moveDC Vision
The District of Columbia will have a world-class transportation system serving the people who live, work, and visit the city. The transportation system will make the city more livable, sustainable, prosperous, and attractive. It will offer everyone in the District exceptional travel choices. As the transportation system evolves over time, the District will:

- Be more competitive and attractive locally, regionally, nationally, and internationally
- Have safer and more vibrant streets and neighborhoods
- Have cleaner air, streams, and rivers, and be more responsive to climate change
- Accommodate the travel needs of all residents, workers, and visitors regardless of age or ability
- Integrate the District’s transportation system with the region’s transportation network

Photography Credits
Many of the photographic images throughout this plan—in addition to those taken by the project team and DDOT—were freely contributed by people involved in the planning process through the project’s Flickr site (www.flickr.com/groups/wemoveDC) and through DDOT’s photo sharing site (www.flickr.com/photos/ddotphotos/sets/). DDOT appreciates the generosity of contributors of photography in the plan.
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11th Street Bridge project provides long-missing connectivity of D.C.’s interstate system and the local street network
Vehicle

I. Safety and Efficiency

Investing in the District’s street system to move traffic efficiently is—and will remain—critical to the function of the city. Strategic investments have the potential to maximize the value of the District’s roadway assets, improve people’s driving experience, support efficient movement of goods and services, improve air quality, and protect the system’s reliability. Investments in the vehicle network also are frequently investments in better conditions for other modes of travel.

DDOT maintains more than $44 billion in roadway infrastructure. Comprised principally of streets, tunnels, bridges, traffic signals, and streetlights, this infrastructure facilitates access to virtually all land in the city and enables the efficient movement of people and goods as well as the delivery of public services.

DDOT remains committed to and bears a substantial and core responsibility for the construction, maintenance, and effective management of its vehicular network. DDOT is increasingly supportive of all modes and seeking creative ways to diversify what has historically been a roadway system primarily for vehicles. The vehicular network must create safe and complementary interaction between the many transportation modes, preserve and protect space to permit efficient movement of goods and services, and facilitate the movement of automobile traffic efficiently and effectively.

Protecting the safety of travelers must be a central goal of the transportation system. The District already has made strides to make the transportation system safer and will need to continue to retain its priority on providing a safe environment.

Investing in state of good repair (SOGR) and system efficiency is critical. Recognizing this, DDOT is continuously engaged in major infrastructure rehabilitation and replacement, addressing both SOGR and changing transportation demand. As the city grows, reliability and efficiency of the transportation system will be even more important.

In the future, goods will continue to need to be moved and delivered, often by truck. Whether or not other travel options are available, many people will still choose to drive for personal and professional purposes.
II. Existing Conditions

The District’s roadway network serves many purposes in the transportation system. It carries vehicles—private and commercial vehicles—as well as surface transit; is the location of the majority of bicycle infrastructure; and is the largest interconnected open space system in the city. In addition to the street network, traffic operations and intelligent transportation systems (ITS) are integral components of vehicular travel.

Traffic congestion is frequent on primary routes leading into and out of the city during peak periods and can extend for long periods of time. Although largely continuous, the city’s network of streets is interrupted by natural and man-made barriers, which contribute to the difficulty of making some trips. Several streets, particularly in the Monumental Core, are closed or have some restriction on use due to security requirements.

A. CORE FACTS

The District’s street network is a product of years and many layers of planning, policy, trends, and incremental implementation. The L’Enfant city—the center city laid out according to the L’Enfant Plan—is organized around a largely rectilinear grid of streets intentionally interrupted by long diagonal avenues intersecting at public squares and circles. Outside the L’Enfant city, the street pattern varies. In many neighborhoods adjacent to the Monumental Core, the street pattern is a natural extension of the pattern of the core. Further away, development patterns, prominent natural land forms, water bodies, and substantial man-made features contribute to other, irregular street patterns.

Functional Classification

The functional classification system is a tool developed by the Federal Highway Administration (FHWA) and used by state, regional, and local public agencies to help describe and generally assign the vehicular transportation purpose of a street within the street network. In the District, street functional classifications include interstates, non-interstate freeways, principal arterials, minor arterials, collectors, and local streets. DDOT updates the Functional Classification Plan on a 2-year cycle.

Roadways designated as interstates and non-interstate freeways are intended to provide mobility within the system and carry longer-distance trips. The primary purpose of collector and local streets is to provide access to land and support local circulation. Principal and minor arterials provide a high level of mobility for medium-distance trips while also providing some support to local circulation and limited land access.

The moveDC plan identifies modal priorities on each of the District’s transportation corridors that are designated collector or higher. The District’s functional classification of streets is shown in Figure V.1.

Control

The vast majority of the District’s streets are controlled by DDOT; however, several significant corridors are under the control of another entity. Figure V.1 highlights the control of major streets throughout the District.

The quantity of streets under the control of other entities is small relative to those under DDOT’s control. Despite this, many non-DDOT streets have a pivotal role in the transportation system in serving commuter and visitor vehicular traffic and bicycle, pedestrian, and transit trips.

Constitution Avenue NW, Independence Avenue SW, and Rock Creek Parkway carry substantial commuter traffic and are controlled by the National Park Service (NPS). Streets surrounding the Capitol that are under control of the Architect of the Capitol (AOC) play an important role in serving multimodal travel.
Operations and Management

With the many demands of the transportation system in the District, efficient and appropriate use of the vehicular transportation network is essential. The city has designated evacuation and snow emergency routes (Figure V.2) and a designated freight network (Figure V.3).

The District is in the process of making major modifications to the city’s traffic signal system, adding needed functionality and features to meet short- and long-term traffic operations needs. Recognizing the need for short- and long-term traffic flow improvements, DDOT is optimizing traffic signal operations on major roadway corridors throughout the District. The many and complex unconventional intersections—at squares, circles, and starbursts—complicate traffic signal operations and often disrupt flows.

In addition to traffic signals at intersections, several key commuter corridors—such as Canal Road, Connecticut Avenue, and 16th Street—are operated with reversible lane functionality and/or rush hour parking restrictions. Depending on the time of day, the number of lanes in each direction of the roadway varies based on peak-direction traffic flow. Roadways with reversible lanes and time-of-day parking restrictions are shown in Figure V.4.

Reversible Lanes

Reversible lane facilities offer benefits to peak direction traffic by increasing capacity during peak periods to better serve demand. At the same time, drawbacks to the use of reversible lanes, particularly along arterials, include:

- **Driver confusion.** For those unfamiliar with the operation and termini of a reversible lane facility, they can be confusing. Even for those who are familiar, the change in position of left- and/or right-turn lanes, prohibitions on turning, and the lanes currently in use to serve a directional flow can be confusing. In the District, the prohibition on overhead signs and signals further complicates matters.

- **End of facility transitions.** Often, reversible lane facilities operate well between termini, but poorly at locations where operations transition back to a “normal” lane condition. This is attributed to situations such as “lane drops” and through lanes that abruptly transition to turn or “trap” lanes.

- **Safety.** Driver confusion can lead to vehicles traveling the wrong-way in a peak-direction travel lane, turning left from the wrong lane, or improperly using a lane with a turn prohibition to make a turn. This confusion can lead to near-misses, head-on collisions, sideswipe crashes, rear-end crashes, and angle crashes.

- **Loss of off-peak direction mobility.** Depending on the reversible lane condition, peak direction mobility can be significantly limited or lost, negatively impacting local streets and mobility.
FIGURE V.1 — EXISTING ROADWAY CONTROL AND FUNCTIONAL CLASSES

This figure shows the federal functional classifications and control of streets in the District. Within the District, some critical infrastructure is controlled and operated by non-District agencies.
FIGURE V.2 — DESIGNATED EVACUATION AND SNOW EMERGENCY ROUTES

This figure shows designated evacuation and snow emergency routes in the District.

Legend

- Washington D.C. Boundary
- Quadrant Boundary
- Ward Boundary
- Water
- Park
- University
- Military
- Monumental Core

Road
Railroad
Evacuation Route
Snow Emergency Route

Metrorail

Station
Line
FIGURE V.3 – DESIGNATED TRUCK ROUTES AND FREIGHT NETWORK
This figure shows the District’s existing (2013) freight network and facilities.
FIGURE V.4 — REVERSIBLE LANES AND ON-STREET PARKING RESTRICTIONS

This figure shows accommodations for rush hour traffic including reversible lanes and on-street parking restrictions. As shown in the figure, the majority of these restrictions are in downtown and on corridors serving significant vehicular volumes of commuter traffic in a.m. and p.m. peak periods.
Safety

Safety is central to DDOT’s mission and the moveDC plan sets high goals for safety. Table V.1 shows the top 20 hazardous intersections in the District based on reported crash data between 2009 and 2011. Figure V.5 shows the most hazardous corridors and intersections in the District. The District has numerous programs targeted toward improving motorized and non-motorized conditions for users.

D.C. Highway Safety Program

The District conducts many safety education and enforcement programs through the D.C. Highway Safety Office within DDOT. The District's Highway Safety Program is funded by a grant from the United States Department of Transportation (U.S. DOT) National Highway Traffic Safety Administration (NHTSA), with a primary mission to shift user behaviors. The funds support community programs to reduce injuries and fatalities in the District, and are used for a variety of safety initiatives including conducting data analysis, developing safety education programs, and conducting community wide pedestrian and bicycle safety campaigns. Eligible programs focus on promoting seat belts use, preventing impaired or distracted driving, and supporting child passenger safety. To implement these programs, the D.C. Highway Safety Office regularly partners with D.C. agencies such as the Metropolitan Policy Department (MPD), the Department of Motor Vehicles (DMV), and the Fire and EMS Department on education and enforcement programs, as well as with the Metropolitan Washington Council of Governments (MWCOG) on regional safety campaigns such as the Street Smart pedestrian safety campaign.

Photo Enforcement

The District’s photo-enforcement efforts, including new technologies aimed at enforcing pedestrian laws, help to reinforce the overall culture of safety. Since 2001, Washington, D.C. has deployed a successful traffic safety camera program aimed at reducing red-light running, slowing speeding speeds and improving driver behavior, which has reduced traffic fatalities in the District by 76%. The District recently expanded photo enforcement capabilities to include infractions such as stop sign running, blocking the box, and failing to yield to pedestrians in crosswalks.

To maximize the program’s flexibility and impact, MPD uses both mobile photo radar units and fixed-location cameras.

