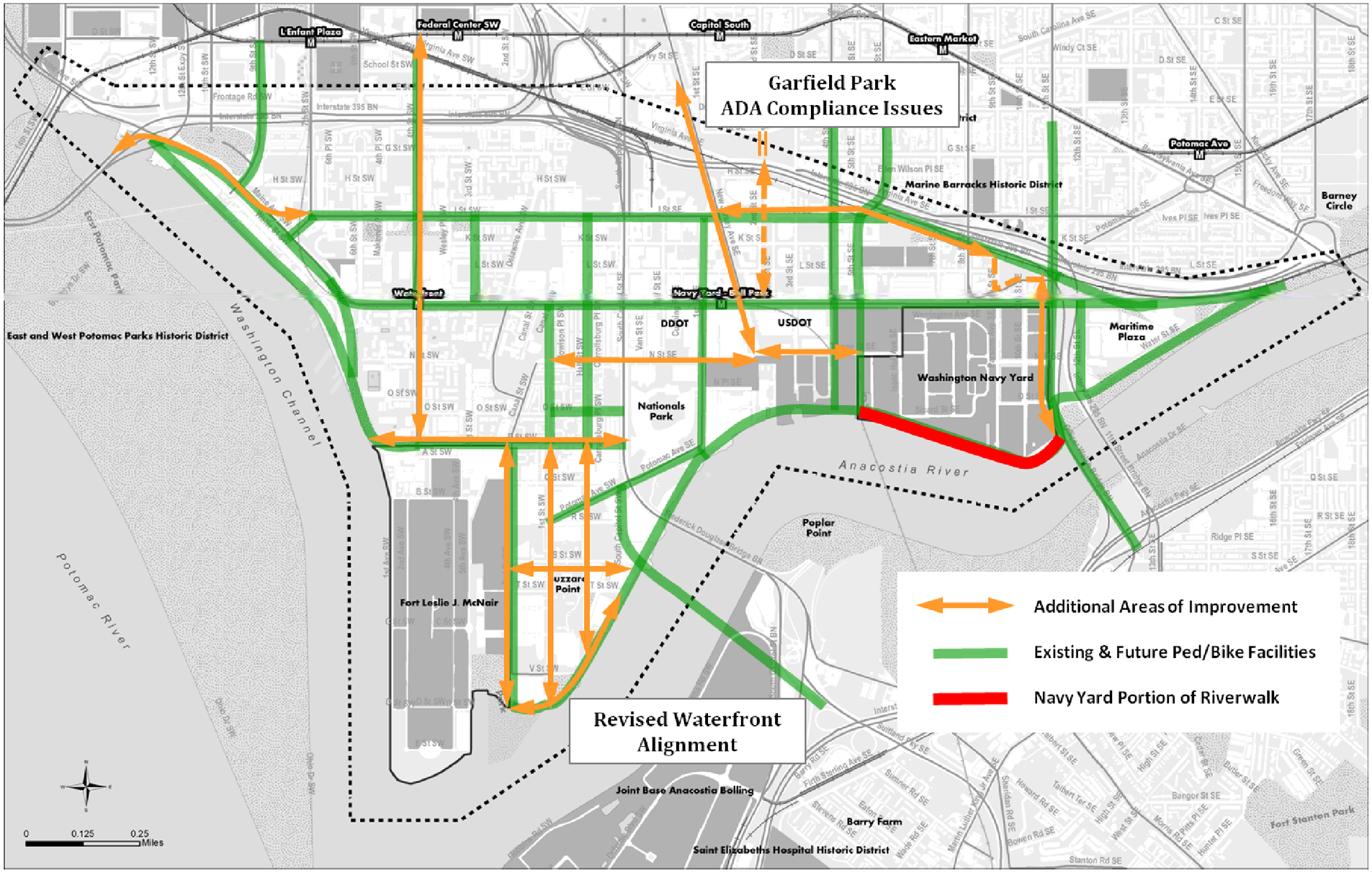
- Provide facilities and amenities for cyclists and pedestrians that include benches, bicycle racks, and well-placed comfort stations
- Integrate landscaped trails, particularly for pedestrians and cyclists, into the existing waterfront park access points
- Install and/or improve signs for way-finding and connections to other facilities

5.1.2.4 Bicycle Network Improvements

The Anacostia Riverwalk Trail is a major bicycle network improvement planned within the Study area, as shown in **Figure 3-19**. As part of the near-term bicycle improvements, DDOT may choose to:

- Improve mobility, safety, and accessibility to activity centers by installing pavement markings, providing lighting, and signs for way-finding
- Install colored or contrasting pavement for cycle tracks (bicycle lanes)
- Restripe existing bike lanes along shared bike facilities (i.e. "sharrows") and on exclusive bike facilities

FIGURE 5-2
Proposed Enhancements to the Bicycle and Pedestrian Facilities



5.1.2.5 Waterways and Commuter Ferries

DDOT has partnered with the Northern Virginia Regional Commission (NVRC) to conduct a study that will assess and determine the viability of reliable commuter ferry service in the National Capital Region as a supplement to existing transit services. As part of the study effort, a Commuter Ferry Boat Stakeholder Committee has been developed to perform a market analysis to determine the likely commuter and tourist passenger demand for high-speed commuter ferry service between selected origin and destination locations on the Occoquan, Potomac, and Anacostia Rivers. Preliminary studies indicate that a number of existing marinas and waterfront areas in Northern Virginia, Maryland, and the District of Columbia could serve as possible origin and destination points in an interconnected network of water taxi / commuter ferry services.

The Stakeholder Committee is comprised of two dozen representatives from Maryland, Virginia, and the District of Columbia. The market analysis is expected to assist the Committee with the analysis necessary to make well-informed planning, policy and budgetary decisions regarding the future of commuter ferry passenger transportation in the region. The findings of the analysis will help drive the future operational configuration of a water-based transit system serving points within the Study area such as the Wharf on Washington Channel, Buzzard Point Marina, and new water access points at the Yards development and adjacent to Nationals Park stadium.

5.1.2.6 Transit Service Improvements

The Study assumed some modest improvements to the transit system within the Study area for the Baseline condition, which includes adding/extending the transit routes within the Study area as well as increasing the frequency of existing bus lines during peak hours. **Figure 5-3** presents some of the proposed improvements.

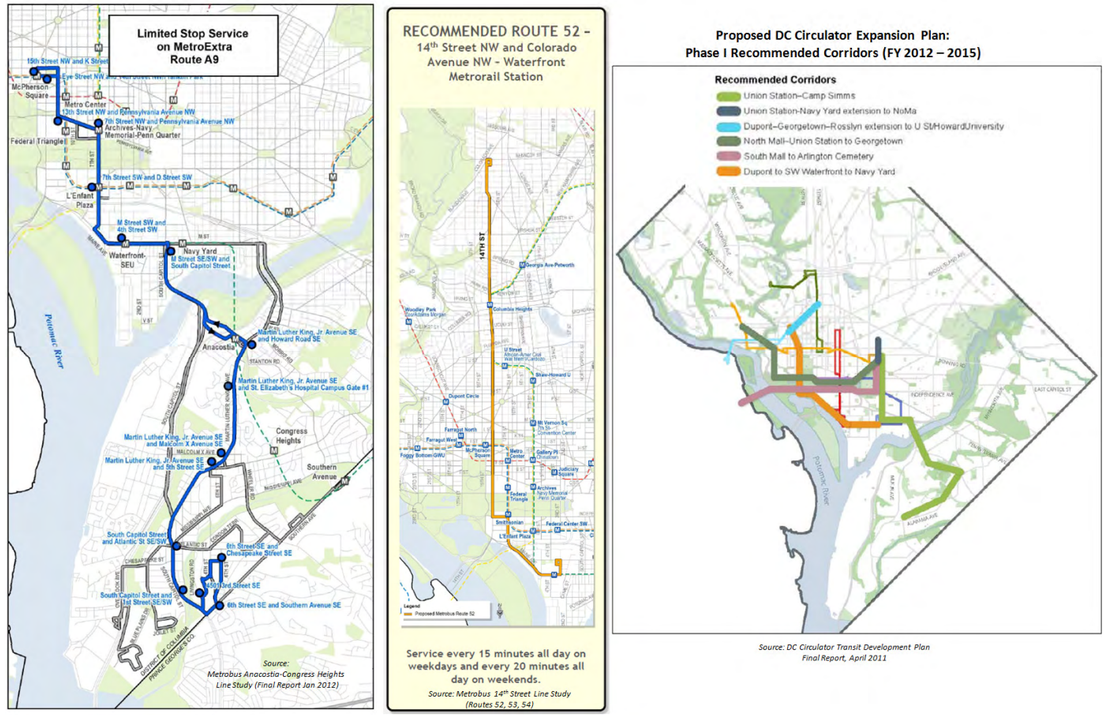
WMATA has already approved the initial phase of A-line service improvements with the conversion of existing Route A9 to a limited-stop Metrobus Express service (proposed to start in December 2012) on Martin Luther King Jr. Avenue in Anacostia and along M Street SW and extended to the McPherson Square Metrorail station from L'Enfant Plaza station. Current plans call for peak direction service operating at a 15- to 16-minute frequency. Due to the requests from the Navy Yard for peak direction service to that facility, WMATA is considering bi-directional service for this route based on availability of funding. WMATA also has made a final recommendation to extend the current Route 52 from L'Enfant Plaza to the Waterfront Metro station. This route would operate at all times with a 15-minute frequency on weekdays.

In addition to WMATA services, DC Circulator is also planning to increase services and has already identified priority corridors for Phase I recommendations (2012-2015) in the *DC Circulator Transit Development Plan* (April 2011). These recommended corridors were selected based on current projections of demographic growth, economic development, and anticipated transit need. As shown in **Figure 5-3**, there are two potential corridors within the Study area where DC Circulator services can be added:

- Union Station – Skyland – Camp Simms
- Dupont Circle – Southwest Waterfront – Navy Yard

Depending on the transit demand and funding opportunities, DDOT should reestablish the suspended DC Circulator line running between the Convention Center and Southwest Waterfront. With the upcoming Southwest Waterfront development along Maine Avenue SW - the Wharf - and the proposed Ackridge development near the Buzzard Point area, it may be beneficial to revise the Red Line to include M Street SW (Waterfront Metro station) and South Capitol Street (Buzzard Point) in its route.

FIGURE 5-3
Proposed Transit Service Improvements



In addition to increasing the transit service, following are some of the low-cost, near-term improvements that DDOT may choose to implement that are applicable to the transit corridors within the Study area:

- Implementation of transit traffic signal prioritization, which is a technology that connects the traffic signal system to a sensor system on each bus. When buses are approaching a prioritized signal, the green phase will be extended for the approaching bus or a red phase will be shortened. The end result is that buses are given the opportunity to pass through intersections on their routes with less overall waiting time, thereby increasing their schedule reliability.
- Improving bus stop amenities to improve the quality of transit services for patrons (bench / bus shelter with trash receptacle), which makes transit stops more inviting and visible.
- Posting up-to-date schedules at transit stops to reflect new services, highlighting the key information used by riders in an easy-to-read and visible format.
- Establishing the practice of on-board announcements by drivers to announce upcoming transfer points to rail transit, major destinations, and major bus routes.
- Providing and promoting capabilities to access real-time next bus information at bus shelters and transit stations.
- Improving the availability of schedules in buses and at Metrorail stations along route.

