City of Alexandria

Comprehensive Transportation Master Plan

March 21, 2008

- TRANSPORTATION CHOICE

- CONNECTIVITY & MOBILITY

- QUALITY OF LIFE

City of Alexandria
Comprehensive Transportation Master Plan

Overview

THERE IS AN INTEGRATED, MULTIMODAL TRANSPORTATION SYSTEM THAT EFFICIENTLY AND EFFECTIVELY GETS PEOPLE FROM POINT "A" TO POINT "B". *-City Strategic Plan 2004-2015*

Vision

Envision walking out of your front door and down a streetscaped sidewalk, safely crossing the street at a well marked, signalized intersection that made you feel like you, the pedestrian, had priority. Then, after safely crossing the street, you arrive at the transit stop, but this is no ordinary transit stop. This is a Smart Stop that provides attractive shelter from the morning sun. You check the information kiosk for the arrival time of your transit vehicle. Realizing that you have two minutes until the vehicle arrives, you decide to arrange for dinner reservations via a web enabled service offered at this stop. Then, you check to see what transit vehicle you should plan on boarding for the trip to Old Town later that evening for dinner. When you are done making plans for the evening, your vehicle arrives, right on time.

You board the transit vehicle, settle into a comfortable seat, and check on your estimated arrival time on the variable message board at the front of the vehicle. You take out your PDA and organize your day as the vehicle departs and quickly leaves the congested automobile traffic behind as it travels along its own dedicated lane. You watch the bicyclists commuting safely along the bicycle lanes dedicated along this corridor and pedestrians sipping their morning coffee on the landscaped walkway, and before you know it, you are at your destination — sooner than if you had decided to drive yourself.

This is the City of Alexandria's transportation future. With the update of the City's Transportation Master Plan the City seeks to initiate an unprecedented paradigm shift, putting Alexandrians first, and providing them with innovative options for transportation. The successful implementation of this Plan will allow all Alexandrians the opportunity to choose, on a daily basis, if they want to walk, bike or take transit to their destination. The goal of this concept oriented Master Plan is to successfully integrate and link these three transportation modes together, providing connectivity and accessibility to all of Alexandria's recreational, cultural, and economic assets, as well as the assets of the greater Northern Virginia region.

Transportation Vision

The City of Alexandria envisions a transportation system that encourages the use of alternative modes of transportation, reducing dependence on the private automobile. This system will lead to the establishment of transit-oriented, pedestrian friendly village centers, focused on neighborhood preservation and increased community cohesion, forming a more urban, vibrant and sustainable Alexandria. The City will promote a balance between travel efficiency and quality of life, providing Alexandrians with transportation choice, continued economic growth and a healthy environment.

Guiding Principles

In response to citizen input, the City has established the guiding transportation principles which, collectively, form a new template for transportation decision making within the City of Alexandria, and aim to establish the City of Alexandria as a regional leader in the development of innovative transportation solutions. Citizens are seeking a wholesale change in the way the City addresses transportation issues in the form of sustainable alternatives that promote transportation choice; enhance connectivity and mobility; and maintain the City's high quality of life.

The seven guiding principles provide the framework for this transportation plan, and seek to encourage a paradigm shift in the way Alexandrians think and act when it comes to traveling. This shift in thinking aims to overcome the traditional approach that the City has taken in the past, assuming the primary use of the automobile in the design and operation of its infrastructure. In the 21st Century, Alexandria must embrace all methods of overcoming automobile dependency. Regional projections show that population and job growth are expected to continue to increase within the City and region, placing further pressure on transportation infrastructure that is currently over stressed. The essential character of Alexandria's land use, the future quality of life for City residents, and the accessibility of all City assets is dependent upon how the City manages its transportation system. This Plan establishes the goals, strategies, actions and policies that will guide these critical management decisions.

The adoption of this Transportation Plan is a very exciting time in the City of Alexandria. Feedback received from citizens and stakeholders throughout the Plan development process indicates that Alexandrians are not willing to accept the status quo. The new paradigm rejects the notion that traffic congestion be considered a necessary evil that goes along with living in close proximity to the Nation's Capital. The problem of congestion not only impacts the required time for daily commutes, it has a negative impact on the quality of life of all Alexandrians—resulting in increased travel times for necessary trips to the grocery store, library, restaurant and post office. Congestion limits the activities of individuals with mobility impediments and those without access to automobiles; it discourages walking and physical activity; it contributes to poor air quality; and it also impacts the City's economic base, deterring tourists from visiting the City during certain times of the day and year, and deterring the establishment of new businesses. With the adoption of this plan, the City of Alexandria recognizes the concerns of its citizens and the inconveniences that congestion has caused, and strives to return the City streets to the citizens of Alexandria.

Guiding Transportation Principles

1. *Alexandria will develop innovative local and regional transit options.*
2. *Alexandria will provide quality pedestrian and bicycle accommodations.*
3. *Alexandria will provide all its citizens, regardless of age or ability, with accessibility and mobility.*
4. *Alexandria will increase the use of communications technology in transportation systems.*
5. *Alexandria will further transportation policies that enhance quality of life, support livable, urban land use and encourage neighborhood preservation, in accordance with the City Council Strategic Plan.*
6. *Alexandria will lead the region in promoting environmentally friendly transportation policies.*
7. *Alexandria will ensure accessible, reliable and safe transportation for older and disabled citizens.*

What Does This Plan Contain?

This Plan was developed by the members of the Ad Hoc Transportation Task Force and the City of Alexandria to ensure the wise, effective, and sustainable planning of the City's transportation future. The Transportation Master Plan is a concept oriented Plan that was developed to identify innovative approaches to addressing the direction of Alexandria's transportation future. This Plan establishes a multimodal vision that will guide the City forward in it's transportation decision-making process.

The Transportation Master Plan includes six sections and an extensive appendix.

Section One

Studies show that a reduction in the intensity of the peak hour traffic congestion within the City is not a realistic long-term aspiration. As congestion increases, alternative transit services that provide seamless travel, time savings for commuters, real-real-time travel information, desirable passenger amenities, and an enjoyable travel experience will become more desirable.

This ***City of Alexandria Transit Concept*** outlines a progressive vision for the future of travel throughout the City of Alexandria with a system of innovative transit vehicles operating along three primary transit corridors within secure rights-of-way dedicated exclusively to transit use. This plan is an innovative vision for the development of clean, efficient, enjoyable transit services that travel in dedicated lanes, enhancing mobility throughout the City and region for commuters, residents and visitors alike.

Section Two

The most important elements of walkability are easily defined but often elusive. Well-connected streets with pleasant sidewalks or paths, attractive landscaping and easy-to-cross intersections are vital to a successful pedestrian network. The character of traffic is also of vital importance: If our streets are too wide or is traffic is too heavy or fast, people will not walk.

The ***Pedestrian Section*** of the Transportation Plan calls for a city where public spaces, including streets and off-street paths offer a level of convenience, safety and attractiveness that encourages and rewards the choice to walk regardless of age or ability. This section outlines supportive policies and targeted infrastructure investments that will place the City as a leader in the region of creating pedestrian friendly streets.

Section Three

A community that is bicycle-friendly is one that pays extra attention to its quality of life. The ***Bicycle Section*** of the Transportation Plan seeks to help Alexandria become a genuine bicycle-friendly community by expanding the city's on- and off-street bikeway network by outlining supportive policies and targeted infrastructure investments.

It is a blueprint for creating a safe and convenient bicycle network that will increase the number of Alexandrians who bicycle for all trips shorter than five miles. With "complete streets" designed to enable safe travel by all users and routine accommodations for bicyclists, the City can make bicycling a viable transportation option in Alexandria.

What Does This Plan Contain?

Section Four

The streets of Alexandria represent the largest public resource within the City. Predominately urban in nature, the City of Alexandria must capitalize on its history as a walkable urban environment, and must ensure that future plans and development serve all modes of travel in a safe, efficient and context sensitive manner. City streets serve many functions providing citizens of all ages and degrees of mobility the ability to walk down the sidewalk to grab a cup of coffee, speak with their neighbors, walk their children to school, or bicycle to work.

The ***Streets Section*** outlines approaches and techniques that will ensure streets are designed to safely accommodate all modes of travel, while preserving community character.

Section Five

Parking is an essential component of the City of Alexandria's transportation system. The City's parking resources consist of private and public parking garages, lots, and curbside parking. All of these resources must be managed effectively in order to provide residents and visitors with needed parking.

This ***Parking Section*** of the Transportation Master Plan provides a background of the City of Alexandria's existing parking policies, identifies the guiding principles for the City in the management of parking, and identifies specific actions and strategies for the City to undertake in order to manage parking resources in a cost effective manner that contributes toward the overall vision of the City.

Section Six

This section explores decisions that impact the ultimate Transit Concept, bicycle, pedestrian, street and parking cost. The section also identifies potential funding mechanisms and implementation approaches that will assist in aiding the City see its transportation vision become a reality. Where applicable, other Master Plan elements that can be funded by similar sources and coordinated in unison with delivery of the Transit Concept project will be incorporated in the presentation of funding options.

The ***Funding & Implementation Section*** of the Transportation Plan provides a listing of federal state and local funding resources that the City may utilize to fund the identified actions, strategies and plan concepts. The process and policies for identifying project funding priority and implementation are also identified in this section.

- Priority Transit Corridors

- Passenger Amenities

- Neighborhood Circulators

Transit

THE CITY WILL EXPAND LOCAL AND REGIONAL TRANSPORTATION OPTIONS TO REDUCE TRAFFIC CONGESTION AND DECREASE PUBLIC DEPENDENCE ON THE AUTOMOBILE.

Introduction

This Transit Element outlines a progressive vision for the future of travel throughout the City of Alexandria with the development of the City of Alexandria Transit Concept Plan. Studies show that a reduction in the intensity of the peak hour traffic congestion within the City is not a realistic long-term aspiration. As congestion increases, alternative transit services that provide seamless travel, time savings for commuters, real-time travel information, desirable passenger amenities, and an enjoyable travel experience will become more desirable.

Source: http://www.amtrakstrail.org/memberpages/MinneapolisLightRail.html, Photo—Joe Kurland, Minneapolis Light Rail, November 2004

In response to this reality, the City envisions a system of innovative transit vehicles operating along three primary transit corridors within secure rights-of-way dedicated exclusively to transit use. These corridors will provide access to the City's major population and activity centers, and connectivity to local and regional destinations. The state-of-the-art vehicles will provide for a clean, quiet, enjoyable commuting experience, resulting in minimal impact on existing neighborhoods, traffic routes and the environment. The City's new transit system will be linked through circulator shuttles as well as intermediate transit services offered via DASH that complete the transit network, providing access to all residents who are not located in direct proximity of the newly designated transit corridors.

The entire transit network will be linked by way of Smart Stops, Shelters and Stations located along all transit routes. These smart facilities will provide varying levels of passenger amenities such as wireless access, coffee, ticket machines and information kiosks. All of these facilities will provide real-time transit information, bicycle parking, shelter and seating for transit users. The Smart Stops, Shelters and Stations will provide a natural transition from the pedestrian environment to the transit environment, making mass transit attractive, enjoyable and efficient alternative to the private automobile.

City of Alexandria
Transit Concept Plan

Goal: Ensure that people can travel into, within and out of the City of Alexandria by providing a mass transit system that combines different modes of travel into a seamless, comprehensive and coordinated effort.

Objective: A reliable and convenient mass transit system integrated with surrounding land uses and existing transportation connections that offers travel time savings and an enjoyable transit experience for its riders, featuring advanced technology and passenger amenities.

Issue:

Transit is not viewed as a comparable alternative to the private automobile.

Metrobus, Metrorail, Virginia Railway Express (VRE) and DASH lack the flexibility, efficiency and convenience of the automobile. Transit usage is often a result of necessity versus choice and is generally perceived unfavorably, particularly concerning reliability and safety. Insufficient service hours, geographic coverage, capacity and frequency of service have all been identified as problems. Lack of real-time information, long headways, difficulty of transfers and lack of connections to preferred destinations discourage existing and potential riders.

Solution:

Secure dedicated, congestion-free, transit rights-of-way for future transit services using advanced technologies.

The main emphasis of the Transit Concept Plan is to secure dedicated, congestion-free, transit rights-of-way for future transit services. The expansion of transit and dedicated lanes will provide the residents of Alexandria an alternative mode of travel that is fast, efficient, comfortable and reliable. Existing local bus service in general, is characterized by frequent stops routed along, or traveling on congested roads, thus offering limited incentives to riders in terms of travel time, comfort and convenience. This Plan's success will hinge upon the ability to provide superior transit service levels that:

- are competitive with the private automobile;
- coordinate feeder services and enhancements to the existing local transit services offered by DASH; and
- connect with existing local and regional services including WMATA Metrorail, commuter rail, other rail-based transit services, major highway portals.

This transit concept must be fully integrated with existing regional services and coordinated with proposed future services in order to truly serve Alexandrians. The City will work diligently to foster regional cooperation and coordination with the future transit plans of Arlington, Fairfax and other regional entities to ensure that new services are coordinated, and provide the most efficient means of operation.

What's Different about this Plan for Transit?

- Focus on securing dedicated, congestion-free transit right-of-way
- Use of state-of-the-art clean, environmentally friendly , comfortable, accessible, vehicles (Light Rail, Street Car, Bus Rapid Transit) that provide amenities to make the daily commute an enjoyable experience
- Use of smart technology to provide transit users and riders with up to the minute information
- Shorter headways, making it easier for riders to catch a ride when and where they need to
- Focus on enhanced connectivity between various modes of transit, bicycle and pedestrian facilities

Transit Concept Plan

The Ad Hoc Transportation Task Force, in collaboration with City officials, worked on the analysis of City trends in transit ridership, socioeconomic conditions, travel demand forecasts for automobile and transit travel, and regional plans. The result of this in-depth analysis is the designation of three primary transit corridors: Corridor A in the vicinity of Route 1, Corridor B in the general vicinity of Van Dorn/Shirlington, and Corridor C in proximity to Duke Street.

In addition to the above mentioned analysis, the designation of the proposed transit corridors was developed with consideration of the following important goal and objective and input from

Goal: Ensure that people can travel into, within and out of the City of Alexandria by providing transportation choices that combine different modes of travel into a seamless, comprehensive and coordinated transportation system.

Objective: A reliable and convenient mass transit system integrated with surrounding land uses and existing transportation connections that offers travel time savings and an enjoyable transit experience for its riders, featuring advanced technology and passenger amenities.

In addition to the three transit corridors being proposed for future transit investments, other potential alignments are also proposed on the Transit Plan Concept Map. Specific alternatives depicted include potential service along Eisenhower Avenue and Quaker Lane. In many cases, these and other potential alignments represent options for future extension. These additional alternatives will only be pursued when travel demand and corridor development dictate.

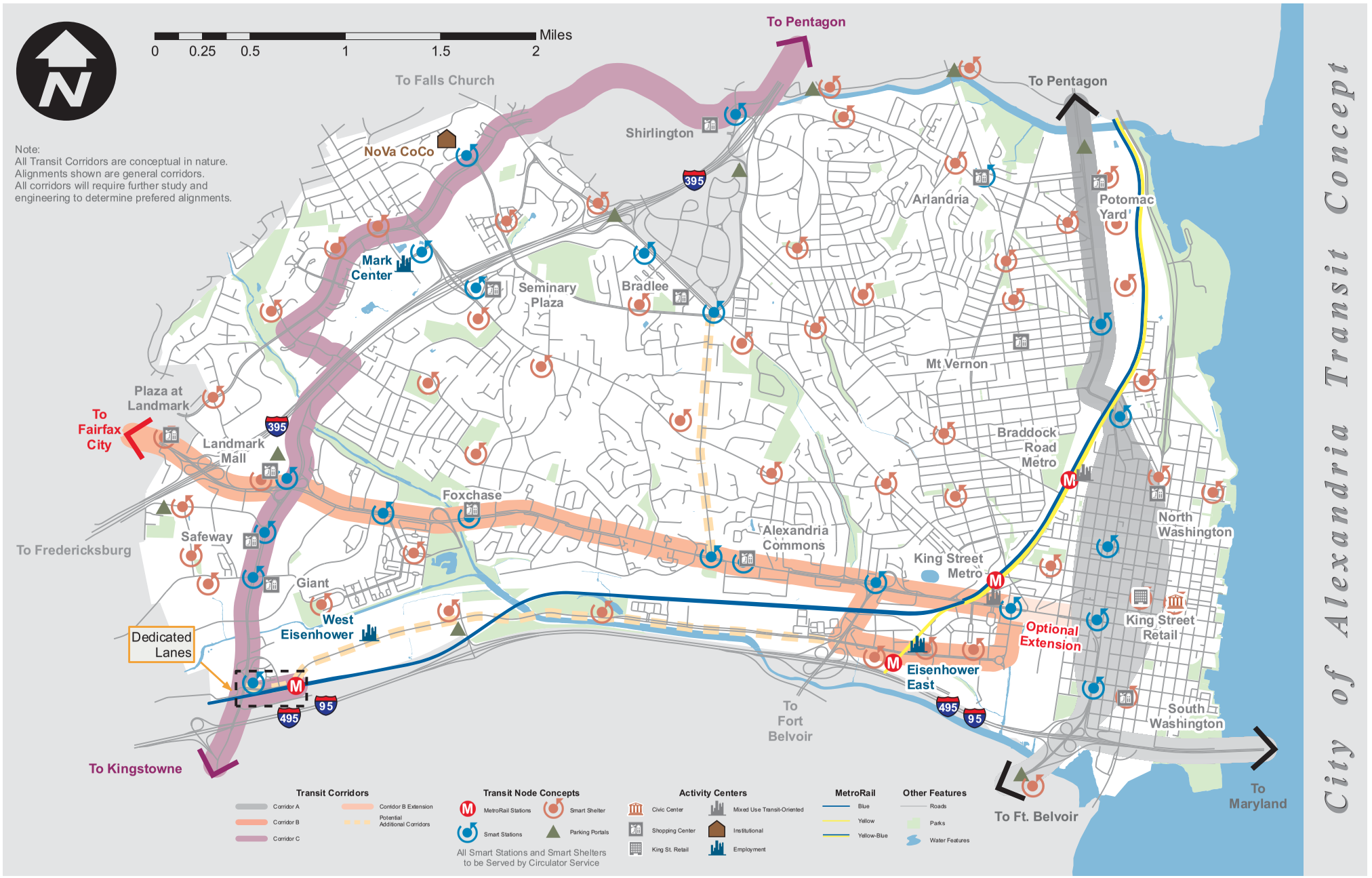
The corridor outlines presented in the following map have been developed only at a conceptual level, with the purpose of identifying initial issues and concerns. Upon public review and stakeholder input, one or more corridors may be identified as a priority to move forward in the project development process. At that time, the specific corridor concept would be subject to a formal feasibility study which would encompass more focused alignment, conceptual design of guideway/station improvements, and initial service planning scenarios. Order-of-magnitude capital costs would be estimated.

What Do Alexandrians Say?

Desired Public Transit Improvements

Community Meeting—July 9 & 10, 2003

- More peak hour buses and bus-only lanes
- Smaller buses
- Increase shelter lighting and safety
- Improve pedestrian walkways and access to public facilities
- Provide automated schedule
- Better maintenance, recognizable, visible transit signage
- More and clearer bus schedules
- Integrate transit with city planning/development


Miles
0
0.25
0.5
1
1.5
2
Note:
All Transit Corridors are conceptual in nature.
Alignments shown are general corridors.
All corridors will require further study and engineering to determine prefered alignments.
To Pentagon
To Falls Church
Shirlington
NoVa CoCo
To Pentagon
Arlandria
Potomac Yard
Mark Center
Seminary Plaza
Bradlee
Mt Vernon
Plaza at Landmark
To Fairfax City
Landmark Mall
Braddock Road Metro
Foxchase
North Washington
To Fredericksburg
Safeway
Alexandria Commons
King Street Metro
Giant
West Eisenhower
King Street Retail
Optional Extension
Dedicated Lanes
Eisenhower East
To Fort Belvoir
South Washington
To Kingstowne
To Ft. Belvoir
To Maryland
Transit Corridors
Corridor A
Corridor B
Corridor C
Corridor B Extension
Potential Additional Corridors
Transit Node Concepts
MetroRail Stations
Smart Stations
Smart Shelter
Parking Portals
All Smart Stations and Smart Shelters to be Served by Circulator Service
Activity Centers
Civic Center
Shopping Center
King St. Retail
Mixed Use Transit-Oriented
Institutional
Employment
MetroRail
Blue
Yellow
Yellow-Blue
Other Features
Roads
Parks
Water Features
City of Alexandria Transit Concept

Transit Concept Characteristics

► ***Provides for a Seamless Transit Feeder Network***
Transit improvements will be developed along routes that parallel existing roads and areas of high travel demand. Current DASH service will be integrated with new transit elements to provide high frequency feeder and circulator service. The feeder bus network will circulate in lower density communities, connect to developments beyond walking distance of the corridor transit system, and provide timed transfers at smart stations along the main route.

► ***Focuses Investments on Mobility Needs***
Three corridors have been proposed as identified in the following pages, each of which can be developed independently as funds and development dictate, as part of a larger, more flexible system.

This Transit Concept will provide guidelines for the identified corridors, specifically addressing the following:

- Location and type of dedicated right-of-way and transit priority features (vehicle type will be determined during the feasibility study stage)
- Local transit access to and internal circulation at Metrorail Stations
- Traffic flow in congested areas
- Coordinated parking, pedestrian and bicycle improvements

► ***Integrates Key Elements with Transit Plans in Surrounding Jurisdictions***
This Transit Concept proposes essential regional connections with destinations beyond the City of Alexandria for each corridor including connections to Fort Belvoir, Fairfax City, the Pentagon, and potentially to Maryland via the Woodrow Wilson Bridge.

Key external planning efforts that will be incorporated into the detailed design of service in these corridors include:

- Capital Beltway Corridor Study[1]
- Transaction 2030[2]
- Crystal City/Potomac Yard Transit Alternatives Analysis[3]

► ***Advocates Policy to Encourage Future Transit Supportive Land-Use***
This Transit Concept proposes coordination with City planning efforts to adequately review and comment on all new land use/development adjacent to the designated corridors. Review will consist of:

- Identification of rights-of-way to be dedicated as part of future development planning or approvals
- Encouragement and coordination of an appropriate mixture and density of activity around transit stations
- Addition of design requirements to create a comfortable walking environment for pedestrians and good connections for bicyclists.

Dedicated Right-of-Way

The Transit Concept is focused on having the running surface for the transit vehicles, alternatively called a right-of-way or alignment, within existing lanes of traffic. The lanes would be dedicated, for the use of transit vehicles only, thus improving schedule reliability and travel time. This approach minimizes the need to expand the width of roads within the corridor, thereby minimizing the construction costs as well as impacts on surrounding development.

Transit Concept Characteristics

Transit Vehicles

While this transit concept does not identify the specific vehicle type that will be utilized in the City of Alexandria, it does recognize that there are a variety of vehicle types, options and related costs. The graphic below provides a brief primer on vehicle types and characteristics.

Lower: Cost, Performance, Effectiveness

Higher: Cost, Performance, Effectiveness

Strip Retail

Parking Dominance

Unconnected Parcels

Hostile pedestrian amenities

SHUTTLE BUS

Characteristics:

Local circulators that connect to major routes/transit centers.

Corridor Applicability:

Central Business District and lower density communities with mixed-land uses.

Bus Lane

Restricted access to existing lane or newly constructed lane

Impact to on-street parking

Clusters

At 7 dwelling units/acre transit usage increases sharply

BUS/EXPRESS BUS

Characteristics:

Expanded bus service with improved frequency and added bus routes and enhanced quality of service.

Corridor Applicability:

Enhanced bus potential on all corridors. Express bus suited for arterials where bus priority can be given.

Signal Priority

Accelerates bus service in congested corridors

Main Street

Variety of uses combined with pedestrian activity

Frequent/Enhanced transit supported

STREET CAR

Characteristics (Modern):

Articulated multiple unit cars operating on city streets, at-grade, elevated, or subway alignments.

Corridor Applicability:

Applicable in high demand, heavily urbanized corridors. Heritage trolleys present potential for tourism market in appropriate context.

Bus Zones

Restrictions on auto movements on streets enable more schedule reliability

Need alternative routes for displaced traffic

Town Center

Supportive of intermodal transit options (hubs)

If mixed-use, can capture walk-up trips

BUS RAPID TRANSIT

Characteristics:

Street bus or articulated bus operating on exclusive guideway or lane, at grade or elevated.

Corridor Applicability:

Applicable in high demand corridors where LRT is not yet feasible. Best for line-haul applications, with feeder bus and park-and-ride where necessary.

Congestion Pricing

Peak hour charges to reduce congestion; incentive for transit

High Density

At 60 dwelling units/acre transit mode share can increase to 50%

LIGHT RAIL TRANSIT

Characteristics:

Articulated multiple unit cars operating on city streets, at-grade, elevated or subway alignments.

Corridor Applicability:

Applicable in high demand, heavily urbanized corridors. Strong transit-oriented development potential.

Exclusive Right-of-Way

Separate (but costly) facility to maintain service reliability regardless of congestion level

Corridor A

Providing reliable transit service on dedicated transitways where possible through Corridor A will provide a much needed resource for through commuters. This is needed to accommodate commuters who currently choose automobile travel over transit due to the lack of incentive and benefit to use transit. This corridor will also provide an alternative to Metro for tourists to access the Old Town area.

Corridor A is a primary link between the Pentagon to the north and Ft. Belvoir to the south. The focus of Corridor A is on accommodating through trips and providing connectivity between City neighborhoods. Corridor A also provides a critical route for Alexandrians who commute to the Pentagon and Crystal City on a daily basis. The transit corridor will enter the northern City limit through Arlington – coordinating and integrating service with the City of Arlington to provide a seamless connection to the Pentagon and the North. Traveling south on Corridor A will provide access to the Potomac Yard Development, Mount Vernon Avenue retail area, Old Town and the South Washington area of the City. To the south, Corridor A will coordinate and integrate with service provided by Fairfax County to Fort Belvoir. In addition, a transit connection to Maryland, via the Woodrow Wilson Bridge, is possible.

Length: 4 Miles

Demographics 2000 / 2030
(1/4 mi buffer):

Population:	15,850 / 21,157
Pop. Density (sq. mi.):	7,304 / 9,705
Employment:	18,405 / 30,479
Emp. Density (sq mi):	8,443 / 13,980

Major Activity Centers
Potomac Yard
King Street Corridor

Strength
High through trip demand with no transit alternatives.

Opportunities
Coordination with services provided by adjacent jurisdictions including connections to Crystal City, Fairfax, Fort Belvoir and the Pentagon.

Corridor B

Corridor B will connect parts of the city with various land uses. This corridor also provides a critical link between Alexandria and Fairfax County to the west. The Corridor B transit alignment would also feature a loop to better enhance connectivity to the Eisenhower East area.

Corridor B crosses the western City limit from Fairfax County, coordinating and integrating service with the County to provide a seamless connection to Fairfax City to the West. Traveling east, the corridor will provide access to the Landmark Mall area, Foxchase, Alexandria Commons and the King Street Metrorail station. At its eastern terminus, Corridor B will follow a loop around the East Eisenhower area comprised of Holland Lane, Eisenhower Avenue and Telegraph Road

In addition, this corridor will provide for the option of an extension of Corridor B between Holland Avenue and Route 1, providing a direct connection to transit services along the Route 1 corridor.