Table V.1: Top 20 Hazardous Intersections in the District

<table>
<thead>
<tr>
<th>Rank</th>
<th>Intersection</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Minnesota Avenue NE &amp; Benning Road NE</td>
</tr>
<tr>
<td>1</td>
<td>14th Street NW &amp; U Street NW</td>
</tr>
<tr>
<td>3</td>
<td>Wisconsin Avenue NW &amp; M Street NW</td>
</tr>
<tr>
<td>4</td>
<td>7th Street NW &amp; Florida Avenue NW</td>
</tr>
<tr>
<td>5</td>
<td>Stanton Road SE &amp; Suitland Parkway SE</td>
</tr>
<tr>
<td>6</td>
<td>New York Avenue NE &amp; Bladensburg Road NE</td>
</tr>
<tr>
<td>7</td>
<td>Firth Sterling Avenue SE &amp; Suitland Parkway SE</td>
</tr>
<tr>
<td>8</td>
<td>New York Avenue NE &amp; North Capitol Street NE</td>
</tr>
<tr>
<td>9</td>
<td>Alabama Avenue SE &amp; Stanton Road SE</td>
</tr>
<tr>
<td>10</td>
<td>K Street NE &amp; North Capitol Street NE</td>
</tr>
<tr>
<td>11</td>
<td>Minnesota Avenue SE &amp; Pennsylvania Avenue SE</td>
</tr>
<tr>
<td>12</td>
<td>Florida Avenue NE &amp; New York Avenue NE</td>
</tr>
<tr>
<td>13</td>
<td>H Street NW &amp; North Capitol Street NE</td>
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<tr>
<td>14</td>
<td>14th Street NW &amp; K Street NW</td>
</tr>
<tr>
<td>15</td>
<td>South Dakota Avenue NE &amp; Bladensburg Road NE</td>
</tr>
<tr>
<td>16</td>
<td>4th Street NE &amp; New York Avenue NE</td>
</tr>
<tr>
<td>17</td>
<td>W Virginia Avenue NE &amp; Mt Olivet Road NE</td>
</tr>
<tr>
<td>18</td>
<td>14th Street NW &amp; Irving Street NW</td>
</tr>
<tr>
<td>19</td>
<td>Martin Luther King, Jr. Avenue SE &amp; Howard Road SE</td>
</tr>
<tr>
<td>19</td>
<td>Brentwood Parkway NE &amp; Mt. Olivet Road NE</td>
</tr>
</tbody>
</table>

Note: Intersections identified are based on crash history as evaluated in terms of crash rate, severity, and frequency.
Source: Traffic safety statistics for 2009 - 2011 (DDOT)
MPD selects locations throughout the District based on recent incidents of speeding-related crashes and fatalities, their proximity to school zones and other places where children or other vulnerable populations are present, and known sites of chronic speeding. DDOT regularly coordinates with MPD and can request photo enforcement units. Deployment of the units is at the discretion of the MPD.

#### Road Safety Audits
Road Safety Audits (RSAs) are a proactive approach to improving transportation safety. An RSA is a safety performance examination of an existing or future road or intersection by a multidisciplinary review team. It qualitatively estimates and reports on potential road safety issues and identifies opportunities for improvements in safety for all road users. DDOT can use RSAs to improve safety and communicate to the public how DDOT is proactively working towards crash reduction. DDOT staff identifies projects, existing roadways, or intersections for road safety audits per FHWA requirements.

#### Traffic Control Officers
DDOT’s traffic control officers (TCOs) ensure the safe flow and operation of vehicular, pedestrian, and bicycle traffic throughout the city. With coverage on the weekend, DDOT ensures that special events such as parades, demonstrations, and marathons can be convened more safely and efficiently. This heightened coverage also allows the agency to readily respond to unanticipated emergencies where traffic control assistance is required. TCOs also have the ability to issue citations for parking infractions and minor moving violations.

#### Traffic Calming
DDOT is committed to improving the quality of life in neighborhoods and addressing traffic-related safety issues throughout the District. Traffic calming and system management refers to a balanced operation of the District’s street system which fosters fluid, safe, and managed movement of traffic flows on the network. In particular, this means developing ways to tame traffic and protect neighborhood quality of life while also maintaining operational efficiency for all modes.

#### Vehicular Accessibility
From 2010 to 2013, The District grew by approximately 1,100 residents per month. With more residents comes the need for new and expanded services, ultimately bringing additional workers and deliveries not only into downtown but also into neighborhoods.

Accessibility to and between some District neighborhoods is limited due to existing natural barriers and river crossings. Throughout the public engagement process, community stakeholders talked about the challenges of travel between neighborhoods to access schools, recreation centers, and local destinations, while balancing the variety of users and needs on the roadway. As activity centers outside of central Washington continue to grow and change, vehicular demand will no longer be as focused on the core of the District.

Already in the District, some “circumferential” streets, such as Military Road NW or Alabama Avenue SE, experience high levels of vehicular traffic and some peak hour congestion. Figures V.6 and V.7 show a summary of existing (2013) a.m. and p.m. peak hour vehicular traffic volumes on District roadways where traffic count data was available. Components of the vehicular network such as signal timing, local street connections, and new street segments will need to respond to continued growth in the District during the next 25 years.

Figures V.8 and V.9 show travel speeds on the District’s major roadways during weekday morning and evening rush hours. These maps indicate both congested corridors, where travel speeds are low compared to the posted speed limit, and areas of the District that do not experience significant congestion.
**FIGURE V.5 — HIGH-CRASH CORRIDORS AND INTERSECTIONS**

This figure shows the most corridors with the highest crash frequency in the District. Generally, the highest crash frequency corridors also are those with the highest traffic volumes.

FIGURE V.6 — 2013 AM PEAK HOUR VOLUMES
This figure shows a.m. peak hour volumes where data is available.

Source: DDOT, 2013.
FIGURE V.7 — 2013 PM PEAK HOUR VOLUMES
This figure shows p.m. peak hour volumes where data is available.

Source: DDOT, 2013.
FIGURE V.8 — AM PEAK PERIOD TRAVEL SPEEDS
This figure shows travel speeds on major corridors in the District during an average weekday a.m. peak period.

Source: INRIX, 2013.
FIGURE V.9 — PM PEAK PERIOD TRAVEL SPEEDS
This figure shows travel speeds on major corridors in the District during an average weekday p.m. peak period.

Source: INRIX, 2013.
Evaluating volume to capacity (V/C) ratios is another way to understand where congestion may exist on streets under existing and future travel conditions. In theory, when a V/C ratio exceeds 1.0 it means the roadway is over capacity—there is more demand (traffic) than capacity (space for that traffic).

Figure V.10 shows existing p.m. peak hour roadway conditions, based on 2010 modeled baseline data from the District’s Travel Demand Model. The darker reds and blacks in the map indicate locations where congestion is likely. Green and yellow indicates areas where congestion is less likely.

Intelligent Transportation Systems
DDOT owns, operates, and maintains a wide array of technologies to support arterial and freeway traffic management. The ITS system helps DDOT identify and manage incidents, and provides useful traffic data.

Communications Network
DDOT’s communications network allows it to connect with ITS devices Districtwide and for those devices to connect with each other. Among DDOT’s largest technology assets is a communications network in excess of 270 miles of twisted pair copper cable. Most of this cable is more than 25 years old and some is in ducts more than 100 years old with many collapsed sections.

The communications system is augmented with some “last mile” wireless links, cellular and General Packet Radio System (GPRS) communications, and connections between Traffic Management Centers (TMCs) that are provided by D.C. NET, the telecommunications provider of the District’s Office of the Chief Technology Officer (OCTO).

The communications network is essential transportation infrastructure. It is a critical component of the District’s freeway management system, citywide signal system, and emergency management system. The data carried across the communications network enables DDOT to efficiently operate and monitor many elements within the transportation system. The communications network is functional today; however, it has limited capacity to carry more devices and functions. It will need to be significantly upgraded to meet future system needs.

Traffic Management Centers
DDOT has multiple transportation management centers that serve different purposes. The Reeves Center Municipal Office Building on 14th and U Street is the main communications and central hardware hub for DDOT’s copper network and is the former site of the main TMC. The TMC at the Reeves Center contains the racks and servers for all ITS subsystems. The building also houses a Snow Management Center.

The primary TMC is located at the Unified Communications Center (UCC). This location is staffed by multiple agencies with representatives from DDOT, MPD, District of Columbia Public Schools (DCPS), and the Homeland Security and Emergency Management Agency (HSEMA). Other control centers include the Special Operations Center (SOC) and the Emergency Management Agency (EMA) and Signal System Rooms at 55 M Street.
The city’s TMCs are critical to the day-to-day and emergency operations of the city’s transportation system. TMC staff gather and disseminate traffic and emergency information using DDOT’s network of cameras and other ITS devices.

**Software**

CapTOP is DDOT’s freeway management system software. Developed in-house, CapTOP has been enhanced to add functionality over time. As of December 2013, DDOT was in the process of procuring a replacement system.

The new CapTOP will be an important piece of DDOT’s ITS enterprise for many years. It will serve as the centralized management system for traffic management activities including real-time data collection and data sharing, management of planned events, and real-time management of incidents impacting traffic in the District. CapTOP will facilitate the exchange of transportation-related information across a variety of agencies within the region and will provide an integrated interface to a number of traffic management related systems.

**Roadway Operations Patrol**

DDOT operates a Roadway Operations Patrol (ROP) out of its TMC. The ROP responds to traffic incidents and emergencies on the District’s roadways to quickly and efficiently address accidents and restore normal traffic flow.

According to the *2011 DDOT Annual Report*, ROP vehicles were dispatched more than 5,500 times during 2011. Of these incidents, 44% involved disabled vehicles, 27% involved minor crashes, and 8% involved traffic control. The other 20% included incidents such as pedestrian injuries, abandoned vehicles, and special events.

**Signals and Signal System**

The District has more than 1,600 traffic signals, which are interconnected through signal system software. DDOT is currently upgrading its signal communications system from analog serial to Internet Protocol (IP) based communications. The transition from analog to digital will enable DDOT to more efficiently use available bandwidth of the copper network which will allow DDOT add functionality to its signal system and to signal operations.

To improve traffic flow under uncertain conditions, DDOT is piloting an adaptive traffic control system starting on New York Avenue. This system will update traffic signal timing in the corridor in real-time in response to prevailing traffic conditions. Based on the outcome of the pilot, DDOT will decide whether to expand the program to other corridors in the city.

**Dynamic Signage**

To manage peak period traffic, the District operates a number of reversible lanes on its network. The dynamic lane indications on Clara Barton Parkway/Canal Road are controlled from traffic signal controllers on a time-of-day clock.

**Detection Technologies and Permanent Count Stations**

In the past several years, DDOT has invested heavily in vehicle and bicycle detection. Establishing permanent count stations and increasing the coverage within the system of vehicle detection system increases the amount of historic and real-time data DDOT and other agencies have at their disposal. This data can be used to evaluate historic and current system performance and make decisions about the future.

DDOT recently deployed in-pavement wireless magnetometer sensors and permanent traffic count stations across the District. Five different technologies will be implemented to collect the traffic data under the latter project, including inductive loops and acoustic, microwave, infrared, and video base detectors.

**Dynamic Message Signs and Portable Changeable Message Signs**

The District has portable changeable message signs (PCMS) that are used to alert motorists of work zones, special events, and incidents. In addition, DDOT uses permanently installed dynamic message signs (DMS) units. The permanent DMS are either on freeways or major arterials. Based on sight line and other aesthetic concerns, DDOT has found PCMS to be easier to deploy on arterials than permanent DMS.

**CCTV Camera and Video Distribution System**

DDOT currently uses CCTV cameras at intersections, red light cameras, cameras in tunnels, and speed enforcement cameras. The video is used by the TMC to monitor traffic conditions and traffic incidents. *Figure V.11* depicts the location of DDOT’s existing ITS devices.
FIGURE V.11 — EXISTING ITS DEVICES AND OPERATIONS CENTERS
This figure shows the locations of DDOT’s existing (2013) ITS devices and operations centers.