5.1.3 Sustainability Improvements and LID

As referenced in previous sections, a number of different types of sustainability spot improvements, particularly addressing stormwater runoff and low impact development (LID), may be beneficial within the Study area. DDOT is committed to compliance with the District Department of the Environment (DDOE) Stormwater Management Division, DC Water Quality Standards for Surface Water (21 DCMR Ch.11), DC Water Management Plan per the Water Pollution Control Act of 1984 (DC Law 5-188), and Section 402 of the Clean Water Act, including compliance with the Municipal Separate Storm Sewer System (MS4) permit issued to DDOT under the National Pollutant Discharge Elimination System, also referred to as NPDES.

5.1.3.1 Sustainable Design Policies

Over the past three years, DDOT has begun coordinating with the District Department of the Environment (DDOE) to explore public-private partnerships for the maintenance of specialized infrastructure treatments related to sustainable design. A draft plan for standardized design practices of LID in the public space was completed by DDOT at the end of 2010. In advance of near-term sidewalk improvements and longer-term street reconfigurations, DDOT may expand the partnership with DDOE to establish a framework for potential maintenance agreements with commercial space owners, residential property owners, and/or the BID within the Study area. This may include specialized neighborhood stormwater runoff areas, such as rain gardens in certain medians or sidewalk buffer areas.

DDOT is in the process of finalizing a District-wide LID policy and guidelines framework plan and anticipates adoption to provide for the appropriate application of several LID infrastructure elements including (but not limited to) the following:

- Bioretention, stormwater planters, and bioswales
- Green Alleys
- Use of pervious pavers, or installation of pervious asphalt or pervious concrete pavements within the roadway, especially in parking lanes; pervious pavers within sidewalks and café spaces
- Use of extended planting areas with the public space

A number of sustainability measures may be implemented as independent short-term improvements or incorporated into a more substantial street network improvement alternative, as described in the previous chapter.

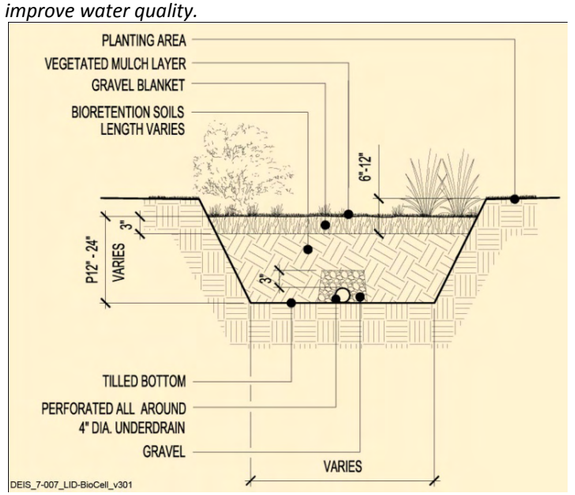
5.1.3.2 Sustainable Design and LID Techniques

DDOT should explore a Study area-specific sustainability improvement program to treat the stormwater runoff from the roadway using LID techniques. These techniques, elaborated in the *Anacostia Waterfront Initiative Transportation Architecture Design Standards*, may include vegetated drainage swales; rain "gardens," which are vegetated holding ponds; and/or treatment wetlands. These techniques can reduce substantially the amount of metals and other contaminants borne in roadway runoff that is discharged into the adjacent Anacostia River or Washington Channel. The design and location of the best management techniques for this project could ultimately depend on the selected long-term alternative. It is the intent to minimize the area of right-of-way acquisition for the roadway infrastructure, so undeveloped areas immediately adjacent to the roadway network or open areas within the public right-of-way will be the primary candidate locations for these treatment sites.

The practicality of specific LID technologies and locations within the Study area will need to be evaluated during more detailed design and project development. In general, these technologies work best during small storm events, where they provide incremental improvements to the quality of the receiving waters. Some of the principal technologies that hold promise for implementation within the Study area are bioretention, bioslopes, bioswales, vegetated filter strips, trees (both with and without tree box filters), and underground cisterns.

Bioretention cells, as shown in **Figure 5-4**, are small-scale soil and plant-based devices that remove pollutants and control runoff volume and peak rates through a variety of physical, biological, and chemical treatment processes. They improve water quality for small, frequently occurring storms.

FIGURE 5-4
Bioremediation Cells
Bioremediation Cells are a type of LID that might be appropriate for use within the Study area Landscape infiltration devices help improve water quality.



Source: DDOT

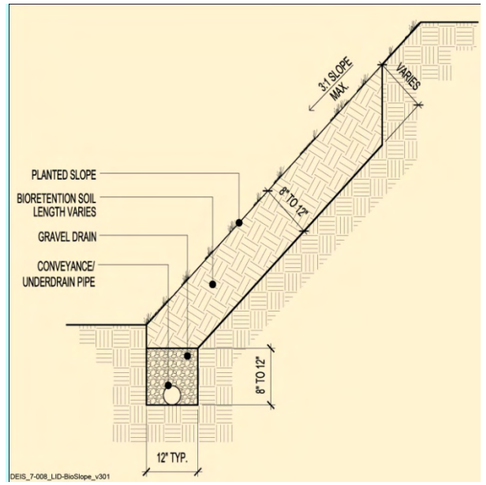
Bioslopes (**Figure 5-5**) expand the amount of open vegetated areas in the urban environment. Consisting of modified filter strips with a special soil, bioslopes improve water quality, reduce the runoff volume, and reduce the tendency for erosion to occur. They can be incorporated into standard fill slopes in the roadway cross section and resemble a basic grass filter strip when completed. Such systems require periodic aeration and possible incorporation of amendments, such as topsoil or compost, to maintain infiltration capacity.

Bioswales (**Figure 5-6**) mimic the appearance of natural stream channels. They are broad, shallow, vegetated channels that convey and infiltrate stormwater runoff. Bioswales are designed to reduce stormwater volume through infiltration, improve water quality through infiltration and vegetative filtering, and reduce runoff velocity by increasing flow path lengths and channel roughness.

Vegetated filter strips (**Figure 5-7**) are bands of dense permanent vegetation with a uniform slope, providing water quality pretreatment between an impervious area and another best management practice. Vegetated filter systems provide runoff prevention and runoff treatment, reducing the frequency of discharges and retaining water through infiltration and evapotranspiration. Maintenance requires removal of debris and trash for appearance.

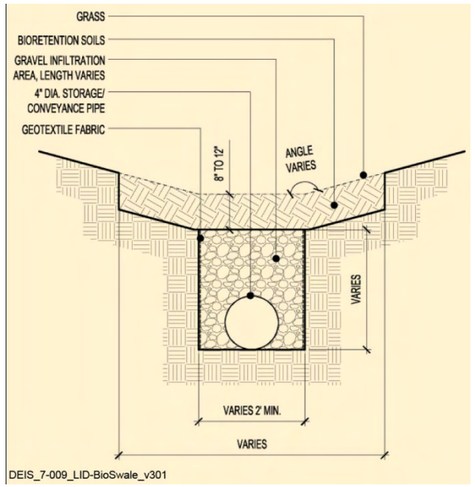
Because the right-of-way on some of the more major streets is constrained and because of challenges in trying to balance many needs and modes in the public realm, these types of LID treatments may be best implemented in the short-term on local residential or collector streets through the Study area.

FIGURE 5-5
Bioslopes
Bioslopes are a type of LID that might be appropriate for use within the Study area, specifically in those areas adjacent to the interstate system or the waterfront. Vegetated infiltration and filtering systems help improve water quality.



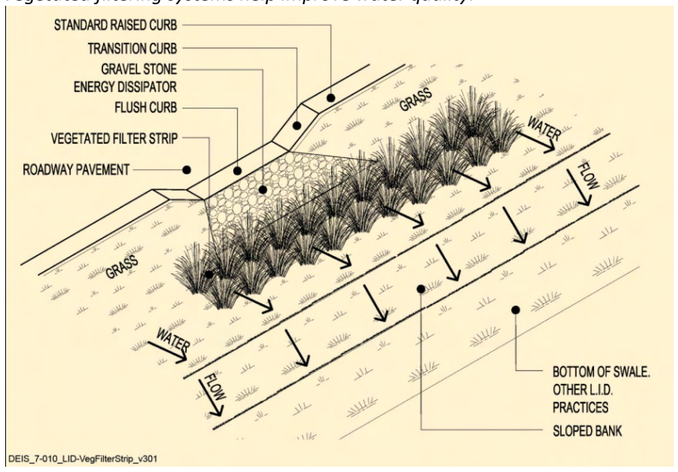
Source: DDOT

FIGURE 5-6
Bioswales
Bioswales are a type of LID that might be appropriate for use within the Study area. Landscape infiltration areas and conveyance systems help improve water quality.



Source: DDOT

FIGURE 5-7
Vegetated Filter Strips
Vegetated Filter Strips are a type of LID that might be appropriate for use within the Study area. Vegetated filtering systems help improve water quality.

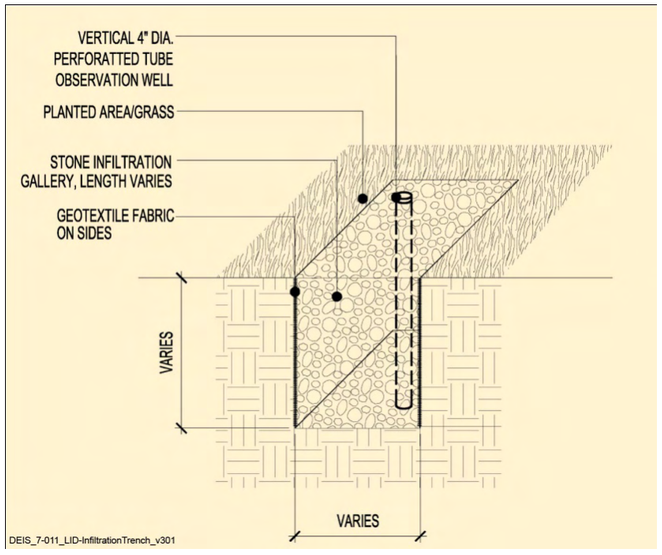


Source: DDOT

A tree canopy (**Figure 5-8**), in addition to providing aesthetic benefits, intercepts rainfall, allowing water to evaporate into the atmosphere and reducing the amount of runoff generated by storm events. In locations where pervious surfaces surround the trees, root zone uptake also diminishes stormwater generation and removes pollutants. Healthy urban tree canopies reduce peak storm runoff. Occasional pruning and fertilization are required. As part of the mitigations and net benefit enhancements to Anacostia Park, DDOT will plant a large number of new trees that will also have the benefit of intercepting rainfall.

Tree box filters are concrete boxes filled with bioretention soil and installed below grade at the curb line and upstream of a storm system inlet to reduce runoff volume, reduce peak discharge rate, and improve water quality for small, frequently occurring storms. For low-to-moderate flows, stormwater enters through the tree box's inlet, filters through the soil, and exits through an underdrain into the storm drain. For high flows, stormwater bypasses the tree box filter if full and flows directly to the downstream storm system inlet. Removal of trash and debris from the inlet is required. Plants and media may have to be replaced after a long time period.