Length: 6.25 miles

Demographics (1/4 mi buffer):

	2000 / 2030
Population:	26,722 / 35,587
Pop. Density (sq. mi.):	8,430 / 11,226
Employment:	24,843 / 50,209
Emp. Density (sq mi):	7,837 / 15,839

Major Activity Centers

King Street & Eisenhower Metrorail Station
East Eisenhower Development
Landmark Mall

Strength

Important corridor with proven existing transit ridership base.

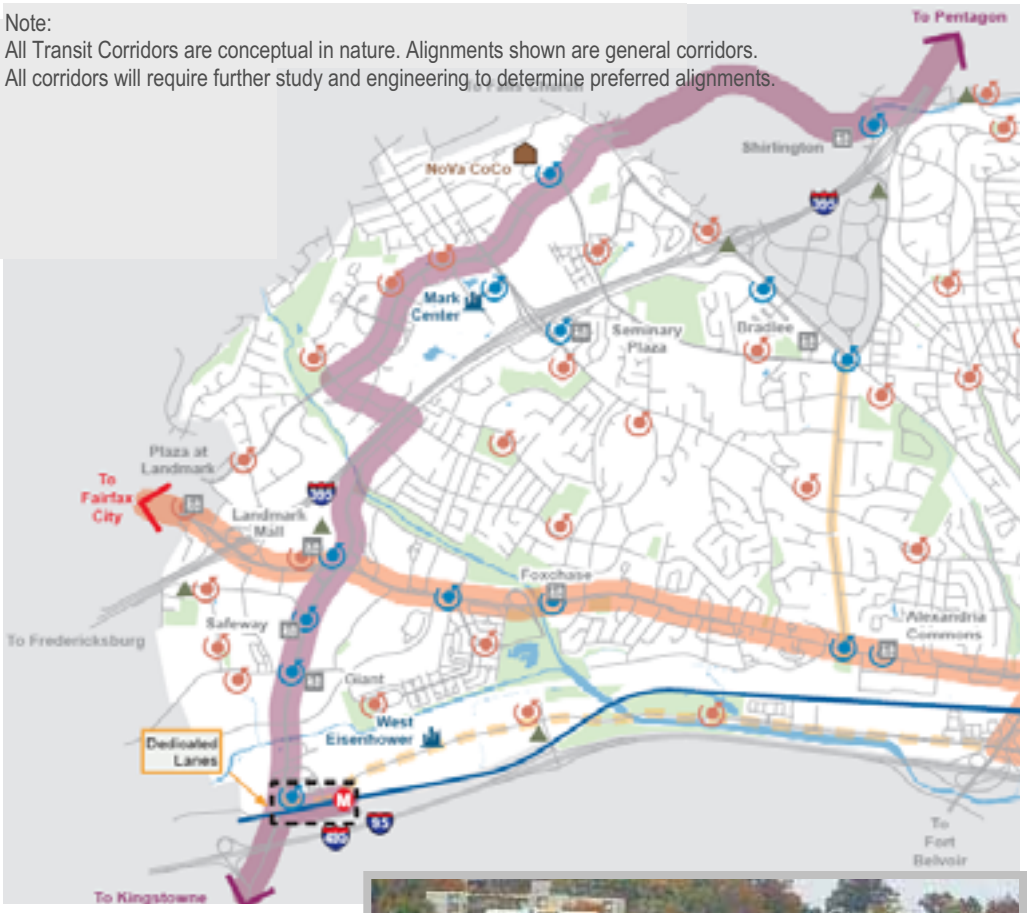
Opportunities

Redevelopment and infill of the Landmark Mall area provides opportunities for a range of transit amenities and could serve as a hub for regional and local transit services.

Corridor C

Corridor C provides a key link between Kingstowne and points south with the Pentagon. The corridor would serve both to capture through traffic as well as provide vital connectivity to key destinations.

Corridor C will begin at the northern City limit with Arlington along Beauregard Street, coordinating and integrating service with the City of Arlington to provide a seamless connection to the Pentagon to the North. Traveling South the corridor will provide access to the Mark Center, Landmark Mall area, and Eisenhower area of the City. At its southern terminus, Corridor C will coordinate and integrate with service provided by Fairfax County to Kingstowne and points south. In addition, this corridor will provide for a direct connection to the Van Dorn Street Metrorail station via dedicated lanes.



Length: 6.25 miles

Demographics (1/4 mi buffer):

	2000 / 2030
Population:	36,261 / 40,438
Pop. Density (sq. mi.):	11,332 / 12,637
Employment:	18,842 / 27,216
Emp. Density (sq mi):	5,888 / 8,505

Major Activity Centers

Van Dorn Street Metrorail Station
Landmark Mall
Mark Center
Northern Virginia Community College

Strength

Serves area of high employment growth

Opportunities

Improved connection with Van Dorn Metrorail Station from points north.

Passenger Amenities

A variety of amenities can be provided at transit Smart Stops, Shelters and Station locations to enhance the attractiveness of public transportation, to brand the system and to provide passenger information and amenities. The treatment of transit stations and stops is a key component of this Transit Concept as a means to promote the visibility of a new, high-tech transit system.

The potential design features of these facilities that set them apart from traditional bus shelters would be:

- Extensive use of wireless technology for personal passenger information
- Ticket machines / information kiosks
- Real-time travel information (at stop and available on-line)
- Cell phone text messaging for next bus departure
- The use of environmental design and operation (solar power)
- Efficient layout of weather protected interior spaces, with inclusion of off-vehicle fare collection technology.
- Designs that permit efficient, orderly and rapid flow of alighting and boarding passengers from the stop to the vehicle
- Bicycle and pedestrian amenities including bicycle racks, lockers and benches.
- Vendors for coffee, newspaper, magazines, etc.

Smart Stations and Shelters

Smart Stations, Shelters and Stops will transform the way Alexandrians perceive and utilize transit by providing users with weather protected access to traveler information systems and electronic payment systems, resulting in enhanced safety, scheduling and improved quality of service. These facilities will be fully accessible by pedestrians and bicyclists, provide adequate lighting for safety and varying levels of amenities depending on demand and location. Services and amenities provided at these facilities may include bicycle racks, lockers, coffee service, newspaper stands and internet access.

Traveler Information Systems

Include wireless communication and technologies to provide information to travelers at home, at work, on the roadside, at transit stations, or on transit vehicles. Travelers can access real-time schedules and traffic information via cell phone, television, computer, PDA, variable message signs, or information kiosks. Electronic notification of transit information, routes and schedules can also be provided at stations and on vehicles.

Electronic Payment Systems

These systems may utilize magnetic swipe cards or smart cards to provide convenient fare payment for travelers and reduce costs for revenue collection by transit providers. Smart cards can be standardized to provide a single form of fare access to multiple transit providers.

Neighborhood Circulators

In high traffic volume areas of Alexandria, numerous private operators provide shuttle service from major developments to nearby destinations and Metrorail Stations. These are often initiated as the result of Transportation Management Plans, which are developed to identify and finance the transportation strategies to induce people to use public transportation. Often these services travel only from point-to-point and are not coordinated.

The Transit Concept proposes a consolidation of these services into circulator routes with integrated stops and schedules providing connectivity between neighborhoods and the dedicated transit corridor services. This consolidation would focus on providing reliable service into lower-density neighborhoods and shopping areas. This will result in an increase of citywide transit mobility options, while at the same time, ensuring that existing routes and services funded through previous TMPs are maintained.

Circulator routes are designed to collect, distribute, and feed riders into the larger transit network, offering services that penetrate into neighborhoods, provide localized trips and operate on secondary roadways. Circulator routes are generally confined to a single community, with intercommunity trips offered via transfers to other bus or rail services. The routes are generally short, and smaller vehicles reflect more frequent and smaller passenger loads as well as the need to operate on smaller streets, or more confined spaces.

Circulators may focus around a certain development or Metrorail Station and can be implemented in stages along the corridor. In fact, a circulator network could begin to be implemented prior to initiation of the transit improvements within the corridor, provided they are coordinated with the schedules and routes of other transit providers. Operation of these circulators could be provided via contract or operated by DASH. In general, the characteristics identified below define successful circulator systems and are recommended to be considered during the public input and planning stages that will refine this concept and its circulator routes.

Characteristics of Successful Circulator Systems[3]

- Coordinated Intermodal Connections
- Population and Population Density
- Established Ridership Demand
- Mixed-Use Setting or Special Conditions
- Appropriate Headway and Travel Times
- Low Operating Cost
- Attractive Pricing
- Accessible to older adults and disabled citizens

Funding

Various components of the Transit Concept could potentially have different project delivery approaches. Typically the system (right-of-way, vehicles) is better suited for traditional financing while development of station areas has significant potential to attract private interest and funding. The funding mechanisms available to project sponsors and local partners are outlined in the following sections.

Federal Funding Options

Federal transportation funding legislation known as SAFETEA-LU, authorizes $286 billion in spending for the six-year period 2004-09 and incorporates federal programs for transit projects. This includes the discretionary Section 5309 New Starts program, administered by the Federal Transit Administration (FTA), which is the primary capital funding source for major fixed-guideway transit investments. Eligible projects include BRT, busways, and rail systems. As previously indicated, this program on average finances 50% of the capital costs. Significant scrutiny is placed upon the technical requirements, evaluations, and funding recommendations associated with the project. While meeting these conditions is better geared for mega projects, such as the Dulles Corridor Metrorail, a new "Small Starts" program is envisioned for smaller-scale circulator systems.

The entire Alexandria Transit Concept, implemented as BRT, or one specific streetcar or LRT corridor could qualify under this program. On a corridor-by-corridor basis, alternatives and their components can be packaged uniquely to reach the $250 million threshold. Small Starts funding has several requirements, which would need to be incorporated into the design of BRT facilities, vehicles, and the service plan. The requirements that correspond with the Small Starts program include:

- Substantial Transit Stations
- Signal Priority/Pre-emption (for Bus/LRT)
- Low Floor/Level Boarding Vehicles
- Special Branding of Service
- Frequent Service - 10 min peak/15 min off peak
- Service offered at least 14 hours per day

The Small Starts funding application will compete with other projects nationwide. Favorable evaluation depends on key considerations, such as overall cost effectiveness, inclusion of transit supportive land-use plans and policies, and a demonstrated local financial commitment. The financial commitment must indicate a reasonable plan to secure funding for the local share of capital costs or sufficient available funds for the local (non Federal) share and demonstrate the agency sponsoring the project is in good financial condition. The Small Starts program follows a consolidated Alternatives Analysis Development process as prescribed by the FTA. In this case, other potential solutions It is important to also note, that in order to secure these Federal funds and comply with regulations, the project sponsor must work with the Metropolitan Washington Council of Governments (MWCOG) to ensure the project is included in the region's long-term planning documents.

The Small Starts program is new, and currently no appropriations have been made. Draft rules, following up on interim guidance are anticipated in spring 2007, with final implementation expected in 2008. The FTA is actively soliciting viable Small Starts project proposals to advance the new program, while rulemaking is underway.

Other Federal Programs

There are also various other federal funding mechanisms available through SAFETEA-LU. Typically, the programs identified here do not represent a primary source of project capital funding, yet rather support components of the overall project, such as vehicle purchase or station area development. Other programs are available to transit providers by formula, based upon population served and the amount of service provided. Finally, Some programs represent credit assistance, rather than grant funds, which are often useful to deliver a project more rapidly and at lower cost.

Funding

Other Federal Programs that may be applicable to the Transit Concept include:

STP/CMAQ - Flexible Highway/Transit funding which may be used for a variety of transit improvements.

Formula Funds - Section 5307 represents the primary funding that is a formula grant program for urbanized areas, providing capital, operating, and planning assistance for mass transportation.

State infrastructure banks (SIBs) - These state or multi-state funds operate in the same manner as private banks and provide flexible transportation funding in the form of loans, lines of credit and other credit enhancements to allow states to accelerate the completion of transportation projects.

Transportation Infrastructure Finance and Innovation Act (TIFIA) - Credit assistance available to support no more than 33 percent of the eligible project costs of projects that are budgeted at $100 million or more. Dedicated revenue streams (e.g., tolls for highway projects) must support eligible projects.

Grant Anticipation Revenue Vehicles (GARVEEs) - Mechanism to accelerate future federal revenues to fund transportation projects.

State Funding Options

While Federal funds typically represent a primary funding source for large, capital intensive transit projects, there are other state, local, and private funding options available either in lieu of Federal funds or to provide the local match requirement for receipt of Federal funds. In Northern Virginia, state funding is primarily directed through recommended projects from the Northern Virginia Transportation Authority (NVTA). Funding sources are generally Northern Virginia's own allocation of primary highway system funds with some state transit assistance. Funding levels have been minimal, but have been directed to such projects as the Columbia Pike bus service and Loudoun County commuter bus service. Currently, the metropolitan Washington regional constrained long range plan produced by the Transportation Planning Board (TPB), which applies only revenue sources reasonably expected to be available, has not included sufficient funds for known capital needs in the area. Current reform initiatives, such as the Office of Intermodal Planning and the Transportation Accountability Commission are tasked with addressing these funding shortfalls.

Virginia Department of Rail and Public Transportation - Including programs that oversee Transportation Efficiency Improvement Funds, Mass Transit Capital Assistance and Technical/Demonstration Project Assistance.

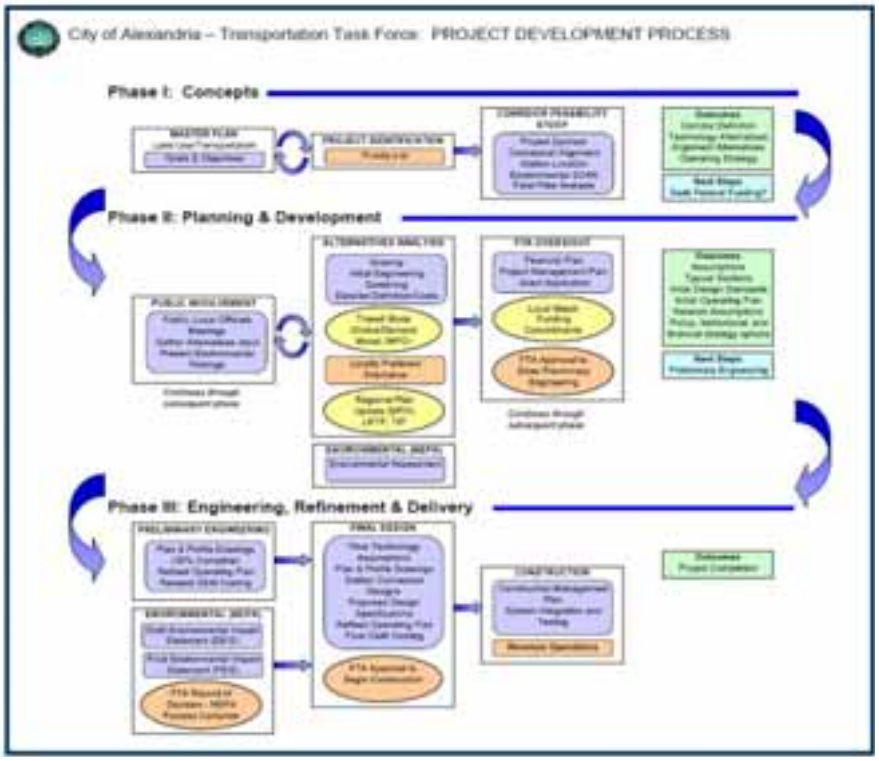
Under the **Virginia Multimodal Public-Private Partnership Act of 2003** - administered through the department, private entities are allowed to propose innovative solutions for designing, building, financing and operating transportation improvements. Typically, there are cost and time-savings associated with public-private partnerships as the private sector often has more appropriate incentives to limit costs than the public sector.

SAFETEA-LU Enhancement Funds - These funds are available for ancillary improvements and may also be useful for implementing other elements of the Master Plan. Primary applications include bike / pedestrian improvements and landscaping / beautification.

Northern Virginia Regional Fees - Currently pending state legislation to authorize a combination of regional fees that would be apportioned by the NVTA. These regional funds would be distributed by jurisdiction, assuring that locally generated revenues support projects that benefit the jurisdiction. Set asides for WMATA and Virginia Rail Express (VRE) would be included in this funding mechanism.

Implementation

The transit concept that is presented in this plan is an innovative and ambitious proposal that will challenge City leaders and residents throughout the implementation process. The proposed transit corridors and services must be developed from a concept level to an operating transit service following a process that will be context sensitive, provide ongoing opportunity for public involvement and preserve eligibility for federal funding to support implementation. As illustrated in the graphic below, the development process that will be followed is intended to identify and evaluate increasingly refined alternatives based on information that becomes broader in scope and more detailed during each development phase. Progressing from the initial corridor feasibility studies through alternatives analyses, environmental impact assessments, and preliminary and final engineering to construction and initiation of service, the process is open for public input as key implementation decisions (such as the preferred transit route and mode for a particular corridor, the level of service to be provided, the type (s) of transit priority that will provided in individual corridor segments, and the locations of stations and stops) are being made. For any individual corridor, this process may take six to ten years to complete.



During the implementation process, it may be determined that providing fully dedicated transit lanes or running ways along the full length of the corridor may not be possible due to prevailing constraints. Under these circumstances, it may be necessary to employ other transit priority techniques, such as operating in mixed traffic with transit priority at signalized intersections and "queue jumping" in critical congestion areas, in certain corridor segments in order to achieve a feasible implementation plan.

A key element of the project development process is the preparation of environmental impact documents pursuant to the National Environmental Protection Act (NEPA) to ensure that information is available for public officials and citizens to properly balance infrastructure development, economic prosperity, health and environmental protection, community and neighborhood preservation, and quality of life issues. The potential project impacts that are required to be identified, evaluated and documented in these environmental evaluations include several factors that have already been identified as early community concerns. These include: air quality; environmental justice; historic, archeological and cultural resources; noise and vibration (both during construction and operation); historic sites; social and economic impacts (factors influencing the character and nature of the community); and transportation (both traffic and parking).

Actions & Strategies

In order to implement the proposed transit concept and to enhance the transportation network for the City of Alexandria the City has identified the following actions and strategies. All action items have been developed in order for the City and the public to track progress toward achieving the overall goal for the Transit Concept Plan.

T1. The City will conduct extensive public outreach to educate citizens and stakeholders on the proposed concept, the process and to determine where the greatest support lies for implementation of a major transit investment.

- T1.A. The City will hold public meetings on transit plans and investments.
- T1.B. The City will develop a website dedicated to the Transit Concept Plan.
- T1.C. The City will develop informational brochures that explain the Transit Concept.

T2. The City will coordinate closely with adjacent jurisdictions, specifically Arlington County, Prince George's County in Maryland, Fairfax County, WMATA, the City of Fairfax and other stakeholders to ensure that the City Transit Concept is integrated into existing services where feasible and to explore opportunities for future connections that would provide for enhanced regional connectivity.

- T2.A. The City will designate a regional liaison to continually coordinate and keep up to date with the plans and actions of neighboring jurisdictions.
- T2.B. The Regional Liaison will conduct initial meetings with representatives of adjacent jurisdictions.
- T2.C. The Regional Liaison will establish a schedule of quarterly meetings with regional representatives to maintain an active dialogue.

T3. The City will prioritize transit corridors for investment.

- T3.A. The City will establish a prioritized list of transit corridors.
- T3.B. The City will initiate one or more feasibility studies to conduct a more detailed analysis for the highest priority corridor(s) in order to determine:Conceptual Alignment and Engineering; Proposed Station Locations; Transit Vehicle Technology and Suitability; Initial Scan of Environmental Issues; Fatal Flaw Analysis. The City will develop and issue an RFP for a feasibility study of the highest priority corridor.

T4. The City will develop corridor-specific plans for dedicated transit lanes along these corridors and ensure that new developments do not preclude development of dedicated transit lanes.

- T4.A. The Department of Transportation and Environmental Services (T&ES) will coordinate with Planning and Zoning (P&Z) to establish a framework for identifying high priority rights-of-way.
- T4.B. T&ES will coordinate with P&Z to establish corridor specific plans and/or overlays for the highest priority corridor (as established under T3.A.).

T5. The City will identify locations for smart stations that will serve both the new system and existing transportation modes.

- T5.A. The City will establish a list of prioritized locations for smart stations and stops.
- T5.B. The City will coordinate with DASH and other existing services to identify priority areas for transit stop retrofits to transform existing stops to meet the Transit Concept vision for Smart Stations and Stops.

Actions & Strategies

T6. The City will ensure that development and redevelopment does not preclude efforts to expand public transit infrastructure.

T6.A. The City expects that any amendment to the Potomac Yard/ Potomac Greens Small Area Plan which results in an increase in density beyond what is currently approved will include reasonable provisions to address the development and funding of an additional Metrorail Station.

T6.B. The City expects that any proposed amendment to the Eisenhower West Area Plan, the King Street Metro/Eisenhower Avenue Small Area Plan or the Seminary Hill Small Area Plan that includes land in the Eisenhower Valley and that proposes an increase in density beyond what is currently approved shall study the feasibility of the development and funding of an additional Metrorail Station. If a City-directed feasibility study concludes and City Council agrees that a new Metrorail station is viable and desirable, then any proposals to add additional density to the Eisenhower Valley sections of the above mentioned plans must include a specific plan to support the development of an additional Metrorail station on Eisenhower Avenue to serve the Valley.

T7.The City will further identify specific transit mode technology and newest techniques best suited in the identified transit corridors and for the system as a whole.

T7.A. The City will implement a technology pilot program to test the success of various transit mode technologies throughout the City.

T7.B. The City will dedicate funding toward the implementation of technology into existing and future transit services.

T7.C. The City will coordinate the development and deployment of transit information technologies with regional service providers to provide seamless delivery to transit users.

T8. The City will integrate existing DASH bus service with new transit system elements for DASH to serve as a high frequency feeder system.

T8.A. The City will coordinate with Dash to determine proposed routes for a feeder system.

T8.B. The City will work with Dash to develop an operations plan for feeder systems.

T8 C. The City will coordinate the development and deployment of transit information technologies with regional service providers to provide seamless delivery to transit users.

T9. The City will incorporate traffic signal priority, traffic circulation changes, pedestrian and other on-street enhancements into the new system for the benefit of transit vehicles and riders.

T9.A. The City will develop a prioritized list of locations for transit system spot improvements.

T9.B. The City will earmark funds for the completion of priority spot improvements.

T10. The City will create Transportation Management Plans, Transit Overlay Zoning Districts, Parking Management Zones, etc. to coordinate efforts to support the system.

T10.A. T&ES will work in coordination with P&Z to develop revised Transportation Management Plan requirements with the goal of creating a more consistent, integrated approach to Citywide transit issues within individual TMPs.

T10.B. T&ES will work in coordination with P&Z to develop a citywide comprehensive parking management plan.

T11. The City will investigate potential funding available through existing, new, and innovative revenue sources.

T11.A. The City will develop a funding priority plan that identifies potential funding opportunities, applicability, deadlines, and requirements for requesting funds.

T11.B. The City will identify a revenue source to be dedicated toward actual investment in and/or matching funds for transit improvements.

Actions & Strategies

T12. The City will develop an extensive public outreach and marketing campaign to energize the citizenry around Alexandria's transportation future

T12.A. The City will create a website, email list, posters and other marketing materials to educate citizens on the vision for the future, benefits, and how they can make a difference in the City.

T12.B. The City will develop a logo for the overarching transportation plan initiatives.

T13. The city will coordinate with pertinent Alexandria Boards and Commissions, such as the Commission on Aging and The Alexandria Commission on Persons with Disabilities, to ensure that the special transportation needs of all citizens are considered.

THE CITY OF *Alexandria* VIRGINIA

TRANSPORTATION MASTER PLAN

Pedestrian and Bicycle Chapter

April 2016

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SECTION 1

Introduction

INTRODUCTION

Successful cities evolve over time – retaining their heritage, while adapting to changing technologies, cultural attitudes and community priorities. Today, many people desire dynamic, vibrant places that provide an array of high quality transportation options and accommodate a wide range of travelers including those with disabilities. Cities are responding by enhancing their transportation systems to adapt to this new paradigm. Alexandria is fortunate in having a great walking and bicycling network to build upon, as recognized by the City's Silver status in the national Walk- and Bicycle-Friendly Communities programs.[1]

Walking has been one of the primary means of travel in Alexandria since the City's founding in 1749. The street pattern in older parts of the City are a direct result of the transportation technology of that time: short blocks, sidewalks on most every street and relatively narrow roadways. With the emergence of the automobile- development patterns changed. Roads became wider, speeds increased and destinations separated by greater distances. Development patterns in areas of the City built between the 1950s through the late 1990s - especially central and west Alexandria - reflect the prevailing approach to land use. Residential uses were separated from commercial and other uses, and the automobile became a necessary form of transportation.

Today, Alexandria has a robust mixture of transportation options including a strong transit network, streets that facilitate vehicle trips both within and through the City, Capital Bikeshare, and several major trails that serve commuters as well as recreational users. This Pedestrian and Bicycle Chapter demonstrates the City's continued commitment to providing a world-class transportation system that serves people of all ages and abilities and builds a bridge between Alexandria's early past and its future. Many Alexandrians do not drive, and many use assistive devices such as wheelchairs, walkers or other mobility devices. A high-quality pedestrian and bicycle transportation system allows all to move about all parts of the city with dignity, independence and comfort.

As the City continues to evolve, it will increase its focus on providing safe, comfortable and convenient pedestrian and bicycle transportation options for residents and visitors. This effort will build upon past plans and studies completed in Alexandria, many of which include a strong focus on multimodal transportation. In some areas that already have high quality walking and bicycling environments, achieving the vision of this plan may simply mean enhanced emphasis on maintenance and increasing awareness and education of the rights and responsibilities of pedestrians, bicyclists and motorists. In other locations, new sidewalks and crossings, on- and off-street bicycle facilities, and improved trail/road transitions are recommended.

The Pedestrian and Bicycle Chapter articulates a vision for walking and bicycling in Alexandria that serves the needs of all users, and of all ages and abilities. The Chapter includes several goals, objectives, performance measures and specific strategies to achieve that vision. Strategies address physical improvements to the transportation system as well as policy and programmatic recommendations that aim to increase the education and awareness of all users of the transportation system. Many strategies are interdependent and must be pursued in a coordinated manner to achieve desired results. For example, focusing on infrastructure alone will not achieve the vision.

Existing Crosswalk on Duke Street

1 The Walk Friendly Community Program is managed by the Pedestrian and Bicycle Information Center and the Bicycle Friendly Community Program is run by the League of American Bicyclists. Both programs award ratings based on programs, policies, and infrastructure.

Holmes Run Trail in Alexandria

Planning Process

Several recent changes in the City created a need to update these chapters of the Plan. Since the 2008 Transportation Master Plan and the 2008 Pedestrian and Bicycle Mobility Plan (the Mobility Plan), the City has completed numerous Small Area Plans that include proposed pedestrian and bicycle improvements. Capital Bikeshare was launched in 2012, creating increased demand for comfortable and safe places to bicycle. In 2011, Alexandria adopted a Complete Streets policy which states that the City will incorporate, to the extent possible, infrastructure that enables reasonably safe travel for all users.[2] Additionally, new innovations and trends at the national level have created the need to take a fresh look at Alexandria's programs, policies, and infrastructure related to bicycling and walking.

The 2015 Pedestrian and Bicycle Chapter builds on the recommendations included in the 2008 Alexandria Transportation Master Plan, the Mobility Plan, and other City plans. Some recommendations from the 2008 Transportation Master Plan and the Mobility Plan have been removed because they have been completed, some have been revised based on current conditions, and others remain relevant and have been carried forward in this Chapter. Whereas the 2008 Mobility Plan contained detailed inventory of improvements to be made across the City, this update aims to prioritize and focus the City's efforts over the next ten years on specific corridors that have significant potential to benefit non-motorized transportation.