Legend
- Quadrant Boundary
- Ward Boundary
- Water
- Park
- University
- Military
- Monumental Core

Existing Infrastructure
- Metrorail Station
- Metrorail Line
- Railroad
- Road

Existing ITS Devices
- Traffic Signals
- Traffic Cameras
  - Legacy
  - Pilot

Other ITS Devices
- Highway Advisory Radio (HAR)
- Road Weather Information System (RWIS)

Existing ITS Devices (cont.)
- Detection and Monitoring Stations
  - Detection

Operations Centers
- District Unified Communications Center (UCC)
- District Department of Transportation (DDOT)
- United States Department of Labor (DOL)
- District Department of Public Works (DPW)
In 2012, the Washington metropolitan area was ranked as the most congested area in the nation based on traffic congestion and delay. Within the District, users can feel the strain of daily travel conditions. About half of survey respondents contacted through the moveDC process expressed a belief that it is getting more difficult to travel in the District. The delays and uncertainty associated with congestion represent a loss of time, productivity, and resources for the city and region’s economy, and are a source of frustration for drivers and businesses.

Growth and Activity
In addition to population growth in recent years, growing employment and visitor activity brings more people and vehicles into the District, especially the central areas which have high concentrations of jobs and visitor destinations.

- In 2012, approximately 18.5 million people visited the District, primarily from other parts of the United States.
- Each weekday, D.C.’s population swells by 79% to over 1 million people, the largest surge of commuters in the nation.

While residents, visitors, and workers arrive by transit, bike, or on foot, many others drive and park in the District. Congestion is also a sign of economic vitality, so the District needs to strike a balance between encouraging activity and access, while addressing critical congested areas.

System Management
Without proactive management, growth and congestion could threaten the economic viability of the District. DDOT invests significant capital and operational resources to manage the vehicular system in the downtown area, including TCOs at key intersections, traffic signal optimization, parking and freight management; however, the limited entry points into the District and persistent congestion along key routes result in vehicular congestion at peak hours in locations across the downtown area.

Unplanned Events
Traffic disruptions are common, if not daily, occurrences in the District, causing significant and sudden impacts to the city’s transportation network. Both scheduled events such as marathons, and unscheduled events such as demonstrations or motorcades, require street closures that create challenges for the network in downtown as well as in neighborhoods. Adding to these challenges are streets adjacent to the Capitol or White House that have limited access or have been fully closed to traffic for security measures. These unplanned events strain the system management tools available to DDOT to manage downtown congestion.

Solutions for the Future
The District will need to manage its resources and use new technologies to improve future travel conditions and help manage congestion. A range of potential tools will be needed to address projected future congestion, including:

- Additional TCOs at key intersections
- Ongoing citywide signal optimization
- Dynamic signage and real-time information for users
- Incident detection and management
- Parking management
- Freight management
- High-occupancy vehicle (HOV) or high-occupancy toll (HOT) lanes on major corridors accessing the Central Employment Area
- Limited-area cordon charge to price access to specific areas at congested times

These tools range from staff intensive to more technology-based, and each has trade-offs that must be evaluated. Ultimately, multiple tools will be needed to manage congestion over time.

1 Texas Transportation Institute's 2012 Urban Mobility Report
B. NOTABLE SYSTEM ACHIEVEMENTS

Citywide Signal Optimization Project
DDOT is in the midst of a 5-year project to facilitate a comprehensive signal optimization of the District’s 1,600 traffic signals. The first phase of the signal optimization project was completed in late 2013. This initial phase of the project included upgrading signal software and updating signals and pedestrian clearance times to be compliant with the Manual on Uniform Traffic Control Devices (MUTCD). Following phases will include signal and software optimization, data collection and inventory, and performance evaluations throughout the District. The goal of the signal optimization project is to make District traffic signals safer for pedestrians, reduce delays and improve overall traffic flow, and reduce vehicular emissions. It also will help mitigate conflicts between different modes, and address regional growth and changes in travel patterns.

Increasing Street Network and Connectivity
The District’s street grid is largely well connected, although the street pattern varies outside the L’Enfant city and adjacent neighborhoods. Connected streets provide greater mobility and access, and provide redundant routes in the event of emergencies. The relative amount of connectivity in the District can be measured by intersection density. Table V.2 summarizes existing intersection density by ward.

In recent years, the District has added or reopened blocks and streets into the transportation network, adding capacity and connectivity to the system. Many of these additions have been the result of large-scale redevelopment projects, which have offered the opportunity to reconnect the street grid both in downtown and in neighborhoods. Recent street segment additions include 10th Street NW and I Street NW in the City Center development; 3rd Street SE, 4th Street SE, and Water Street SE in The Yards development; and 4th Street SW in the Waterfront Mall redevelopment.

These additions to the District’s street network provide shorter, more direct routes between destinations and help spread out concentrations of traffic. They also offer new routes and accessibility which help mitigate delays in congested areas or during peak hours. Opportunities to continue to add local street connections with major development projects exist into the future as well.

Table V.2: Intersection Density by Ward

<table>
<thead>
<tr>
<th>Ward</th>
<th>Total Intersections</th>
<th>Overall Intersection Density (Intersections/Square Mile)</th>
</tr>
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<tr>
<td>1</td>
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<td>922</td>
<td>77</td>
</tr>
</tbody>
</table>

Note: Area includes parks and water

Major Bridge Projects
Due to age, many of the District’s bridges are in need of major rehabilitation or replacement. DDOT has proven successful in meeting this challenge during recent projects.

DDOT participated in FHWA’s Highways for LIFE (HfL) pilot program to accelerate innovation in the highway community. DDOT used innovative engineering to complete the reconstruction of the Eastern Avenue Bridge over Kenilworth Avenue in less than 10 months. The project’s key innovations included rapid construction of the bridge through the use of prefabricated elements, innovative application of maintenance-of-traffic methods and technology to decrease traffic congestion and increase safety in the construction zone, and use of a no-excuse clause with relation to inclement weather. As a result of DDOT’s innovative approach, the project schedule was reduced by more than 1 year compared to traditional estimates.

DDOT is scheduled to complete the 11th Street Bridge—an Anacostia Waterfront Initiative project—in 2015. This is the largest single DDOT project underway at a cost of approximately $390 million. It includes three new bridges separating local and freeway traffic in addition to multimodal access improvements and is critical to improving travel by completing a missing interstate connection between I-695 and D.C. 295 and improving local access. The new 11th Street bridges replace two bridges built in 1960.
C. FUTURE DEMAND

Growth in the District and region will increase the overall number of trips made within, to, from, and through the District. Without sustained investment to diversify the District’s transportation system, the number of vehicular trips will increase significantly as will vehicular delay. Future traffic demand was modeled using the Districtwide Travel Demand Model.

The future (2040) baseline scenario is the existing transportation network with committed transportation projects. Committed transportation projects include those in DDOT’s **Transportation Improvement Plan** (TIP) and the MWCOG **Fiscally Constrained Long-Range Transportation Plan** (CLRP).

**Table V.3** shows a summary of daily trips under existing (2010) modeled and future (2040) baseline conditions. **Table V.4** shows a summary of modeled existing (2010) and future (2040) baseline vehicular system performance data. As shown in the two tables, the number of trips to, from, within, and through the District will increase significantly between 2010 and 2040, resulting in a considerable increase in vehicular delay—approximately 40%. The increase in delay and trips on the vehicular network, unless supported by a proportional investment in vehicular system capacity or the multimodal system, will result in additional congestion on the District’s roadway network.

**Figure V.12** shows modeled future baseline (2040) roadway conditions in the p.m. peak hour. The darker reds and black in the map indicate locations where congestion is likely. Lighter colors (green and yellow) are areas where congestion is less likely. As shown in the figure, investing only in the projects that DDOT is already committed to funding will not address the city’s mobility needs or eliminate traffic congestion on city streets. A coordinated plan for investment will be essential in support of the city’s continued growth.
Table V.3: Existing Model (2010) and Future Baseline (2040) Daily Trips

<table>
<thead>
<tr>
<th>Travel Mode</th>
<th>District-District Trips</th>
<th>To/From District Trips</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model Base Year (2010)</td>
<td>Future Baseline (2040)</td>
</tr>
<tr>
<td>Motorized (drive)</td>
<td>639,000</td>
<td>756,000</td>
</tr>
<tr>
<td>Transit</td>
<td>314,000</td>
<td>384,000</td>
</tr>
<tr>
<td>Non-Motorized (walk and bike)</td>
<td>450,000</td>
<td>698,000</td>
</tr>
</tbody>
</table>

Notes:
1. Motorized includes private vehicle (driver and passenger) and commercial vehicles
2. Transit is bus, streetcar, high-capacity transit, Metrorail, commuter rail, and water taxi

Table V.4: Existing Model (2010) and Future Baseline (2040) Vehicular System Performance

<table>
<thead>
<tr>
<th>Measure</th>
<th>Model Base Year 2010</th>
<th>Future Baseline 2040</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle Miles Traveled (VMT)</td>
<td>9.13 million</td>
<td>10.45 million</td>
</tr>
<tr>
<td>Vehicle Hours Traveled (VHT)</td>
<td>335,000</td>
<td>389,000</td>
</tr>
<tr>
<td>Delay (Hours)</td>
<td>21,000</td>
<td>30,000</td>
</tr>
</tbody>
</table>

Note: These values are for the District of Columbia only

Figure V.12: 2040 p.m. Peak Hour V/C Ratios (existing network with committed projects)
D. OPPORTUNITIES FOR IMPROVEMENT

Safety

Between 2009 and 2011, approximately 17,500 crashes were reported in the District each year. These crashes contributed to more than 30 fatalities annually. Reducing the rate, frequency, and severity of crashes in conjunction with reducing instances of crashes between vehicles and pedestrians and bicyclists must remain a priority for DDOT.

Persistent Congestion

Two-thirds of traffic on the city’s streets during morning and evening peak periods is from neighboring states. This traffic is comprised of people traveling to jobs in the District as well as traveling through D.C. for other purposes. Corridors such as New York Avenue, Constitution Avenue, Independence Avenue, D.C. 295, I-395/695, Rhode Island Avenue, the city’s many parkways, and Wisconsin Avenue are substantially affected by traffic from outside the District. Congested travel speeds are shown on Figures V.8 and V.9. This congestion will continue to worsen without investments in the multimodal system.

Management of the freeway system could help improve the predictability and person-carrying capacity of District roads. Management could include occupancy restrictions and/or pricing strategies. Management of vehicular access to the Central Employment Area could provide similar improvements. In addition, enhancements in multimodal accommodations such as transit and bicycle facilities and transportation demand management (TDM) strategies could indirectly result in improved vehicular conditions if fewer people travel by automobile in the future. Other opportunities to address congestion include technological and operational improvements.

Aging Infrastructure

Aging infrastructure is a maintenance challenge and a system reliability concern in the District. Key transportation infrastructure is typically needed 24 hours a day, 7 days a week. When a bridge, tunnel, street, or intersection must be closed, parallel facilities are significantly impacted, causing cascading impacts throughout the system.

The District uses its Capital Improvement Program to schedule the ongoing maintenance and reconstruction of infrastructure assets throughout the District to preserve the system and improve system reliability. Investments in this program extend from minor repairs to substantial replacement or reconstruction of major transportation assets. The District can lessen the impact of major repairs by accelerating and prioritizing maintenance of bridges and streets.