FIGURE 5-8
Tree Canopies
Tree Canopies, with or without box filters, are a type of LID that might be appropriate for use within the Study area. Reforestation, interception, and infiltration systems help improve water quality.



Source: DDOT

As part of the review process for any potential construction plans, the Sediment and Storm Water Technical Services Branch will also review the potential LID measures for consistency with District and federal water quality laws and regulations, as cited above. New Stormwater Regulations (21 DCMR Ch. 5 – update from the 1984 law) that will become effective in July 2013 will require DDOT to install LID to the Maximum Extent Practicable (MEP) to meet the requirement to retain 1.2 inches of stormwater runoff in this project Study area. Some examples of successful stormwater LID treatments that were recently installed by DDOT are shown in **Figure 5-9**. The treatment in the top photo was constructed within the Study area, as part of the Yards development.

FIGURE 5-9
Examples of LID Treatments/Streetscape Improvements in the District: Stormwater Planters
Stormwater planters adjacent to roadways or alleys can help improve water quality.

5.2 Long-Term Solutions (2020-2040)

This section of Chapter 5 provides an assessment of potential improvements within the Study area that are considered long-term strategic options. These improvements might be implemented sometime after the mid-term improvements discussed in Chapter 4 are implemented, or potentially beyond the alternatives analysis horizon year of 2035. The nature of these types of improvements is such that they may depend on, or are related to, additional redevelopment or separate transportation project development studies. Some of the options discussed in this chapter would require a separate and detailed preliminary engineering/concept feasibility study and also could trigger significant corresponding National Environmental Policy Act (NEPA) efforts to assess potential environmental impacts.

5.2.1 Buzzard Point Redevelopment / Transportation Improvements

As discussed in previous chapters, most of the anticipated redevelopment within the Study area is projected to be completed by 2020. One area that may extend beyond that time horizon, in terms of changes in land use and major infrastructure, is Buzzard Point – specifically, the area bounded by South Capitol Street, 2nd Street SW, Q Street SW, and the Anacostia River. Future development plans and the most recent zoning call for high-density, mixed-use development, including the proposed site owned by Ackridge known as 100 V Street. The potential redevelopment concepts, highlighted in **Figure 5-10**, envision up to 2.7 M SF of mixed-use or office space, situated along three blocks between 1st and 2nd Streets, SW. The US Coast Guard headquarters immediately to south would be relocated from the tip of Buzzard Point to the St. Elizabeths Campus in 2013, which will not only open up that site for potential redevelopment or adaptive reuse, but will also reopen 1st and 2nd Streets, SW to the Anacostia waterfront. Once these connections are reopened for public use, the improved access to James Creek Marina off 2nd Street and Buzzard Point Marina off 1st Street could significantly change the size and nature of the current facilities. Additional development is also projected for areas north and east of the Ackridge site, between S and Q Streets, SW, and 1st Street SW and South Capitol Street, with the potential for almost 400 residents and over 18,000 employees by 2035, as shown in **Table 5-1** below:

TABLE 5-1
Additional Buzzard Point Development (North and East of Ackridge Site)

Households	Household Population	Group Quarters Population	Total Population	Industrial Employment	Retail Employment	Office Employment	Other Employment	Total Employment
116	263	117	380	2,081	99	16,169	198	18,547

Based on land-use planning data in the MWCOG model and from the most recent development plans, these figures would represent an increase of roughly 135 percent in population and 350 percent in employment between 2020 and 2035. Additional land-use options might even include a potential urban-style stadium to serve as the new home for the DC United professional soccer team. As a result, the transportation network in this area would require additional improvements in order to adequately serve the associated trip demands for Buzzard Point. The future traffic circulation patterns may require a modification from the existing north/south one-way pair to instead allow for two-way circulation on 1st and 2nd Streets and to improve the sidewalk and bicycle facilities to allow for substantially greater ROW allocated to those modes, with separate dedicated facilities for each. DDOT may consider engaging with land owners and developers to dedicate enough width as public space to allow for a balanced approach to all transportation modes, not just the minimum width necessary to accommodate only vehicular traffic demands. This may entail requiring greater building setbacks and wider ROW along Half, 1st, and 2nd Streets. Due to the block length of some of the parcels within Buzzard Point, it will be critical that future PUDs consider the need for east-west connectivity of pedestrian and bicycle travel by potentially providing for breezeways or non-motorized streets within the development footprint. Otherwise, the current street grid structure could result in several "superblocks" that make non-motorized travel more cumbersome.

FIGURE 5-10
Potential Buzzard Point Redevelopment / Transportation Improvements Concept

Source: Capitol Riverfront website, www.capitolriverfront.org / Ackridge – 100 V Street website: www.100vstreet.com

Additional long-term transportation improvements would need to consider the following:

- Extension of north-south transit connectivity within Buzzard Point to substantially build upon the limited service provided by Metrobus Line 74. This may include additional Metrobus services along Half Street SW and 2nd Street SW, extension of future DC Circulator routes along 1st or 2nd Streets, or a potential spur extension for future DC Streetcar routes.
- Potential site locations for a DC Streetcar car barn (storage and maintenance building) integrated within the proposed development plans – possibly in the vicinity of 2nd Street and S Street or Potomac Avenue SW.
- Relocation of the existing Buzzard Point motor coach and commuter bus parking lot between 1st and 2nd Streets SW to a satellite lot location outside of the Study area.
- Enhancements to the portion of the Anacostia Riverwalk Trail running along Fort McNair, including an increase in trail width and modified hardscape materials that are more characteristic of the portions of the trail that run along the water's edge (that is, improvements to differentiate this segment of the trail from standard sidewalks in the vicinity).
- Coordination of on-street parking options, including performance parking, with land use and site plan configurations.

- Allocation of adequate space and capacity for new Capital Bikeshare stations north of R Street SW and south of S Street SW, integrated within the potential development footprints.
- Potential localized shuttle service (unsubsidized /non-public service) to connect the south half of Buzzard Point with the nearest Metrorail stations, located roughly 1 mile away.

5.2.2 Connectivity Opportunities along East-West Corridors

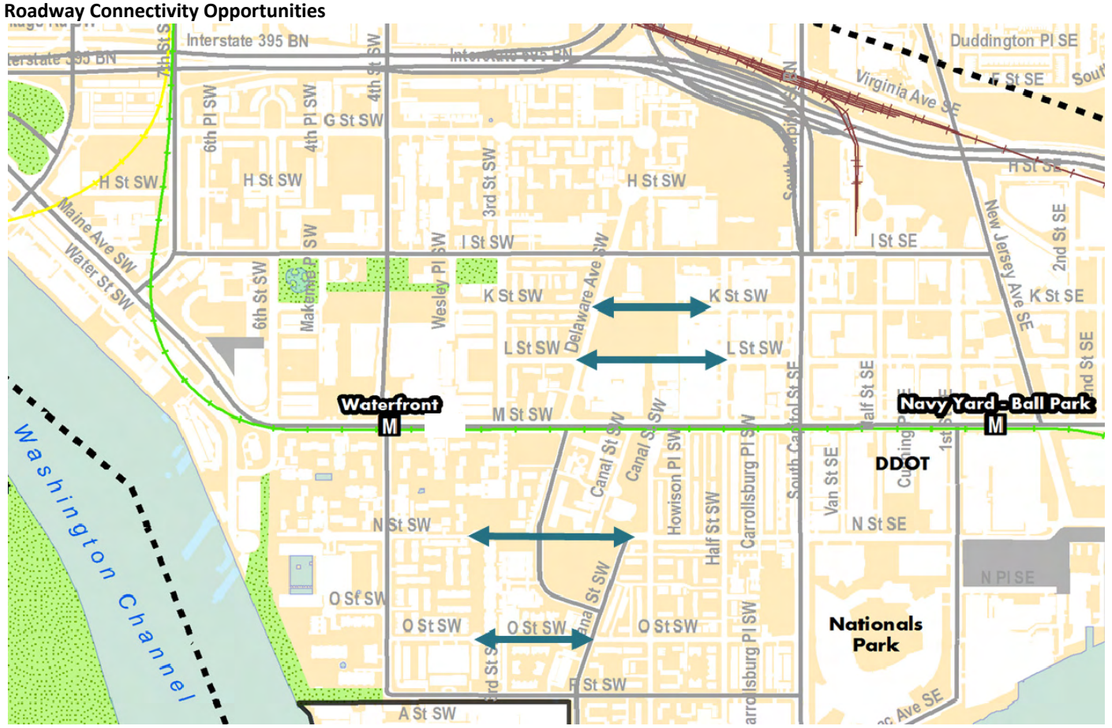
As discussed in previous chapters, the Study area is characterized by a noticeable gap in east-west connectivity. Although M Street is the only existing continuous roadway along the east-west axis, several corridors may offer the potential to supplement and balance out the future demands among all modes, as shown in **Figure 5-11**. In addition to future I (Eye) Street connection improvements in the near term and long term, other street connections that may be considered include L Street SW and K Street SW. These connections would require reconfiguration of the existing land use and potential network connection as follows:

- K Street SW –
  - Conversion of 1 ½ linear blocks of Lansburgh Park from existing open space and offset sidewalk to either a bicycle boulevard or a local street with connecting sidewalks on each side (between Delaware Avenue SW and Half Street SW).
  - Connection would require compliance with NEPA and with Section 4(f) for assessment of impacts to parkland.
- L Street SW –
  - Conversion of 2 linear blocks of publicly owned land from existing surface parking and associated circulation aisles to either a bicycle boulevard or a local street with connecting sidewalks on each side (between Delaware Avenue SW and Half Street SW). Parcel parking areas affected would include:
    - 1001 Half Street SW – DC Department of Motor Vehicles Safety Inspection Station
    - 1101 Half Street SW – DC Fire Department Engine Company Number 7
    - 95 M Street SW – DC Department of Motor Vehicles Southwest Service Center
    - 101 M Street SW – DC Metropolitan Police Department First District Station
  - Connection would require partial or full demolition of two structures: (1) 1001 Half Street SW – DC Department of Motor Vehicles Safety Inspection Station – service bay number 1; and (2) 95 M Street SW – DC Department of Motor Vehicles Southwest Service Center.
  - Connection would require compliance with NEPA and with Section 4(f) for assessment of impacts to parkland due to a potential minimal take of land at the southern edge of Lansburgh Park.

Two other long-term strategic street connections southwest of M Street – N and O Streets, SW – could only be considered if the residential neighborhood, River Park, were to undergo a major redevelopment many years in the future. Both streets were reconfigured decades ago, when the area was laid out as a planned high-rise and mid-rise residential development, and represented a departure from the original L'Enfant Plan. Instead of serving as a pair of continuous streets between South Capitol Street and 4th Street SW (and even beyond to the Washington Channel), the streets were broken into smaller residential stubs of roughly one block length between what once was 6th Street SW and 2nd Street/Canal Street, SW. A series of cul-de-sacs were constructed at the disconnected ends of the stubs along N and O Streets. In addition, 3rd and 6th Streets, SW do not extend south of M Street to provide any north-south connectivity.