One particular area of focus for this Plan is an effort to ensure that people throughout the entire city have access to comfortable, safe places to walk and bike. This led to a consistent effort throughout the planning process to ensure that recommendations and priority projects serve the west side of the City, which has historically had fewer on-street bicycle facilities and pedestrian-friendly areas.

> Making it safe for more people to walk and bike in our City provides health and economic benefits to both individuals, as well as to our community as a whole.
>
> — Jim Durham, *Chair, Bicycle and Pedestrian Advisory Committee*

2 The Alexandria Complete Streets Policy was reenacted in 2014.

Pedestrians crossing Seminary Road

Groups with Representation on Advisory Committee

- Commission on Aging
- Design Professional Representative
- Traffic and Parking Board
- Transportation Commission
- Business Representative
- Commission on Persons with Disabilities
- Planning Commission
- Parks and Recreation Commission
- Bicycle and Pedestrian Advisory Committee
- Community Representatives

As part of the process, planners identified and assessed six Case Study Areas focused primarily on pedestrian issues and needs. The Case Study Areas represent recurring issues that are found throughout Alexandria. Recommendations include closing gaps in the sidewalk network, changes to intersection geometry, and crossing improvements. In some cases, programmatic and policy changes are recommended, as well. The recommendations are based on national best practices and designed to increase safety and comfort. These recommendations are intended to be applied to similar conditions in other parts of the City.

The Plan considered many of Alexandria's roadways for their potential to serve bicyclists- including people who may be interested in bicycling but do not feel comfortable riding with traffic on many streets. Particular emphasis was placed on connecting neighborhoods to destinations such as schools, commercial centers, transit and the regional trail system. Many of Alexandria's local streets have relatively low motor vehicle speeds and volumes, and are subsequently appropriate for most bicyclists; however, due to the City's topography and street network, a larger road is often the only reasonably direct connection between destinations. These roads tend to carry higher volumes of traffic moving at greater speeds, thereby requiring significant improvements such as bicycle lanes and sidepaths that separate bicyclists from motor vehicles. This Plan Chapter identifies priority on-street bicycle, trail and sidewalk improvements for City staff to focus on in the near term, but also includes many other recommendations to be addressed as opportunities arise (e.g. redevelopment or roadway resurfacing).

The Pedestrian and Bicycle Chapter reflects the input and feedback gained over an 18-month period – and has been a demonstration of the City's robust *What's Next, Alexandria* civic engagement process. An Ad-Hoc Pedestrian and Bicycle Master Plan Advisory Committee (Advisory Committee) representing key City committees and stakeholder groups met ten times over the course of the planning process to help guide development of the vision, goals, recommendations and strategies. Community input was also received at these meetings. Two interactive public meetings were held to solicit input from the community. The first meeting focused on issues, needs and priorities while the second was held to receive feedback on draft recommendations. City staff attended community events such as farmers markets and neighborhood festivals to reach out to groups and individuals who do not typically engage in planning efforts, but use the walking and bicycling network every day.

In addition to in-person civic engagement, the plan outreach had a robust online component. The project website served as a central location for online information about the plan as well as a place where people could review presentations, draft reports and recommendations. The project had an online survey and interactive map, provided in English and Spanish, to gather input from residents about their concerns and priorities for walking and bicycling througout the City. People also had an opportunity to participate in the survey and mapping exercise in-person at several events in different parts of the City.

The public engagement process was complemented by a planning process that included coordination with City departments involved in planning, design, operations, implementation and maintenance of Alexandria's transportation system as well as briefings with City Council, meetings with key City commissions and committees and Alexandria City Public Schools (ACPS). A detailed synopsis of the public engagement is presented in Appendix B.

Complete Streets Design Guidelines

In a process paralleling the development of the Pedestrian and Bicycle Chapter, the City developed a Complete Streets Design Guide. This Guide integrates existing City policy and design guidance related to roadway, sidewalk and trails, and incorporates new information to reflect best practices for developing a transportation system that serves the needs of people who walk, bike, ride transit or drive vehicles. The Complete Streets Design Guide identifies new street types for Alexandria and provides direction on the design of sidewalks, roadways, intersections and curbsides.

The Design Guide will be used by City staff in the planning and design of improvements to existing roadways and intersections, as well as new roads. The Guide will also be used by developers to ensure that new roadways, intersections, sidewalks and trails are achieving the City's objectives for a safe and effective multimodal transportation system.

"Complete Streets" describes a comprehensive, integrated transportation network with infrastructure and design that allows safe and convenient travel along and across streets for all users, including pedestrians, bicyclists, riders and drivers of public transportation, as well as drivers of other motor-vehicles, and people of all ages and abilities, including children, older adults, and individuals with disabilities.

—Alexandria 2011 Complete Streets Policy

Plan Organization

The Pedestrian and Bicycle Chapter is organized into four sections. This introductory section provides context for the plan, as well as an overview of the planning process. Section 2, *Walking in Alexandria*, and Section 3, *Biking in Alexandria* provide the vision, goals and objectives for each of these modes. Each section summarizes existing conditions and provides an array of strategies designed to improve the accommodation of people who walk and bike, respectively. Although trails are used for both walking and bicycling, they are covered in section 3. Section 4, *Implementation*, contains guidance on implementing the strategies recommended in sections 2 and 3. *Implementation* is presented as a unified section in recognition that many plan recommendations address the needs of people who walk and bike. Technical appendices provide more detail on the planning process, public meeting materials, existing conditions assessment and specific recommendations.

SECTION 2

Walking in Alexandria

WALKING IN ALEXANDRIA

The City of Alexandria is currently one of the most walkable communities in the Commonwealth of Virginia, as well as the country. Many of its residents enjoy neighborhoods served by a substantial network of sidewalks that make walking to schools, commercial areas, and jobs safe. Through significant investments in its pedestrian network and related programs, the City has experienced an increase in the number of people walking to work since 2008 (from 3.0 to 3.8 percent in 2012);[3] however, challenges related to the safety and comfort of pedestrians throughout the City persist. According to the Alexandria Police Department (APD), the City has experienced an average of 64 crashes involving pedestrians per year over the past ten years. Furthermore, while some areas of the City are extremely attractive and inviting places to walk, others are uncomfortable for pedestrians due to relatively high vehicular speeds and limited or inaccessible sidewalks. These issues are at the heart of this Chapter, which serves as the pedestrian element of the City's Transportation Master Plan.

Vision, Goals and Objectives

The project team worked with the Advisory Committee and public to develop the following vision, goals and objectives to guide the pedestrian section of this Chapter. These themes were used to develop the strategies presented in the next section, and can be used to assess the City's progress over time. In the strategies section, the goals addressed by each strategy are noted using the icons shown in the table on the following page. A set of specific performance measures was also developed and is presented in the Implementation section of the Chapter.

Vision for Walking in Alexandria

Walking is vital to the health and mobility of Alexandria's residents, workers and visitors. The City provides safe and accessible streets, intersections and trails, as well as programs and policies that encourage increased walking as a safe and active form of transportation and recreation. Pedestrian facilities, programs and policies foster social equity, ensuring that investments benefit people of all backgrounds, abilities, including children, older adults and persons with disabilities and income levels, as well as geographic equity, ensuring that people throughout the City have access to safe and comfortable places to walk.

Kids walking to school

3 2008-2012 American Community Survey 5-Year Estimates. S0801 Commuting characteristics by Sex. U.S. Census Bureau.

Goals	Objectives
SA SAFETY The City will create a safe, well-maintained, comfortable and enjoyable pedestrian environment that encourages walking and is accessible for people of all ages and abilities.	1.1 Ensure that all streets, trails and intersections are accessible, safe and well designed using national best practices for safety and accessibility.
	1.2 Partner with Alexandria Police Department to improve the safety of pedestrians, cyclists and drivers through effective law enforcement implemented in coordination with other pedestrian-focused programs, policies and pedestrian facility improvements.
	1.3 Reduce conflicts between pedestrians, vehicles, and bicyclists by implementing a range of pedestrian and bicycle facility treatments appropriate to a street and its surrounding context.
	1.4 Eliminate pedestrian fatalities and injuries citywide.
EG ENGINEERING The City will provide a continuous, connected and accessible pedestrian network that enables people of all ages and abilities to move safely and comfortably between places and destinations.	2.1 Ensure sidewalks are available on both sides of all streets.
	2.2 Make intersections throughout the City safe, comfortable and accessible for pedestrians.
	2.3 Increase the number and quality of off-street pedestrian connections between adjacent destinations not connected by the street network, such as neighborhoods, multifamily housing developments, shopping districts, parks, schools and trails.
EC ENCOURAGEMENT The City will promote walking as a means of improving transportation circulation, transit access, public health, environmental quality and recreation, with the ultimate goal of increasing walking trips as a percent of all travel in Alexandria.	3.1 Encourage and provide incentives for active lifestyles that include regular walking.
	3.2 Partner with other local and regional organizations to support existing and new programs that promote walking and active lifestyles.
	3.3 The City will advance to a recognized gold level "walk friendly community" (www.walkfriendly.org)
ED EDUCATION The City will educate users of all transportation modes about pedestrian safety, rights and responsibilities.	4.1 Initiate targeted outreach that aims to increase adult pedestrians' and motorists' knowledge of safe walking and driving behaviors and traffic laws related to pedestrian travel
	4.2 Partner with Alexandria public and private schools to implement pedestrian safety education and programs that support increased walking among the City's youth.
	4.3 Ensure that education efforts reflect the diversity of the Alexandria community, with messages and programs offered in various languages whenever possible and targeting communities with the greatest need.
	4.4 Educate public and private sector design professionals, city groups and the public who are involved with Alexandria's transportation system on Complete Streets principles and design.

Figure 2.1: Pedestrian Goals and Objectives

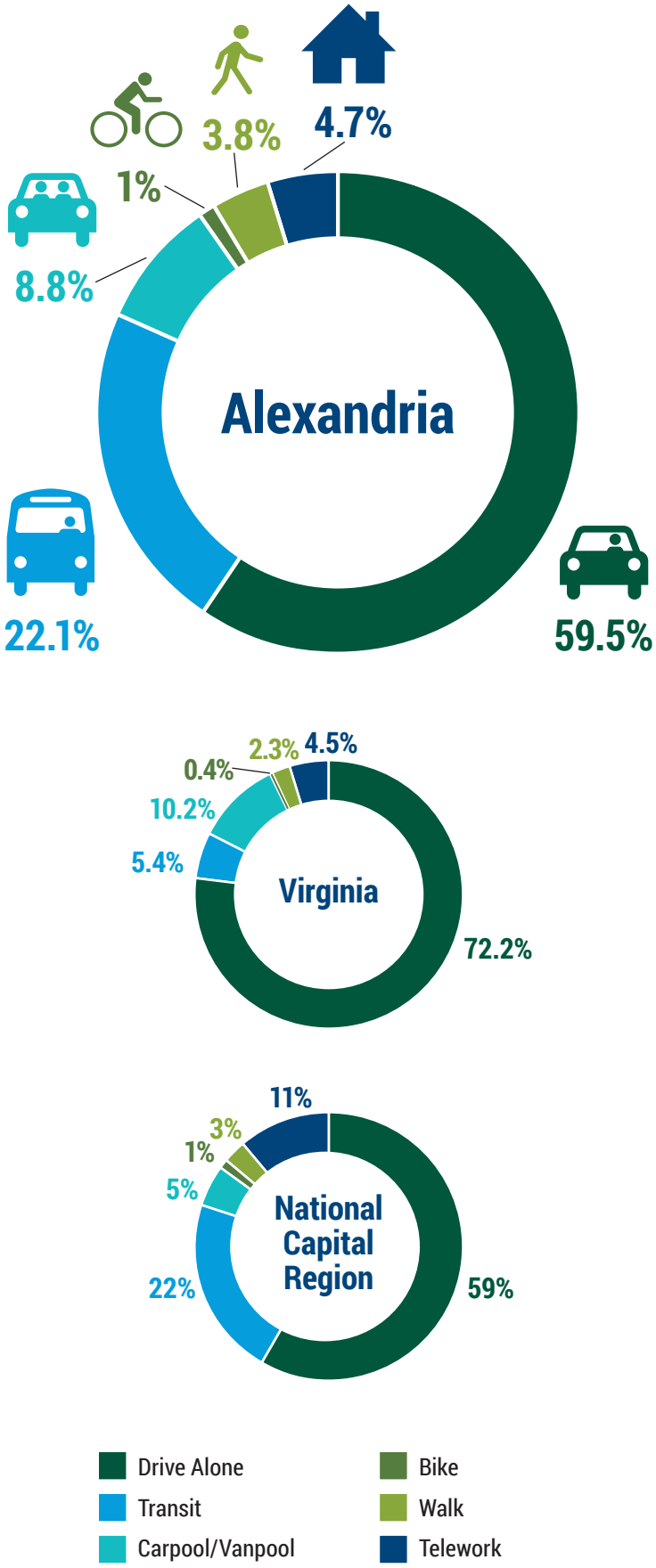


Figure 2.2: Commute to Work Data

Existing Conditions

The baseline for pedestrian needs and issues in Alexandria included a targeted review of public perceptions and existing conditions for walking. Key takeaways from this review are presented below, and a full report of findings can be found in Appendix C: Progress Report.

Alexandria has experienced a 28 percent increase in walking to work since 2000,[4] and has a higher average walk to work rate than both the state and region (see Figure 2.2). This trend creates a strong foundation on which the strategies for improving walking can build.

Each year, volunteers from the Alexandria Bicycle and Pedestrian Advisory Committee (BPAC) conduct pedestrian and bicycle counts at seventeen locations throughout the City. Among the count locations, the areas of the City experiencing the highest levels of pedestrian activity include Old Town, Arlandria, Del Ray, as well as the Mount Vernon and Holmes Run Trails.[5]

4 2008-2012 American Community Survey 5-Year Estimates. S0801 Commuting characteristics by Sex. U.S. Census Bureau.

5 These counts have been performed annually during the months of May and September. Counts are completed two times per week 5:00 p.m. to 7:00 p.m. on Thursdays and 12:00 to 2:00 p.m. on Saturdays. In 2013 and 2014 additional counts were done in the months of January and July. The counts have been taken in 17 locations throughout Alexandria. BPAC volunteers note the time of day, location, and gender of the pedestrians.

Existing Crossing in Mount Vernon Avenue

Although these counts do not provide a comprehensive portrait of walking everywhere in the City, they do provide a general understanding of relative pedestrian activity levels in the seventeen count locations (see Figure 2.3). In 2015, the City installed automated counters in eight locations which collect data on pedestrian and bicycle activity 24 hours a day. This new data will provide an improved understanding about pedestrian and bicycle demand over time.

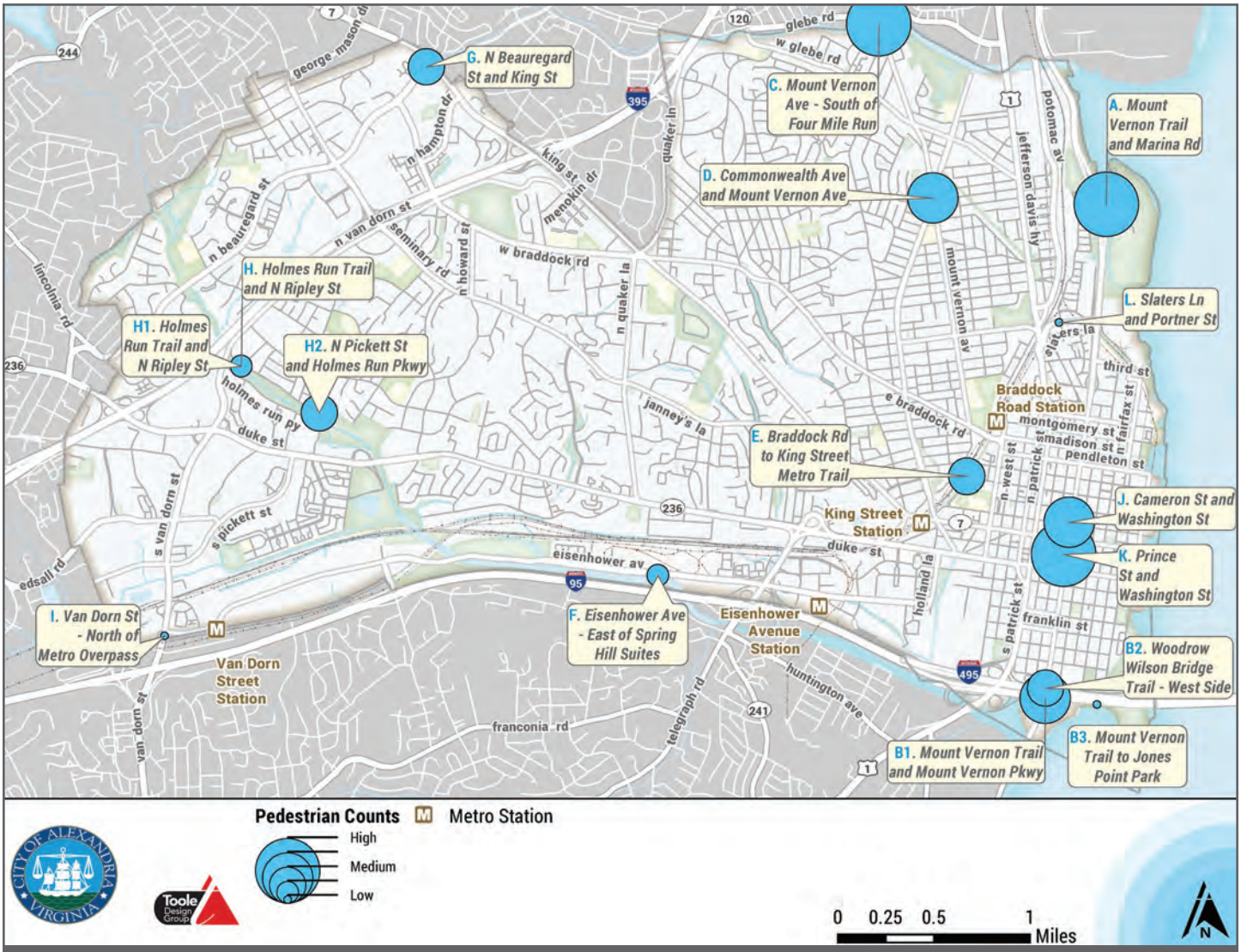


Figure 2.3: Pedestrian Count Locations and Data (BPAC Volunteer Counts, 2011-2014)

Infrastructure

Alexandria has approximately 575 miles of sidewalks which cover approximately 76 percent of City streets. The City has completed a number of new sidewalk projects since the completion of the 2008 Transportation Master Plan and Mobility Plan, including most of the projects that could be accomplished without significant new right of way acquisition, utility relocation or other investments (see Figure 2.4). Areas without sidewalk coverage on both sides of streets tend to be residential neighborhoods such as locations in the North Ridge/Rosemont area, the Dowden Terrace neighborhood and the Taylor Run area. While sidewalk coverage is fairly comprehensive, some sidewalks have obstructions that impede pedestrians such as overgrown vegetation, utility poles or other obstacles.

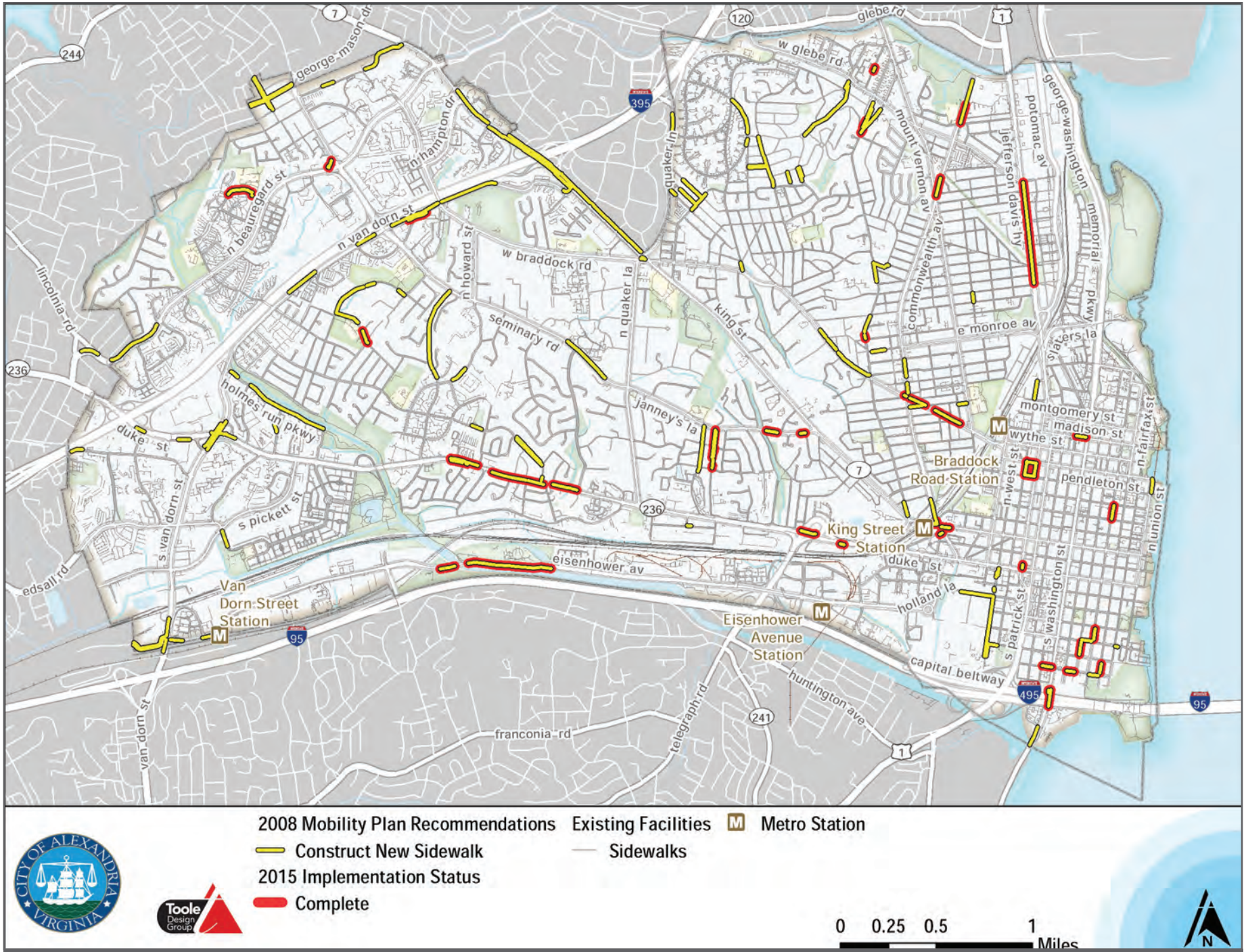


Figure 2.4: Status of 2008 "New Sidewalk" Recommendations

Throughout Alexandria, there is significant variability in the presence and quality of other pedestrian facilities such as curb ramps, crosswalks, pedestrian signals, accessible bus stops, wayfinding and regulatory signage. For example, while the City has installed countless accessible curb ramps over the past ten years, there are still areas of the City where substandard or missing curb ramps create barriers for people with disabilities and people pushing strollers or pulling wheeled luggage. Similarly, many City traffic signals provide pedestrian countdown signals but some areas feature an older type of signal without a countdown, or none at all. While a citywide inventory of curb ramps and similar features was not feasible during this project, the City recognizes the need to continue to upgrade these facilities and has incorporated a number of strategies for doing so into this Chapter.

Recently Installed Sidewalks and Existing Curb Ramps in Alexandria

Pedestrian Safety

Safety has been a key component of every aspect of this planning process, and will remain the foremost consideration related to street design in Alexandria. As shown in Figure 2.5, there were nine pedestrian fatalities on City of Alexandria streets between 2005 and 2014, with another one occurring in 2015 during the planning process.[6] As shown by the darker red areas in Figure 2.5, locations with higher concentrations of pedestrian crashes include Old Town and the King Street Metrorail station area, Mt. Vernon Avenue in Arlandria, and areas on Duke and Van Dorn Streets on the west side of Alexandria.

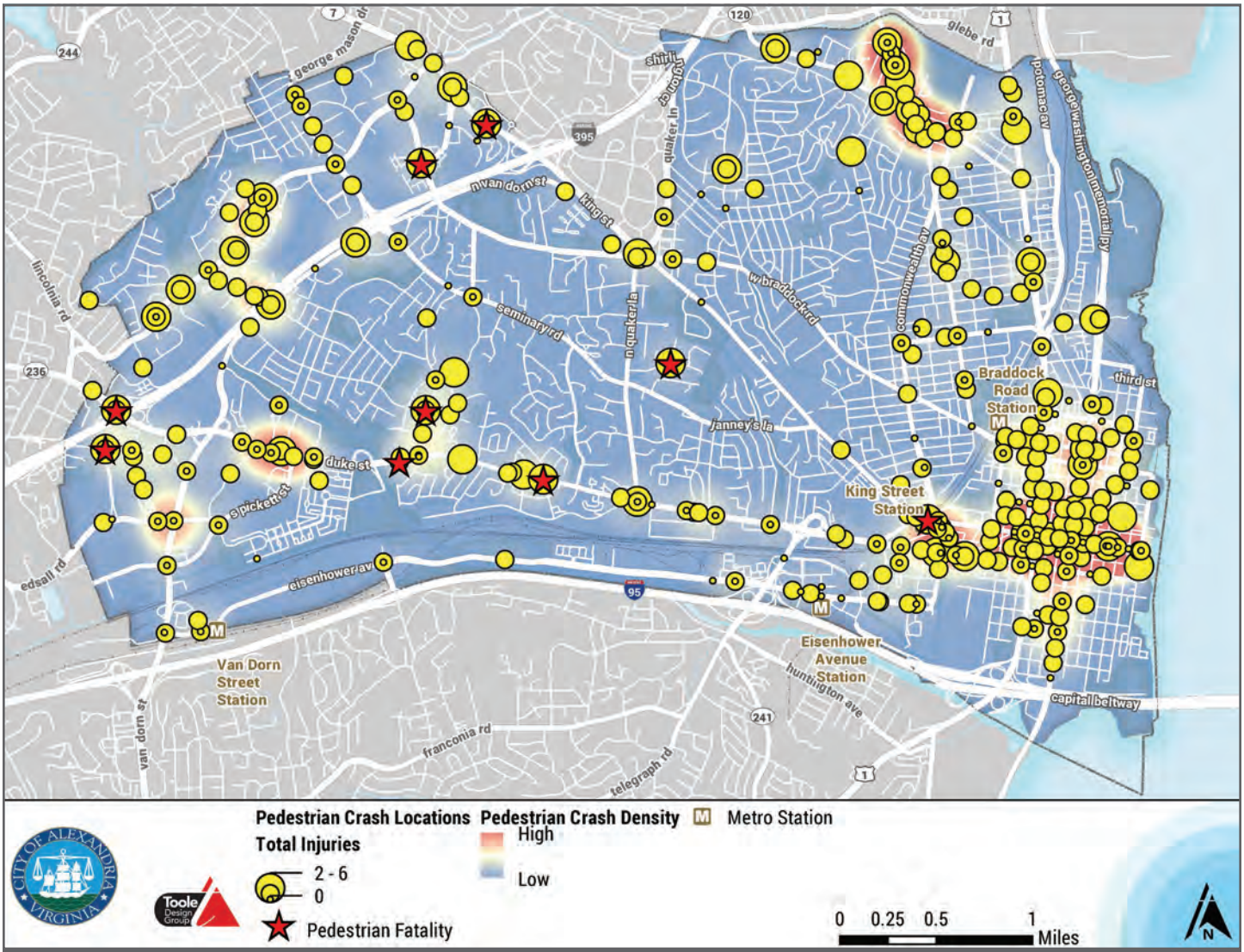


Figure 2.5: Reported Pedestrian Crashes (January 2005 – December 2014)

6 Alexandria Police accident reports for the years of 2005 to 2014 were used for this analysis. It is important to note that while this data includes information on 641 pedestrian related incidents for the ten year period, the true number of incidents may be different as many pedestrian crashes tend to not be reported to police and therefore are not reflected in the data.