Technology

DDOT has a tremendous opportunity to leverage technology and data to shift the transportation landscape for people, build stronger communities, and create a highly-responsive transportation system. Investment opportunities include open data, ITS, and autonomous vehicles.

Aging Signal System

The functionality of the District’s signal system limits the opportunities available to the city to respond to changing traffic conditions, modal demands, and special circumstances. A modern and expandable citywide signal system is needed to support the city’s increasingly multimodal transportation network and demands. The system needs to have functionality to better support changing traffic conditions, bicycle and pedestrian mobility, transit priority and pre-emption, and emergency operations. The city is actively investing in the replacement of the existing system to meet current and future demand.

Air Quality

Vehicles are a large source of contaminants such as carbon monoxide, nitrogen oxide, and other volatile compounds that negatively impact the District’s air quality. District asthma and respiratory disease rates are high. The pollutants also deteriorate buildings and infrastructure. Adopting renewable and cleaner fuels, using more low-emissions vehicles, and shifting to cleaner forms of transportation will improve our ability to manage air quality. Other strategies include offering incentives to reduce driving on days when the level of air pollution is highest.
Climate Adaptation

Historically, transportation infrastructure has been developed under the assumption that climate and weather patterns remain constant through its service life. DDOT’s capacity to adapt to the impacts of extreme weather conditions on the transportation system depends on its ability to respond to the physical needs of the system and to plan for future contingencies. Assets should be maintained at a state of good repair so that they are better able to withstand strains caused by extreme weather events.

DDOT’s *Climate Change Adaptation Plan* (2013) identified and developed potential adaptation strategies to ensure DDOT’s transportation infrastructure can withstand climate change and to reduce the vulnerability of its assets to the effects of extreme weather conditions. With respect to the vehicular network, strategies include:

- Considering climate change in planning and design, such as evaluating vertical clearance for bridges on waterways and impact of wind
- Evaluating bridge expansion joints and design
- Evaluating pavement design and monitor pavement conditions
- Improving stormwater management practices

Barriers

The connectivity of the street system within the city and between the District and Virginia and Maryland is influenced by the Anacostia and Potomac Rivers. In addition, the significant system of local and national parks in the District, including Rock Creek Park and the National Mall, create additional challenges to connectivity. Lastly, though limited, D.C.’s freeway system and railroad corridors are barriers to connectivity and continuity of the street network in some areas and neighborhoods. Investments in street connectivity could alleviate some choke points.
III. Recommendations

The Vehicle Element presents recommendations for the District’s vehicular transportation system. In addition to meeting the goals and vision for the overall plan, the Vehicle Element of the moveDC plan seeks to:

- Create an environment where demand can be managed and where capacity is available to those who need to drive
- Improve traveler safety by reducing crash frequency, rate, and severity
- Increase system reliability and efficiency
- Maintain the transportation system at a full state of good repair

The District continues to make significant investments in infrastructure modernization, maintenance, and management and will need to continue to do so in the future. The recommendations in the Vehicle Element are presented as infrastructure investments, policies, and educational or enforcement programs.

A. INFRASTRUCTURE INVESTMENTS

The moveDC recommended vehicular network is shown in Figures V.13 through V.18. Generalized numbers of lanes and roadway cross sections are shown in Figure V.19. The specific roadway configurations and trade-offs between elements like parking and travel lanes will need to be assessed on a capital investment by capital investment basis.

**Recommendation A.1: Maximize the District’s federal maintenance contribution.**

The District should retain its opportunity to receive the maximum available federal maintenance contribution. This entails maintaining an optimum inventory of streets functionally classified as interstate, freeway/expressway, and principal arterial, as well as staying current and compliant with federal rules and regulations. Preserving the mileage of streets in these functional classes will ensure eligibility for federal maintenance funds.

**Recommendation A.2: Bring the District’s bridges to a state of good repair.**

The District’s bridges should be maintained at a state of good repair. The District should perform routine preservation activities to maximize the useful life of bridges and complete major bridge repairs, rehabilitation, and replacement, as needed. Major bridge rehabilitation projects include:

- **Benning Road Bridge (over Kenilworth Avenue NE).** The Benning Road Bridge should be replaced or rehabilitated. Preliminary engineering for the project is scheduled for Fiscal Year 2015.
- **East Capitol Street Bridge.** The East Capitol Street Bridge should be rehabilitated to eliminate structural deficiencies. The rehabilitation work is scheduled for Fiscal Year 2014.
- **Hopscotch Bridge (H Street).** The Hopscotch Bridge should be replaced or rehabilitated. Preliminary engineering is scheduled for Fiscal Year 2017.
- **Key Bridge.** In Fiscal Year 2014, deteriorated structural elements will be replaced and drainage and utility deficiencies will be corrected.

- **South Capitol Street Bridge (Frederick Douglass Memorial Bridge).** The bridge will be replaced and adjoining sections of limited access roadway will be transformed into a scenic boulevard to better serve pedestrians, bicycles, and vehicles. The project will increase multimodal capacity across the Anacostia River and remove existing infrastructure-related barriers on both sides of the river. Preliminary engineering and right-of-way acquisition have been underway since January 2012, but the final federal environmental approval and construction funding are pending. A contract for constructing the initial phases of the project is anticipated in 2015.

- **Theodore Roosevelt Memorial Bridge (I-66).** The bridge superstructure and substructure and other bridge damage will be repaired. In addition, pedestrian and bicycle access will be improved. Construction is scheduled for Fiscal Year 2015.

Beyond these structures, DDOT will continue to monitor the condition of bridges, and DDOT’s capital planning should emphasize state of good repair investments. Over the life of the plan, nearly all bridges will need some degree of rehabilitation, and this should be accounted for in financial planning.
Modal Priorities on Existing Roadways

As the District grows, existing streets will increasingly need to support more and different transportation users and will still have a role to play in conveying a mixture of vehicular traffic for many different purposes.

To achieve this end of supporting a mixture of uses while also being able to accommodate vehicular trip purposes, the framework in which non-local street recommendations were developed was the following:

Every non-local street should prioritize pedestrians, accommodate driving and local deliveries, and support one of the following modes:

- **B** Protected bicycle facilities
- **T** Dedicated high-capacity surface transit lane(s)
- **F** Dedicated freight routes
  or
- **A combination of these modes in simpler accommodation**

The framework establishes rules for sharing existing limited street space among the system’s diverse transportation users while maintaining vehicular accommodation and access. In applying this approach to the network, some streets will have vehicular capacity reductions, while experiencing an increase in person-carrying capacity. A high-capacity transit corridor where a general purpose vehicular lane is removed to permit the operation of transit in exclusive accommodation is an example of this condition.

**Major Vehicular Network Elements**

Major recommended components within the vehicular transportation network include the following:

- **Major bridge rehabilitation and replacements.** South Capitol Street Bridge, Theodore Roosevelt Memorial Bridge, and other major bridges to address state of good repair and better accommodate multimodal demand.
- **System operations optimization.** Traffic signal system and field equipment replacement and optimization and investment in intelligent transportation systems to optimize operations, reliability, and infrastructure capacity.
- **Goods movement.** Preservation of and enhancement to designated freight routes to increase goods movement efficiency and reduce negative impacts.
- **Transportation facility management.** Use of occupancy and entry requirements in combination with user fees in some locations to increase the person-carrying capacity of facilities and manage vehicular demand.
- **Street connections.** Restoration of historic street segments and streets on new alignment in planned land use change areas and across barriers such as I-395 to improve overall multimodal network connectivity.
FIGURE V.13 — PLANNED VEHICULAR NETWORK
This figure shows the planned vehicular network. Major network elements include system management, preservation of freight routes, safety and efficiency measures, and new local street connections.
The moveDC vehicular network for the Downtown planning area includes:

- A downtown congestion pricing cordon around the Central Employment Area
- Managed lanes on some of the major facilities entering downtown including
  - I-395 and 14th Street Bridges
  - I-395/I-695 between the 11th and 14th Street Bridges
  - New York Avenue NE, northeast of the I-395 tunnel
  - Theodore Roosevelt Memorial Bridge (I-66/US 50)
- Reconfiguration of the I-66 freeway between the Constitution Avenue and K Street NW and replacement with a connected local street grid
- Reconfiguration of the Rock Creek and Potomac Parkway to accommodate two-way travel all day
- Replacement or rehabilitation of the Hopsotch Bridge (H Street NE over railroad tracks)
- Rehabilitation of the Theodore Roosevelt Bridge
- New local street connections across I-395
- Maryland Avenue SW Plan potential street connections
- Preservation of key citywide freight routes
The moveDC vehicular network for the Eastern planning area includes:

- Managed lanes on New York Avenue NE
- Improvement/reconfiguration of the Anacostia Freeway SE (D.C. 295) and the Old Southeast Freeway to improve connectivity and safety
- Rehabilitation of the East Capitol Street Bridge
- Rehabilitation of the Benning Road Bridge over Kenilworth Avenue NE
- New street grid network in Reservation 13 (Hill East)
- Extension of Eastern Avenue between Bladensburg Road NE and Kenilworth Avenue NE
- Preservation of key citywide freight routes
FIGURE V.16 — NORTHERN PLANNING AREA VEHICULAR NETWORK

The moveDC vehicular network for the Northern planning area includes:

- New street grid network at the McMillan site
- New street network in the U.S. Soldiers’ and Airmen’s Home area
- W Street NW extension from Florida Avenue NW to Georgia Avenue NW
- New street crossings of the railroad tracks north of the Fort Totten neighborhood
- Preservation of key citywide freight routes
The moveDC vehicular network for the Southern planning area includes:

- Managed lanes on the Anacostia Freeway (I-395)
- Improvement/reconfiguration of the Anacostia Freeway SE (D.C. 295) and the Old Southeast Freeway to improve connectivity and safety
- Replacement or rehabilitation of the South Capitol Street Bridge
- Replacement or rehabilitation of the Winkle Doodle Branch Bridge
- New street grid network in the Skyland area
- New street connection between 13th Street SE and St. Elizabeths redevelopment area
- L Street SW and K Street SW extensions in the Southwest Waterfront area
- Extension of Southern Avenue SE between Naylor Road SE and Branch Avenue SE
- Preservation of key citywide freight routes
The moveDC vehicular network for the Western planning area includes:

- Reconfiguration of the Rock Creek and Potomac Parkway between K Street and Q Streets NW to accommodate two-way travel all day
- Replacement or rehabilitation of the Key Bridge from Rosslyn to Georgetown
- Preservation of key citywide freight routes
- Managed lanes on Canal Road from the District line to Georgetown
This figure shows the potential change (2013 to 2040) in number of lanes on District streets in the p.m. peak period with moveDC recommendations. As a result of the desire to expand bicycle and transit networks within existing District roadways, the number of vehicular lane-miles on some corridors could decrease. The reduction in vehicular lane-miles results in an increase in capacity on corridors and within the system as a whole. Each roadway reconfiguration will need to be studied in further detail to determine the potential trade-offs between roadway capacity changes and other components like on-street parking.
Recommendation A.3: Designate modal priorities for arterial streets and implement appropriate facility modifications for the modal improvements.

Figure V.20 describes moveDC modal priorities in addition to vehicular traffic for major arterial corridors. Priorities were established so that every mode does not compete for space on every major street. As projects are implemented along these corridors, modal improvements should be made. Bicycle facilities should be added as designated in the moveDC plan as streets are repaved or reconstructed. Chapter 4 describes the full multimodal transportation network.