In order to reconnect N Street SW, a portion of the existing private swimming pool complex adjacent to Delaware Avenue (the smaller of the two pools to the north), would have to be eliminated. In addition, the existing cul-de-sac east of 4th Street would need to be either demolished or reconfigured to extend N Street farther eastward by approximately 800 linear feet. A reconfiguration of O Street SW to provide a continuous street would require removal of two cul-de-sacs and construction of two segments of 100 linear feet each just west of 3rd Street SW and just west of Canal Street SW. Based on the character of the surrounding land use and the nature of these roadways, the widths would only be able to accommodate one lane in each direction, with on-street parking along one or both sides.

FIGURE 5-11
Roadway Connectivity Opportunities



A less costly (and potentially more amenable option to the community) would entail more minor improvements and connections along one or all of these four streets for pedestrians and bicycles only. Along N Street, an existing trail/sidewalk connects non-motorized trips between Canal Street SW and Delaware Avenue, so the remaining connection is limited to the boundary around the pool complex mentioned above. Bicycle and pedestrian connections along O Street SW would mainly entail tie-ins along the circumferential sidewalks at the various cul-de-sacs. K Street SW already is served by a continuous pedestrian connection through Lansburgh Park, so improvements along that corridor would be minimal, if any.

At the east and west edges of the Study area, there are a few select locations where long-term initiatives could provide for better bicycle and pedestrian continuity and external connectivity. Potential non-motorized connection improvements that were identified for future consideration include the following locations:

- Along 9th Street SW over the I-395 Southwest Freeway
- Banneker Park connections between the Case Bridge trail and G Street SW
- Along Virginia Avenue SW between 5th and 11th Streets, SW

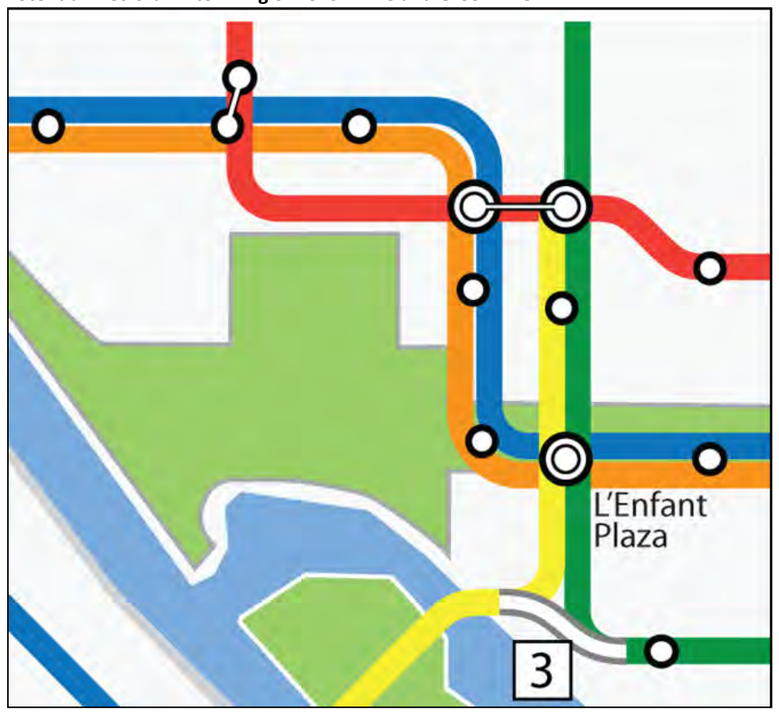
The topographic or geometric constraints are more complex at several of these locations, so additional preliminary engineering and detailed survey would be required to assess potential feasibility.

5.2.3 Transit and Multimodal Transfer Centers

An increasingly important component of long-term solutions will entail transit capacity improvements. Changes in population and also in level of activity within the Study area will drive up demand for Metrorail use, which will in turn require capacity enhancements along the current Green Line stations. This is especially true for Waterfront station, which is in close proximity to the mixed-use venues at the future Wharf development. Capacity enhancements could include platform extensions and expansion of escalator access, or even additional access portals that tie directly into adjacent parcels.

An additional component of future Metrorail capacity long-term improvements, as envisioned in WMATA's Regional Transit System Plan (RTSP), is the potential for extending or realigning portions of the Yellow Line. One potential long-term solution would entail interlining of the Yellow Line and the Green Line south of the L'Enfant Plaza station. This would allow the Yellow Line to split east of the Potomac River crossing and to extend through Waterfront station and Navy Yard-Ballpark station toward Anacostia, as shown in **Figure 5-12**. By providing a separate line with direct access to Northern Virginia, WMATA will be able to better serve the anticipated commuter demand into the area, as well as to expand the carrying-capacity beyond that of an eight-car Green Line train.

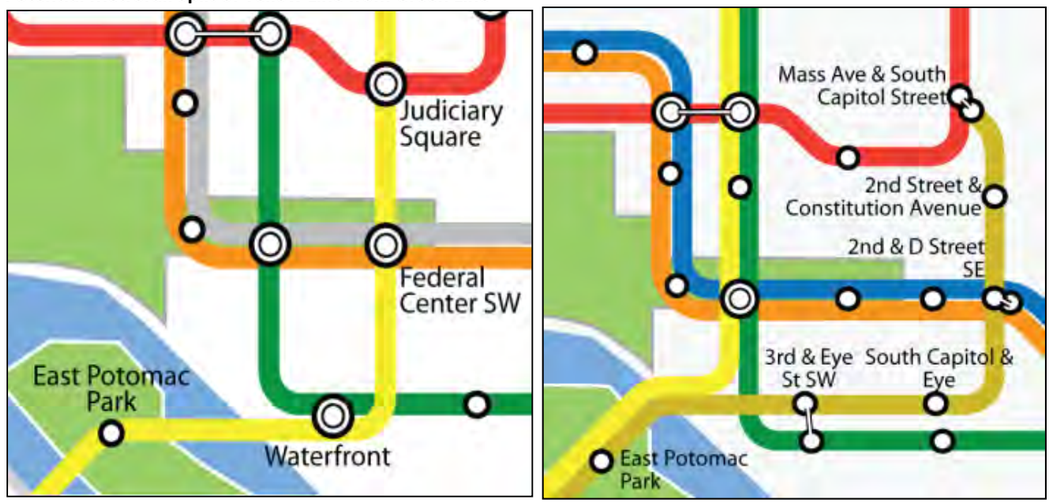
FIGURE 5-12
Potential Metrorail Interlining of Yellow Line and Green Line



Source: WMATA PlanItMetro website, www.planitmetro.com/rtsp, (February 16, 2011)

More significantly expensive Yellow Line enhancement options could include separating the Yellow and Green Lines by relocating the Yellow to an offset parallel alignment east of its current configuration as shown in **Figure 5-13**. The two options shown would realign the Yellow Line through the District beneath 2nd Street SW/NW or 2nd Street SE/NE. Under either of these scenarios, additional capacity would be provided within Southwest and in proximity to development along Maine Avenue. The 2nd Street SW/NW alignment would not entail new stations but would run through an expanded Waterfront station. The 2nd Street SE/NE alignment would traverse beneath I (Eye) Street SE/SW and could entail two new stations: one located close to 3rd Street SW and one located east of South Capitol Street.

FIGURE 5-13
Potential Metrorail Split of Yellow Line from Green Line



Source: WMATA Regional Transit System Plan – Presentation to Rider Advisory Committee (November 2, 2011)

In addition to potential Metrorail improvements, regional rail enhancements are also potential solutions that could provide additional capacity and service within the vicinity of the Study area, especially at L'Enfant Plaza. Virginia Rail Express (VRE) commuter rail service, operated by a partnership of two regional transportation commissions in Virginia, and the Maryland Area Regional Commuter (MARC) Train commuter rail system, administered by the Maryland Transit Authority, are both exploring future long-term improvements within the District. These include increasing the frequency and extent of service, as well as potential interstate transit line expansions via extensions on each respective service's rail lines. Improvements to the regional service would provide relief for the projected capacity demands on the Metrorail system within the metropolitan area, and especially within the urban core of the District. These types of potential long-term improvements could allow the Green Line or the Yellow Line to then better serve the more localized transit demand in the urban core and within the Study area.

Another long-term strategic focus considered in the Study entailed a permanent solution for motor coach and commuter bus parking that addressed the concerns raised about on-street parking throughout portions of the Study area. Although traditionally there have not been many existing tourist destinations within the Study area that warranted nearby bus loading or parking, the future plans for much of the waterfront areas will likely draw substantial tourism. A few options were considered to allow for a sustainable solution that would address issues related to motor coaches and commuter buses. These potential solutions centered primarily on consideration of new transit "hubs" that focused not only on providing for long-term parking or staging, but also connecting tourists

and/or commuters with other transit modes (such as DC Circulator, Metrobus or Metrobus Express, other regional transit providers, and connections to Metrorail). In coordination with other ongoing studies being explored by DDOT, the idea of "air-rights" multimodal transfer centers were considered in select areas along the Study area border, specifically:

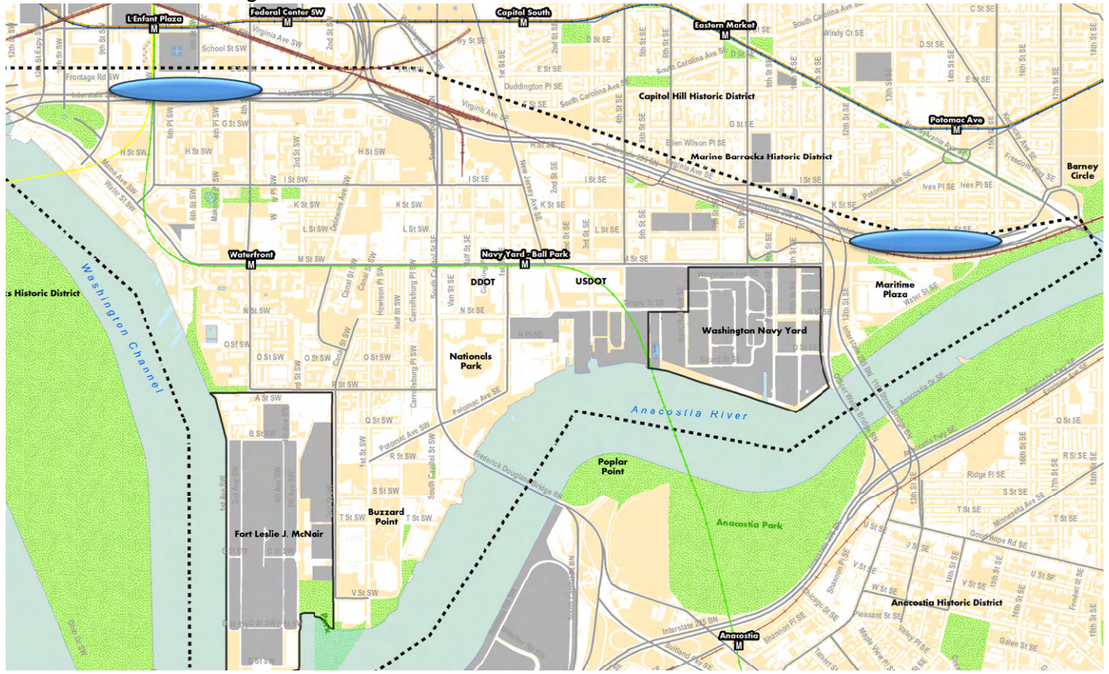
- Over the top of I-395 Southwest Freeway, situated somewhere between L'Enfant Plaza and 4th Street SW (occupying a portion, but not all, of this proposed segment).
- Over the top of the decommissioned portion of I-695 Southeast Freeway, just east of 11th Street Bridges. Depending on the ultimate configuration of the proposed Southeast Boulevard that will be reconstructed in place of this obsolete freeway segment, a potential facility may also be considered below the future roadway because the existing facility is at a significantly lower grade than the surrounding land.