Programs and Outreach Effort

The majority of the City's existing outreach related to walking is managed through Local Motion, Alexandria's Transportation Demand Management program. The Local Motion website provides educational materials on pedestrian safety, and information on ongoing City plans that impact the pedestrian environment and similar content. Local Motion also promotes the Guaranteed Ride Home program for people who walk or use other transportation alternatives, and promote events such as Car Free Day.

Alexandria also provides training for DASH bus drivers on pedestrian safety and participates in the Metropolitan Washington Council of Governments (MWCOG) StreetSmart Campaign, which includes bus advertisements, fliers and other media focused on pedestrian safety.

Another existing City program related to pedestrian and bicycle education is the Safe Routes to School (SRTS) program. Alexandria has completed SRTS infrastructure improvements focused on pedestrian/bicycle safety near Charles Barrett, Cora Kelly and George Mason Elementary Schools. As noted in Figure 2.6, 30 percent of students at participating schools reported regularly walking to school in 2014, which is significantly higher than regional and statewide averages.[7]

While the average of percentage of students walking to school at participating schools exceeds regional and statewide averages, wide disparities in walking rates exist across the school district. In 2015, the Alexandria City Public Schools (ACPS) adopted a 2015-2020 Strategic Plan that included an objective to encourage walking and biking at all schools, and to work with city authorities to ensure safe routes to school are available and publicized as part of its Health and Wellness Goal.

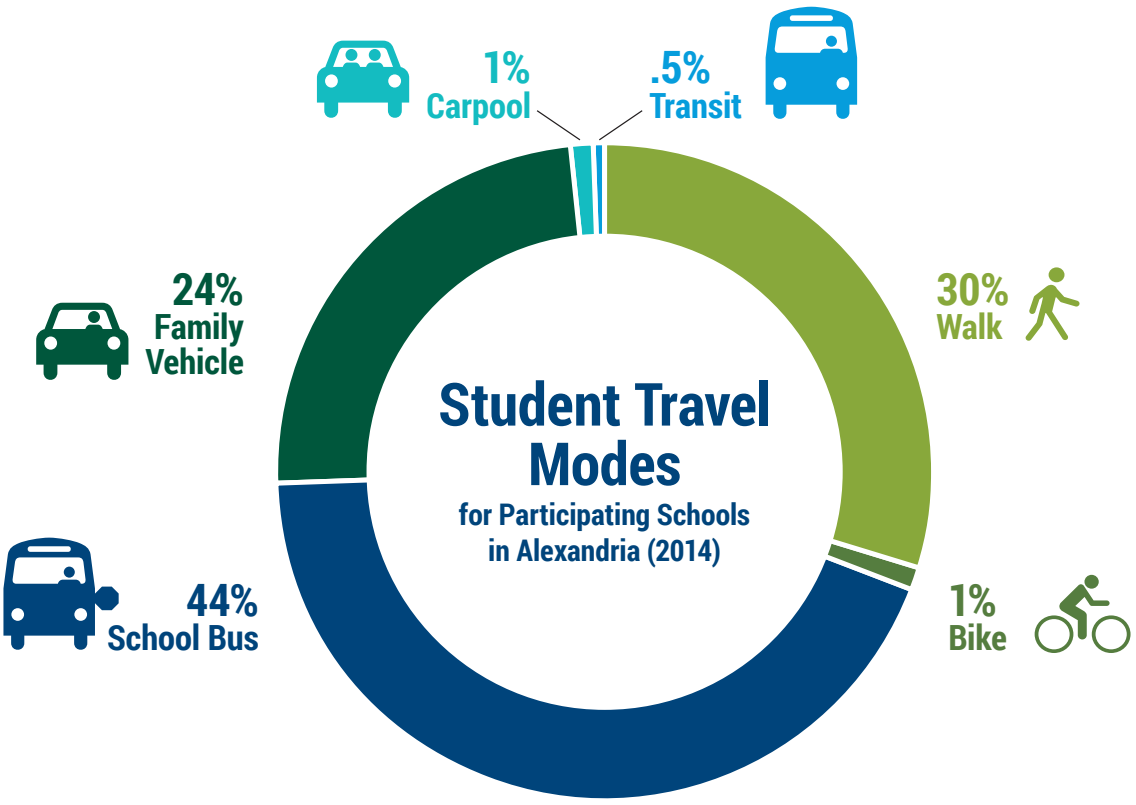


Figure 2.6 : Student Travel Modes for Participating Schools in Alexandria (2014)

7 National Center for Safe Routes to School. Data Central. Parent Survey 2014. Accessed from http://www.saferoutesinfo.org/data-central on December 9, 2014. Participating schools included: Charles Barrett ES, Cora Kelly ES, Francis Hammond MS, George Mason ES, George Washington MS, James K. Polk ES, Jefferson-Houston ES, John Adams ES, Patrick Henry ES, and William Ramsay ES.

Case Study Areas

In order to develop the strategies presented later in this Chapter, a closer look at the physical conditions that make up Alexandria's pedestrian environment was needed. To do this, the City identified six Case Study Areas that represent different "place types" in Alexandria and feature issues that occur throughout the City. Because these Case Study Areas have characteristics similar to many other places in Alexandria, the recommendations can inform efforts to improve pedestrian safety and comfort in those areas with comparable issues and needs.

The themes shown in Figure 2.6 were developed based on input from Advisory Committee, the public and City staff. These themes reflect both recurring issues noted by the public and "place types" in Alexandria where pedestrian safety and comfort are particularly critical. A map of the specific Case Study Areas used to study these themes is shown in Figure 2.8.

THEMES	CASE STUDY AREAS:	I-395 and Landmark Mall	Hammond Middle School Area	Duke Street Corridor	Mount Vernon Avenue/ Four Mile Run	King Street Station	Braddock Road and Commonwealth Avenue
	Major Barriers/Freeway Interchanges	●	●			●	
	Schools and Neighborhoods		●		●		●
	Transit Access and Integration	●		●		●	
	Neighborhood Main Streets				●		
	Suburban Commercial Connectors	●		●			
	Trail/Roadway Transitions				●		

Figure 2.7: Themes and Case Study Areas

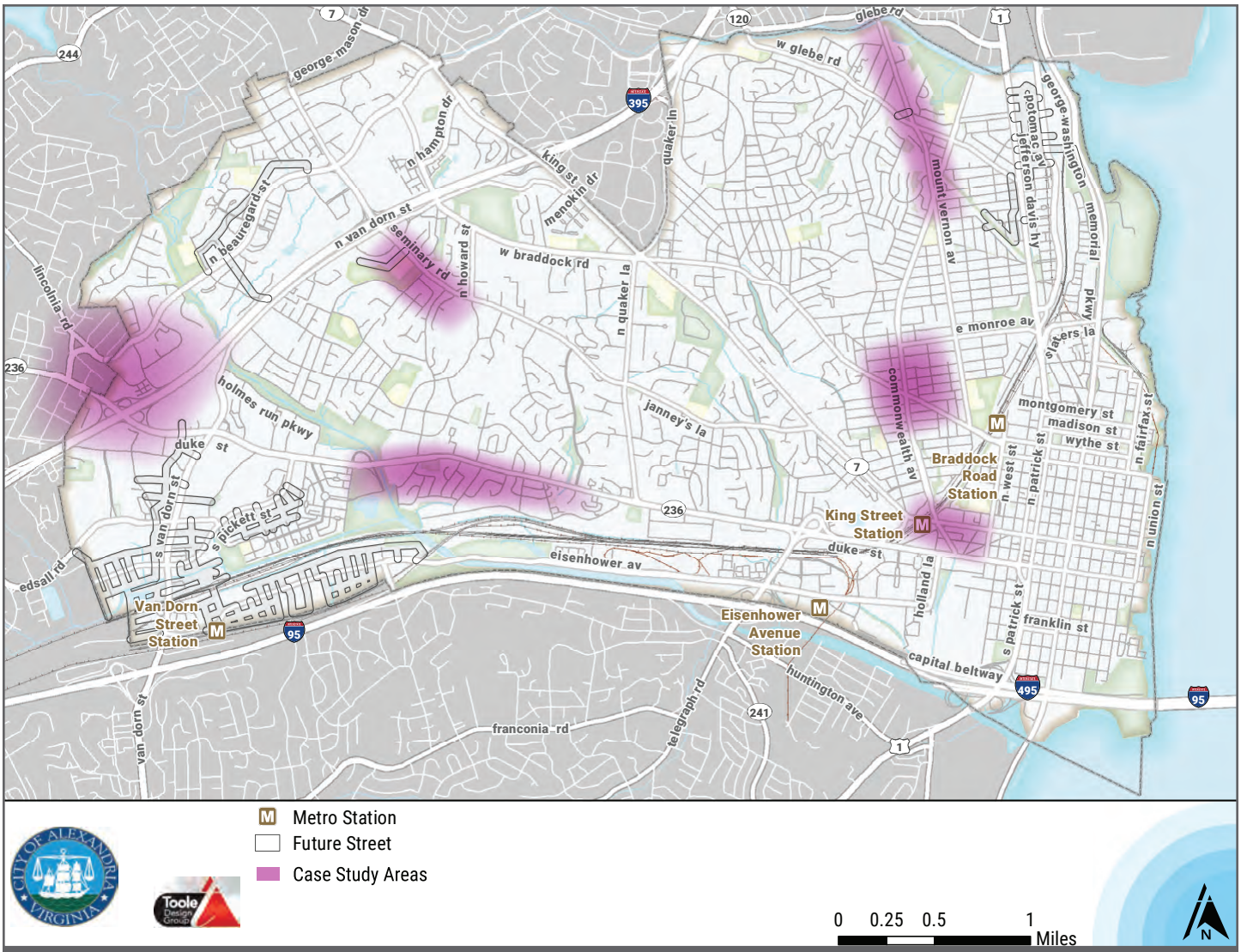


Figure 2.8: Map of Case Study Areas

The project team conducted field work in each of the Case Study Areas, collected data about existing conditions, observed pedestrian and bicycle behaviors, and developed recommendations for facility improvements. While the focus was on pedestrian infrastructure, some localized bicycle issues and recommended improvements were also noted. A summary of the recommendations for one of the Case Study Areas (Seminary Road/Hammond Middle School) is presented on the following pages.

Complete details on all six areas can be found in Appendix D.

Hammond Middle School entrance

Example Case Study: Seminary Road / Hammond Middle School

This Case Study Area is located in western Alexandria along Seminary Road near I-395 and the Inova Alexandria Hospital. Centered around Francis Hammond Middle School, this area was selected as a case study to represent the theme of *schools and neighborhoods*. It also has characteristics related to other themes evaluated through the case studies including *major barriers/freeway interchanges* and *transit access and integration*.

Seminary Road serves as a major, cross-city transportation corridor that connects from Quaker Lane to I-395 and Bailey's Crossroads in Fairfax. There are heavily used WMATA and DASH bus routes along Seminary Road that serve the school, hospital and other residential and commercial development. There is a significant amount of pedestrian activity in the area, with many people crossing Seminary Road at both signalized and unsignalized locations.

As was true in all of the Case Study Areas, missing or substandard curb ramps was a prevalent issue. Additionally, there are several gaps in the sidewalk network and many areas where the sidewalks are four feet wide, which is less than the City's minimum standard of five feet for new sidewalks. Similarly, sidewalk buffers between four and six feet exist on some segments of Seminary Road and nearby local streets, but in some instances buffers are too narrow given the speed and volume of traffic. Other issues in this corridor include missing or inadequate crosswalks, poor bus stop access and inaccessible or broken pedestrian signals.

Student crossing mid-block on Seminary Road at Kenmore Avenue near I-395 entrance

Figure 2.9 shows the recommendations that were made for the Seminary Road/Hammond Middle School area. One goal of this exercise is to improve pedestrian access to Francis Hammond Middle School. The team recommended several improved curb ramps and crosswalks in front of the school, as well as additional highly-visibility school zone signage. There may also be a need for improved management of school drop off/pick up zones, to minimize vehicle backups onto Seminary Road.

Another location in this study area where the team made numerous recommendations was at the intersection of Seminary Road and Kenmore Avenue. The team observed many pedestrians crossing Seminary Road at an unsignalized, mid-block location in order to access the bus stop and shopping centers to the north of Seminary Road, on Kenmore Avenue and Library Lane. This condition likely results from the concentration of higher density housing to the south of Seminary Road, the commercial development and bus stops to the north, and the long distances between marked crossings in this area. To help with the issue of people crossing mid-block across Seminary Road at Kenmore Avenue, a near-term recommendation is to consider relocating the bus stop on the north side of the street closer to the signalized intersection of Seminary Road and Library Lane. Longer term, the City could evaluate the potential for a new traffic signal or pedestrian activated signal at Seminary Road and Kenmore Avenue; however, the close proximity to the adjacent signal at Library Lane may make this infeasible.

Use the following links to read the other five Case Study summaries, which are presented in Appendix D:

- I-395 and Landmark Mall
- Duke Street Corridor
- Mount Vernon Avenue/Four Mile Run Trail
- King Street Station
- Commonwealth and Braddock

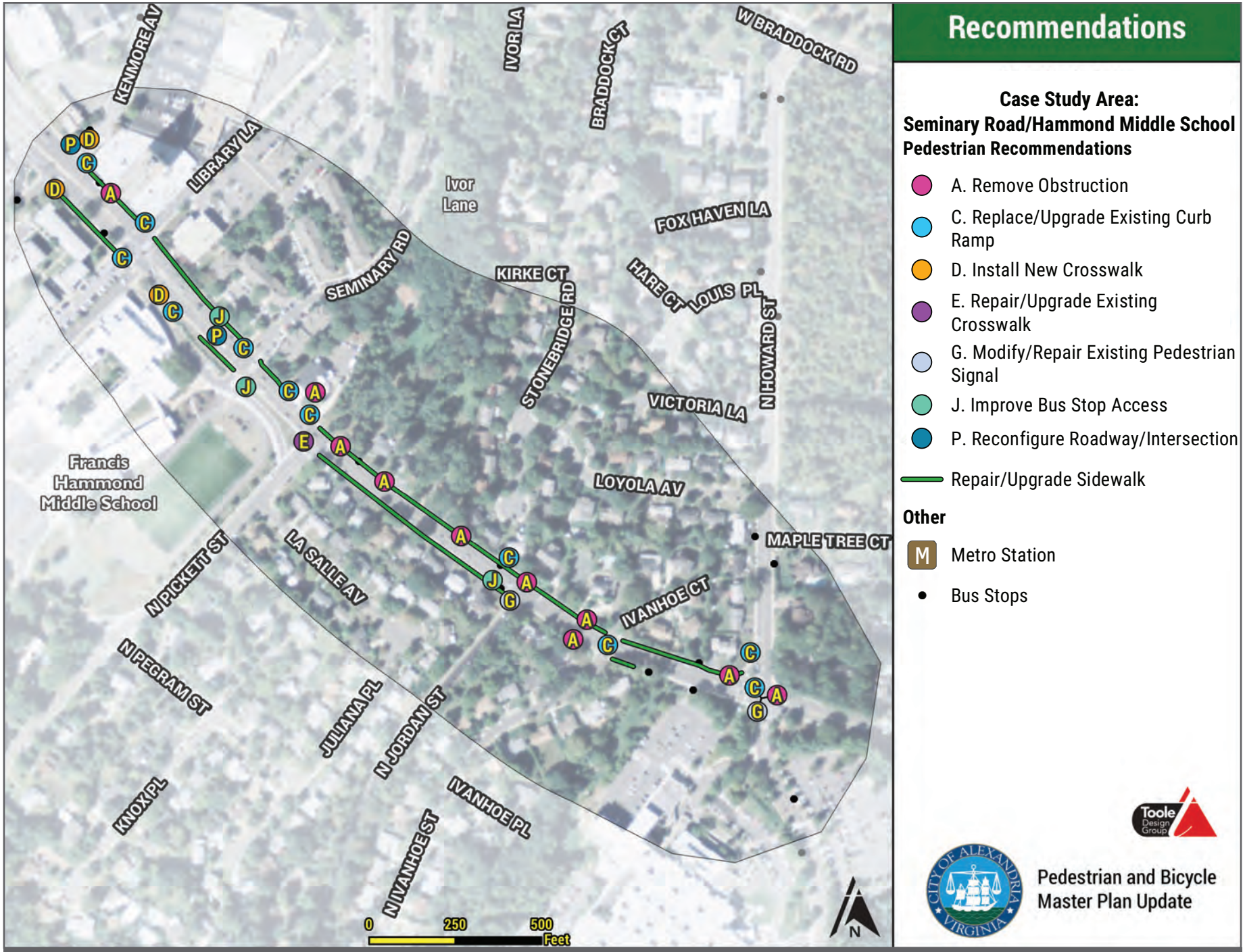


Figure 2.9 : Map of Recommendations for Seminary Road / Hammond Middle School Area

Pedestrian Strategies

The existing conditions analysis, case studies, and public/stakeholder input were used to develop a series of strategies that will guide the implementation of the Pedestrian and Bicycle Chapter. Strategies apply citywide and aim to accomplish the vision, goals and objectives developed at the beginning of the planning process. Strategies are organized under two categories:

1. **Engineering strategies** relate to the sidewalks and other physical characteristics of the built environment in Alexandria.
2. **Program and policy strategies** include changes to City plans or procedures, as well as education, encouragement and enforcement efforts.

Many of the strategies are self-explanatory from their title, however a short description is provided for some of the strategies where more explanation or background information is needed. Throughout this section, the icons below indicate which of the Plan goals are addressed by each strategy.

Example of an Existing Complete Street in Alexandria (Stevenson Ave)

Pedestrian Goals	
SAFETY (SA)	ENGINEERING (EG)
ENCOURAGEMENT (EC)	EDUCATION (ED)

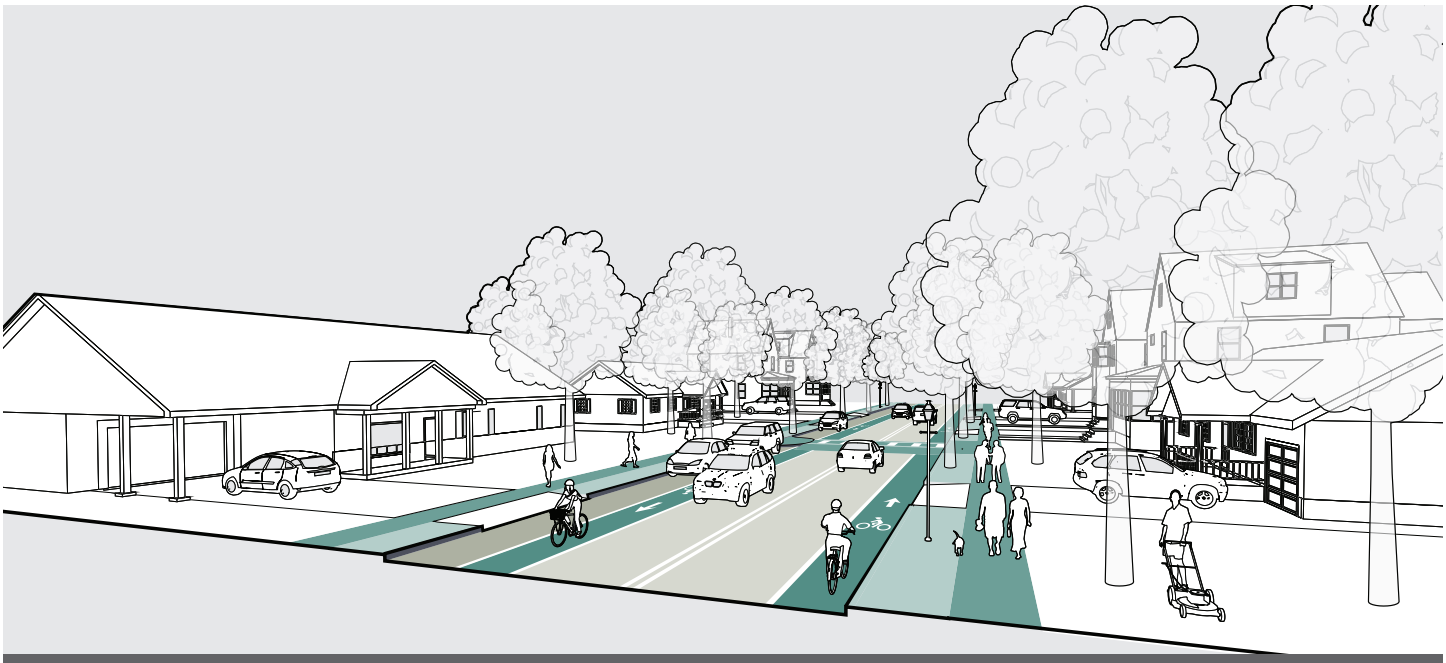
Pedestrian Engineering Strategies

STRATEGY #1 — EG

Apply the Complete Streets Design Guidelines on all street projects in the City.

a. Regularly utilize the Guidelines for direction regarding sidewalk width and materials, sidewalk buffers, street trees and other green features, wayfinding, street furnishings, methods for activating the pedestrian experience and other topics related to the pedestrian environment.

b. Integrate the Guidelines into City policies and the development review process as required by 2011 Complete Streets policy.



Example Graphic from the Alexandria Complete Streets Design Guidelines

STRATEGY #2 SA EG

Close sidewalk network gaps and improve sidewalks where needed.

a. Implement the prioritized new sidewalk recommendations (see Figure 4.4), and increase the annual capital budget for new sidewalks to allow for construction of these sidewalks. Continue to address narrow sidewalks through redevelopment.

b. Use the Complete Street Design Guidelines or other applicable, adopted City plans to determine sidewalk width and design for all new and reconstructed sidewalks.

c. Ensure a clear pedestrian zone on sidewalks by inspecting and enforcing right-of-way encroachment.

d. Promote the use of Call.Click.Connect for reporting maintenance issues on City property (e.g. vegetation management, sidewalk upheavals, etc.).

e. Develop a citizen petition process for new, citizen-requested sidewalks on neighborhood residential streets.

Figure 2.10 documents the areas in the City where new sidewalks on one or both sides of the street are recommended. Many of these new sidewalk projects were recommended in the 2008 Mobility Plan but have not been completed due to cost, right-of-way limitations or other design complexities. Since implementing these projects will likely require dedicated City resources, the project team used a data-driven process to prioritize sidewalk projects for implementation. This process and the results are presented in Section 4: Implementation.

Call.Click.Connect is the City's online customer service system which allows users to submit service requests related to sidewalk repairs and cleaning needs, snow and ice removal, potholes, signage problems and a range of other issues (including many topics not related to transportation). Access Call.Click.Connect at http://request.alexandriava.gov/CCC or 703.746.HELP.

Pedestrian Engineering Strategies

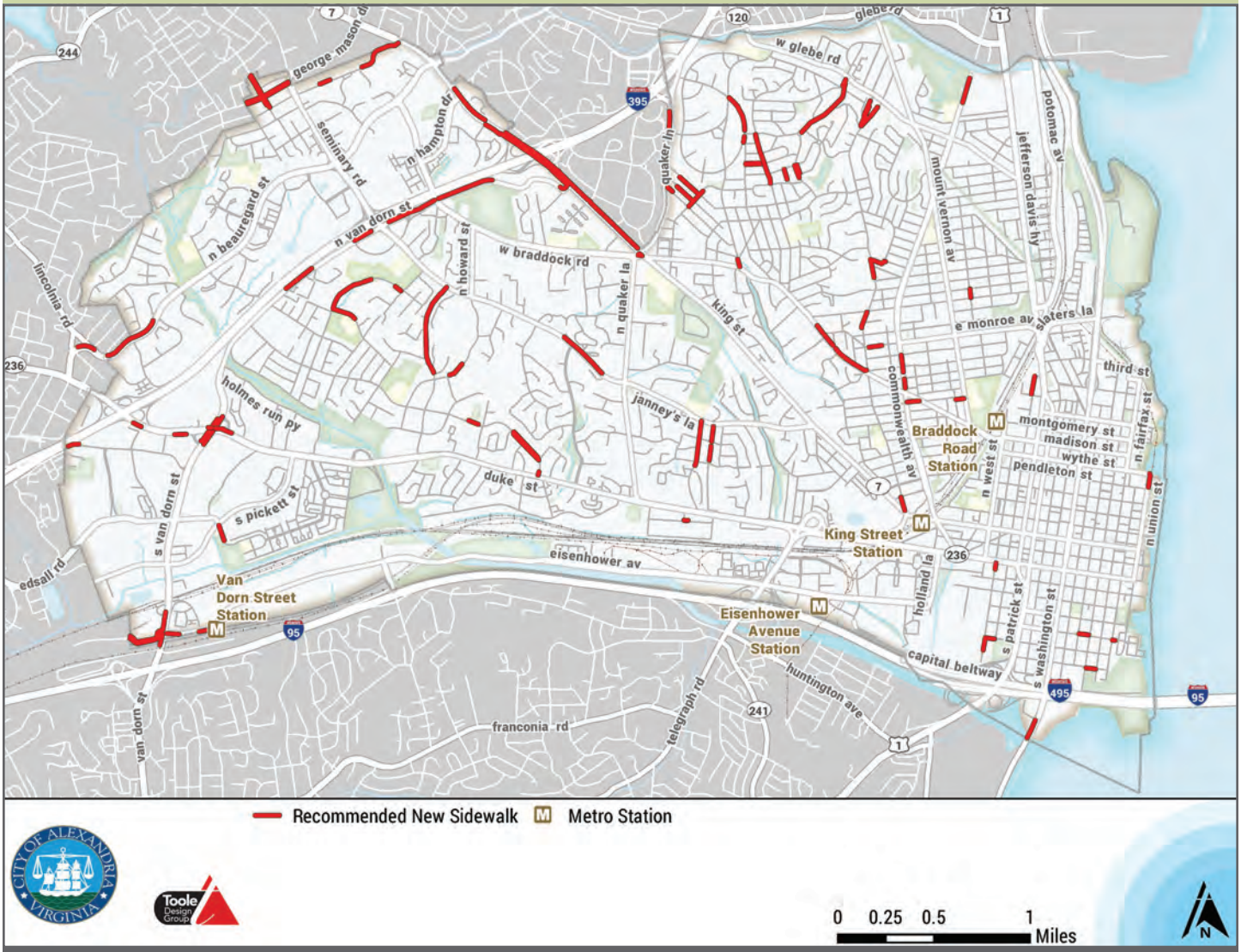


Figure 2.10 Citywide Map of All Recommended New Sidewalk Projects

STRATEGY #3 EG

Prioritize and standardize curb ramp upgrades and other Americans with Disabilities Act (ADA) improvements.

a. Provide ADA accessible curb ramps at every intersection and ensure that curb ramps align with crosswalks where feasible, in conjunction with reconstruction of streets, or development opportunities. See the Complete Streets Design Guidelines for more information on curb ramps.

b. Provide pedestrian pushbuttons at all actuated signals (signals that do not automatically provide a pedestrian phase). Pedestrian pushbuttons should be easily activated and conveniently located near each end of the crosswalk. Install accessible pedestrian signals (i.e. audible tones, speech messages, detectable arrow indications and/or vibrating surfaces) at all new signals, as is the recommended Federal standard used by the City (see Proposed Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way).

c. Develop a phased approach for assessing ADA needs throughout the City, starting with areas near schools and transit stops and stations. Request dedicated and sufficient funding to implement the ADA upgrades identified through these studies.

d. Maintain a continuous, level and clearly delineated pedestrian path across driveways-prioritizing new sidewalks and areas of higher levels of pedestrian activity. Limit or consolidate the number and width of driveways where possible. See the Complete Streets Design Guidelines for more information on driveway design.