Recommendation A.4: Move traffic efficiently and safely by optimizing traffic signal operations on all major roadway corridors and updating corridor traffic signal timing on a regular basis.

Beginning in 2011, DDOT began to modernize the District’s traffic signal system. In coordination with the system modernization, a 5-year traffic signal timing optimization project began. The traffic signal optimization project includes replacing outdated traffic control software and equipment at intersections and re-timing traffic signals. When complete, more than 1,600 signals will have been upgraded. Current plans are for traffic signal timing to be evaluated and reassessed on a 5-year rotating basis.

The modernization of the citywide signal system will add critical new features to support the increasingly complex multimodal needs of the District’s transportation system. The system should include transit beneficial features such as transit signal priority and pre-emption. It also should include features that enable better active and real-time management of the system during events and special situations. Emergency vehicle pre-emption should be considered as the system is modernized. Actuated bicycle signalization and special bicycle signals should be incorporated at key locations. Sufficient time for pedestrians to safely cross intersections should be included in all signal timings.

Continuous signal system modernization should be conducted beyond the scope of the current project. Future modernization should stay up to date on state of the practice elements and should consider coordination of all traffic signals citywide and interfacing with autonomous and connected vehicles.

Recommendation A.5: Manage capacity on major commuting routes by implementing HOV and/or HOV with toll lanes.

To expand the person-carrying capacity of the system, the District should consider managed lanes on the limited access roadway system and major bridges at the District boundary. DDOT should consider pricing and/or occupancy as a means of facility management. The goals of managed facilities should include improving travel reliability and optimizing person-carrying capacity (e.g., HOV requirement). The following facilities are recommended for these improvements:

- I-66 on the Theodore Roosevelt Memorial Bridge
- I-295 between the District line and the 11th Street Bridge
- I-395 on the 14th Street Bridge
- I-395/I-695 between the 11th and 14th Street Bridges
- Canal Road between Chain Bridge and the Whitehurst Freeway
- New York Avenue between I-395 and the District line

Any priced management practice should preserve a no-cost option to avoid creating a mandatory fee for commuters.
Recommendation A.6: Reconfigure roadways to improve local access and connectivity or to improve safety.

District roadways should be reconfigured to improve local and multimodal access, connectivity, and safety. Recommended roadway reconfiguration projects include:

- **Anacostia Freeway SE between the 11th Street Bridge and Benning Road.** The Anacostia Waterfront Initiative (AWI) reflects a commitment by the District to restore and revitalize the Anacostia River and its waterfront. A primary goal of AWI’s transportation agenda was redesigning highways and freeways to reduce transportation barriers between neighborhoods and the water. DDOT subsequently developed the Anacostia Waterfront Transportation Master Plan, updated in 2007, which recommended improvements to the Anacostia Freeway corridor to address pedestrian and bicycle accessibility, short merging zones, and weaving patterns. The master plan proposed a variety of alternatives such as reconstruction as an urban boulevard, reconstruction to a limited access roadway flanked by access roads, or a combination that includes a depressed roadway. While further study is needed to identify a specific solution, the Anacostia Freeway is envisioned to be improved and reconfigured to include multimodal crossings and safe vehicular operations.

- **Rock Creek and Potomac Parkway from K Street NW to Q Street NW.** These parkways are envisioned to be reconfigured to provide two-way access throughout the day and improved local circulation.

- **Old Southeast Freeway between 11th Street SE and Pennsylvania Avenue SE.** This former freeway should be transformed to an urban boulevard with appropriate connections to the local street network. In addition, Barney Circle should be reconstructed.

This list of roadway reconfigurations does not include capital investments that are recommended in other moveDC Modal Elements.

Recommendation A.7: Maintain the District’s streets at a state of good repair.

The District’s streets should be maintained at a state of good repair. Maintaining streets in this manner has the potential to improve system reliability, safety, and availability.

Recommendation A.8: Improve street connectivity.

Land use transition as well as potential changes to major transportation facilities offer opportunities to reconnect streets that were once connected and in some cases, create entirely new street connections. Recommended street connection locations and specific street connections (new location and historic) are identified in Figure V.21. Continued changes in the city may offer the ability to identify additional new street connections.

Recommendation A.9: Implement safety improvements at high-rate and high-frequency locations and at locations with a history of severe crashes.

DDOT should continue to monitor crash rate, frequency, and severity, which should be evaluated as a part of ongoing monitoring and assessment. Based on the assessment, appropriate countermeasures should be identified and implemented at locations with a high crash rate (taking into account total user exposure) and/or crash severity. Projects addressing identified safety issues should be implemented expediently. Countermeasures should address multimodal transportation conditions and needs.

Recommendation A.10: Upgrade DDOT’s communications system.

The current copper communications network limits DDOT’s ability to deploy state-of-the-art technology applications. It is costly to maintain and modify to support new applications.

To support the applications outlined in this plan, the communications system must be upgraded. The recently-completed ITS Communications Master Plan outlines a phased migration from copper to Ethernet over fiber optics, adding redundancy for the network core.
As the District grows, its existing streets will increasingly need to support more and different transportation users while also conveying a mixture of vehicular traffic for many different purposes. To achieve this end of supporting a mixture of uses including vehicular trips, modal priorities were assigned for each major District corridor as shown in the figure.
FIGURE V.21 — RECOMMENDED STREET CONNECTIONS

This figure shows locations where future street connections have been identified. These changes may be possible with redevelopment of existing properties or through DDOT initiatives, and continued changes in the city may offer the ability to identify additional new street connections.
Within and connecting to Reservation 13 (Hill East)

L Street SW and K Street SW between Half Street SW and Delaware Ave SW

14th Street between Rhode Island Avenue NE and New York Avenue NE

Along and crossing the Southeast Freeway

Eastern Avenue NE between Bladensburg Road NE and Kenilworth Avenue NE

Within the U.S. Soldiers’ and Airmen’s Home as a part of development

13th Street SE between High Street and the St. Elizabeths campus

G Street NE north of Union Station (part of Union Station redevelopment)
FIGURE V.21 — RECOMMENDED STREET CONNECTIONS (CONTINUED)

Longfellow Street NE between 1st Street NE and 3rd Street NE

Sligo Mill Road between Oglethorpe Place NW and Chillum Place NE

I Street SE and H Street SE between New Jersey Avenue SE and 2nd Street SE (in progress)

Potential Maryland Avenue SW Plan street connections

Southern Avenue SW between Naylor Road SE and Branch Avenue SE

K, L, N, and O Streets SW between 3rd Street SW and Half Street SW
Recommendation A.11: Upgrade analog video system to digital video.
The current traffic monitoring system uses a combination of analog and digital video to distribute streams within the District and to external partners. Incompatibilities have led the District to digitally decode and re-encode for different third parties. Standards are improving and the recent widespread adoption of the H.264 standard, for example, has improved interoperability and made digital video sharing easier. As digital video improves at a rapid rate in the industry, further improvements and standardization are expected. DDOT should seek to keep its system up to date to support current standards, which are not driven by the ITS market, but the broader security and digital entertainment arenas which promise rapid change.

Recommendation A.12: Actively manage performance of operations and maintenance.
U.S. DOT has been increasing its emphasis on performance measures, particularly with the Moving Ahead for Progress in the 21st Century (MAP-21) Act which requires states to adopt maintenance and mobility performance measures.

DDOT should seek to identify key performance targets that align with its mission and chart its performance over time. DDOT also should improve its asset management processes. With millions of dollars of technology assets and limited budgets, DDOT must develop and follow processes to closely track its inventory and plan for replacement of aging assets.

Recommendation A.13: Continue to adopt technologies that improve safety and system operations.
As electronics and communications get smaller, cheaper, and less energy consuming, DDOT should expect to see a convergence of static and dynamic signage and pavement markings. Crosswalk lighting systems are one example of this today. In the future, similar applications could become feasible for reversible lanes. DDOT should continue to evaluate and use—as they become economically- and technically-feasible and sound—new technology to improve safety and operations.

B. POLICIES
For the vehicular network to reach its full potential, it will need to be supported by appropriate policies. The following are policies recommended to support network recommendations.

Policies that apply to multiple modes are repeated throughout moveDC’s Modal Elements.

Recommendation B.1: Prioritize the needs of trips that start and/or end in the District over those that use D.C. as a through route.
The District needs to preserve space within the transportation system to fully accommodate District-to-District driving, walking, bicycling, and transit trips along with trips that start or end in the District. These trip types should be given priority over trips that travel through D.C.

The District’s Interstate highways, although designed primarily to offer access to and from central Washington, nonetheless carry traffic through the District and serve an important regional function. This function should be maintained and the Interstate highway system in the District should be kept in a state of good repair.

Recommendation B.2: Allow flexible use of rights-of-way during non-peak periods.
Vehicular traffic volumes in the District are highest during weekday commute times. On weekends and during off-peak weekday periods (middays and evenings), traffic volumes are considerably lower and many streets have available capacity that can be repurposed for other uses including pedestrians, bicycles, and recreational space.

In addition to the many special events that use the District’s roads on a yearly basis, the District should work with local groups to identify locations and time periods where rights-of-way can be used for purposes other than vehicular travel. Weekend closures of Beach Drive in Rock Creek Park and neighborhood festival-related street closures are good existing examples of this type of flexible use.

Recommendation B.3: Create new or reestablish historic street segments to maximize connectivity.
When possible, the District should seek to restore street connectivity to maximize the functionality of the street network in providing local access. Recommendation A.8 describes specific locations for potential new street connections.
Additional street connections should be implemented where possible. These connections could take the form of new streets as part of development projects or could occur independently along a historic right-of-way. The District should prioritize connections that can reduce walking distances to and from transit stations or activity centers. While the District will seek to create new street connections, it should not generally seek to add vehicle lanes or vehicle capacity in the street system by moving curbs and reducing the quality of the pedestrian environment.

**Recommendation B.4: Improve multimodal travel reliability and reduce congestion through area and corridor management strategies.**

As the District continues to grow, managing vehicle access on key corridors and to key destinations through price or minimum vehicle occupancy may become an important approach to providing reliable access to activity centers. The District’s congested entry routes, including freeways and bridges as well as the Central Employment Area, are areas to explore occupancy and pricing as ways to manage congestion, as referenced in Recommendation A.5.

Lane management typically uses price and/or occupancy requirements to manage vehicular demand in designated lanes or on roadway facilities. Typically, HOVs and transit vehicles are permitted to use managed facilities at a discounted rate or for free.

In addition to corridor-specific pricing and vehicle occupancy strategies, area management strategies should be considered. The best known examples of area pricing are based on a cordon area and typically involve center cities and the places and times of day with the highest concentrations of travel demand. A cordon area in the District could be implemented for weekday trips into the Central Employment Area at a rate approximately equivalent to a round-trip peak period Metrorail fare. Revenues from the zone should be dedicated to operations and maintenance of the managed facility (or area) and toward projects that expand the person-moving capacity of the transportation system, including those providing greater access to the priced areas or corridors.

Demand management also would help to manage the reliability and accessibility of goods movement and delivery in the District. In addition, they would help to improve the District’s air quality by reducing the amount of delay per vehicle throughout the transportation network.