Both of these options would entail substantial costs and require a series of comprehensive engineering analyses, cost-benefit studies, and NEPA studies, as well as significant agency coordination and public involvement.

Other options could entail a potential partnership with the current owners of the parking lots adjacent to RFK Stadium to develop a future facility with multimodal connections near the stadium. This option would be less costly but would be complicated by the logistics of a public-private partnership, by any potential plans to convert the existing stadium/supporting lots to a completely new land use, and by the longer distance from the Study area and urban core of the District.

Figure 5-14 illustrates the potential locations of the options for a transit/multimodal transfer center. The potential location at RFK Stadium parking lots is not pictured due to the distance relative to the Study area.

FIGURE 5-14
Location of Potential "Air-Rights" Multimodal Transfer Centers



5.2.4 Summary of Potential Long-Term Strategic Options

A summary of the potential long-term strategic options is provided in **Table 5-2**. It is important to note that for each of these potential improvements, a feasibility study would have to be performed before advancing the project forward, followed by a comprehensive assessment of environmental impacts and a financial plan.

TABLE 5-2
Summary of Potential Long-Term Strategic Options

Long-Term Improvement Strategic Option	Location(s)	Possible Implementation
Buzzard Point Transportation Network Improvements	1st St SW, 2nd St SW, Half St SW, Potomac Avenue SW between P St SW and V St SW	2020-2025
East-west Connectivity Improvements	L St / K St SW between Half St SW and Delaware Avenue	2020-2040
Metrorail Station Capacity Improvements	Waterfront and Navy Yard-Ballpark Stations	2020-2040
Metrorail Yellow Line Improvements	Interlining along Green Line or separate alignment beneath 2nd Street SW/NW or SE/NE	2020-2040
Commuter Rail Enhancements	Virginia Rail Express or MARC train alignments through the District	2020-2040
Multimodal Transfer Centers	I-395 west of 4th St SW, I-695 east of 11th St SE, or RFK Stadium Lots	2025-2040

Chapter 6
SUMMARY AND IMPLEMENTATION

6. Summary of Findings for Evaluation of Alternatives and Potential Implementation

The Southeast/Southwest waterfronts, including the M Street corridor and the Capitol Riverfront area, will be an integral part of an active and sustainable neighborhood where residents, workers, and visitors can walk or bike for basic services and use transit for day-to-day activities and also to travel to other destinations. Based on the evaluation of existing and future transportation network and infrastructure, this Study has identified several near-term, mid-term, and strategic long-term improvements to cater to the multimodal needs of the Study area. The Study area is proposed to be more accessible to and supportive of multiple travel modes. This goal is built on the following primary objectives:

- Improve safety, mobility, and access for all modes
- Improve local connections to the regional transportation system
- Support public and private development

In order to achieve this goal, it is imperative to understand and proactively plan for impacts to the transportation system that will result from substantial new growth along M Street and in the Southeast/ Southwest waterfront area. Comparisons were made for the 2035 Baseline condition in order to analyze how traffic conditions could be improved with transportation improvements. Improvement projects were grouped as near-term, mid-term, and long-term, based on their construction and implementation timeframe. The following sections present a summary of findings, their use in evaluation of alternatives, and potential implementation.

6.1 Summary of Baseline Conditions

Traffic conditions for the Study area were analyzed by applying design and engineering guidelines set by DDOT, the American Association of State Highway and Transportation Officials (AASHTO), the *Manual of Uniform Traffic Control Devices* (MUTCD) and methodologies from the HCM 2010. To be consistent with the latest MWCOG regional transportation model, the horizon year of 2035 was selected for the Baseline condition of land use and traffic demand. A comprehensive multimodal analysis, complemented with signal optimization software SYNCHRO, the VISUM planning software, and the VISSIM traffic simulation software, was conducted to evaluate the Baseline conditions. The summary of findings of the analysis by each mode is presented below.

Automobile Mode: The Baseline roadway system does not provide enough capacity, connections, or redundancy to handle the future traffic demand that would be derived primarily from growth in local activity as a result of new development within the Study area. This is reflected by poor LOS at several intersections. In addition, the conversion of South Capitol Street to an at-grade intersection at M Street results in a major bottleneck for both approaches (M Street and South Capitol Street) that will result in significant delays and queues spilling over other intersections because of the high volumes traveling in both corridors. The I (Eye) Street corridor also presents significant congestion as a result of increased demand, but not as significant as the expected congestion in the M Street and South Capitol Street corridors.

Transit Mode: The MMLOS analysis shows that the transit system will not operate at an adequate LOS on the M Street corridor, which handles almost all of the transit supply in the Study area. Without additional services and new transit options, the system does not have enough capacity to handle the increased demand by 2035. In addition, the system lacks adequate connectivity throughout the network, and users cannot traverse the entire corridor in a single line. The system does not provide adequate coverage of the Study area, which results in long walking distance for many users. When future employment growth is superimposed with available transit services, several areas will be completely underserved by future transit services.

Pedestrian and Bicycle Modes: The MMLOS analysis shows that the overall operation on M Street and I (Eye) Street is adequate but in many segments is very close to being marginal (LOS D or E). South Capitol Street shows very poor LOS for pedestrians as a result of high traffic volume, narrow sidewalks, and lack of connectivity. In addition, several other places in the network do not have adequate width for sidewalks or lack connectivity, thereby preventing pedestrians and bicyclists from traversing the area. Major challenges include:

- Connectivity gaps
  - Disconnected street grid
  - Incomplete bike lanes, trails, and sidewalks
  - Physical: Fort McNair, Navy Yard, large institutional barriers
- Visual and real safety barriers
  - Streets: South Capitol Street, M Street, Maine Avenue, and 11th Street
  - Highways: I-395, I-695 (tunnels, at-grade, and bridge crossings)
- High volume/major intersections
  - Pedestrian/bike safety balance vs. motorist mobility
  - Peak signal timing vs. non-peak signal timing
- Overcoming institutional barriers/large sites (Navy Yard, Nationals Park Stadium, Fort McNair, I-395) to create a sense of connectedness to parks, retail, community

In summary, based on the comprehensive analysis conducted in the Study, the transportation system assumed for the 2035 Baseline condition will not be able to adequately handle the future demand if no system improvements are completed. Improvements will need to either increase the capacity of the roadway, transit, and pedestrian/bicycle facilities, or generate a significant modal shift from automobile to an improved transit system as well as to non-motorized modes of travel.

6.2 Improvement Options

Based on the evaluation of the Baseline condition, the Study team developed a set of transportation improvements focused on providing a more balanced system that can adequately handle the projected demand for the area's build-out condition. As mentioned in the previous sections, the roadway infrastructure within the Study area could not handle future traffic demand unless significant capacity improvements are made. However, the overall system presents several challenges for roadway capacity improvement, including the difficulty of acquiring additional ROW for major corridors such as the Maine Avenue/M Street SE/SW corridor, as well as other constraints on parallel routes due to land use or utility conflicts. In addition, it is both DDOT's goal and that of the public that the area become an integral part of an active neighborhood, where both transit and non-motorized modes are prioritized to create a more livable and sustainable community in which residents, workers, and visitors can walk and bike for basic services and use transit to other destinations. With these objectives in mind, the improvement options focused on:

- Encouraging the use of public transit and non-motorized modes through enhancing and increasing transit, bicycle, and pedestrian facilities within the area
- Improving capacity only on a few roadways and mostly modest improvements that are feasible for the main corridors in the area
- Providing a more balanced function for streets in terms of mobility and accessibility within the area, with the understanding that all functions cannot be accomplished by a single corridor
- Increasing connectivity for all modes

6.3 Potential Near-Term Solutions (2013-2016)

The near-term solutions can be applicable across any of the three alternatives in Chapter 4 and focus on various immediate improvement options that may provide congestion relief to Study area residents and commuters from current transportation issues and challenges. These solutions could be implemented between 2013 and 2016. They would not require the type of environmental review process and project development efforts that are associated with mid-term and longer-term improvement alternatives, and many of the solutions can implemented with relatively small costs.

The proposed near-term improvements are categorized into several groups: policy updates, TSM / operational and small-scale capital improvements, and sustainability design / LID improvements. Proposed policy updates include: TDM strategies, parking system improvements regulations, transit policies, motor coach and commuter bus staging / parking, freight loading and truck routes, bicycle and pedestrian policies, and sustainable design policies.

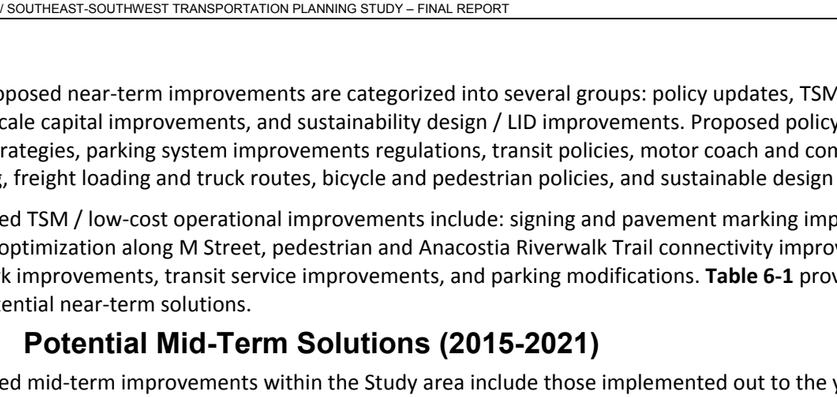
Proposed TSM / low-cost operational improvements include: signing and pavement marking improvements, signal timing optimization along M Street, pedestrian and Anacostia Riverwalk Trail connectivity improvements, bicycle network improvements, transit service improvements, and parking modifications. **Table 6-1** provides a summary of the potential near-term solutions.

6.4 Potential Mid-Term Solutions (2015-2021)

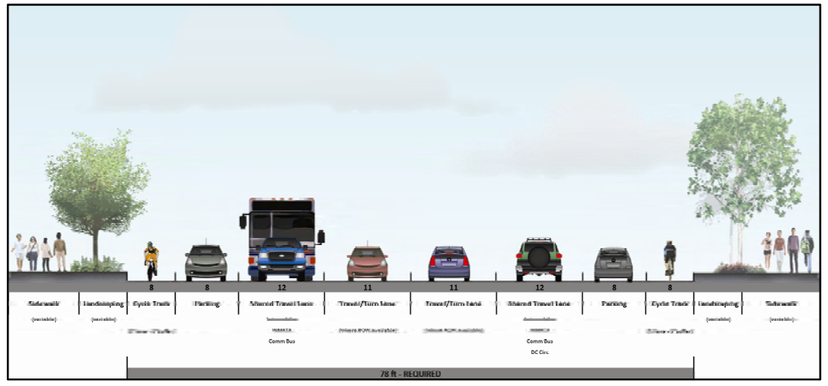
Proposed mid-term improvements within the Study area include those implemented out to the year 2021. Three fundamentally different "bookend-type" alternatives, with several transportation elements spread out to different streets within the Study area, were considered.