ADA compliant paths and curb ramps make it possible for users of assisted mobility devices to safely use the transportation network. For example, curb ramps in Alexandria have been installed with different designs and materials over time, and have various issues from steep grades to lack of alignment with crosswalks. Addressing all accessibility issues is a monumental task, and improvements will be phased. The City recently finalized an ADA analysis of transit stops in Old Town and Del Ray[8] that can serve as the first step in the phased approach to addressing ADA retrofits at transit stops.

> Improving bike and pedestrian ways is very important to persons with disabilities that limit mobility. Safe bike routes help persons with disabilities who wish to bike and, when fewer cyclists ride on the sidewalks, persons with disabilities feel safer walking.
>
> – Mollie Danforth, *Commission on Persons with Disabilities*

Improve safety and access through and across major barriers including freeways, waterways and rail corridors.

a. In high-speed areas such as those near freeway interchanges, use enhanced design elements to improve:

   I. Safety: Provide high-visibility crosswalks, pedestrian-activated signals and ample crossing time for pedestrians at intersections. Crossing islands should be considered where the crossing distance is greater than 50'. Design features to slow vehicles should also be used, including narrower travel lanes and speed feedback signs. Preferred crossing locations should be highly apparent to pedestrians so that they are encouraged to use the safest locations.

   II. Comfort: Wider sidewalks and buffers should be used.

   III. Pedestrian Visibility: Areas with poor visibility for pedestrians should be evaluated for possible street reconfiguration including narrowing turning radii, installing bulb outs, leading pedestrian intervals, reorienting intersection geometry, strategic parking removal or other design changes.

   Partner with VDOT as needed for improvements in these areas. See Complete Streets Design Guidelines for more information about these strategies.

b. Identify locations that need enhanced pedestrian connections over rail tracks, freeways, waterways and other barriers to connect key destinations/attractors (i.e. near existing and future Metrorail stations, mixed-use development sites or commercial districts). Encourage at-grade crossings whenever possible to support pedestrian activity at the street level. Partner with CSX, WMATA or others to ensure that connections are created. Ensure adequate lighting and ADA access on bridges and tunnels.

c. Provide wayfinding to guide pedestrians to crossings of major barriers.

8 City of Alexandria, Pedestrian and ADA Improvements to Transit Stops Study, June 2015 (https://www.alexandriava.gov/localmotion/info/default.aspx?id=78360)

Improve crossing conditions, especially in areas with high pedestrian demand or documented safety concerns, and in all new development and future capital improvement projects.

a. Evaluate current signal timing practices and revise, as needed, to improve safety and minimize pedestrian crossing delay while minimizing the impact on vehicle throughput. Apply Leading Pedestrian Intervals and eliminate Right Turns on Red when appropriate to improve pedestrian comfort and safety. Provide automatic pedestrian signals where feasible in order to minimize pedestrian delay.

b. Prioritize select angled intersections with high crash rates and long crossing distances to reduce pedestrian exposure and increase visibility for and of pedestrians.

c. Prioritize the installation of new/improved pedestrian-scale street lights in areas near schools, transit stops/stations, parks, senior centers and commercial districts. See Complete Streets Design Guidelines for more information about street lighting design, use and placement.

d. Discourage slip ramps as part of new roadway or development projects. As opportunities arise through roadway improvements or development, improve or eliminate existing slip ramps.

Slip ramps and slip lanes present a particular safety challenge by creating and additional potential conflict point between pedestrians and automobiles in a situation where drivers are, by virtue of wide curb radii, able to turn at higher speeds.

Prioritize ongoing maintenance and repair of the pedestrian network.

a. Develop internal and external practices to improve snow and trash removal on streets and trails, prioritizing popular commuter trails. Work with the National Park Service to formalize a partnership related to maintenance and snow removal on the Mount Vernon Trail.

b. Promote Call-Click-Connect as a means for residents to report maintenance and safety concerns. Address reported issues as part of routine staff activities, prioritizing areas near schools, transit stops/stations, parks and senior centers.

Improve access and safety for all users on trails; particularly at entrance/exit points.

a. Remove unnecessary bollards, signs or obstructions that create choke-points at trailheads.

b. Widen trail access points and segments that experience higher volumes of pedestrian and bicycle traffic. Use pavement markings in these areas to delineate separate spaces for each user group.

c. Use signage, pavement markings and surface treatments to create simple and obvious paths of travel for people trails.

d. Provide wayfinding at access points and key interior trail junctions/intersections to aid navigation.

Reduce conflicts between bikes, pedestrians and other users on sidewalks.

a. In areas with significant pedestrian traffic, provide dedicated, on-street bicycle facilities on roadways (or on parallel roadways when needed).

b. Explore revisions to the City code to better define and address conflicts between pedestrians, bicyclists, drivers and other users, such as skateboarders.

Union Street is an example of a location where heavy pedestrian and bicycle traffic create frequent conflicts between modes. While increased enforcement and education related to appropriate behavior can help address this issue, it is also important to provide each user group with dedicated facilities that provide a convenient and direct route. Strategy #8 also addresses the need for added clarity in the city code regarding skateboarding, inline skating, people using push-scooters and other forms of non-motorized transportation.

Improve walkability, connectivity and ADA access to transit.

a. Prioritize pedestrian improvements such as new/widened sidewalks, curb ramp upgrades and high visibility crosswalks near transit stops/stations.

b. Encourage transit providers to locate transit stops close to signalized intersections. See Complete Streets Design Guidelines for more information about bus stop design, bus shelters and related features.

c. Increase the number of ADA compliant bus stops in the City.

Improve walkability, connectivity and ADA access near schools and parks.

a. Prioritize pedestrian improvements such as new/widened sidewalks, curb ramp upgrades, sidewalk buffers and high-visibility crosswalks near these key destinations. Also employ traffic calming measures, based on assessments of need, in these areas.

b. Partner with ACPS and APD to conduct school zone audits. Dedicate adequate staffing and funding to complete school audits and implement identified improvements.

c. Partner with the Department of Recreation, Parks and Cultural Activities (RPCA) to evaluate access to parks.

Child pedestrian travel in Alexandria is often heaviest near school sites and parks, and Strategy #10 recommends prioritizing these areas for walkability, connectivity and accessibility improvements. Traffic calming in areas with identified need can help drivers avoid conflicts with pedestrians by increasing reaction time, and slower speeds can mitigate the impact of crashes when they do occur. Partnership with ACPS, APD and RPCA will be essential to the success of this strategy.

Conduct an evaluation of traffic fatalities and develop a Vision Zero program that outlines the framework, budget and staffing needed to work towards eliminating pedestrian and bicycle related deaths and serious injuries in Alexandria.

Vision Zero is an international program based in the idea that all traffic fatalities are preventable. Vision Zero combines engineering, education, enforcement and other strategies to address traffic safety issues, with the express goal of eliminating traffic-related fatalities and serious injuries. In Alexandria, a Vision Zero program will include many of the City's existing programs and investments, as well as some new efforts specifically targeting high-crash locations or documented safety issues. Dedicated staff time and funding for Vision Zero program and project implementation will be essential to the success of this strategy.

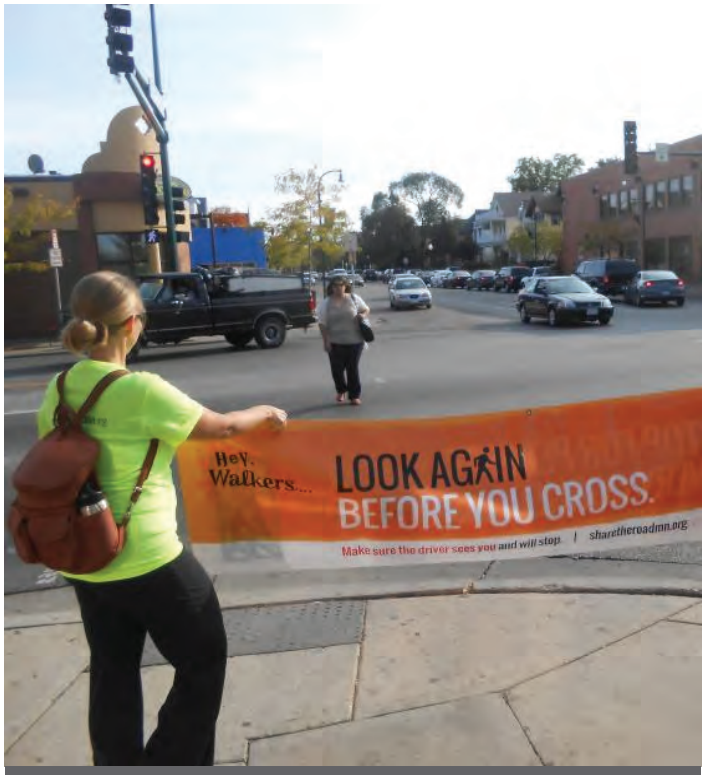
Pursue funding to oversee education and outreach for pedestrian/multimodal transportation safety initiatives citywide.

It takes more than good infrastructure to create a walkable city; you must also support walking through education and outreach programs and campaigns that give people the motivation and knowledge needed to encourage increased walking and safe behavior. There is also a need for similar education focused on drivers, to ensure that they are aware of safe practices and laws related to driving around pedestrians.

VISION ZERO was launched in Sweden in 1997 and has gained great momentum both internationally and throughout the U.S. The goal for Vision Zero is to reduce the number of traffic fatalities by making safety a top priority for every user of the transportation system. The ultimate goal is zero traffic fatalities.

Vision Zero initiatives in the United States are using a broad range of strategies to prevent and reduce traffic fatalities. Some efforts include targeted data collection, detailed safety studies of crash hot spots, community education campaigns, or safety-focused roadway design guidance. Some examples from the U.S. include:

- **San Mateo, CA** has embraced a Vision Zero policy through its Sustainable Streets Plan. This Plan calls for a review of the locations and causes of traffic collisions every year, and the implementation of design changes that aim to improve walking and bicycling conditions at intersections with the highest collision rates.
- In **New York City**, some of the actions taken to date related to Vision Zero include: the reduction of the citywide speed limit to 25 mph, the creation of a permanent Vision Zero Task Force, and the development of Borough focused pedestrian safety action plans.
- In **Santa Barbara, CA**, two nonprofit groups have partnered to develop a Vision Zero Plan and work with the city to adopt a policy targeting zero traffic fatalities. The Plan will include not only engineering and education strategies; it will have a strong focus on traffic laws and enforcement.



Pedestrian Safety Education Campaign (Minneapolis, MN)

STRATEGY #3 SA EG

Regularly conduct construction inspections to ensure safe, convenient and accessible pedestrian accommodations are provided during all phases of construction.

Good pedestrian infrastructure networks must be connected, and pedestrians must be able to expect infrastructure and routes to be consistently available to them. The existing City policy requiring safe, convenient and accessible accommodation during construction must be enforced and inspected to effectively retain pedestrian routes. Where construction projects have unavoidable impacts that result in the closure of sidewalks, the first choice should be to provide alternate accommodation on the same side of the street.

STRATEGY #4 ED EC SA EG

Develop an annual report card with information on the performance measures identified in this Plan (see Section 4: Implementation), as well as those identified by the Office of Performance Accountability related to bicycling and walking.

a. Make the report card available on the City website and promote through listserves, social media and local organizations.

STRATEGY #5 EC

Explore a pilot Open Streets Event to encourage active transportation and lifestyles.

a. Use the event to increase education about Complete Streets, health benefits, transportation options and programs in Alexandria, and innovative facility types.

Open Streets events are community gatherings where a portion of a street, or an entire street, are temporarily closed to automobile traffic and made available for walking, bicycling and other health related activities. These events can be used to demonstrate a new street design, for example by using chalk paint and other temporary means to create a buffered bike lane, or may be used more generally to raise awareness and community support for active, healthy transportation options.

Photo of Open Streets Event (Howard County, MD)

Pedestrian Program and Policy Strategies

STRATEGY #6 EC

Evaluate the use of the employee alternative transportation benefits program, and expand promotion efforts related to the program.

Alexandria currently provides a stipend to City employees who take transit, walk or bike to work at least four times per week. Alexandria is a major employer and a role model for others in the City. The employee alternative transportation benefits program should be evaluated for usage and efficacy, and then refined and promoted as needed.

STRATEGY #7 EG

Pursue funding for high priority pedestrian projects (see Section 4: Implementation).

Example of high priority project (Union Street)

STRATEGY #8 ED EC

Partner with the Alexandria Health Department and Department of Community and Human Services, as well as non-profits such as Partnership for a Healthier Alexandria, to identify funding and prioritize programs related to active transportation and lifestyles.

STRATEGY #9 ED

Continue to provide training for appropriate City staff on national ADA design standards, Complete Streets and other best practices.

Pedestrian design and planning are quickly evolving fields. As the best thinking in these fields advances, key staff should strive to remain current with information and create or access trainings for additional staff who work on implementation or policy change.

STRATEGY #10 ED EC SA

Partner with Local Motion and the Alexandria Police Department to build upon regional safety campaigns and other similar efforts that promote pedestrian, bicycle and driver safety, rights and responsibilities, as well as the benefits of active transportation.

Large apartment building in Alexandria.

STRATEGY #11 EG

Continue to improve pedestrian access within and through large properties such as shopping centers and multifamily housing complexes through partnerships with developers/ landowners, small area plans and the development review process.

Large private properties can serve as barriers to pedestrian travel if they are not designed to accommodate all modes. The pedestrian environment on these properties, especially in parking lots, can also pose safety challenges through unpredictable conflict points between pedestrians and automobiles. City staff will continue to review development applications and site plans to ensure adequate access is provided in new development, and will take advantage of opportunities to work with owners to improve access on existing sites. Access easements are a proven way to implement this strategy.

STRATEGY #12 ED EC SA EG

Strive for Gold designation in the Walk Friendly Community program of the Pedestrian and Bicycle Information Center through implementation of the pedestrian projects and strategies presented in this Plan.

This strategy refers to a national program administered by the Pedestrian and Bicycle Information Center. Alexandria currently holds a Silver Walk Friendly Community designation, which reflects the City's "dedicated pedestrian staff time, excellent Safe Routes to School program, and pedestrian development and encouragement strategies."[9] Earning a Gold-level designation would place the City on par with Washington, DC and Arlington for the most walk-friendly community in the region. To achieve Gold status, Alexandria will need to continue to expand its pedestrian programs and infrastructure.

9 More information available at www.walkfriendly.org.

SECTION 3

Bicycling in Alexandria

BICYCLING IN ALEXANDRIA

If you visit any of the City's trails on a sunny Saturday afternoon, or look at the bike racks at the Braddock Road Metrorail stations on a typical week day, it is clear: Alexandria has a strong culture of bicycling. Over the past several years, the City has made significant strides to support bicycling as a viable, affordable and healthy transportation option. Alexandria is also a major regional center for bicycle tourism and recreational bicycling. Since 2008, the City has launched Capital Bikeshare, built over 22 miles of bicycle lanes and shared-lane markings, approximately 6 miles of shared-use paths, and installed over 200 bicycle parking spaces throughout many of its streets. Alexandria has also piloted a number of new bicycle facility types in recent years, including the region's first advisory bike lane on Potomac Greens Drive and a colored bike lane on King Street.

Despite this progress, growth in bicycle commuting remains relatively low compared to leading bicycle cities in the U.S.: around one percent of all commute trips for Alexandria residents are made by bike.[9] Although work trips comprise only a small percentage of all travel,[10] the opportunity exists to support increased bicycling in the City. This section, the Bicycle element of the Transportation Master Plan, aims to leverage past investments and help Alexandria become a world class place to ride a bike.

Vision, Goals and Objectives

City staff collaborated with the Advisory Committee to create a vision and corresponding goals and objectives relating to bicycling (see Figure 3.1). These were used to guide the planning process and to develop the strategies presented later in this section. In the strategies section, the goals addressed by each strategy are noted using the icons shown in the table on the following page.

Vision for Bicycling in Alexandria

Bicycling is a convenient, safe, and desirable choice for transportation and recreation trips in Alexandria. The City provides a network of facilities that link important destinations and appeal to bicycle riders of different ages and abilities, including children, older adults, and persons with disabilities, as well as programs and policies that encourage increased bicycling as a safe and active form of transportation and recreation. Bicycle facilities, programs and policies foster social equity, ensuring that investments benefit people of all backgrounds and income levels, as well as geographic equity, ensuring that people throughout the City have access to safe and low-stress places to bike.

> I want to ride my bike to the market in Alexandria, but riding next to cars makes me feel uncomfortable.
>
> – Sophie Henry, *10 years old*

9 2008-2012 American Community Survey 5-Year Estimates. S0801 Commuting characteristics by Sex. U.S. Census Bureau.

10 American Associate of State Highway and Transportation Officials, National Report on Commuting Patterns, May 2013.

Goals	Objectives
SA SAFETY The City will create a safe, well-maintained bicycling environment that encourages bicycling as an enjoyable and convenient mode of travel and recreation for riders of all ages and abilities.	1.1 Reduce conflicts between bicyclists, vehicles, and pedestrians by implementing a range of bicycle facility treatments appropriate to a street and its surrounding context.
	1.2 Improve the safety of bicyclists and drivers through effective law enforcement implemented in coordination with other bicycle-focused programs, policies and facility improvements.
	1.3 Eliminate bicycle fatalities and injuries citywide.
EG ENGINEERING The City will develop a connected bicycle network that includes both on-street and off-street facilities, as well as support facilities such as bicycle parking, that provide safe, enjoyable and comfortable accommodations for riders of all ages and abilities	2.1 Increase the total miles of on-street bicycle facilities to create a citywide network that enables safe bicycle travel in and between all City neighborhoods and from Alexandria to key destinations and bicycle facilities in neighboring jurisdictions.
	2.2 Develop a citywide network of low-stress bicycle routes that are appealing to lower skilled riders, made up of protected and buffered bicycle lanes, sidepaths, trails and neighborhood bikeways that connect important destinations and promotes bicycling as a safe and convenient mode of travel.
	2.3 Integrate the off-street trail system with the on-street bicycle network by providing wayfinding and well-designed transitions at trail access points, ensuring smooth transitions for bicyclists and minimizing conflicts between users of all travel modes.
EC ENCOURAGEMENT The City will promote bicycling as a means of improving transportation circulation, transit access, public health, environmental quality and recreation, with the ultimate goal of increasing bicycling trips as a percent of all travel in Alexandria.	3.1 Encourage and provide incentives for active lifestyles that include bicycling for transportation or pleasure.
	3.2 Partner with other local and regional organizations to support existing and new programs that promote bicycling and active lifestyles.
	3.3 The City will advance to a gold level bicycle-friendly community (http://bikeleague.org/community).
ED EDUCATION The City will educate users of all transportation modes about bicycle safety, rights and responsibilities.	4.1 Initiate targeted outreach that aims to increase adult cyclists' and motorists' knowledge of safe bicycling and driving behaviors and safety.
	4.2 Partner with public and private schools to support bicycle safety education and programs that support increased bicycling among the City's youth.
	4.3 Educate public and private sector professionals who work on transportation, land use and development issues in Alexandria about Complete Streets principles and design.

Figure 3.1: Bicycle Goals and Objectives

Existing Conditions

Similar to the analysis of existing conditions for walking, the study team conducted a thorough analysis of the current infrastructure and programs that relate to bicycling. This baseline review provided a framework for the rest of the planning process for this Chapter.

Between 2000 and 2012, Alexandria experienced an 87 percent increase in people who biked to work. The rate of bicycle commuting in Alexandria is consistent with the average for the DC region (also one percent) and is higher than the statewide average in Virginia (0.4 percent).

To gain a general sense of volumes of cycling at a few high-traffic locations throughout the City, the team looked at data collected by volunteers with the Bicycle and Pedestrian Advisory Committee (BPAC). BPAC counts are taken two times a year at various locations throughout the City where bicycle activity is expected.[11] The top five count locations in 2013, shown in Figure 3.2 below, provide an understanding of relative bicycling levels on some of the City's busiest bicycling corridors. As mentioned previously, data collection began in 2015 through the installation of automated bicycle and pedestrian counters.

Automated pedestrian/bike counter installed in 2015 in Alexandria

Count Location	Total bicyclist counted
Mount Vernon Trail, South of Marina Road	2,537
Mount Vernon Trail, South of the Woodrow Wilson Bridge Trail	1,178
Commonwealth and Mount Vernon Avenue	517
Mount Vernon Avenue South of Four Mile Run	371
West Side of Woodrow Wilson Bridge Trail	360

Figure 3.2: Top 5 Bicycle Count locations, 2013 (last full year of data available, see footnote 11 for count details)

11 It is important to note that the data is not available for all locations and all years. Because there was some variation in the count locations from year to year, a longitudinal data comparison is difficult to provide. Figure 3.2 shows the total number of bicyclists counted in 2013. That year, counts were completed in January, May, July and September. Counts were completed two times per week: 5:00 to 7:00pm on Thursday and 12:00 to 2:00pm on Saturdays. Data can be used to understand relative levels of bicycling in count locations.

Safety

Regarding bicycle safety, statistics from the Alexandria Police Department show that the City has averaged 19 collisions involving bicyclists per year over the past ten years (2004- 2014). Figure 3.3[12] shows locations with higher concentrations of crashes, which included King Street north of I-395, the areas around both the King and Braddock Road Metrorail stations, Old Town and areas around Mt. Vernon Avenue and Commonwealth Avenue in Arlandria. There was one reported bicycle fatality in this timeframe.

Police data reflects reported collisions, which typically involve a car. It is important to also consider other safety issues. Examples of common safety concerns raised during the planning process included crossing conditions at large intersections with fast-moving traffic, conflicts between users on high-traffic trails (like the Mount Vernon Trail), bicycling conditions on roads with heavy traffic and without dedicated bicycle facilities, bicyclists not stopping at stop signs, and the need to address conflicts between pedestrians and bicyclists on sidewalks (particularly in Old Town), among others.

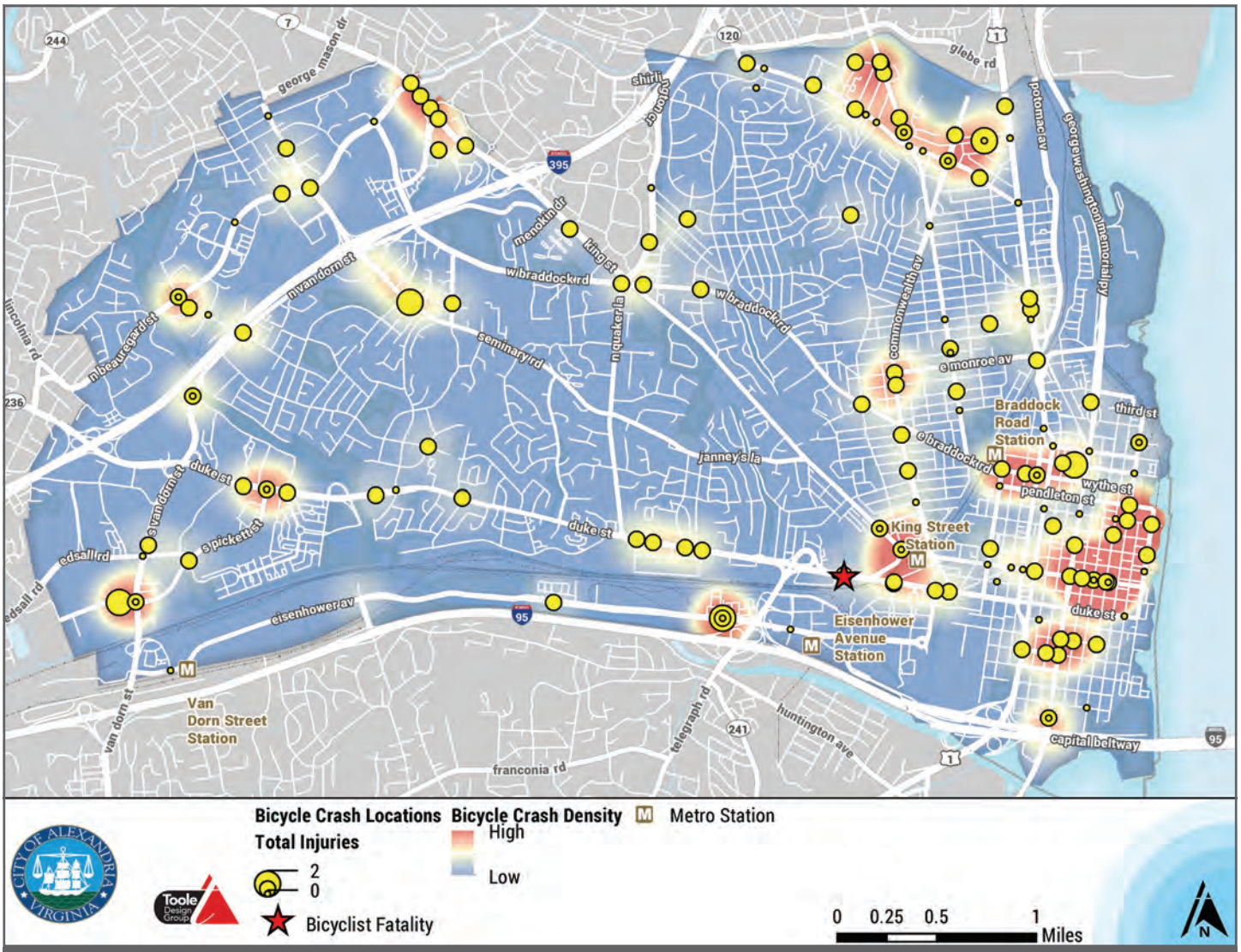


Figure 3.3: Reported Bicycle Crashes (January 2005 – December 2014)

12 Alexandria Police accident reports for the years of 2005 to 2014 were used for this analysis. It is important to note that while this data includes information on reported bicycle related incidents for the ten year period, the true number of incidents may be different as many bicycle crashes tend to not be reported to police and therefore are not reflected in the data.

Infrastructure

The existing bicycle network in the City of Alexandria consists of on-street facilities (e.g., bike lanes, shared lane markings, and signed routes), and off-street sidepaths and trails. Figure 3.4 shows the total mileage in the bicycle network as of 2015.[13] It is notable that Alexandria installed Virginia's first Advisory Bike Lane on Potomac Greens Drive.

Other elements of the existing bike network include bike boxes (e.g., Commonwealth Avenue and Mount Vernon Avenue) and the first-in-Virginia bicycle signal at the intersection of the Mount Vernon Trail, South Washington Street and South Alfred Street. Also, since 2008, Alexandria has provided over 200 new bicycle parking spaces on City streets and has adopted bicycle parking standards for all new development, which have resulted in over 500 new bicycle parking spaces. There are bike parking corrals in five locations, many of which are often full. That said, there are still locations where the quantity of bike parking does not meet the demand.