**Recommendation B.5: Manage vehicular speed for safety and efficiency.**

The District should emphasize safety and vehicle speed management in the design of all streets. Street design elements should help self-enforce the posted speed limit. The District also should evaluate speed limits to assess the trade-offs between time and safety.

In addition to traffic operational benefits of a steady vehicle speed profile, lower vehicle speeds tend to result in fewer and less severe crashes for all modal users. In the case of pedestrians and bicycles, vehicular speeds of less than 20 mph result in significant safety benefits in terms of crashes resulting in fatality or severe injury.

Many people believe that the regulation of the transportation network to promote low vehicular speeds results in longer travel time and more congestion along a given street. While this can certainly be the case, in most instances it is not. The stop-and-go nature of urban driving, combined with the practical matter of intersection capacity, results in an optimum urban street capacity at a speed of approximately 25 mph.

**Recommendation B.6: Preserve key freight corridors for goods movement.**

Goods movement and delivery needs must be coordinated with multimodal system demands to allow goods to be moved efficiently and safely, without impeding overall system balance or endangering other modal travelers (especially bicycles and pedestrians).

Urban areas around the world have had to address dramatic increases in freight movement in the last 20 years. Globalized production models and supply chains have meant that goods manufactured overseas must be distributed back to markets where they are consumed. This has been increasingly through low-cost container shipping, which has resulted in significant truck traffic on major and minor travel routes. Challenging globalized production are just-in-time delivery models and reduced on-site inventories at supply locations. These models and inventory management approaches have created demand
for more frequent deliveries by more services and have resulted in less-coordinated deliveries.

The District should provide adequate freight movement infrastructure in designated freight corridors while also improving safety for all users in these corridors. Preserving these corridors means maintaining design standards compatible with larger vehicles, while also seeking to implement treatments that reduce conflicts between large vehicles and other users. One example is the current standard’s limitation on commercial vehicles reversing in public spaces.

**Recommendation B.7: Support reduced emissions for consumer and commercial vehicles.**

The transportation sector is one of the most significant emitters of air pollution. Zero and low emission engines are an area where transportation policy can have a direct impact on improving the environment.

Electric vehicles and hybrid vehicles that use batteries charged from an external source or charged by other means are a significant opportunity to maintain current personal mobility while reducing auto emissions. DDOT’s *Electric Vehicle Fleet Program* is working to bring hundreds of electric cars and charging stations to the District. DDOT should continue to explore opportunities to increase the inventory and citywide distribution of publicly-accessible electric vehicle charging stations in public spaces throughout the District.

Natural gas is another alternative to gasoline. It produces less carbon dioxide when combusted. As of 2009, approximately 12% of DDOT’s vehicle fleet was fueled by natural gas. DDOT should support technologies that help reduce emissions for consumer and commercial vehicles.

**Recommendation B.8: All transportation investments should also be state of good repair projects.**

DDOT should seek to align project programming and funding between projects intended to bring the transportation system to a state of good repair (SOGR) and new construction and enhancement projects. This not only can combine funding sources and realize efficiency in project delivery, but also can demonstrate an agency commitment to showing that repair and maintenance of the transportation system are just as important as major changes to it.
SOGR refers to maintenance and rehabilitation projects that keep infrastructure in a sound and functional condition and offset the need for more costly, extensive maintenance into the future. For DDOT, the logistical needs of these projects—such as maintenance of traffic, mobilization of work crews and equipment, and potential temporary impacts on parallel infrastructure systems like utilities—represent project costs. To the extent that other adjacent or connected projects can be integrated into the SOGR project, an overall cost savings may be achieved by reducing the outlay of resources needed for these functions of project delivery. This may require additional environmental analysis.

Recommendation B.9: Further formalize the data collection, evaluation, sharing, and monitoring program within DDOT.

Unified data collection and monitoring programs help:

- Identify where changes to the transportation system are needed
- Create universal application of policies and standards
- Provide informed evaluation as to what is most effective after implementation

DDOT should establish a program across its different administrations to allow consistent data formats, regular updates, and systematic means of evaluation and monitoring transportation system performance. This policy also includes providing public access to as much non-personal or non-proprietary data as possible in real time or close to it.

Recommendation B.10: Establish a consistent policy towards traffic calming in neighborhoods.

Traffic calming is effective in reducing negative impacts of vehicular traffic (especially speed, accident rates, and through-traffic volume on neighborhood streets). Achieving successful outcomes and sustained community support will be accomplished by using a variety of physical designs for traffic calming treatments as well as a consistent policy on the conditions in which each treatment can be used.

The District has implemented traffic calming in many of its neighborhoods. A program of traffic calming assessments was designed to respond to neighborhood concerns and evaluate a focused area of neighborhoods for ways that traffic calming approaches might be implemented. DDOT has created the Livability Program to conduct neighborhood transportation planning studies and advance small-scale safety improvements.

Further expansion of this program should shift from a policy of neighborhood-requested traffic calming to include standard assessments of where traffic calming is appropriate. These should lead to place-appropriate traffic calming techniques to ensure that design interventions that are well coordinated with their neighborhood context. DDOT already permits a wide range of traffic calming design options, representing a sophisticated understanding of the practice.

Recommendation B.11: Support autonomous vehicle implementation and connected vehicle research, using D.C. as a test bed for the nation.

Autonomous (self-driving) and connected vehicles have the potential to improve safety, efficiency, and mobility while also reducing parking challenges and improving air quality. Successfully implemented, autonomous vehicles can offer people the convenience of driving, without many of its negative impacts and challenges. Like any new technology, additional study of autonomous vehicles is needed to evaluate things like safety in a complex urban environment.

With or without autonomous vehicles, connected vehicle technology can offer people a safer, more efficient, and more predictable driving experience while, at the same time, allowing the transportation system to perform better. Connected vehicles manage traffic by communicating through vehicle-to-vehicle and vehicle-to-infrastructure data transmission. Successfully implemented, connected vehicle technologies could transform operations for the District by:

- Helping to reduce crash frequency and severity
- Providing data to traffic managers in real-time to optimize system performance
- Providing travelers better information to make informed travel choices and to understand the impact of those choices
- Permitting vehicles to talk to the system to increase vehicle energy efficiency and system operational efficiency
The District could become an urban test bed for both autonomous vehicles and connected vehicles through policy and legal support.

**Recommendation B.12: Develop Integrated Corridor Management applications.**

Integrated Corridor Management (ICM) is a comprehensive set of strategies deployed to gain operational efficiencies and provide travelers with better information along transportation corridors. Strategies include multimodal applications in traveler information and corridor technology applications to create better mobility and improved operations. Successful ICM implementation in D.C. and neighboring states could result in better utilization of available multimodal system capacity by serving key travel routes, improving system operations, reducing the severity and duration of congestion, and increasing travel time reliability.

Scheduled and unscheduled events affect the District each day. When weather and security concerns severely disrupt travel throughout the city, 511 services can be used to direct messages to a wide audience. By directing travelers to 511 website, mobile application, and phone systems, critical messages can be distributed using one tool to help people make informed decisions about travel. 511 technology has been used for decades in some states and remains a viable communication mechanism.
C. EDUCATION AND ENFORCEMENT

Education and enforcement will help make all users of the vehicular network safer and make the network work more efficiently.

**Recommendation C.1: Enhance transportation education at all levels.**

Safer streets require more than physical improvements—they also require users to understand their own responsibility to use the system safely. A key approach to achieving this is safety education for the public and for owners, managers, and operators of the system.

For the public, educational materials should be integrated into school curricula and day-to-day communication. In addition, information should be shared through regular programs and materials hosted and developed by the DMV. DDOT currently develops educational and awareness campaigns through NHTSA grants and through the region’s Street Smart campaign. DDOT should continue to support the promotion of transportation education into D.C. school curricula to help further educate people on transportation.

For owners, managers, and operators, new information related to standard operating procedures, agency standards, laws, regulations, policies, and guidelines should be incorporated into regular and/or mandated training programs.

**Recommendation C.2: Enforce the rules of the road for all users.**

Safety is the most basic standard for a transportation network. The District supports a culture of safety for all modes throughout the District, and encourages respect for all users by all users. DDOT should assist MPD in providing effective enforcement of the laws for all users throughout the District.

DDOT should continue to work with MPD, DMV, and Department of Public Works (DPW) to provide effective education and outreach regarding the rules of the road. Education related to newer laws pertaining to bicycles, pedestrians, or new facilities should also be provided to those enforcing laws to ensure greater consistency and effectiveness.
Recommendation C.3: Use technology to support enforcement of transportation rules and regulations.
The District’s photo-enforcement efforts, including new technologies aimed at enforcing pedestrian laws, help to reinforce the overall culture of safety. The District should continue to use and explore new ways technology can expand the District’s culture of safety and enforcement of transportation rules and regulations. In the future, the District should explore the ways in which technology can improve enforcement of transit-only facilities, enhance safety in bicycle facilities, and support the management of transportation facilities and areas.

Recommendation C.4: Enhance strategies for engaging with the public through mobile computing, social media, and crowdsourcing.
Interpersonal connectivity has implications for any group or agency with customers or constituents. Companies are increasingly building relationships with their customers to elicit customer service and feedback—they are actively mining customer sentiment to rapidly fix problems before they “go viral.” DDOT should find ways to engage its road users, both as a source of crowdsourced information on topics such as current conditions and maintenance issues, and as taxpayers that will increasingly expect transparency from their public servants. Traveler information is a service that DOTs are expected to provide; social media is the next logical extension.

DDOT manages valuable construction and road condition information. The low barriers to entry in application development are leading to the proliferation of mobile applications to take advantage of this sort of data. DDOT should adopt an “open data” model for this information, particularly construction and planned event information. This would involve creating portals to make these data available to the public and developers to incorporate them into mobile applications.

Recommendation C.5: Use TCOs to proactively manage conflicts between vehicles and other transportation modes.
Conflicts between vehicles and other transportation modes such as pedestrians and bicyclists exist when there is a high volume of such traffic. DDOT should continue to work with MPD to provide TCOs to manage the flow and conflicts between modes at highly trafficked locations such as high-volume Metrorail station entrances and cultural or sporting events.

IV. Performance
The moveDC plan’s vehicular system recommendations are intended to support efficient vehicular movement, increase safety, and improve reliability. They also are intended to allow other transportation modes to function efficiently and safely. The moveDC plan’s recommendations address policy, education, projects, and programs. The plan goals (described in Chapter 1) were used in the evaluation of the Vehicle Element’s performance, similar to the other Modal Elements.

If future District residents, employees, and visitors were to continue driving at the same rate they do today, there would not be room to accommodate everyone on city streets. In the limited investment scenario studied—future (2040) baseline, which best represents a scenario with a similar rate of driving as today among those evaluated for moveDC—vehicle delay would increase by more than 41% and vehicle hours traveled would increase by about 16%. Congestion on major and minor streets would increase significantly and transit services that travel with traffic would become less effective.

However, with the scenario recommended in moveDC, the total number of driving trips would remain approximately equal to existing (2010) modeled conditions—1.944 million trips (existing) versus 1.994 million trips (recommended plan). Amid increasing population (49% between 2010 and 2040) and jobs (28% between 2010 and 2040), vehicle delay would increase minimally (9.5%) from existing (2010) modeled conditions as the District’s transit, bicycle, and pedestrian networks would see a dramatic increase in use.