Each of these alternatives was developed around a principal function for the M Street SE/SW corridor that resulted in derived functions for other corridors. General characteristics of the alternatives are described below. More specific details and the evaluation of each alternative in comparison with the Baseline condition are summarized in Chapter 4.

- **Alternative 1 – M Street "Main Street"**: The main goal for this alternative is to transform the M Street SE/SW corridor from its current condition of serving multi-function transportation modes to a "transit priority" corridor that would prioritize non-automobile transportation and give the corridor a "Main Street" look and feel. Improvements include:
  - Improved transit connections on M Street with new and enhanced premium transit services (streetcar, Metrobus Express, DC Circulator, etc.)
  - Two vehicular lanes each way and one exclusive transit lane per direction for streetcar and transit (outer lanes)
  - Focus on increased connectivity and utilization of parallel streets to better facilitate vehicular and bicycle flows



- **Alternative 2 – "Balanced Links"**: The main goal in this alternative is to achieve a more balanced transit network with wider coverage of the entire area. The alternatives would allocate new transit services to parallel corridors while creating new bicycle facilities on M Street SE/SW. The following improvements are included in this alternative:
  - Pedestrian and cyclist improvements on M Street SE/SW
  - On-street parking on M Street SE/SW
  - Transit concentrated on parallel roads
  - Streetcar on I (Eye) Street (east of 4th Street SW)
  - DC Circulator on Tingey Street / N Street SE and N Street / P Street, SW
  - Focus on increased connectivity / multimodal aspects



- **Alternative 3 – M Street "Mobility Arterial"**: The main goal of this alternative is to keep the M Street SE/SW corridor as the main vehicular activity corridor, with less emphasis on alternative modes and allowing as many vehicles as possible to use the corridor by implementing modest operational improvements (parking restrictions, signal optimization, and lane channelization) to maximize vehicular throughputs during peak hours. The main elements in this alternative are:
  - Parking restrictions and lane configuration changes to maintain three lanes in each direction on Maine Avenue and M Street SE/SW during peak hours
  - Signal optimization on M Street SE/SW
  - Shared lane for streetcar and transit (outer lanes)
  - Improved pedestrian safety and transit on M Street
  - Aggressive traffic calming on parallel streets to discourage drivers from short-cutting
  - Focus on improved vehicular throughput

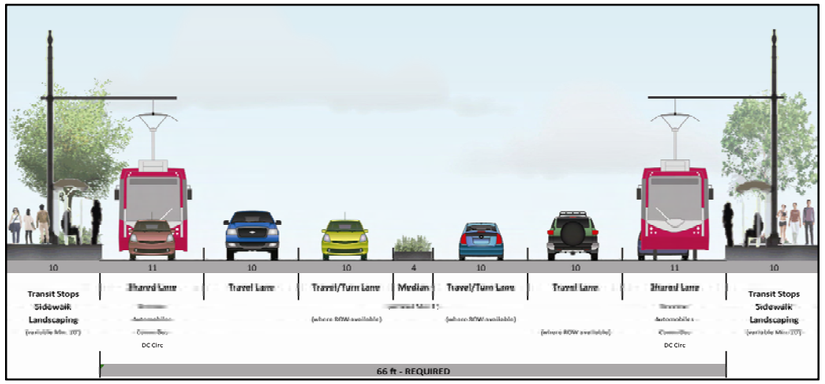


TABLE 6-1
Summary of Potential Near-Term Projects

POLICY UPDATES						
Travel Demand Management (TDM) Strategies	**Parking System Improvements and Parking Regulations**	**Transit Policies**	**Motor Coach and Commuter Bus Staging / Parking**	**Freight Loading and Truck Routes**	**Bicycle and Pedestrian Policies**	**Sustainable Design**
• Form a Transportation Management Association (TMA) to help develop and implement TMPs and serve as an advocacy group to identify sustainable solutions for local area transportation needs • Create position of Area Transportation Coordinator(s) for effectively managing and implementing strategies identified by the TMA • Use commercial office space to enable telework/telecommute options • Implement alternative work schedules strategies such as compressed work week, flexible schedule, and staggered work shifts • Promote car-sharing • Ensure participation in guaranteed ride home to encourage transit use or ride-sharing • Provide resident / employee TDM orientation and education and incentivize the use of use of transit and non-vehicular trips	• Introduce performance-based parking/dynamic pricing to improve efficiency of curbside parking and reduce turnover time for short-term parkers • Implement temporal parking to increase roadway capacity during peak periods • Expand the enforcement powers of traffic control officers • Enhance goDCgo.com to provide real-time information • Increase enforcement of double-parking and rush-hour violations • Extend Residential Parking Permit (RPP) hours • Use technologies to more effectively manage on-street parking • Implement solar-powered parking meters with real-time information and dynamic pricing capability • Improve on-street commercial loading operations through metering, increased enforcement, and better design and placement of loading zones • Encourage shared parking • Monitor and expand performance-based parking districts • Unbundle parking spaces to be rented or sold separately • Use of maximum parking rates • Repurpose on-street parking for bicycle parking • Provide satellite parking locations with transit linkages • Provide transit incentives during event venues to encourage visitors to use transit • Explore congestion pricing methods • Enforce against double parking focusing on truck and motorcoach parking by declaring “double-parking enforcement week”	• Increase transit modes and frequency • Make transit a priority for this community • Identify and improve additional pedestrian access points to transit facilities, particularly the existing Green Line Metro stations: L’Enfant Plaza, Waterfront, and Navy Yard-Ballpark • Improve access to other metro stations adjacent to the Study area such as Federal Triangle, Capitol South, Eastern Market, and Potomac Avenue • Ensure adequate infrastructure/spacing requirements are considered in the Study area to support improved transit services such as car barn, bus staging and lay over areas, dedicated transit lanes, improvements to metro rail stations, etc.	• Maximize off-street parking for motor coaches and commuter buses • Implement/increase fines for parking violations and idling violations, and intensify enforcement • Expand anti-idling educational components and driver recognition program incentives through MWCOG’s regional program • Streamline and standardize regulations/ restrictions within the District’s Commuter Bus Management Plan • Establish an interagency task force consisting of regional transit provides to develop a short-term and long-term service plan • Identify and study the feasibility of candidate locations for intermodal transfer facilities • Coordinate with National Park service and establish a long–term plan for motor coach parking along Maine Avenue • Charge buses for curbside parking via implementation of multi-space “smart” parking meters	• Ensure the use of the current area-wide policy or guidelines for Planned Unit Development (PUD) applications that require rear-side access for freight loading and side-street truck access • Improve on-street loading operations by metering commercial loading-zones • Continue engaging freight and trucking industry to strategize and develop a comprehensive management system for loading zone parameters and usage efficiency	• Continue public service messages and advertisements on safety education and outreach programs to educate transportation facility users • Implement traffic calming measures • Improve traffic control at key intersections within the Study area • Implement the Safe Routes to School program for local schools • Improve area crosswalks • Optimize signal timings • Encourage shifts from single--occupancy vehicles to pedestrian, bicyclist, and transit modes • Install, enhance, and enforce bicycle facilities • Enhance sidewalk connectivity and walkability • Introduce incentives for bicycle commuting • Increase bike racks and provide shower facilities in new developments	• Provide pervious pavers within sidewalks and café spaces • Construct “Green Alleys” by removing gravel, impervious concrete, or asphalt surfaces and replace them with a variety of permeable concrete, asphalt or brick paver materials in areas where the storm sewer and sanitary sewers are separated • Use of extended planting areas with the public space • Standardize street lighting replacement plan and expand incorporating LED technology to reduce energy consumption and increase efficiency • Increase number of street trees along major roadways and reconfigure tree boxes and root zone control

TABLE 6-1 (cont…)

Summary of Potential Near-Tem Projects

TRANSPORTATION SYSTEM MANAGEMENT / LOW-COST OPERATIONAL IMPROVEMENTS						SUSTAINABILITY IMPROVEMENTS AND LOW-IMPACT DEVELOPMENT
Signing and Pavement Marking Improvements	**Signal Timing Optimization along M Street**	**Pedestrian and Anacostia Riverwalk Trail Connectivity Improvements**	**Bicycle Network Improvements**	**Transit Service Improvements**	**Parking**	
• Unify signage and naming for consistency purposes • Increase the use of rapid flashing beacon signs for safer pedestrian crossings Install speed feedback signs on potential cut-through roadways for traffic calming purposes. Install signs to show cycle tracks (bicycle lanes) and shared-use paths (multi-purpose trails) • Install signs at the intersection approaches to show lane control and turn restrictions • Install way-finding signs (to places of interest and to connect with other intermodal facilities) • Install truck routing signs for all truck trips on Study area arterials • Provide lane usage pavement markings on approaches along major roadways at few key intersections • Implement road diet or “right-sizing” on residential streets by restriping to reduce the number of through travel lanes on a roadway and repurpose it for other uses, such as channelization, pedestrian and bicycle facilities, on-street parking, and/or landscaping • Install pavement markings to indicate Sharrows and promote non-motorized transportation use • Restripe pavement in color and/or install on-pavement speed limit markings for traffic calming purposes • Install school zone pavement markings to ensure Safe Routes to School	• Revise signal timings and offsets • Use new 120-seconds cycle length • Signals - actuated coordinated and optimize splits • Install pedestrian countdown signals • Install priority signal controls for pedestrians and transit vehicles • Expand the use of intelligent transportation systems (ITS) to synchronize traffic signals	• Improve intersection access for people with vision and hearing disabilities by providing audible warnings at intersections and detectable warnings at curb ramps • Install pedestrian countdown walk signals • Provide raised and/or textured pavement for crosswalks, at least near major intermodal facilities • Restripe the crosswalks for better visibility • Provide facilities and amenities for cyclists and pedestrians that include benches, bicycle racks, and well-placed comfort stations • Integrate landscaped trails, particularly for pedestrians and cyclists, into the existing waterfront park access points • Install and/or improve signs for way-finding and connections to other facilities	• Improve mobility, safety, and accessibility to activity centers by installing pavement markings, providing lighting, and signs for way-finding • Install colored or textured pavement for cycle tracks (bicycle lanes) • Restripe existing bike lanes to indicate if it’s a shared or exclusive facilities	• Increase transit by adding Metro Express Route A9, Route 52, and DC Circulator services • Implement transit traffic signal prioritization • Improve bus stop amenities • Post up-to-date schedules at transit stops • Establish the practice of on-board announcements of bus stop names by the drivers to inform ADA patrons and/or elderly • Provide and promote capabilities to access real-time next bus information • Improve the availability of schedules in buses and at Metrorail stations along route	• Share parking at new waterfront development for its own uses and other destination park activities. • Replace all conventional coin-based parking meters with advanced, solar-powered, multi-space parking meters that can accept credit cards. • Work with the developers of office space to make their weekday parking available to the public on weekends to accommodate special events and weekend visitors to the waterfront • Repurpose on-street parking for bicycle parking • Update goDCgo.com regularly	• Install bioretention cells to remove pollutants and control runoff volume • Install bioslopes to expand the amount of open vegetated areas, improve water quality, and reduce runoff and tendency for erosion • Install bioswales to reduce stormwater runoff through infiltration • Install vegetated filter strips for runoff prevention and runoff treatment, reducing the frequency of discharges and retaining water through infiltration and evapotranspiration • Use of tree canopy for reforestation and rainfall interception to reduce amount of runoff • Use of tree box filters to reduce runoff volume, reduce peak discharge rate, and improve water quality for small, frequently occurring storms. • Minimize the area of soil that is exposed • Mulch/ revegetate exposed areas as quickly as possible after grading