Programs and Outreach Efforts

Alexandria offers a number of bicycle-related programs and outreach through its Local Motion program. The Local Motion website provides bike maps and other information, and promotes events such as Bike to Work Day, Car Free Day and an annual Commuter Challenge. Other programs offered in the City include an annual Lights for Bikes event, where staff and volunteers distribute bicycle lights to bicyclists, and funds regular bicycle education courses offered by the Washington Area Bicyclists Association (WABA).

Safe Routes to School is an important element of City's existing bicycle programs. While overall rates of students cycling to school are still relatively low (approximately 1 percent of students at participating schools), some schools have notable rates of biking and offer programs such as bicycle rodeos and "bike trains" to support active travel to school.

Facility Type	Miles
Bike Lanes	10.35
Shared Lane Markings (Sharrows)	13.31
Paved Trails	21.02
Unpaved Trails	7.99
TOTAL	**52.67**

Figure 3.4: Existing Bicycle Network Facilities (as of 2015)

Local Motion

On-Street Bicycle Parking Corral in Alexandria

Photo of SRTS Bicycle Rodeo at Alexandria School

13 Based on City of Alexandria GIS data of transportation facilities.

Bicycle Strategies

Making bicycling a convenient, safe, and desirable choice for more people in Alexandria will require support from staff in numerous City departments, elected officials and a range of community partners. It will require both targeted infrastructure investments as well as sustained leadership from staff and elected officials. This section provides specific direction on the investments and other efforts that can help elevate Alexandria's status as a leading city for biking. The bicycle-related recommendations of this Chapter were developed with significant input from the Advisory Committee and the public, and are comprised of three elements:

1. **The Future Bicycle Network**
2. **Bike Share Recommendations**
3. **Citywide Bicycle Strategies**

Future Bicycle Network

The proposed bicycle network (Figure 3.5) includes recommendations for on-road and off-road routes that will be important for bicycling in the City. The network builds upon the recommendations of the 2008 Transportation Master Plan and 2008 Mobility Plan, and was developed through extensive field work as well as input from the project team, Advisory Committee, the Bicycle and Pedestrian Advisory Committee (BPAC) and the general public. The proposed network ensures that the entire City is reachable by continuous routes that connect existing bike facilities, adjacent neighborhoods, key destinations, and existing and planned facilities in neighboring jurisdictions. The implementation of this proposed system will be dependent on funding availability and opportunity, and will be accomplished over the long term.

Bicycling along Holmes Run Trail

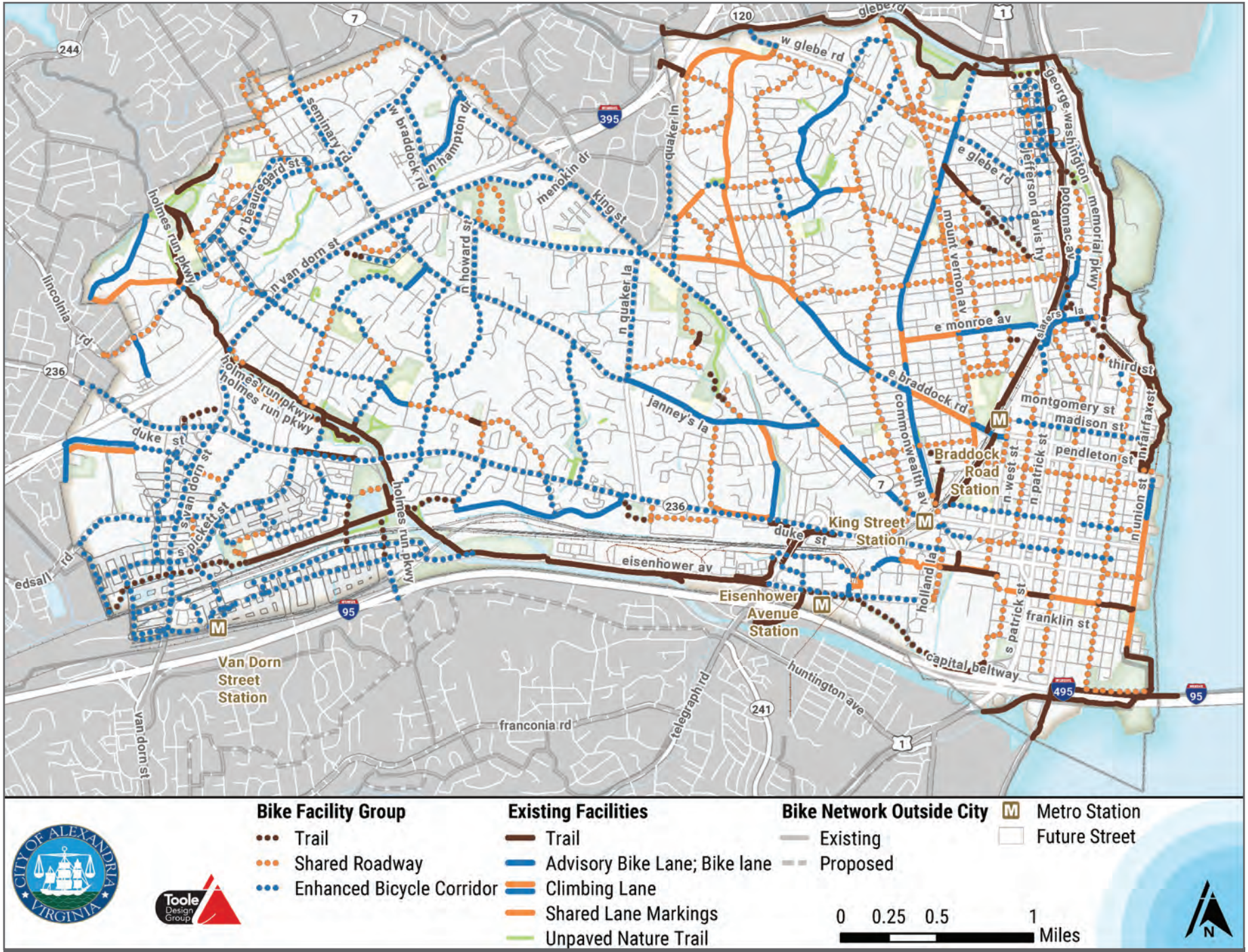
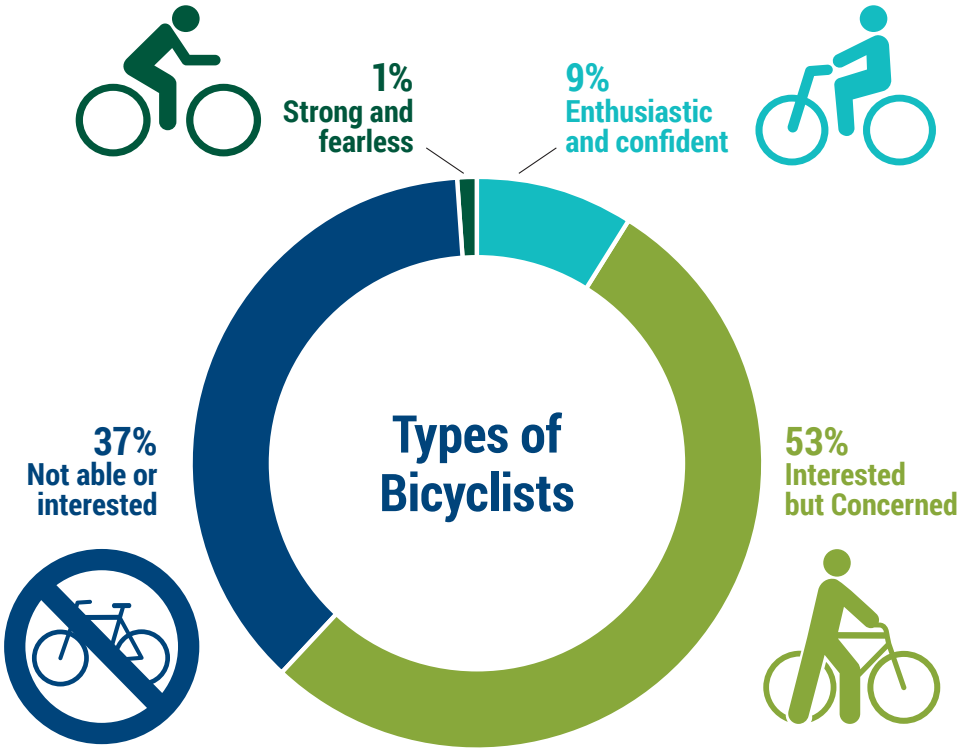


Figure 3.5: Proposed Bicycle Network

Bicycle Facility Groups

One of the central goals of the bicycle element of this project was to create a system where more cyclists of all abilities would feel comfortable riding in Alexandria, including younger, older and novice bicyclists. This target group, often called "interested but concerned" riders, is estimated to comprise roughly 53 percent of the population (see Figure 3.6). Research shows that "interested but concerned" bicyclists prefer low-stress bicycling environments that are either slow/low-traffic streets or facilities that provide separation from motor vehicles. In some cases, existing local streets and trails are well-suited for all types of bicyclists. However, larger roads that carry heavier volumes of traffic require greater attention to design and separation in order to attract less confident bicyclists. With this in mind, the future bike network will incorporate low-stress facilities like separated bike lanes, buffered bike lanes, and Neighborhood Bikeways whenever possible and appropriate (these facilities are defined on the following pages).



Bicyclists generally fall into one of four categories based on their level of comfort:

Strong and Fearless bicyclists will ride in any road conditions or environment.

Enthusiastic and Confident bicyclists will ride comfortably on most types of streets, but may be uncomfortable in certain situations or road conditions.

Interested but Concerned bicyclists require physical bicycle infrastructure improvements before they will want to ride.

People who identify as **No Way, No How** will not ride a bicycle, no matter the circumstances.

Figure 3.6: Types of Bicyclists[14]

14 Dill, Jennifer and Nathan, McNeil, Four Types of Cyclists? Testing a Typology to Better Understand Bicycling Behavior and Potential, Portland State University, August 10, 2012.

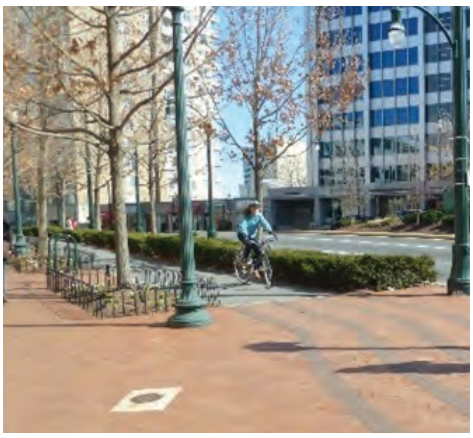
In order to serve a broad array of bicycle riders, Alexandria will use a range of bicycle facility types to implement the proposed bicycle network over time. While specific design decisions for each corridor will be made in the future based on targeted public input and detailed analysis, the map in Figure 3.7 sorts recommendations into three groups: enhanced bicycle corridors, shared roadways, and trails. Each facility type is described below and organized based on each facility's anticipated level of comfort for the user.

1. Enhanced Bicycle Corridors:

Enhanced bicycle corridors are bicycle facilities located within the road right-of-way (either between the curbs or immediately parallel to the road) that provide dedicated space for bicyclists. Enhanced bicycle corridors might be implemented as any of the following facility types:

Protected Bicycle Lanes: Protected bicycle lanes, sometimes referred to as cycle tracks, are exclusive bicycle facilities physically separated from the adjacent motor vehicle lanes by a vertical element (i.e. more than just striping on pavement). Separation can be achieved through a curb, a parking lane, flexposts, plantings, removable curbs, or other measures. This type of facility can improve rider comfort and decreases stress of riding in or directly adjacent to vehicle traffic, and are usable by a broad spectrum of bicyclists including young and more cautious bicyclists. Protected bike lanes may be used on many different street types and are especially beneficial on higher speed, higher volume roadways. Protected bike lanes can be one-directional or two-directional. They may be provided on both sides of two-way streets or on one side of one-way streets.

Buffered Bicycle Lanes: Buffered bicycle lanes are created by painting or using a different surface treatment to create a flush buffer zone between a bicycle lane and the adjacent travel lane. Buffered bicycle lanes are distinct from protected bicycle lanes in that they have no vertical barrier between travel lanes and/or parking. Like protected bicycle lanes, buffered bicycle lanes have been found to dramatically increase bicycling comfort for a wide range of bicyclists.



Sidepaths: Sidepaths run parallel to a roadway and provide shared space for both bicyclists and pedestrians. Ideally, paint or surface treatments identify separate spaces for walkers and bicyclists.

Enhanced Bicycle Corridors *(continued)*

Colored Bicycle Lanes: Colored bicycle lanes are used to increase the visibility of a bike lane facility, particularly in potential areas of conflict, and reinforce bicyclists' space in conflict areas (e.g., at intersections).

Bicycle Lanes: Bicycle lanes provide an exclusive space for bicyclists in the roadway. Bicycle lanes are for one-way travel and are normally provided in both directions on two-way streets. A contra-flow bicycle lane is used on a one-way street to create space for bicyclists to travel in the opposite direction of motor vehicles. A climbing lane can be used on roadways with steep and/or sustained grades where there is not enough space to install standard 5' wide bicycle lanes on both sides of the street. Climbing lanes use a standard bike lane on the uphill side of roadway and shared lane markings in the downhill direction.

Advisory Bicycle Lanes: Where the width of a two-way street is too narrow for a standard bicycle lane or protected bicycle lane, advisory bicycle lanes can be an alternative to the marked shared lane. Advisory bike lanes are appropriate on streets with low traffic volumes. On streets with advisory bike lanes, there is no centerline. Dashed bicycle lanes are provided on either side of a single, central vehicle lane. Motorists drive in the center lane and use bicycle lanes to pass other cars as needed, yielding to any bicyclists that may be in the lane.

2. Shared Roadways:

City ordinances legally allow people bicycling to use all of the City's roadways (the only restrictions are limited access highways such as I-495 and I-395). Subsequently, the majority of road mileage in the City can be considered available for cyclists. The facilities included in this group have been organized based on the level of comfort they may provide for people bicycling and include:

Neighborhood Bikeways: Primarily located in residential areas, Neighborhood Bikeways are designed to encourage slow vehicular traffic and to be comfortable for people walking and bicycling. These streets may feature design elements such as curb extensions and roundabouts, "calming" traffic and giving priority to local vehicle trips over cut-through traffic. As an important part of the citywide bicycle network, Neighborhood Bikeways may also feature bicycle facilities such as shared lane markings or bike route signage.

Priority Shared Lane Markings: On multi-lane streets, marked shared lane symbols, or sharrows, can be enhanced with dashed longitudinal lines and colored pavements. This marked "lane within the lane" can reduce conflicts by encouraging (though not requiring) vehicles to use inside lanes on multi-lane roads and reserve the outside lane for bicyclists. On streets with narrow travel lanes, priority shared lanes direct the bicyclist to the correct and most conspicuous position on the road—the middle of the travel lane.

Signed Route on Shared Roadways: A signed route or bicycle wayfinding system consists of signing and/or pavement markings to guide bicyclists to the different destinations within the City.

Shared Roadways: *(continued)*

Marked Shared Lane (Sharrows): Marked shared lanes are indicated by specific bicycle symbols called shared lane markings or sharrows. Sharrow markings are two chevrons positioned above a bicycle symbol. In general, this is a design solution that can only be used in locations where a standard bike lane or protected bike lane is not feasible due to space constraints. Shared lane markings should be placed in such a manner to direct bicyclists to ride in the most appropriate location on the roadway. They can also be used in multiple lanes to position bicyclists for turning movements.

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3. Trails

Trails or shared use paths are off-street separated facilities serving more than one type of user. Trails serve as part of a transportation circulation system and support multiple recreation opportunities, such as walking, bicycling, and inline skating. A trail is physically separated from motor vehicular traffic with an open space or barrier. This Chapter focuses on paved trails that offer greater accessibility and utility as part of the transportation system. Trails located in Resource Protection Areas (RPAs) will be constructed in an environmentally sensitive manner, typically using pervious surface treatments.

> I like the Holmes Run Trail because the trees give you shade and make you feel like you're in nature. Also, it's an easy path to follow.
>
> – Vicki Kenneally, *Alexandria Trail User*

Bikeshare

Capital Bikeshare is the D.C. region's bike share program. The system began its service on September 20, 2010 with 1,100 bikes at 114 stations in the District of Columbia and Arlington County. The regional system is the third largest bike share program in the U.S. with over 355 stations throughout the City of Alexandria, Washington DC, Arlington County and Montgomery County.

Capital Bikeshare in Alexandria

In 2011, the City of Alexandria expanded the regional Capital Bikeshare program by deploying eight stations and 80 bicycles. The system serves as an enhancement to the City's overall bicycle system, offering expanded opportunities for people to bike in Alexandria. In its first two years, the system recorded over 50,000 rides and 90,000 miles ridden by users.[15] Based on the program's success, the City expanded its fleet to include eight more bike share stations (for a total of 16) in 2014. New stations now serve the neighborhoods of Del Ray, Carlyle, Arlandria and the Eisenhower Avenue Metrorail Station.

Capital Bikeshare Station in Old Town Alexandria

Capital Bikeshare in Alexandria by the numbers:

Top Stations by usage: King Street Metro, Braddock Road Metro, Market Square
Rides logged since 2012: 101, 283
Miles logged since 2012: 238, 665
Carbon offset since 2012: 129,000 lbs. of CO2 emissions
Membership growth since 2012*: 165 percent
Ridership growth since 2012*: 587 percent

** 2015 figures only include numbers until October 2015.*

Benefits of Capital Bikeshare

Capital Bikeshare has been a boon to local transportation in the City by helping increase mobility and connectivity for many residents and visitors, and by introducing new riders to bicycling as a form of transportation. The system has also brought a variety of economic, transportation, health, and safety benefits:

Economic Benefits

Capital Bikeshare has allowed members to reduce their transportation costs related to car ownership and maintenance. For example, the latest Capital Bikeshare member survey found that around eight percent of all members surveyed had sold a household vehicle since joining Capital Bikeshare, and 81 percent of these members said bike share was a factor in their decision to sell the vehicle.[16] Furthermore, users reported saving an average of $13.65 per week (around $710.00 per year) on personal transportation costs as a result of their bike share use.

15 Capital Bikeshare Data Dashboard (http://cabidashboard.ddot.dc.gov/cabidashboard/)

16 2014 Capital Bikeshare Member Survey Report. Obtained from http://www.capitalbikeshare.com/assets/pdf/cabi-2014surveyreport.pdf

Capital Bikeshare has also had a positive economic impact on local businesses. A 2013 study of five Capital Bikeshare stations located in the D.C. region found that a large number of bike share users travelling to these stations spent money within a four block area and planned to return to the neighborhood on a regular basis.[17]

Transportation Benefits

Based on feedback received from the latest Capital Bikeshare Member survey, around one quarter of respondents (24 percent) said they had reduced their driving miles since joining Capital Bikeshare. Additionally, 55 percent reported driving a car less often and 59 percent used a taxi less often, suggesting some shifts from each of these modes to biking. Capital Bikeshare has also helped increase the reach of transit. In Alexandria, the bikeshare stations located near Metrorail stations have the highest ridership, with King Street having the highest and Braddock Road having the second highest use.[18]

Health and Environmental Benefits

The health benefits of bicycling are well known in helping to address preventable diseases such as obesity, heart disease, and diabetes,[19] and Capital Bikeshare has contributed to keeping Alexandrians healthy. For example, 60 percent of survey respondents said that getting exercise/fitness was an important motivator to join Capital Bikeshare,[20] and around 32 percent of respondents reported stress reduction after joining Capital Bikeshare.[21] Capital Bikeshare has also had an impact on the environment and the reduction of greenhouse gas emissions. Since 2012, Capital Bikeshare users in the City have helped offset an average of 32,000 lbs. of carbon dioxide emissions per year, by replacing trips taken previously by automobile.[22]

Safety Messaging on Capital Bikeshare Bicycle

Safety Benefits

Because improving safety for people walking and bicycling is a major goal for the City, it is important to note that, to date, there have not been any fatalities from collisions involving Capital Bikeshare riders. Further, the system has helped increase awareness about the "rules of the road" through safety messages placed on bicycles, stations, website and other marketing materials. Finally, recent studies have indicated that the rates of injury crashes have been typically lower compared with non-Bikeshare riders.[23]

17 Economic Impact & Operational Efficiency for Bikeshare Systems. Anderson, Ryan et al. Accessed from: http://ralphbu.files.wordpress.com/2014/01/virginia-tech-capital-bikeshare-studio-report-2013-final.pdf on July 2015

18 Capital Bikeshare Dashboard. Obtained from http://cabidashboard.ddot.dc.gov/cabidashboard/ in October 2015. Data included September 2012-July 2015.

19 Lindström, J. et al. The Finnish Diabetes Prevention Study: Lifestyle intervention and 3-year results on diet and physical activity. Diabetes Care, December 2002, vol. 26 no. 12 3230-3236. Accessed online at http://care.diabetesjournals.org/content/26/12/3230.full on July 2015.

20 Capital Bikeshare Dashboard.

21 Ricci, Miriam. Bike sharing: A review of evidence on impacts and processes of implementation and operation. Managing the Business of Cycling. Research in Transportation Business & Management

22 Alexandria Capital Bikeshare Dashboard, 2012 – October 2015

23 Injury rates for private bicycling obtained from: Beck, L. et al. (2007). Motor Vehicle Crash Injury Rates by Mode of Travel, United States. Published in the American Journal of Epidemiology.

Proposed Expansion

To determine where expansion of the popular Capital Bikeshare system should take place in Alexandria, a demand analysis was performed using data from U.S. Census, Bureau of Labor Statistics, and the City of Alexandria. Data used for the analysis included employment and population density, location of attractions (i.e., tourist destinations, parks, malls/shopping, schools and libraries), transit density by ridership (i.e., metro and bus stops), existing bicycling infrastructure (on-and off-road), topography, percentage of minority populations and percentage of zero-car households. While this was a data driven examination, the final recommendations took into account the City's program goals as defined by City staff, as well as stakeholder and community input received through the project's online crowdsourcing interactive map.

The heat mapping exercise was used to identify areas of the City with the highest potential demand for bike share, which include areas with high concentration of people, jobs, attractions, and transit availability. Figure 3.9 presents generalized station location recommendations for a five-year time horizon. The recommendations call for expanding the system into other areas of the City, especially on the west end, as well as enhancing existing services by providing infill stations in current service areas. Final station sizing, location and placements will require additional public outreach and fieldwork to confirm availability of space and identify right of way, property ownership, and other site considerations. Private developments above a certain size will support the City's Bikeshare system through monetary contributions.

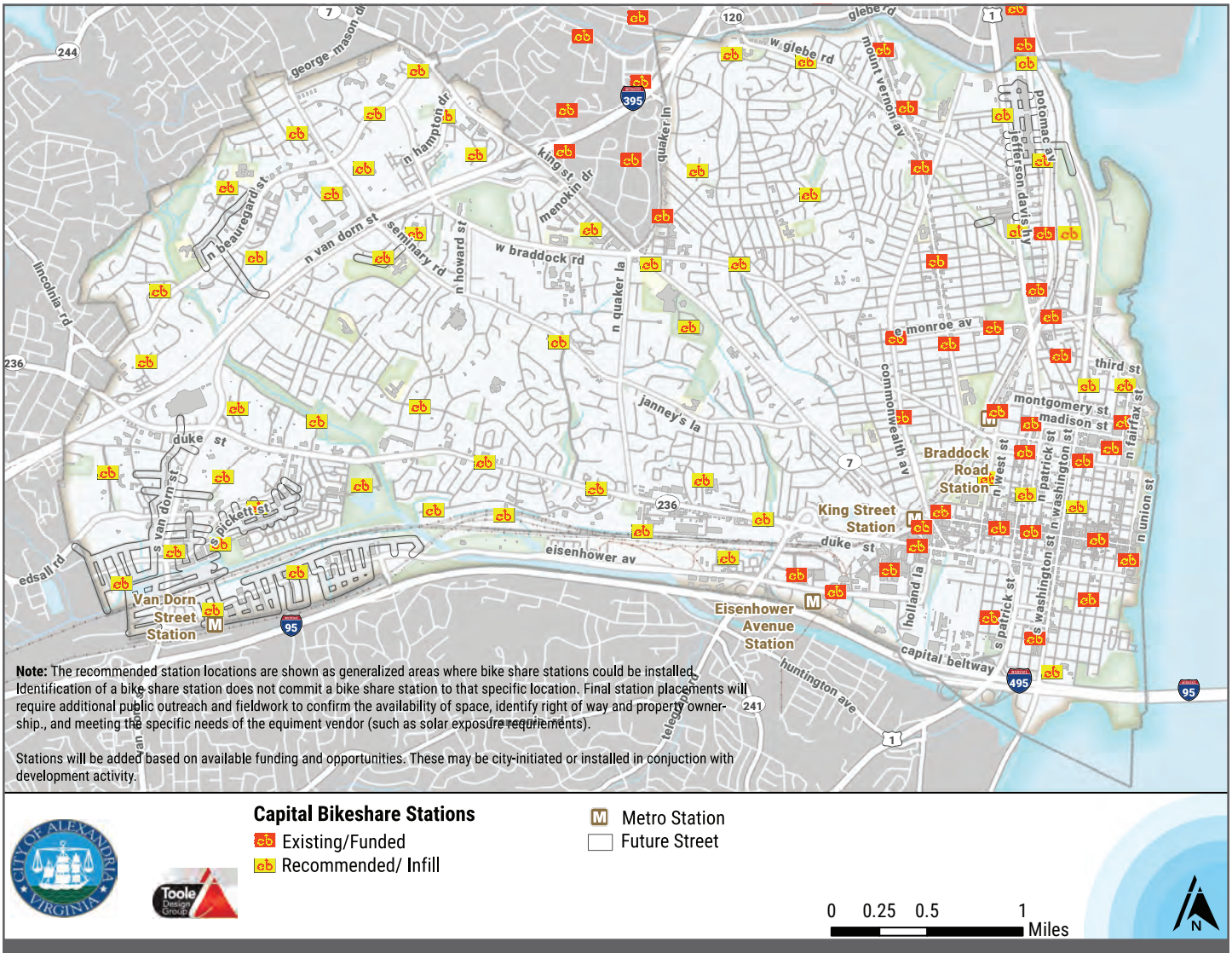


Figure 3.7: Recommended Capital Bikeshare Expansion Map (General Station Locations)

Bicycle Strategies

The existing conditions analysis, case studies, and public/stakeholder input were used to develop a series of strategies that form the backbone of the Pedestrian and Bicycle Chapter. Strategies apply citywide and aim to accomplish the vision, goals and objectives developed at the beginning of the planning process. Strategies are organized under two categories:

1. **Engineering strategies** relate to the on-street bicycle facilities, trails and other physical characteristics of the built environment in Alexandria.
2. **Program and policy strategies** include changes to City plans or procedures, as well as education, encouragement and enforcement efforts.

Many of the strategies are self-explanatory from their title; however, a short description is provided for some of the strategies where more explanation or background information is needed. Throughout this section, the icons below indicate which of the Plan goals are addressed by each strategy.