Investments in other transportation modes will allow the city to continue to grow, while vehicular conditions in 2040 remain similar to existing conditions.

State of Good Repair
The moveDC plan recommends infrastructure investments and system maintenance to bring the District’s roads and bridges to a state of good repair. It also recommends facility and area management strategies and technological investments to increase efficiency and reliability of system assets. The objective of the ultimate system is to manage vehicular demand, optimize operations, and improve safety so people and goods can move efficiently Districtwide.
Travel Demand
The Districtwide Travel Demand Model, the project's spatial analysis model, and qualitative reviews were used to develop the metrics for each performance measure relevant to the Vehicle Element.

Mode Share
The moveDC plan's recommendations reduce demand for motorized trips—those that stay within the District and those traveling to or from the District—as shown in Table V.5 and V.6.

Person-Carrying Capacity
The moveDC plan reduces vehicular capacity on some corridors and reallocates space for other modes to expand the person-carrying capacity of the network 24% from existing (2010) modeled conditions (Table V.7). The combination of strategic improvements in the vehicular transportation network coupled with robust investments in other modal infrastructure and services has the dramatic effect of moderating the increase in vehicular trips and delay between 2010 and 2040, amid the substantial forecasted increase in population and jobs.

Vehicular Measures of Effectiveness
As shown in Table V.8, when compared to existing (2010) modeled conditions, the moveDC plan results in potentially fewer vehicle miles traveled and only a slight increase in vehicle hours traveled (5.5%) and delay (9.5%) for District-to-District trips. When compared to future (2040) baseline conditions, the recommended plan results in approximately 13% (1.38 million) fewer vehicle miles traveled and 23% (7,000) fewer hours of delay. This performance is attributed to strategic investments in vehicular network efficiency and transit, pedestrian, and bicycling infrastructure, programs, and services. The performance noted above is in the context of the forecasted increase in population of nearly 50% in the District and an increase in jobs in the District by more than 27%.

Volume to Capacity
V/C ratios provide a way to understand where congestion may occur on streets under future conditions. A visual comparison of performance between the future (2040) baseline (Figures V.22 and V.24) and recommended plan scenario (Figure V.23 and V.25) yields subtle differences, quantitatively, the difference in performance between the future (2040) baseline scenario and recommended plan is substantial.

The Vehicle Element’s overall performance—by relevant goal category—is summarized in Table V.9.

<table>
<thead>
<tr>
<th>Travel Mode</th>
<th>Base Year (2010)</th>
<th>Future Baseline (2040)</th>
<th>moveDC Plan (2040)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motorized (Drive)</td>
<td>Trip</td>
<td>639,000</td>
<td>756,000</td>
</tr>
<tr>
<td></td>
<td>Mode Share</td>
<td>45.5%</td>
<td>41.1%</td>
</tr>
<tr>
<td>Transit</td>
<td>Trip</td>
<td>314,000</td>
<td>384,000</td>
</tr>
<tr>
<td></td>
<td>Mode Share</td>
<td>22.4%</td>
<td>20.9%</td>
</tr>
<tr>
<td>Non-Motorized (Walk/Bike)</td>
<td>Trip</td>
<td>450,000</td>
<td>698,000</td>
</tr>
<tr>
<td></td>
<td>Mode Share</td>
<td>32.1%</td>
<td>38.0%</td>
</tr>
</tbody>
</table>

Notes:
1. Mode share shown in the above table is for weekday (all-day) trips that start and end in the District
2. Mode share is forecast using the Districtwide Travel Demand Model
3. Transit is bus, streetcar, high-capacity transit, Metrorail, commuter rail, and water transit
4. Table does not account for carpool trips by passengers
5. Columns may not total 100% due to rounding
### Table V.6: Daily Mode Share for Trips to or from the District

<table>
<thead>
<tr>
<th>Travel Mode</th>
<th>Base Year (2010)</th>
<th>Future Baseline (2040)</th>
<th>moveDC Plan (2040)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motorized (Drive)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trips</td>
<td>1,305,000</td>
<td>1,480,000</td>
<td>1,340,000</td>
</tr>
<tr>
<td>Mode Share</td>
<td>65.6%</td>
<td>63.7%</td>
<td>58.8%</td>
</tr>
<tr>
<td>Transit</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trips</td>
<td>486,000</td>
<td>615,000</td>
<td>694,000</td>
</tr>
<tr>
<td>Mode Share</td>
<td>24.4%</td>
<td>26.4%</td>
<td>30.5%</td>
</tr>
<tr>
<td>Non-Motorized (Walk/Bike)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trips</td>
<td>200,000</td>
<td>229,000</td>
<td>244,000</td>
</tr>
<tr>
<td>Mode Share</td>
<td>10.0%</td>
<td>9.9%</td>
<td>10.7%</td>
</tr>
</tbody>
</table>

**Notes:**
1. Mode share shown in the above table is for weekday (all-day) trips that start or end in the District
2. Mode share is forecast using the Districtwide Travel Demand Model
3. Transit is bus, streetcar, high-capacity transit, Metrorail, commuter rail, and water transit
4. Table does not account for carpool trips by passengers
5. Columns may not total 100% due to rounding

### Table V.7: Network Person-Carrying Capacity

<table>
<thead>
<tr>
<th>Facility Type</th>
<th>Change in Capacity from Existing Network (2013)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Future Baseline (2040)</td>
</tr>
<tr>
<td>Roadway Change in Capacity</td>
<td>0%</td>
</tr>
<tr>
<td>Transit Change in Capacity</td>
<td>54%</td>
</tr>
<tr>
<td>Bicycle Facilities</td>
<td>N/A</td>
</tr>
<tr>
<td>Total (All Facilities)</td>
<td>9.5%</td>
</tr>
</tbody>
</table>

**Notes:**
1. Capacities shown are for peak period weekday conditions
2. Transit is streetcar, high-capacity transit, and Metrorail
3. Bicycle facilities are trails, cycle tracks, and bicycle lanes
4. Roadway capacities do not take into account increases in capacity that may result from signalization upgrades or other technologies

### Table V.8: System-level Vehicular Measures of Effectiveness

<table>
<thead>
<tr>
<th>Travel Mode</th>
<th>Base Year (2010)</th>
<th>Future Baseline (2040)</th>
<th>moveDC Plan (2040)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle Miles Traveled</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VMT</td>
<td>9.12 million</td>
<td>10.45 million</td>
<td>9.07 million</td>
</tr>
<tr>
<td>Change</td>
<td>–</td>
<td>15% increase from base year</td>
<td>13% reduction from future baseline</td>
</tr>
<tr>
<td>Vehicle Hours Traveled</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VHT</td>
<td>335,000</td>
<td>389,000</td>
<td>355,000</td>
</tr>
<tr>
<td>Change</td>
<td>–</td>
<td>16% increase from base year</td>
<td>9% reduction from future baseline</td>
</tr>
<tr>
<td>Delay</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hours</td>
<td>21,000</td>
<td>30,000</td>
<td>23,000</td>
</tr>
<tr>
<td>Change</td>
<td>–</td>
<td>41% increase from base year</td>
<td>22% reduction from future baseline</td>
</tr>
</tbody>
</table>

**Notes:**
1. Forecasts shown are for weekday (all-day) trips within the Districtwide Travel Demand Model area (inside the Capital Beltway)
2. Measures of effectiveness are forecast using the Districtwide Travel Demand Model
FIGURE V.22 — 2040 AM PEAK HOUR V/C RATIOS FOR FUTURE BASELINE SCENARIO
This maps shows 2040 baseline scenario V/C ratios for major corridors in D.C.
FIGURE V.23 — 2040 AM PEAK HOUR V/C RATIOS FOR THE RECOMMENDED PLAN

This map shows 2040 recommended plan V/C ratios for major corridors in D.C., with the moveDC plan recommendations fully implemented.
FIGURE V.24 — 2040 PM PEAK HOUR V/C RATIOS FOR FUTURE BASELINE SCENARIO
This map shows 2040 baseline scenario V/C ratios for major corridors in D.C.
FIGURE V.25 — 2040 PM PEAK HOUR V/C RATIOS FOR THE RECOMMENDED PLAN
This map shows 2040 recommended plan V/C ratios for major corridors in D.C., with the moveDC plan recommendations fully implemented.
<table>
<thead>
<tr>
<th>Goal</th>
<th>Metric</th>
<th>Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainability &amp; Health</td>
<td>Increase non-auto mode split</td>
<td>• A 64% non-auto mode share is forecasted for all trips that start and end in the District</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• A 51% non-auto mode share is forecasted for all trips that start or end in the District</td>
</tr>
<tr>
<td></td>
<td>Increase access to parks and green space</td>
<td>• Not applicable for this chapter</td>
</tr>
<tr>
<td></td>
<td>Encourage active transportation for health benefits</td>
<td>• Not applicable for this chapter</td>
</tr>
<tr>
<td></td>
<td>Reduce air and water quality impacts of transportation</td>
<td>• Reduce vehicular travels and emissions per capita</td>
</tr>
<tr>
<td></td>
<td>Prepare the transportation system for changing environmental and climatological conditions</td>
<td>• Not applicable for this chapter</td>
</tr>
<tr>
<td>Citywide Accessibility &amp; Mobility</td>
<td>Increase the person-carrying capacity of the transportation system</td>
<td>• Plan recommendations result in a 7% decrease in peak period vehicular facility capacity Districtwide compared to the existing (2013) network</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• The overall transportation system capacity increase 24% compared to the existing (2013) network</td>
</tr>
<tr>
<td></td>
<td>Improve system reliability</td>
<td>• Vehicular delay decreases 22% compared to the baseline future condition</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Plan performs considerably better in both the a.m. and p.m. peak periods</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Implement managed lanes, price private vehicle access to the Central Employment Area, optimize traffic signal operations on all major roadway corridors, and upgrade the ITS</td>
</tr>
<tr>
<td></td>
<td>Reduce financial barriers to the lowest-income transportation system users</td>
<td>• Not applicable for this chapter</td>
</tr>
<tr>
<td></td>
<td>Accommodate the movement and management of freight and goods</td>
<td>• Preserves key freight corridors for goods movement</td>
</tr>
<tr>
<td></td>
<td>Integrate the District’s transportation system with the region’s transportation network</td>
<td>• Compatible with Virginia’s I-395 and I-66 HOV lanes</td>
</tr>
<tr>
<td>Neighborhood Accessibility &amp; Connectivity</td>
<td>Increase the coverage of all modal networks throughout the District</td>
<td>• Improve local street connectivity in specific locations as well as part of redevelopment projects or to reestablish access along historic rights-of-way</td>
</tr>
<tr>
<td></td>
<td>Increase the number of transportation choices for travel between city neighborhoods</td>
<td>• New streets and reconfiguration of some roadways can remove barriers for local access and connectivity</td>
</tr>
<tr>
<td></td>
<td>Increase transportation availability to population centers and jobs, schools, amenities, and services</td>
<td>• New streets or managed lanes access two of eight population centers, four of nine employment centers, and 10 out of 20 mixed-use centers (see Figure V.26)</td>
</tr>
<tr>
<td></td>
<td>Increase transportation availability to economically challenged or targeted redevelopment areas</td>
<td>• New streets and managed lanes access 16 of 33 low-income Census Tracts and 11 of 26 designated redevelopment areas (see Figure V.26)</td>
</tr>
</tbody>
</table>
### Table V.9: moveDC Vehicle Element Performance (continued)