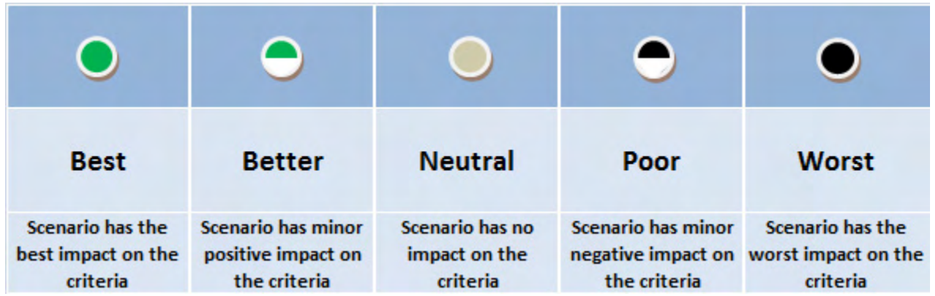
A summary of what each alternative achieves and the associated trade-offs involved in balancing multimodal demands and the resulting impacts on system-wide performance are presented in **Table 6-2**.

TABLE 6-2
Summary of Potential Mid-term Improvement Impacts and Trade-Offs

Multimodal Alternative	What does this Alternative Achieve?	What are the Trade-Offs ?
Multimodal Alternative 1	• Improved transit service and reliability on M Street (streetcar, express bus, premium transit service, etc.) • Expanded sidewalks in several locations and improved boarding/alighting areas with shelters • Bike lanes/facility improvements via increased connectivity / utilization of parallel streets to better facilitate flows	• No on-street parking for most of M Street/Maine Avenue Corridor; could potentially impact retail along M Street/Maine Avenue corridor • No exclusive-lane bike facilities on M Street • Two vehicular travel lanes in each direction along M Street; potential for spill-over to parallel facilities and neighborhood streets leading to traffic calming issues • On-street parking on some parallel facilities may be replaced by travel lanes or bike lanes • Potential right-turn restrictions at a few intersections along M Street will reduce access options to certain developments
Multimodal Alternative 2	• Increased focus on multimodal use of the major corridors like M Street and South Capitol Street • Pedestrian and cyclist improvements on M Street • On-street parking on portions of M Street and Maine Avenue; improves access to retail developments • New transit service concentrated on streets closer to residential neighborhoods	• Premium transit (streetcar, express bus, etc.) could not operate on exclusive lanes on M Street, resulting in longer travel times • Potential issues with the design of streetcar path due to additional turns • On-street parking on some parallel facilities may be replaced by travel lanes or bike lanes • Longer walking distances to access streetcar on I Street for developments south of M Street • Potential impacts to residential nature of some portions of I Street, especially along narrower street segments
Multimodal Alternative 3	• Optimizes major roadways/intersections to reduce vehicular delays and congestion • Provides improved transit services along M Street with more types of transit service without losing the vehicular capacity • Provides traffic calming on some parallel streets through neighborhoods	• Premium transit (streetcar, express bus, etc.) operate on shared lanes, resulting in longer travel times • No on-street parking for most of M Street/Maine Avenue Corridor • No exclusive-lane bike facilities on M Street

6.5 Evaluation of Alternatives

Each alternative was compared against criteria developed through public involvement, as shown in *Table 1-1* of Chapter 1. Based on the results of the comprehensive multimodal transportation analysis complemented with qualitative input from DDOT, a "*Consumer-Reports*"- style evaluation was used to compare the performance of the Baseline conditions and the three multimodal mid-term alternatives against the evaluation criteria. As shown below, five performance indicators ranging from "Best" to "Worst" are used to evaluate each scenario.



The summary of the alternatives evaluation is presented in **Table 6-3**. The evaluation of each alternative was based on quantitative measures, such as user delay, travel times, capacity/demand ratios, as well as qualitative factors such as convenience of on-street parking or land use-transportation linkage. Based on the comparative evaluation of each alternative against the others and the baseline, the findings show a very mixed set of results across various criteria. Each alternative achieves a unique goal and series of objectives but also has trade-offs that may preclude that particular concept from being the clear-cut favorable alternative or transportation recommended alternative.

Each of the alternatives was as also vetted by a number of citizens and stakeholders who provided comments and preferences on the various alternatives. Surprisingly, the input provided was broadly split amongst the three multimodal alternatives, with no clear "winner" rising to the top as the preferred choice by the public. A number of respondents indicated a preference for certain elements of two or more alternatives that would be considered more favorable if combined together to form a "hybrid" option. For instance, one comment might recommend moving forward with Alternative 1 but consider a revised concept to include a cycle track along M Street west of South Capitol Street or preservation of the bike lanes on I (Eye) Street. At the same time, other feedback included different combinations, such providing on-street parking as an additional element to Alternative 3 within the specific segments of M Street and Maine Avenue. There were also concerns about M Street/South Capitol Street being brought to grade because of the impact on vehicular congestion and the challenges of the pedestrian crossing distance.

The original intent of this Study was to compare and evaluate three contrasting multimodal alternatives in order to determine what major improvement elements could best accommodate the future demands on the transportation system, while at the same time satisfy the most number of evaluation criteria. None of the three alternatives in and of themselves was considered as a candidate to become the "final alternative" that would then be assessed for environmental impacts and pushed forward for design and construction, pending satisfactory compliance with NEPA. However, the results of this Study are intended to inform and guide the formal Project Scoping process as the project progresses from preliminary transportation planning to detailed alternatives development and preliminary design engineering. Thus, one outcome from this Study was a more informed understanding of the advantages and disadvantages associated with any particular major element of the alternatives in order to next develop/analyze potential "hybrid" alternatives that are feasible, sustainable, flexible, complete streets compliant, and most importantly account for public input.

6.6 NEPA Considerations

Transportation planning is the first step in the project development process for small and major transportation projects, but additional considerations must be incorporated into the alternatives development process as a project moves from the first phase – consideration of a larger number of more broadly-defined concept alternatives – to the

subsequent phase(s) – evaluation in detail of smaller set of more highly-refined alternatives. For instance, this Study was focused mainly on the user experience and the resulting changes to user Level of Service (which could be based on the factors previously mentioned – delay, travel time, etc.), but NEPA stipulates that a number other factors must also be considered in the development and screening of refined alternatives and assessment of impacts:

- Land Use
- Socioeconomics
- Historic and Cultural Resources
- Visual Resources
- Noise
- Air Quality
- Vibration
- Mitigation of Potential Hazardous Materials
- Water Quality
- Terrestrial Ecology
- Indirect and Cumulative Effects
- Construction Impacts
- Irreversible and Irretrievable Commitment of Resources

The next step in the project development process will entail Project Scoping, which will build off of the goals and objectives / criteria outlined in this Transportation Planning Study. From that point, a Purpose and Need statement will be derived, alternatives will be advanced and screened, and impacts will assessed. The ultimate decision of how the final preferred alternative will look is shaped and driven by the NEPA process, which includes significant public involvement at each of the major project development milestones. Through this process, other major agency stakeholders may be engaged as cooperating or participating agencies. The "Final Decision" to select a particular alternative is determined by the associated lead federal agency in coordination with DDOT, which could be the Federal Highway Administration, the Federal Transit Administration, or a combination of both as joint-lead agencies. It is DDOT's intention to begin the NEPA process for the east-west premium transit planning as soon as possible.

6.7 Potential Long-Term Improvements (2020-2040 and Beyond)

Potential long-term strategic options improvements within the Study area, implemented sometime after the mid-term improvements discussed in Chapter 4, would need to be studied for feasibility and environmental impacts. These improvement options focus on potential new connections to complete the street grid and consider transit and multimodal transfer centers within the Study area if future development beyond 2035 were to occur in areas currently not available. Additional redevelopment could prompt more improvements for consideration that would require a separate and detailed preliminary engineering/concept feasibility study and also would likely trigger significant corresponding NEPA efforts.

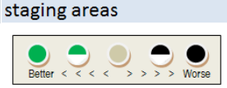
- **Buzzard Point Redevelopment / Transportation Network Improvements:** The Buzzard Point development plans include high-density, mixed-use or office space, potentially including:
  - Three blocks between 1st and 2nd Streets, SW,
  - Areas north and east of the Ackridge site,
  - between S and Q Streets, SW, and
  - 1st Street SW and South Capitol Street.

  Additionally, the US Coast Guard headquarters would be relocated from Buzzard Point in 2013, opening up that site for potential redevelopment, and will also reopen 1st and 2nd Streets, SW to the Anacostia waterfront. These figures would represent an increase of roughly 135 percent in population and 350 percent in employment between 2020 and 2035.

  Additional long-term transportation improvements would need to consider the following:
  - Extension of north-south transit connectivity
  - Potential site locations for a DC Streetcar car barn
  - Relocation of the existing Buzzard Point motor coach and commuter bus parking lot to a satellite lot location
  - Enhancements to the portion of the Anacostia Riverwalk Trail running along Fort McNair
  - Coordination of on-street parking options, including performance parking
  - Allocation of adequate space and capacity for new Capital Bikeshare stations
  - Potential localized shuttle service (unsubsidized/non-public service) to connect the south half of Buzzard Point with the nearest Metrorail stations
- **East-West Connectivity Improvements:** The Study area is characterized by a noticeable gap in east-west connectivity. Although M Street is the only existing continuous roadway along the east-west axis, several corridors may offer the potential to supplement and balance out the future demands among all modes. In addition to future I (Eye) Street connection improvements in the near term and long term, other street connections that may be considered include L Street SW and K Street SW, and would require the following:
  - K Street SW – Conversion of existing open space at Lansburgh Park to a bicycle boulevard or local street with connecting sidewalks. Would require compliance with NEPA and Section 4(f).
  - L Street SW – Conversion of publicly owned land from existing surface parking to a bicycle boulevard or local street with connecting sidewalks. Would require partial or full demolition of two structures, and would require compliance with NEPA and Section 4(f).
  - Reconnection of N and O Streets, SW for all modes via removal of existing facilities and cul-de-sacs, or reconnection of N and O Streets for pedestrians and bicycles only.
  - Bicycle and pedestrian connections on edges of Study area network.