Bicycle Goals

SAFETY	ENGINEERING
SA	EG
ENCOURAGEMENT	**EDUCATION**
EC	ED

Existing Bike box Mount Vernon Avenue

Bicycle Engineering Strategies

Add new bicycle lanes, signed bicycle routes and shared lane markings to expand the on-street bicycle network.

a. Focus implementation efforts on the priority projects presented in this Plan (see Section 4: Implementation) and on opportunities related to repaving or redevelopment.

Implement and evaluate protected bike lanes and neighborhood bikeways on City streets where appropriate.

a. Identify corridors in the 2015 Bicycle Network to serve as priority locations for **protected bike lanes** and **neighborhood bikeway** projects. Conduct public outreach, evaluate right-of-way, parking impacts and other design considerations as needed. Evaluate these new protected bike lanes and neighborhood bikeway projects in order to optimize the design, operations, maintenance, safety and usage. Use findings from the evaluation to refine the Complete Streets Design Guidelines, as needed, related to protected bike lanes and neighborhood bikeways in Alexandria, and to inform the design of future projects. Share lessons learned with national partners to contribute to the emerging state of practice related to low-stress bicycle facility design.

The existing bicycle network attracts riders who are more experienced and comfortable with greater exposure to sharing space with automobile traffic. This plan includes two new facility types - protected bike lanes and neighborhood bikeways – that have the potential to serve a wider range of bicyclists in Alexandria. Public outreach and analysis process will help ensure the success of these new treatments, and post-construction evaluations will help the City refine designs so that future projects can provide even greater outcomes for all roadway users.

Improve access and safety for all users on trails, particularly at entrance/exit points.

a. Design trails to maximize user safety and meet standards and best practices, including the placement of fixed structures at transition points, and appropriate wayfinding and signage.

b. Remove unnecessary bollards, signs or obstructions that create choke-points at trailheads.

c. Widen trail access points and segments that experience higher volumes of pedestrian and bicycle traffic. Use pavement markings in these areas to delineate separate spaces for each user group or direction of travel.

d. Use signage, pavement markings and surface treatments to create simple and obvious paths of travel for bicyclists entering and exiting trails.

e. Provide wayfinding at access points and key interior trail junctions/intersections to aid navigation.

Use bicycle-specific treatments at intersections to improve safety and provide a more continuous, low-stress experience for people biking.

Large, complex intersections can present barriers to bicycle travel and prevent some people from choosing to ride a bicycle for their trip. Bicycle-specific intersection treatments are being installed in Alexandria today, such as the bicycle box on Commonwealth Avenue at Mount Vernon Avenue. Designs such as bicycle boxes, left-turn boxes and protected intersections can be installed in priority locations and evaluated for more widespread use throughout the City.

STRATEGY #5 EC

Increase the availability of bicycle parking throughout Alexandria.

a. Prioritize locations for installing bicycle parking racks in the public right-of-way with an emphasis on commercial areas, parks, libraries, schools, and transit stops/stations.

b. Continue to install bike parking corrals in on-street parking spaces with the goal of installing new corrals each year.

c. Ensure that all City-sponsored events have bicycle parking and increase the number of City events that provide bike valet services.

d. Regularly review the City's bicycle parking guidelines and revise as needed to reflect increasing bicycling or other changes.

Riders should be able to expect end-of-trip facilities that enable them to safely and securely park a bicycle while they are at a destination. For locations with especially heavy bicycle traffic where sidewalk-level space is not available, in-street bike corrals should be installed to provide adequate parking. The City can set a good example of adequate parking accommodation by ensuring that City-sponsored events have bike parking provided. This may require set-up of temporary racks or partnership with local groups to provide bike valet service at events that expect to draw high volumes of bicyclists.

Streetsblog

Bicycle Facility Maintenance

STRATEGY #6 SA EG EC

Prioritize ongoing maintenance and repair of the bicycle network.

a. Develop internal and external maintenance practices to improve snow and trash removal on streets and trails, prioritizing popular commuter routes. Work with the National Park Service to formalize a partnership related to maintenance and snow removal on the Mount Vernon Trail.

b. Promote Call-Click-Connect as a means for residents to report maintenance and safety concerns. Address reported issues as part of routine staff activities, prioritizing areas near schools, transit stops/stations, parks and senior centers.

> Vehicle traffic and parking is a challenge for almost any business in the city. As the operator of a small business, I think that a reduction in the amount of cars is a win/win for business and residents alike.
>
> – Bill Blackburn, *President, Del Ray Business Association*

STRATEGY #7 EG EC

Improve bicycle access to transit.

a. When building out the citywide bicycle network, prioritize facility improvements that create continuous, low-stress connections to bus, Metro, and rail stations in Alexandria. Continue partnering with WMATA and DASH to implement access improvements near transit facilities.

b. Incorporate bicycle access and bicycle parking near stations as critical elements of design plans for future transitway corridors and stations.

Bicycle Racks on Buses

STRATEGY #8 EC ED

Improve signage and wayfinding for people biking.

a. Develop a citywide system for installing bicycle wayfinding on signed bike routes, near transit and in activity centers.

b. Review streets for potential applications of regulatory and advisory signs at intersections and along existing and new bicycle facilities. Possible sign types may include "Bicycles May Use Full Lane," "Cross Traffic Does Not Stop," and "Right Turning Traffic Yield to Bikes."

c. Implement wayfinding signage for off-street bike trails as recommended in the City's Wayfinding System.

Wayfinding can help introduce new riders to potential routes and facilities. Signage can help introduce all road users (cyclists and motorists) to newly-installed facilities that are installed in the future. Regulatory signage, such as "Right Turning Traffic Yield to Bikes," can help reinforce traffic patterns created by geometric, striping and traffic control infrastructure. Advisory signage will help drivers and bicyclists better understand what to expect from one another. For instance, "Cross Traffic Does Not Stop" sings are often used at two-way stop-controlled intersections on neighborhood bikeways to indicate that bicyclists (and drivers) will need to exercise additional caution when crossing. Pedestrian and bicycle signage and wayfinding improvements will be coordinated with the Citywide Wayfinding Signage System.

STRATEGY #9 EC ED

Continue to expand the citywide Capital Bikeshare system using the recommendations presented in this Plan as well as other opportunities that arise related to redevelopment. Seek additional funding opportunities to support maintenance, operations and system expansion.

Bicycle Program and Policy Strategies

Regularly conduct construction inspections to ensure safe, convenient and accessible bicycle and pedestrian accommodations are provided during all phases of construction.

When an existing, dedicated bicycle or pedestrian facility is blocked during prolonged construction, an alternative accommodation should be provided. Ideally, the facility will be of a similar type. For instance, if a bike lane is removed, shifting travel lanes and/or temporarily removing parking to stripe an interim bike lane should be the first choice. If space is not available, shared lane markings should be temporarily placed on the roadway to indicate that bicyclists will be shifting into the automobile travel lane for that segment of roadway. Adequate signage directing bicyclists and alerting drivers to the temporary traffic pattern must be included in the designs of these temporary facilities.

Conduct post-construction development inspections to ensure that new bicycle facilities, including bike parking, is installed and appropriately designed.

When on-street bicycle facilities, trails or bicycle parking are provided by a private property owner as part of new development, the City should conduct routine post-construction inspections to ensure that the facilities meet City standards and national best practices for design. Seemingly minor characteristics of a design, for example the exact width of a bike lane or placement of a shared lane marking, can influence the functionality and safety of a facility.

Develop an annual report card with information on the performance measures related to walking and biking identified in this Plan, as well as those identified by the Office of Performance Accountability related to bicycling and walking.

a. Make the report card available on the City website and promote through listserves, social media and local organizations.

Incorporate key bicycle commuting routes into the existing map that shows the current status of maintenance and snow removal on City streets/ facilities.

Alexandria maintains a citywide map (http://apps.alexandriava.gov/SnowReport/) that indicates the priority and status of various streets for snow plowing or ice treatment. Important bicycle commuting routes, including major City trails, should be added to this map. It is important to note that the Mount Vernon Trail is maintained by the National Park Service, which historically has not plowed the trail during snow events.

Explore a pilot Open Streets Event to encourage active transportation and lifestyles.

a. Use the event to increase education about Complete Streets, health benefits, transportation options and programs in Alexandria.

Bicycle Program and Policy Strategies

Evaluate the use of the employee alternative transportation benefits program, and expand promotion efforts related to the program.

Pursue funding for high priority bicycle projects (see Section 4: Implementation).

Conduct a biennial citywide survey to learn more about the non-commute transportation habits of Alexandria residents and employees.

The U.S. Census and the Regional Household Travel Survey by the Metropolitan Washington Council of Governments (MWCOG) provide valuable data on the commute patterns of Alexandria residents and workers. However, less quantitative data is available on non-commute trips, which are estimated to comprise approximately 70 percent of vehicle miles traveled.24 Strategy #8 provides useful data on travel habits, needs and desires for non-work trips, allowing staff to better align City investments with travel demand.

Partner with the Alexandria Health Department and DCHS to identify funding and prioritize programs related to active transportation and lifestyles.

> Our daily environment plays an important role in our community's well-being. Ensuring equitable access to the pedestrian and bicycle network creates increased opportunities for Alexandrians to live healthy lifestyles.
>
> — Katie Leonard, *Public Health Planner, Alexandria Health Department*

Continue to provide staff training on Complete Streets Design Guidelines and other bicycle-related topics as needed.

Partner with Local Motion and the Alexandria Police Department to build upon the regional safety campaign and other similar efforts that promote bicycle, pedestrian and motorist safety, rights and responsibilities, as well as the benefits of active transportation.

24 American Associate of State Highway and Transportation Officials, National Report on Commuting Patterns, May 2013.

STRATEGY #12 EC ED

Partner with local bicycle groups and Alexandria City Public Schools to support bicycle education, outreach and promotion amongst underrepresented groups including children, women, senior citizens and non-English speaking communities.

Alexandria and the greater Washington, DC region have many nonprofit organizations that conduct bicycle education, outreach and promotion to diverse audiences. Partnership with these groups will be the most effective way for Alexandria to deliver targeted programing to underrepresented groups, since these organizations are often already embedded in and trusted by the targeted communities.

Bicycle Activities for Walk and Bike to School Day in Alexandria

STRATEGY #13 EC

Promote the City's existing Bicycle Friendly Businesses (from the League of American Bicyclists' program) on the Local Motion website, in order to support businesses that provide bike parking and take others steps to support bicycling.

Some of the most bike friendly communities in the country have initiated programs of encouraging businesses to apply for the League of American Bicyclists Bicycle Friendly Business (BFB) designation. BFB designation rewards businesses that provide incentives, perks and infrastructure to help employees and customers access their location by bicycle. Promoting Bicycle Friendly Businesses on the Local Motion website will further promote these leaders and incentivize others to apply for designation.

STRATEGY #14 SA EG EC ED

Strive for Gold designation in the League of American Bicyclists Bicycle Friendly Community program[25] through implementation of the bicycle network and other strategies presented in this Plan.

This strategy refers to a national program administered by the League of American Bicyclists. Alexandria currently holds a Silver Bicycle Friendly Community designation. Earning a Gold-level designation would make Alexandria the highest ranking bicycle friendly community in the Washington, DC metro area and in the state of Virginia. To achieve Gold status, Alexandria will need to continue to expand its bicycle programs and infrastructure.

25 Learn more at http://bikeleague.org/bfa.

SECTION 4

Implementation

IMPLEMENTATION

The infrastructure improvements and strategies described in the previous sections will allow Alexandria to achieve the pedestrian and bicycle vision statements presented in the beginning of the Chapter. Continuing to improve conditions for walking and bicycling is an important priority for the City; however, the implementation of the projects and strategies in this document will necessarily be phased over time and will depend on available resources. This section presents an implementation strategy that includes:

1. **Information on relevant funding sources;**
2. **High priority sidewalk, bicycle and trail projects; and,**
3. **Performance measures for ongoing evaluation.**

To be most useful to the City, this implementation strategy must allow for flexibility and encourage City staff to take advantage of opportunities as they arise. For example, the City will continue to implement pedestrian, bicycle and other Complete Streets improvements in concert with routine street resurfacing or based on safety concerns. Similarly, opportunities may arise to implement pedestrian, trail or bicycle improvements in coordination with development/redevelopment. These types of opportunities should always be leveraged in support of a more walkable and bicycle-friendly future for Alexandria.

The City will also take proactive steps to implement the strategies and projects recommended in this Plan. Within the first five years, staff will work to implement many of the recommendations in the Case Study Areas, and will leverage repaving and development opportunities to implement pedestrian-focused improvements in areas not covered by the Case Studies. The City will pursue funding from grants and through the City's budget process to begin implementation of the priority projects shown on the following pages. Additionally, the City will immediately begin to develop a Vision Zero Program and identify what elements would be included in the program, as well as funding needs. The City already has many, existing safety-focused programs that may be incorporated into the Vision Zero effort, in addition to the development of new programs.

Project Prioritization

A data-driven prioritization process was used to identify projects that have significant potential to benefit the City. The prioritization process was based on the 10-step method described in the national publication, *The ActiveTrans Priority Tool Guidebook* by the National Cooperative Highway Research Program (NCHRP).[26] The process uses factors (broad themes related to walking and bicycling) and variables (measurable characteristics related to each factor) to calculate a score for each of the bicycle, trail and sidewalk projects in this plan. The factors, variables and weights (see Figure 4.1) were developed with significant input from the Advisory Committee and the interdepartmental Technical Advisory Committee. A detailed explanation of the prioritization methodology is provided in Appendix F.

People walking in Alexandria

26 NCHRP Report 803, Pedestrian and Bicycle Transportation Along Existing Roads – ActiveTrans Priority Tool Guidebook, 2015 (http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_803.pdf)

Factor	Variable	Weight
Existing & Potential Demand	Population Density	3
	Future Population	
	Employment Density	
	Existing Bicycle Mode Share	
	Number of Online Interactive Map Comments ("Place I ride," "Place I want to ride")	
	Proximity to Attractors (Libraries, Community Centers, Parks, Schools)	
	Transit Proximity (Metrorail and BRT Stations)	
	Transit Proximity (Bike Share Stations, Bus Stops)	
Geography	Project Located in Western Alexandria	3
Connectivity*	Project Connects to Existing Bicycle Facilities	2
Safety	Number of WikiMap Comments ("Barrier to biking")	2
	Number of Collisions Involving Bicycles/Pedestrians	

** This factor was used for on-street bicycle and trail projects, but not sidewalk projects.*

Figure 4.1: Prioritization Factors, Variables and Weights

The top scoring projects were reviewed with City staff, the Advisory Committee and at a public meeting on September 24, 2015. Revisions were made based on input from these groups. The top ten on-street bicycle and sidewalk projects, as well as the top three trail projects, are presented in the following maps and tables. **It is important to note that the rankings presented on these maps do not reflect the order in which projects will be implemented.** Project implementation depends on available funding and opportunities to align with other projects in the area (e.g., utility work, redevelopment, etc.). Also, each project will require targeted public engagement, analysis and design, which may influence the timing of implementation.

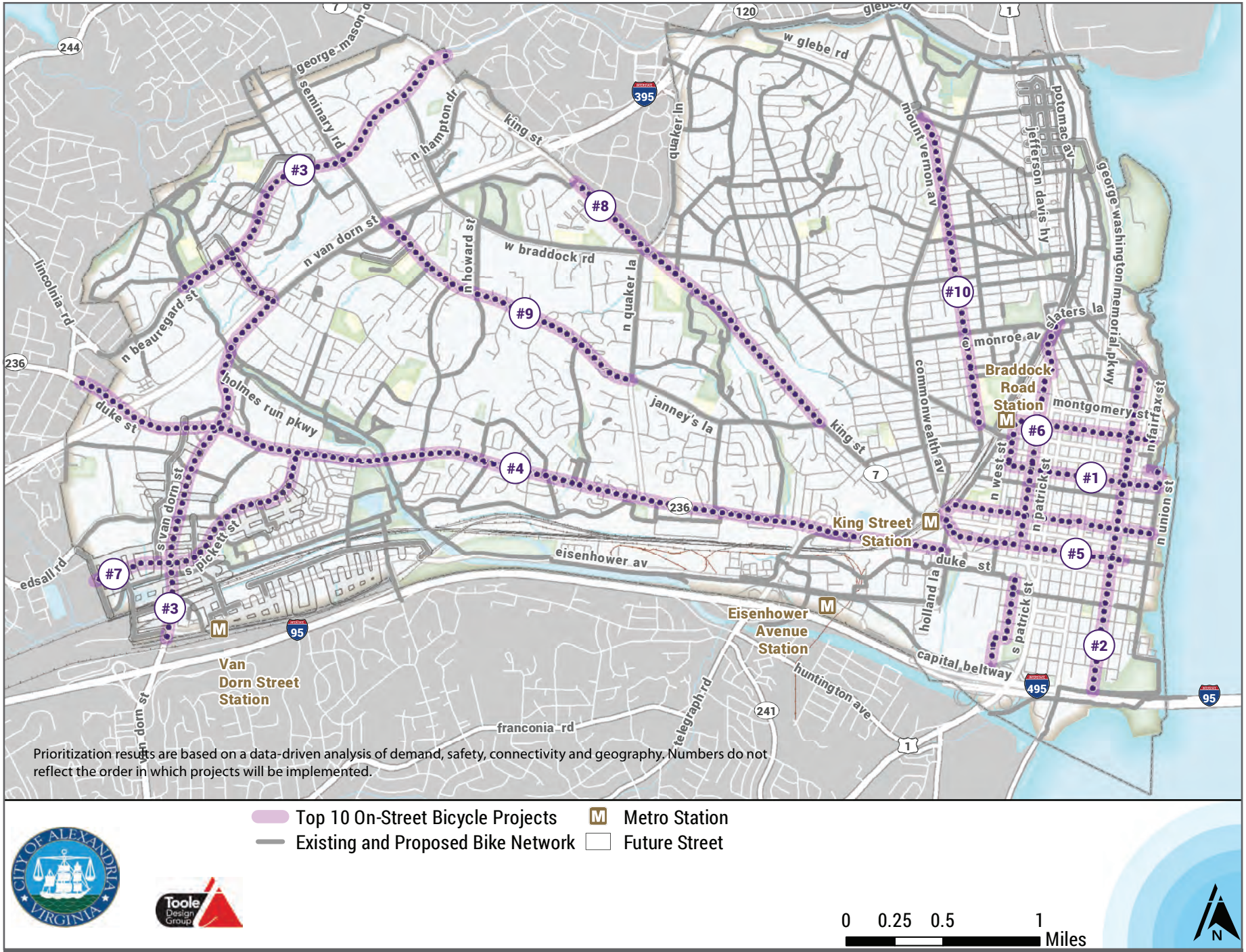


Figure 4.2: Top 10 On-Street Bicycle Projects

Rank	Street	Recommendation
1	Madison Street / West Street / Oronoco Street (from West Street to Mt. Vernon Trail / Union Street)	Provides east-west connectivity in North Old Town and to the Mt. Vernon Trail and Braddock Metrorail Station. Madison Street would be an enhanced bicycle corridor that may remove one travel lane; Oronoco Street would include shared on-street facilities. Traffic study needed.
2	Royal Street (from Jones Point Drive to Bashford Lane)	Neighborhood bikeway to provide north-south connectivity in Old Town and provide connection to the Mt. Vernon Trail. This improvement would provide a more desirable and comfortable route for bicyclists, leading to less walking and bicycling conflicts on Union Street and parallel sidewalks. Additional analysis needed.
3	Van Dorn Street (from Eisenhower Avenue to Sanger Avenue) / Sanger Avenue (from N. Van Dorn Street to N. Beauregard Street) / N. Beauregard Street (from Holmes Run Parkway to King Street)	Enhanced bicycle corridor (specific facility type to be determined through further study) to provide north-south connectivity in West End and provide a connection to the Van Dorn Metrorail station and Arlington County to the north. A sidepath on Van Dorn Street, N Beauregard Street, and future Sanger Avenue were recommended in the Beauregard Small Area Plan. This improvement is being coordinated with the West End Transitway project, currently underway.
4	Duke Street (from I-395 to Daingerfield Road)	Enhanced bicycle corridor (specific facility type to be determined through further study) to provide east-west connectivity in central Alexandria. This facility will be beneficial in providing connectivity to the commercial and residential development along Duke Street. This improvement will need to be coordinated with the analysis and design of the Duke Street transitway (Corridor B).
5	Prince / Cameron Streets (from Reinkers Lane to Union Street)	Bike lanes to provide east-west connectivity in Old Town and as a connection between the King Street Metrorail Station and the waterfront. This project is currently in the City's Capital Improvement Program and will be coordinated with the Pavement program.
6	Payne / Fayette Streets (from Old Cameron Run Trail to Slaters Lane)	Shared on-street facility or neighborhood bikeway to provide north-south connectivity in west Old Town and improved connections to the Old Cameron Run Trail and Mt. Vernon Trail. Additional analysis needed.
7	S. Pickett Street (from City/County line to Duke Street)	Enhanced bicycle corridor (specific facility type to be determined through further study) to provide east-west connectivity in west Alexandria. Also provides connectivity to the future Multi-modal bridge which will connect to the Van Dorn Metrorail station. This improvement is also recommended in the Eisenhower West Small Area Plan.
8	King Street (from Janney's Lane to Menokin Drive)	Enhanced bicycle corridor (specific facility type to be determined through further study) to provide east-west connectivity in central and west Alexandria. Provides a connection to existing bike lanes on King Street east of Janney's Lane and connects to the Bradlee shopping area. Additional analysis needed.
9	Seminary Road (from N Van Dorn Street to N Quaker Lane)	Enhanced bicycle corridor (Specific facility type to be determined through further study) to provide improved east-west connectivity and linkage with the existing bike lane on Janneys Lane. Additional analysis needed.
10	Mount Vernon Avenue (from Braddock Road to West Glebe Road)	Shared lane markings and signage are recommended to provide improved north-south connectivity in the northeast quadrant of the City. This route would connect to the existing bike lanes on Commonwealth Avenue and provide access to commercial and residential nodes in Del Ray and Arlandria.

Figure 4.3: Top 10 On-Street Bicycle Projects

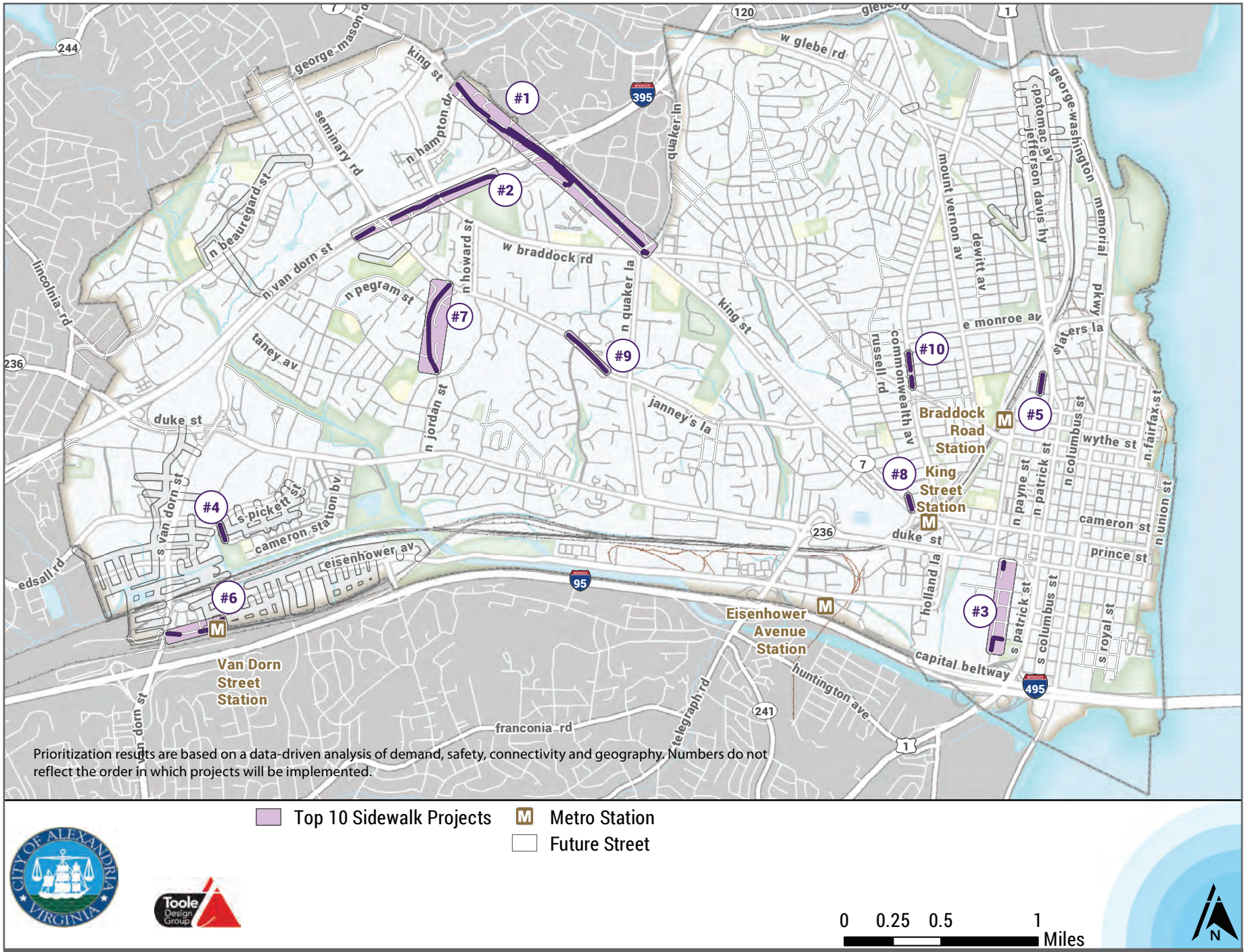


Figure 4.4: Top 10 Sidewalk Projects

Rank	Street	Recommendation
1	King Street (from Quaker Lane to N. Hampton Drive)	New sidewalks along the north and south sides of King Street, including over I-395, where missing. This project improves important pedestrian access and connectivity along a street with higher volumes and speeds, and a history of pedestrian fatalities.
2	Van Dorn Street (from Kenmore Avenue to the north of Braddock Road)	New sidewalk along the west side of Van Dorn Street. This project improves pedestrian access and connectivity in west Alexandria.
3	Payne Street / Jefferson St. (300 block of S. Payne St.; 700 block of S. Payne St.; 1200 block of Jefferson St.)	New sidewalk on the east side of the 300 block of S. Payne Street where missing; new sidewalk on the east side of the 700 block of S. Payne Street where missing; new sidewalk on the south side of the 1200 block of Jefferson Street where missing.
4	Cameron Station Boulevard (from S. Pickett Street to Armistead Boothe Park)	New sidewalk on the east side of Cameron Station Boulevard where missing. Provides an important connection to Armistead Boothe Park / Cameron Station and future redevelopment along S. Pickett Street and areas to the north. This project was also recommended in the Eisenhower West Small Area Plan.
5	Fayette Street (from Route 1 and First Street)	New sidewalk on the west side of Fayette Street, south of Route 1 to First Street. This project was recommended in the Braddock Metro Station Small Area Plan.
6	Eisenhower Avenue (from Van Dorn Street to Van Dorn Metrorail Station)	New sidewalk on the south side of Eisenhower Avenue where missing. Provides an important connection to the Van Dorn Metrorail Station. This project is being coordinated with the West End Transitway and was recommended in the Eisenhower West Small Area Plan.
7	N. Jordan Street (from Howard Street to Seminary Road)	New sidewalk along the east side of N. Jordan Street where missing. Provides connectivity between residential neighborhood and Seminary Road and Hammond Middle School.
8	Russell Road (from King Street to W. Cedar Street)	New sidewalk along the west side of Russell Road where missing. Provides connectivity between the Rosemont neighborhood and Union Station and King Street Metrorail station.
9	Seminary Road (from west of Quaker Lane to west of Ft. Williams Parkway)	New sidewalk along the north side of Seminary Road where missing. Provides connectivity to the Episcopal High School, and to the Virginia Theological Seminary.
10	Commonwealth Avenue	Segments of new sidewalk are needed on the east side of Commonwealth Avenue to provide improved access along this busy residential corridor.