<table>
<thead>
<tr>
<th>Goal</th>
<th>Metric</th>
<th>Performance</th>
</tr>
</thead>
</table>
| **Safety & Security** | Improve safety for all users                                          | • Increase vehicular safety by:  
  • Enforcing the rules of the road for all users  
  • Providing transportation education at all levels  
  • Implementing safety improvements at high-rate and high-frequency locations and at locations with a history of severe crashes  
  • Upgrading the ITS system to facilitate more responsiveness to incidents  
  • Adopting technologies that improve safety  
  • Establishing a consistent policy towards traffic calming in neighborhoods  
  • Reconfiguration of selected roadways to improve connectivity and improve safety  
  • Traffic signal optimization on major roadway corridors to move traffic efficiently and safely |
|                   | Improve redundancy of transportation networks to handle emergencies   | • While vehicular capacity will decrease by 8% in peak periods along designated evacuation routes, multimodal person-carrying capacity will increase by 44%                                                                                                                                 |
|                   | Expand sidewalk network                                               | • Not applicable for this chapter                                                                                                                                                                                                                                           |
|                   | Maintain ability to evacuate District in case of emergency            | • Not applicable for this chapter                                                                                                                                                                                                                                           |
|                   | Preserve key functions without impacting the transportation system    | • Not applicable for this chapter                                                                                                                                                                                                                                           |
| **Public Space**   | Protect and enhance important corridors and urban landscapes          | • Not applicable for this chapter                                                                                                                                                                                                                                           |
|                   | Make streets functional, beautiful, and walkable                      | • Making streets more efficient will include traffic signal optimization and managing vehicular speeds  
  • Flexing the use of rights-of-way during non-peak periods will create uses for pedestrians, bicycles, and recreational or special event space                                                                                                                                 |
|                   | Increase tree coverage                                                | • Not applicable for this chapter                                                                                                                                                                                                                                           |
| **Preservation**   | Maximize reliability for all District transportation infrastructure by investing in maintenance and asset management | • Perform routine preservation activities on bridges to maximize the useful life along with needed repairs, rehabilitation, and replacement  
  • Approximately 10 miles of new streets will require future maintenance in addition to maintaining existing streets; the District should retain its opportunity to receive the maximum available federal maintenance contribution |

**Multimodal Long-Range Transportation Plan**
FIGURE V.26 — MOVEDC VEHICLE ELEMENT ACCESSIBILITY MAP
This figure shows increased vehicle accessibility in relation to District-designated revitalization districts; population, job, and mixed-use centers identified for moveDC planning purposes; and low-income areas based on U.S. Census data in the context of moveDC vehicle network recommendations.
**V. Vision to Reality**

moveDC is a long-term plan for a reason—achieving its full vision will require decades of investment and continued commitment from city leaders and support from innumerable local and regional partners. The return on the city’s investment of time and funds spent implementing the moveDC plan’s recommendations will be creating stronger, more vital neighborhoods; sharing prosperity among all of the city’s residents; meeting our responsibility to the environment; and making the District more competitive among its domestic and global peers.

This section provides guidance for prioritizing and implementing Vehicle Element infrastructure recommendations in order to get from the present day to the future vision. Additional information on implementation can be found in Chapter 5.

**A. USING THIS ELEMENT**

The Vehicle Element is a starting point for investments in the vehicular system for the District in the next 25 years. It presents needed and realistic vehicular network investments and policy concepts that together, support the moveDC plan’s other Modal Elements in achieving the goals established as a part of the planning process.

The moveDC plan does not present specific and final vehicular system design solutions, nor has moveDC analyzed all of the vehicle project-level trade-offs for individual components of the moveDC plan. The Vehicle Element of moveDC will need to be updated periodically to take into account the many changes the future will bring that cannot be anticipated today. The need for updates is the recognition that some things always change in a city as dynamic as Washington, D.C.

Finally, some recommendations of moveDC, as with the 1997 Transportation Plan for the District of Columbia, may not become reality. Regular updates to the Vehicle Element in coordination with the overall moveDC plan will help ensure the Vehicle Element continues to make sense in the context of changing demands on the system.

**B. PROJECT DEVELOPMENT PROCESS**

Some of the vehicle infrastructure recommendations included in the moveDC plan are already in the design process or ready for construction; however, the vast majority of the moveDC plan’s recommendations will need to undergo additional evaluation and further development—consistent with established city processes prior to their implementation.

The DDOT Environmental Policy and Process Manual, 2nd Edition (2012) further describes DDOT’s Project Development Process. The additional evaluation and development processes are likely to adjust the character, location, and other elements of some recommendations. This is a natural evolution of long-range plan identified recommendations as they move toward implementation.

**C. IMPLEMENTATION THROUGH PARTNERSHIP**

While the implementation of most capital infrastructure recommendations will be led by DDOT, some are likely to occur through partnership among DDOT and other agencies or organizations or with DDOT in a support role to other agencies or organizations.

**D. INFRASTRUCTURE COSTS**

The planning-level costs for identified Vehicle Element infrastructure recommendations (including ITS, bridges, and tunnels) are $5.4 billion and were developed in current year (2014) dollars at a long-range planning level of detail and accuracy. Because of the nature of long-range planning, all costs should be reevaluated in future project development activities. Cost by infrastructure recommendation is presented in Table V.10 through V.13. With respect to the planning-level cost estimates shown, the following were generally assumed:

- Wherever possible, the cost estimates utilized project-specific costs, including costs from MWCOG’s FY13-19 Transportation Improvement Program (TIP), the FY14-20 District budget, and other project-specific estimates.
- Additional costs for moveDC recommendations were estimated using a generalized unit cost related to project type. The unit costs were derived from existing District project costs.
Programs
In the context of implementation for moveDC, the term “program” is used to describe ongoing funding commitments for operations, education, maintenance, regular infrastructure improvements that are not defined as projects, or other items, such as debt service on Grant Anticipation Revenue Vehicle (GARVEE) bonds. Vehicular program costs are estimated to be $4.1 billion. Additional information on costs for vehicular, ITS, and bridge and tunnel programs are presented in Chapter 5.

Asset Management
Costs within this area of the moveDC plan include ongoing assessments, maintenance, and repairs of transportation infrastructure. Costs for asset management $4.2 million and are presented in Chapter 5.

E. BUDGETING PROCESS
moveDC was developed in a fiscally unconstrained environment, but DDOT recognizes that it operates in an environment constrained by available funding. While the financial plan in Chapter 5 identifies new sources of revenue to help close the cost/revenue gap, an annual gap is likely to remain throughout moveDC’s implementation horizon.

Because of this fiscal reality, moveDC has developed a methodology for prioritizing recommendations that can assist in the process of making annual budget decisions. This approach is described in Chapter 5. From a broad prioritization perspective, DDOT should take the following approach:

- Fund basic state of good repair (SOGR) and maintenance for existing programs
- Allocate additional resources that accelerate the pace of reaching SOGR for all infrastructure
- Fund critical transportation infrastructure investments to address deficiencies, safety, or capacity needs

Critical investments in transportation infrastructure have been prioritized in the moveDC plan, but many will still need to go through DDOT’s Project Development Process prior to implementation. DDOT should only seek to advance investments that have the most merit to meet moveDC’s goals.

It should be noted that capital programs and asset management—both of which are related to ensuring safe and reliable operations and adequate maintenance of existing system assets—were not prioritized. The level at which each of these are funded is established through normal annual District budget processes.

F. PRIORITIZATION PROCESS
moveDC capital improvements were prioritized based on an understanding of community and stakeholder support, existing commitments, and goals of ensuring transportation investments are distributed across the District in the service of current and future residents. They also were prioritized based on criteria developed for each of moveDC’s goals. Cost was not a criteria used in prioritization, but will need to be a factor in individual budget decisions.

Individual capital investment recommendations were measured within each criterion and then processed into four tiers within project groupings (generally by transportation mode). The tiers were then used to rank and organize priorities.

Generally, investments within Tier 1 are assumed to be the highest priorities for implementation, while those in Tier 4 projects are lower priorities, relative to projects within their group. It is worth noting that in many cases Tier 1 recommendations—due to size, scale, cost, and complexity—cannot be immediately constructed and will require investment in refinement, definition, and development through DDOT’s Project Development Process. Similarly, most recommendations in other tiers are likely to require some level of proactive investment in further development, prior to them becoming the District’s highest implementation priorities.

G. OUTCOMES
The full results of the prioritization process for the Vehicle Element are shown by tier in Table V.10 through V.13 and Figure V.27. In addition to each infrastructure recommendation’s rating (tier), Table V.10 through V.13 describe project limits, identify potential implementation responsibility, and provide a planning-level cost estimate, where it is possible to do so based on information currently available.
<table>
<thead>
<tr>
<th>Type</th>
<th>Name of Facility</th>
<th>From</th>
<th>To</th>
<th>Length (miles)</th>
<th>Ward(s)</th>
<th>DDOT Role</th>
<th>TIP Project</th>
<th>Cost ($ Millions)</th>
</tr>
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<tbody>
<tr>
<td>ROADWAY</td>
<td>ANACOSTIA FWY SE</td>
<td>EAST CAPITOL ST &amp; KENILWORTH AVE NE</td>
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<td>STUDY</td>
<td>REVENUE NEUTRAL</td>
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### Table V.11: Tier 2 Vehicular Capital Investments

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<th>Type</th>
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<th>From</th>
<th>To</th>
<th>Length (miles)</th>
<th>Ward(s)</th>
<th>DDOT Role</th>
<th>TIP Role</th>
<th>Cost ($ Millions)</th>
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<td>REVENUE EXCEEDS COST</td>
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<td>KENILWORTH AVE NE</td>
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<td>PRIVately Funded</td>
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### Table V.12: Tier 3 Vehicular Capital Investments

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<th>From</th>
<th>To</th>
<th>Length (miles)</th>
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<th>DDOT Role</th>
<th>TIP Role</th>
<th>Cost ($ Millions)</th>
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<td>NEW STREET</td>
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<td>Type</td>
<td>Name of Facility</td>
<td>From</td>
<td>To</td>
<td>Length (miles)</td>
<td>Ward(s)</td>
<td>DDOT Role</td>
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</table>
Figure V.27 — Vehicular Infrastructure Priorities

This figure shows vehicular infrastructure recommendations by tier. The map shows bridge rehabilitations, the cordon area, managed lanes, new streets, new local bridges and tunnels, and roadway reconfigurations.

Legend

- Quadrant Boundary
- Ward Boundary
- Water
- Park
- University
- Military
- Monumental Core

Existing Infrastructure
- Metrorail Station
- Metrorail Line
- Railroad
- Road

Bridge Rehabilitation Tier
- Tier 1
- Tier 2
- Tier 3
- Tier 4

Managed Lane Tier
- Tier 1
- Tier 2
- Tier 3
- Tier 4

New Local Bridge/Tunnel Tier
- Tier 1
- Tier 2
- Tier 3
- Tier 4

Cordon Charge Tier
- Tier 2

New Street Tier

Roadway Reconfiguration Tier
- Tier 1
- Tier 2
- Tier 3
- Tier 4