TABLE 6-3
Alternatives Performance Evaluation Matrix

CRITERIA	DESCRIPTION	2035 FUTURE SCENARIOS				REASONS
		Baseline	Alt-1	Alt-2	Alt-3	
COMMUNITY	Promote walkable, safe pedestrian infrastructure					* In Alt 2, I (Eye) Street focus on vehicular capacity as well as streetcar use. Higher traffic volumes and streetcar operation will slightly reduce pedestrian safety on the I (Eye) Street corridor. In addition, in Alt 1 and Alt 3, pedestrian facilities along M Street would be improved at transit stops to include expanded sidewalks and shelters
	Provide multimodal access to and mobility within neighborhoods					* Although Alt 2 does provide multimodal access, mobility is sacrificed along M Street (too much vehicle capacity reduction hinders travel time and mobility)
	Create diverse and balanced transportation options					* Alt 2 blends the most modes along M Street and I (Eye) Street * Alt 1 has best transit along M Street but forces bikes to I (Eye) Street * Alt 3 is mostly focused on vehicular capacity, shared bike lanes on M Street not preferrable
	Promote sustainable community and infrastructure					* Alt 3's focus on vehicular capacity is least sustainable of all three multimodal alternatives; however, still better than Baseline because of DC Streetcar along M Street
	Protect residential parking					* All three alternatives will result in some loss of residential parking, although Alt 3 focuses the restrictions on M Street, while Alts 1 and 2 will reduce parking on I (Eye) Street which will have a more significant effect on residential parking
CONNECTIONS	Establish and/or Improve pedestrian connectivity to/within communities and to Metro stations					All alternatives would provide additional pedestian connectivity as a result of the construction of new road segments to connect gaps in the grid system and the conversion of one-way road segments to two-way road segments
	Create bicycle lane / cycle tracks connectivity					* Alt 2 is clear cut winner here with cycle track on M Street and shared bike lane on I (Eye) Street * Alt 3 still provides exclusive bike lane on I (Eye) Street, and shared bike lane on M Street * Alt 1 has no bike facilities on M Street, and shared bike lane on I (Eye) Street
	Enhance transit connectivity (including inter-neighborhood connectivity and reduction of transfers)					* Although all alternatives have DC Streetcar, Alt 2 includes expanded DC Circulator to southwest part of the Study area
	Provide flexibility for managing parking demand					* Alt 2 provides for most on-street parking along M Street
	Promote shared parking					* Shared parking strategies assumed for all the alternatives
	Optimize freeway connections (provide for all movements at freeway interchanges where feasible)					* Alt 3 has most vehicular capacity on EB approach to M Street at 11th Street intersection
	Close gaps in missing street connections					* All three alternatives have same road connection projects that are not assumed in Baseline
CAPACITY	Provide transit capacity					* Alt 1 provides most transit capacity along M Street with exclusive lane, transit signal priority, bus stop consolidation, and lowest transit travel time * Alt 2 and Alt 3 still provide DC Streetcar through the Study area. Although Alt 2 has lower transit travel time on M Street, it does provide DC Circulator expanded service
	Address regional vehicular capacity needs					* Alt 3 provides for the most vehicular capacity along M Street by eliminating on-street parking, providing full 6-lane section, and optimizing signal timings * Alt 1 reduces M Street to 4 lanes, but restricts right turns at some locations and provides transitional right-turn lane at key locations * Alt 2 provides least vehicular capacity of the three multimodal alternatives because of lack of right-turn lanes, however, still operates better than Baseline due to optimized signal conditions
	Shift mode split from vehicular to transit and nonmotorized modes to accommodate increased density					* Alt 1 provides most transit capacity along M Street, which would cause highest shift to transit mode share * Although Alt 2 would provide the most benefit to bike mode, transit mode with streetcar along I (Eye) Street is further away from the most dense populated area * Alt 3 still provides for streetcar and shared bike lane along M Street, and exclusive bike lanes on I (Eye) Street * Baseline has least transit compared to any alternative
	Promote efficient/safe movement of people and goods to support new retail, restaurants, etc. (incl. Freight/Motor Coach staging areas)					* Alt 2 on-street parking along M Street is the most preferable * Alt 1 and 3 with DC Streetcar along M Street provides advantage over Baseline
	Balance parking supply between landuse demands					* Alt 2 provides for most on-street parking along M Street * Alt 3 restricts the most parking
	Establish context-sensitive locations for commuter bus and other transit staging areas					* Alt 1 consolidates bus stops along M Street for efficiency * Alt 2 provides improved bus stops along M Street compared to Alt 3 and streetcar stops along I (Eye) Street



- **Metrorail Station Capacity Improvements:** Changes in population and level of activity within the Study area will drive up demand for Metrorail use, which will require capacity enhancements along the current Green Line stations (especially Waterfront station). Capacity enhancements could include:
  - Platform extensions and expansion of escalator access.
  - Additional access portals that tie directly into adjacent parcels.
- **Metrorail Yellow Line Improvements:** There are several potential improvements for expanding service along the Yellow line within the Study area, including the following:
  - The interlining of the Yellow Line and the Green Line south of the L'Enfant Plaza station. This would allow the Yellow Line to split east of the Potomac River crossing and to extend through Waterfront station and Navy Yard-Ballpark station toward Anacostia, providing direct access to Northern Virginia.
  - Separating the Yellow and Green Lines by relocating the Yellow to an offset parallel alignment east of its current configuration, beneath either 2nd Street SW/NW or 2nd Street SE/NE. The 2nd Street SW/NW alignment would not entail new stations but would run through an expanded Waterfront station. The 2nd Street SE/NE alignment would traverse beneath I (Eye) Street SE/SW and could entail two new stations: one located close to 3rd Street SW and one located east of South Capitol Street.
- **Commuter Rail Enhancements:** Regional rail enhancements could provide additional capacity and service within the Study area, especially at L'Enfant Plaza. VRE and MARC are both exploring future long-term improvements within the District, including:
  - Increasing the frequency and extent of service.
  - Potential interstate transit line expansions via extensions on each respective service's rail lines.

  Improvements to the regional service would provide relief for the projected capacity demands on the Metrorail system within the metropolitan area. These types of potential long-term improvements could allow the Green Line or the Yellow Line to better serve the localized transit demand in the urban core and within the Study area.
- **Multimodal Transfer Centers:** A permanent solution for motor coach and commuter bus parking that addresses the concerns raised about on-street parking throughout portions of the Study area is needed. Future plans for much of the waterfront areas will likely draw substantial tourism.

  Potential solutions centered primarily on consideration of new transit "hubs" that focused on providing for long-term parking or staging and connecting tourists and/or commuters with other transit modes. In coordination with other ongoing studies being explored by DDOT, the idea of "air-rights" multimodal transfer centers were considered in select areas along the Study area border, specifically:
  - Over the top of I-395 Southwest Freeway, situated somewhere between L'Enfant Plaza and 4th Street SW (occupying a portion, but not all, of this proposed segment).
  - Over the top of the decommissioned portion of I-695 Southeast Freeway, just east of 11th Street Bridges. Depending on the ultimate configuration of the proposed Southeast Boulevard that will be reconstructed in place of this obsolete freeway segment, a potential facility may also be considered below the future roadway because the existing facility is at a significantly lower grade than the surrounding land.

  Both of these options would entail substantial costs and require a series of comprehensive engineering analyses, cost-benefit studies, and NEPA studies, as well as significant agency coordination and public involvement.

  Other options could entail a potential partnership with the current owners of the parking lots adjacent to RFK Stadium to develop a future facility with multimodal connections near the stadium. This option would be less costly but would be complicated by the logistics of a public-private partnership, by any potential plans to convert the existing stadium/supporting lots to a completely new land use, and by the longer distance from the Study area and urban core of the District.

A summary of the potential long-term strategic options is provided in **Table 6-4**.

TABLE 6-4
Summary of Potential Long-Term Strategic Options

Long-Term Improvement Strategic Option	Location(s)	Possible Implementation
Buzzard Point Transportation Network Improvements	1st St SW, 2nd St SW, Half St SW, Potomac Avenue SW between P St SW and V St SW	2020-2025
East-west Connectivity Improvements	L St / K St SW between Half St SW and Delaware Avenue	2020-2040
Metrorail Station Capacity Improvements	Waterfront and Navy Yard-Ballpark Stations	2020-2040
Metrorail Yellow Line Improvements	Interlining along Green Line or separate alignment beneath 2nd Street SW/NW or SE/NE	2020-2040
Commuter Rail Enhancements	Virginia Rail Express or MARC train alignments through the District	2020-2040
Multimodal Transfer Centers	I-395 west of 4th St SW, I-695 east of 11th St SE, or RFK Stadium Lots	2025-2040

It is important to reiterate that some of these options would require a separate and detailed preliminary engineering/concept feasibility study and an assessment of environmental impacts.

6.8 Implementation of Improvement Projects

Based on the evaluation of existing and future transportation network and infrastructure, the Study has identified several near-term, mid-term, and strategic long-term improvements to address the multimodal needs of the Study area. **Table 6-5** presents a feasible timeline for implementing the projects within the Study area. The timeline assumes that the corresponding project development process and NEPA build off the initial transportation-related findings in order to refine and revise the proposed alternatives carried forward for more detailed engineering feasibility analysis and environmental impacts.

6.9 Analysis of Event and Stadium Traffic

In order to better understand the context of short-term and long-term effects of event traffic within the study area, a follow-on study is being initiated by DDOT that will identify issues and potential mitigation strategies related to events such as baseball games at Nationals Stadium or performances at Arena Stage. In addition, several potential venues within the study area are in the early stages of the planning process, including a 15,000 seat soccer stadium on Buzzard's Point, a 2,000+ seat movie theater east of Nationals Stadium, and a 6,000 seat concert hall at The Wharf. The purpose of the Special Events Transportation Analysis is to: 1) consider current and future transportation conditions associated with special events and stadium traffic in the study area; 2) review plans for the proposed new event facilities and estimate corresponding future traffic demands (vehicular, pedestrian, bicycle, transit) to determine potential impacts to the transportation system; and 3) develop strategies and solutions for improving conditions on the transportation network, including modifications to existing traffic management plans, to mitigate the impacts of event traffic within the M Street SE-SW study area. The study will be performed in 2013 and will update/build upon the two previous versions of the Traffic Operations and Parking Plan for the Washington Nationals Ballpark.

TABLE 6-5
Project Implementation and Next Steps Timeline

Year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Tasks																												
Secure Funding for Near-Term Projects																												
Design and Construct Near-Term Projects																												
Coordinate Mid-Term Projects																												
Secure Funding for Mid-Term Projects																												
Conduct Environmental Assessments (NEPA) and Design on Mid-Term Projects																												
Construct Mid-Term Multimodal Projects																												
Secure Funding for Long-Term Projects																												
Long-Term Improvement Strategic Option - Buzzard Point Transportation Network Projects																												
Long-Term Improvement Strategic Option - East-west Connectivity Projects																												
Long-Term Improvement Strategic Option - Multi-modal Transfer Centers																												

6.10 Responses to Public and Stakeholder Comments

Based on the Draft Report that was published for public review on November 9, 2012, a number of comments were received from local area residents and from stakeholders. This Final Report incorporates revisions and clarifications in response to those comments. Appendix I includes a summary of the comments received on the Draft Report, both via e-mail and via formal letters, along with responses to the comments. The complete report, including the appendices, is posted for public review, along with animations of the three Multimodal Alternatives, on the project webpage:

http://www.anacostiawaterfront.org/awi-documents/m-street-se-sw-transportation-study-documents/

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