Figure 4.5: Top 10 Sidewalk Projects

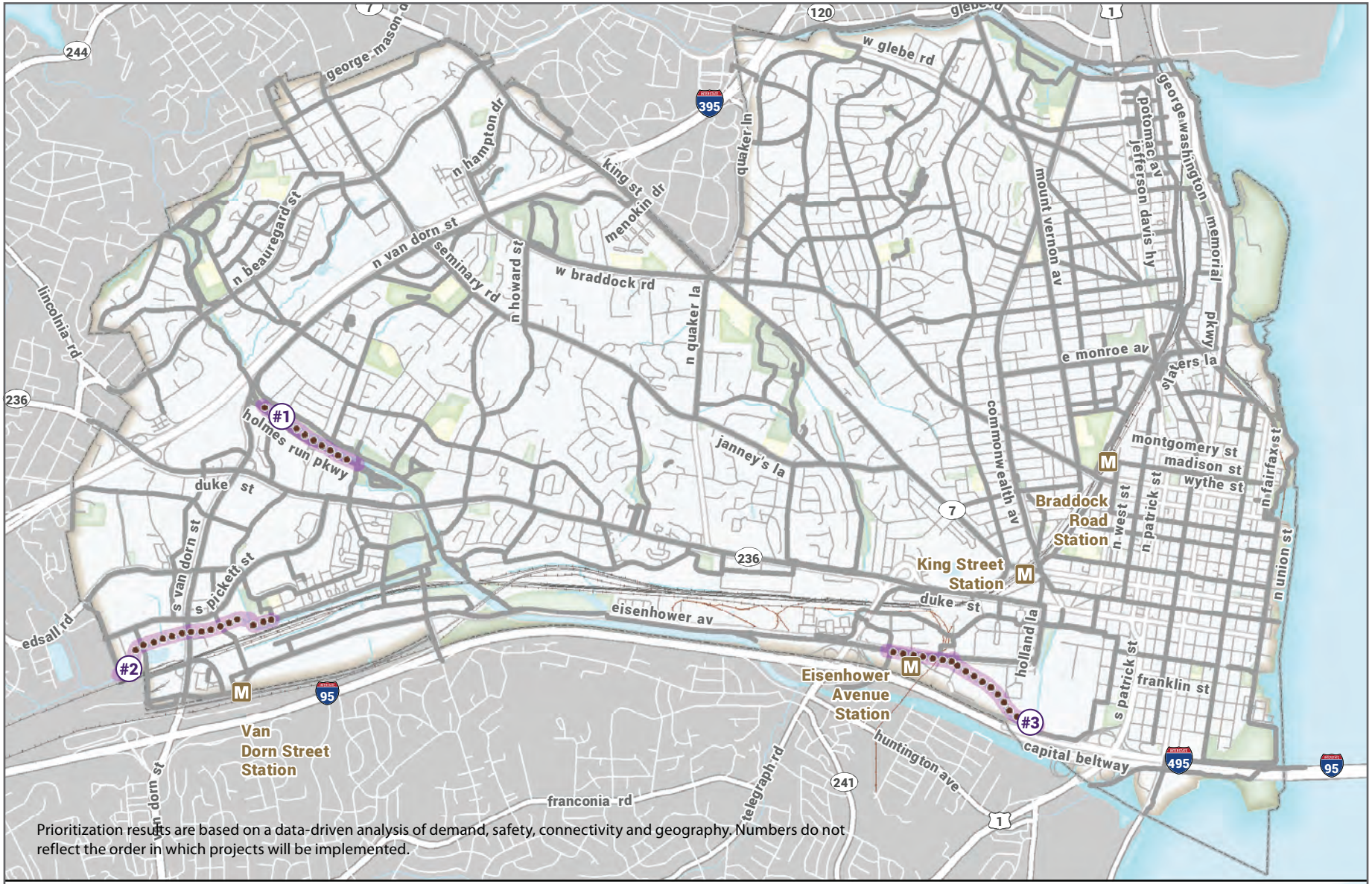


Figure 4.6: Top 3 Trail Projects

Rank	Street	Recommendation
1	Holmes Run Trail (South side of Holmes Run between Ripley Street and N. Pickett Street)	Construct a new trail along the south side of Holmes Run to provide improved connectivity of the existing trail system. This project is recommended in the Citywide Parks Improvement Plan (2014). As the Trail is located within a resource protection area, it will be constructed in an environmentally sensitive manner.
2	Backlick Run Trail (Cameron Station to Fairfax County)	Extend the existing Backlick Run Trail to the west along the north side of Backlick Run to the Alexandria / Fairfax County line. This project is recommended in the Eisenhower West Small Area Plan. This project is partially funded in the FY16-25 Capital Improvement Program (CIP) budget. Additional analysis needed.
3	Old Cameron Run Trail (Eisenhower Avenue / Stovall St. to approximately where Holland Lane alignment is located)	Construct a new trail from Eisenhower Avenue at Stovall Lane to the east along future development in Eisenhower East, continuing along the south side of the Alex Renew plant where the previous trail was located. This trail provides an important connection from Eisenhower East and the Eisenhower Metrorail station to Old Town and the Mt. Vernon Trail. This project is partially funded in the FY16-25 Capital Improvement Program (CIP) budget. Additional analysis needed.

Figure 4.7: Top 3 Trail Projects

The Potomac Yard Trail, a recently-completed connection in the City's trail network

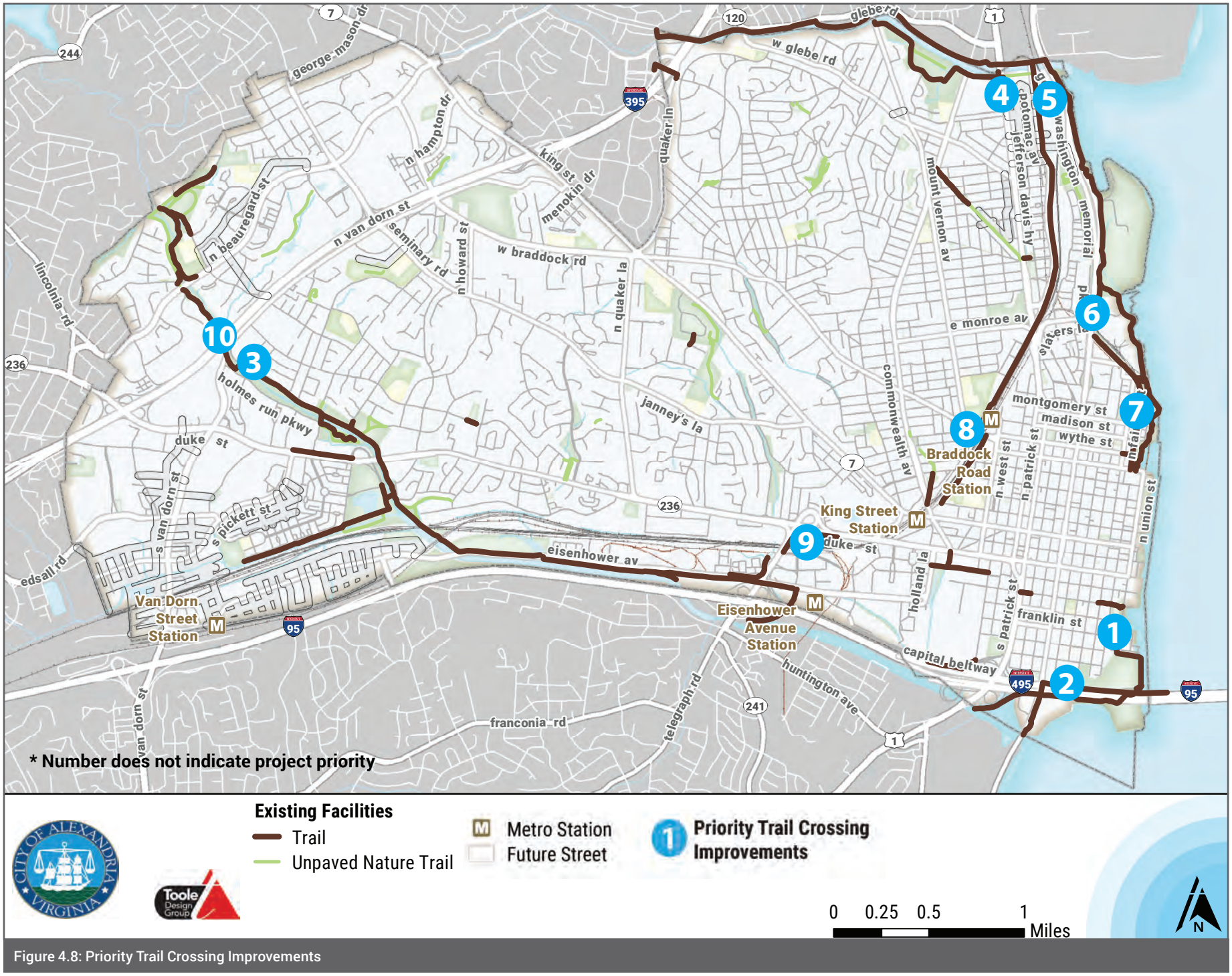


Figure 4.8: Priority Trail Crossing Improvements

The Priority Trail Crossing/Transition Improvements were identified through public and staff input and were not prioritized using the data-driven process described earlier in this section. The map in Figure 4.8 uses project identification numbers that do not reflect priority.

ID #	Street	Recommendation
1	Mount Vernon Trail near Jones Point Park	Widen trail and add signage in areas where trail turns sharply around Jones Point Park. This improvement is on National Park Service property.
2	Mount Vernon Trail and Royal Street	Improve signage, widen trail on sharp turns and provide wayfinding signage in this area.
3	Bridge Across Holmes Run	Replace crossing of Holmes Run to allow for ADA access at all times of year.
4	Four Mile Run and Route 1 Intersection	Widen trail at northeast corner of intersection and install trail crossing and wayfinding signage.
5	Potomac Yard Trail near Shoppers/Barnes and Noble	Work with property owners at Potomac Yard Center to formalize connection to Potomac Yard Trail from northeast corner of shopping center. A worn dirt path exists now, indicating demand.
6	E. Abingdon Street from Mt. Vernon to Slaters Lane	Widen trail as it transitions from off-street to on-street, add signage and improve crossing at Slaters Lane. Install southbound contraflow lane on E. Abingdon Drive to connect to Mt. Vernon Trail spur.
7	Mount Vernon Trail and Canal Center Plaza Intersection	Install improved crossing and trail signage where the Mount Vernon Trail intersects Canal Center Plaza.
8	Potomac Yard Trail at Braddock Road Metrorail Station	Improve connection along Braddock Road between the Potomac Yard Trail and the Braddock Road Metrorail station.
9	Telegraph Avenue Tunnel Under Railroad Tracks	Install lighting and other improvements to increase user comfort and safety in the tunnel from Mill Road to Duke Street along Telegraph Road, under the railroad tracks.
10	Holmes Run Tunnel under I-395	Install lighting and other improvements to increase user comfort and safety in the tunnel on the Holmes Run Trail under I-395.

Figure 4.9: Priority Trail Crossing/Transition Improvement Projects

Funding

The City of Alexandria programmed roughly $3 million in Fiscal Year (FY) 2016 on specific non-motorized transportation improvements in its 2016-2025 Capital Improvement Program (CIP). This represents eight percent of Alexandria's total Transportation and Transit Infrastructure budget (see Figure 4.10). A recommendation of this Plan is to identify additional dedicated funding to implement the Plan. Revenue sources used in other, comparable communities include a percentage of parking revenues, a devoted percentage of the overall City transportation budget, and/or bonds to bundle and implement multiple small improvement projects related to bicycling and walking.

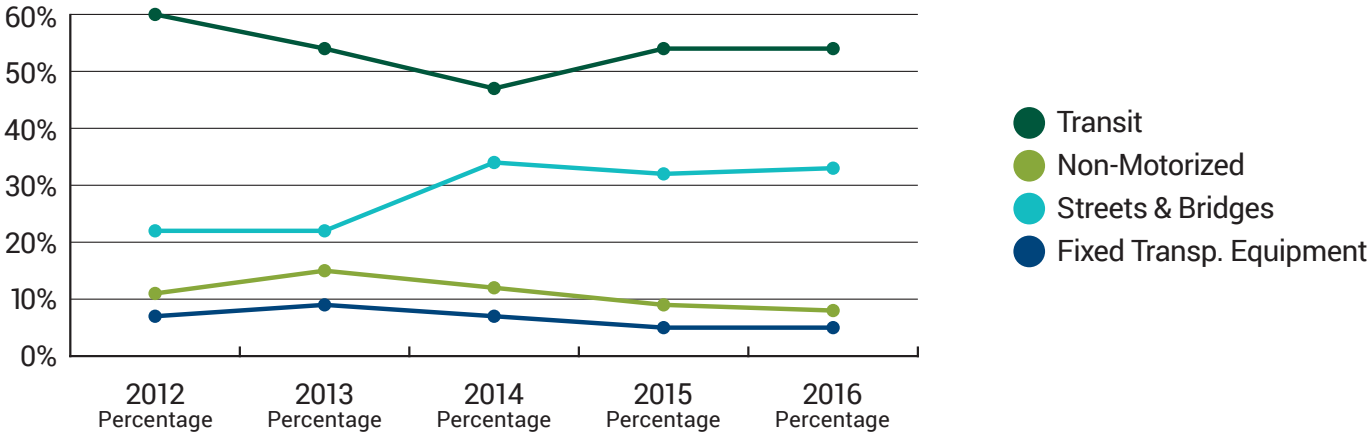
> The specificity provided in the revised Master Plan is valuable for future small area planning and for the review of development proposals, which will be the source of funding for many improvements identified in the Plan.
>
> – Dave Brown, *Alexandria Transportation Commission*

	FY 16 Budget	10 Year Total	Percent of 10 Year Total
Transit*	$11,684,229	$165,279,229	54%
Non-Motorized	$3,046,000	$25,457,685	8%
Streets and Bridges	$7,381,500	$100,581,500	33%
Fixed Transportation Equipment	$1,200,000	$15,503,063	5%
TOTAL	**$23,311,729**	**$306,591,477**	**100%**

**Transit excludes funding for Potomac Yard Metrorail station, and WMATA Capital funds*

Figure 4.10: City of Alexandria Transportation Expenditures (FY 2016-2025)

CIP Historical Breakdown by Transportation Mode



**Transit excludes funding for Potomac Yard Metrorail station, and WMATA Capital funds*

Figure 4.11: CIP Historical Breakdown by Transportation Mode

The majority of the revenue sources identified the City's 2016-2025 Transportation and Infrastructure Capital Improvement Program are local funding programs, including bonds, the general fund and private developer contributions. The remaining 3.9 percent of the funding is divided among State and Federal programs including state revenue sharing programs and the Federal Congestion Mitigation and Air Quality (CMAQ) Improvement Program. Additional funding opportunities exist through the Virginia Department of Transportation and its administration of Federal transportation funds including:

Surface Transportation Block Grant Set-aside Program.

This program, established in the FAST Act signed by President Obama on December 4, 2015, replaces the Transportation Alternatives Program (TAP), which in turn had combined the Transportation Enhancements, Safe Routes to School and Recreational Trails Programs created in previous transportation bills.

As an example, in FY2015, the Virginia Department of Transportation received an apportionment of approximately $20 million for the TAP, of which half is allocated by VDOT directly and half is sub-allocated to local governments in the state. Of that latter half, approximately $6 million goes directly to MPOs with urbanized areas above 200,000 in population. According to the Federal Highway Administration, the Metropolitan Washington Council of Governments will have received $2.8 million of FY2015 TAP funding from Virginia's share of the program funds. TAP funds are not limited to bicycling and walking projects but nationwide this is an important source for funding for active transportation projects and programs – 18.9% of FY2015 spending on this kind of work.

Surface Transportation Block Grant.

This program, established in the FAST Act signed by President Obama on December 4, 2015, replaces the Surface Transportation Program (STP). The STP has historically been one of the largest and most flexible sources of transportation funding administered by the Virginia Department of Transportation. Bicycle and pedestrian projects and programs (e.g. bike lanes, trails, bicycle parking, intersection improvements, crosswalks, streetscaping etc) are eligible activities for STP funds, and STP was the source for 18% of all Federally-funded active transportation projects in FY2015. In FY2015, Virginia received an apportionment of $251 million for the STP, of which $36 million was sub-allocated to the MWCOG.

Highway Safety Improvement Program.

The Highway Safety Improvement Program funds safety infrastructure projects on all public roadways – not just state routes (the Federal-aid Highway System) – and can be used for traffic calming, intersection improvements, sidewalks, crosswalks and signals, and bike facilities of all kinds. The funds are often focused on high crash locations, but can also be used to address systemic design and operational problems that affect traffic safety.

Nationally, the HSIP program has not been used extensively for nonmotorized safety projects. However, Virginia is one of the few states that has made a significant commitment to use these funds to improve bicyclist and pedestrian safety. The state has a goal of spending 10 percent of their $57 million annual HSIP apportionment on nonmotorized safety projects.

Traffic Calming on Local Streets in Alexandria

Chapter Updates and Performance Measurement

This Pedestrian and Bicycle Chapter of the Transportation Master Plan is designed to be flexible, providing sufficient direction for staff while also encouraging them to respond as opportunities arise and conditions change over time. For this reason, the Chapter should be viewed as a "living document" that is re-revaluated and expanded over time. A formal update is recommended in five years, with a particular focus on updating the recommended bicycle network and priority projects.

A set of draft performance measures related to the goals identified in the beginning of the planning process will be used to evaluate progress toward plan completion. Performance measures will keep the City accountable throughout the implementation of Plan recommendations.

By continuing to update the stakeholders involved in this plan-making process, and all members of the public, the City can keep the issues of pedestrian and bicycle safety and travel in the public consciousness.

Figures 4.12 and 4.13 present the measures, the agency or department responsible for tracking the measure, the frequency the measure will be updated, and the goal area that the measure supports. Staff will review performance against these measures annually and, every two years, present a status update for review by the Transportation Commission and/or other appropriate bodies. This update will also include a status report on the implementation of Case Study area recommendations and priority sidewalk, trail and on-street bicycle projects.

Pedestrian Performance Measure	Responsible Department/Group	Frequency	Targeted Goal
Number of pedestrian-motor vehicle crashes, as well as pedestrian injuries and fatalities	APD	Annually	Safety
Number of intersections that are treated with safety and accessibility improvements	T&ES	Annually	Safety
Percent of signalized intersections with pedestrian countdown signals	T&ES	Annually	Safety / Engineering
Percentage of maintenance requests related to a pedestrian issue that are addressed	T&ES	Annually	Safety / Engineering
Linear feet of new sidewalk, citywide	T&ES	Annually	Engineering
Miles of paved off-street trails, citywide	T&ES	Annually	Engineering
Percent of people walking to work	T&ES	With Census	Encouragement
Number of people who are reached through the Local Motion program	Communications	Annually	Encouragement
Percent of people walking to work at employers participating in Local Motion Transportation Demand Management (TDM) program	T&ES	Annually	Encouragement
Percentage of people walking to transit	Dash/WMATA	TBD	Encouragement/ Engineering
Percentage of schools with Safe Routes to School programs and/or offering pedestrian safety education	ACPS	Annually	Education / Safety
Percentage of children walking to school	ACPS	Annually	Education

Figure 4.12: Pedestrian Performance Measures

Bicycle Performance Measure	Responsible Department/Group	Frequency	Targeted Goal
Number of bicycle-motor vehicle crashes, bicycle-pedestrian crashes as well as bicyclist injuries and fatalities	APD	Annually	Safety
Percentage of maintenance requests related to bicycle issues that are addressed	T&ES	Annually	Safety / Engineering
Miles of on-street bicycle facilities citywide by type	T&ES	Annually	Engineering
Miles of off-street trails citywide	Parks and Recreation	Annually	Engineering
Number of intersections improved with bicycle accommodations (bike boxes, bike signals, bicycle-compatible loop detectors, etc.)	T&ES	Annually	Engineering
Number of bike parking spaces installed		Annually	Engineering/ Encouragement
Percent of people bicycling to work	T&ES	With Census	Encouragement
Number of bike share trips in Alexandria	T&ES	Annually	Encouragement
Number of people who are reached through the Local Motion program	Communications	Annually	Encouragement
Percentage of schools participating in Safe Routes to School programs and/or offering bicycle safety programs	ACPS	Annually	Education / Safety
Number of adult bicycle safety courses offered	Local Motion	Annually	Education
Percentage of children biking to school	ACPS	Annually	Education

Figure 4.13: Bicycle Performance Measures

SECTION 5

Glossary

GLOSSARY

Accessible:

Able to be reached or used by people of all levels of abilities. Often used to describe a facility that is compliant with the Americans with Disabilities Act (ADA, see below).

Active Transportation:

A means of getting around that is powered by human energy (e.g., walking, bicycling, roller blading, using a push scooter or skateboard, etc.).

ADA:

The Americans with Disabilities Act (ADA) prohibits discrimination against people with disabilities in employment, transportation, public accommodation, communications, and governmental activities.[27] Federal standards provide guidance on accessible routes, curb ramps, transit shelters and other elements of the build environment.

Bicycle facility:

A general term denoting infrastructure, improvements and provisions that accommodate and/or encourage bicycling. Some examples include bicycle racks, bicycle lanes, trails and shared lane markings (sharrows).

Comfortable:

When used to describe bicycle or pedestrian facilities, denotes a low-stress experience that is perceived as safe by the user.

Complete Streets:

Streets that are designed to provide safe and convenient travel along and across streets for all users, including pedestrians, bicyclists, riders and drivers of public transportation, as well as drivers of other motor-vehicles, and people of all ages and abilities, including children, older adults, and individuals with disabilities.

Incentives:

Information, messaging, rewards or goods that induce or motivate a desired behavior. In the context of transportation, incentives may include literature, resources, subsidies, giveaways or information that encourages safe behavior and/or increased biking, walking, ridesharing, teleworking and transit use.

Leading pedestrian interval (LPIs):

A signal timing change that gives pedestrians a crossing signal before cars have a green light. This gives pedestrians a "head start" into the crosswalk, which has been shown to increase drivers' yield rate and improve the visibility of pedestrians in crosswalks.

Low-stress bicycle facility:

Infrastructure or other provisions that are perceived as comfortable by novice or inexpert bicyclists, and which do not involve an undue level of detour between a rider's origin and destination.

Pedestrian facility:

A general term denoting infrastructure, improvements and provisions that accommodate and/or encourage walking, including for persons with disabilities. Some examples include sidewalks, crosswalks and curb ramps.

Slip lane/slip ramp:

A lane that allows vehicles to turn right without entering an intersection or waiting behind cars that are not making the same right-turn movement. Slip lanes are often, though not always, uncontrolled (meaning there is no traffic signal or stop sign for vehicles).

Wayfinding:

A system of comprehensive signing and/or pavement markings to guide bicyclists or pedestrians to their destinations along preferred routes. Signs are typically placed at decision points along users' routes, often at the intersection of two or more streets, bicycle routes or trails.

27 United States Department of Justice, Civil Rights Division (http://www.ada.gov/)

- STREET CLASSIFICATION

- NEIGHBORHOOD PROTECTION

- SAFETY

Streets

THE CITY WILL INCREASE THE NUMBER OF PEOPLE WHO TRAVEL IN THE CITY BY MASS TRANSIT, BICYCLE OR WALKING AND BECOME LESS AUTO DEPENDENT

-City Strategic Plan 2004-2015

Introduction

The streets of Alexandria represent the largest public resource within the City. Predominately urban in nature, the City of Alexandria must capitalize on its history as a walkable urban environment, and must ensure that future plans and development serve all modes of travel in a safe, efficient and context sensitive manner. City streets serve many functions providing citizens the ability to walk down the sidewalk to grab a cup of coffee, speak with their neighbors, walk their children to school, or bicycle to work.

Traditionally, decisions about streets have focused on how to accommodate the automobile. The City is changing this focus to ensure that City streets serve everyone, whether young or old, motorist or bicyclist, walker or wheelchair user, transit user or shopkeeper. Overall, this transportation plan update addresses City streets as a shared resource—outlining actions and strategies that incorporate equal consideration of the street's travel area, pedestrian area and adjacent land uses into the transportation decision making process, with the overall goal of creating multimodal corridors that protect and enhance the character of the City and its diverse neighborhoods.

The City of Alexandria's policy regarding its street network is targeted toward providing mobility for all users and alternatives to the private automobile. Decisions regarding development and redevelopment must conform to the future transportation vision of the City, taking into consideration the following: future development and redevelopment plans should not preclude the implementation of dedicated transit lanes and focus on street improvements that improve the efficiency of traffic circulation, building access, pedestrian safety and congestion reduction; consideration will be taken to include dedicated bicycle lanes within the travelway of streets as identified in the bicycle and pedestrian facilities update maps; all improvements to roadways will include improvements to infrastructure that focus on enhancing safety and accessibility for all users, regardless of age or ability.

What's Different about this Plan for Streets?

- Focus on integrated solutions for connectivity, providing mobility and access to all modes of transportation
- Development of a comprehensive, integrated, connected network that accommodates all users
- Recognizes the need for flexibility: that all streets are different, serving differing functions, priorities and user needs
- Focus on the application and development of context sensitive solutions that guide and complement street function

This streets section of the plan specifically addresses approaches to ensuring that streets are designed to safely accommodate all modes of travel and includes a general overview of the role of neighborhood protection techniques and travel demand management in ensuring the safety of City streets and community character. In addition, it outlines a number of actions and strategies to be carried out by the City in order to successfully manage the City street system. This section completes the first step in the update of the City's street classification system.

The second component of the City's plan for streets will be the development of multimodal corridor design guidelines — this effort, to be initiated immediately upon completion of this plan, focuses on bringing together the multiple departments and disciplines that utilize and influence development within the City, including but not limited to Transportation & Environmental Services and Planning and Zoning. Collectively, the City will develop corridor design guidelines that comprehensively address the interface of transportation and land use and focus on context sensitive designs, accessibility and complete streets. This will be developed as the City's "Complete Streets" policy and will guide the decision making process for future development and redevelopment.

Collectively these two components of the City Street Classification System will focus on the ability of streets to safely accommodate all modes of travel with a focus on the following four key elements:

- Emphasis on reducing the size of larger blocks through the redevelopment site planning process
- Focus on creation of a street-grid where possible that reduces the traffic load on arterial streets, resulting in reduced travel distances to destinations, reduced vehicle miles and creating more direct access to services.
- Focus on locating building vehicular access points for new development and redevelopment on side street frontage or alleys where feasible.
- The application of traffic calming and street redesign to address cut-through traffic concerns.

Street Classification

Functional classification has commonly been mistaken as a determinate for traffic volume, road size, urban design, land use and various other features. These elements represent the form of a roadway but not its function. Function is best defined by connectivity (Movement from point A to point B), without connectivity, neither mobility nor access can be served. Roadways that provide the greatest reach of connectivity are the highest level facilities. The functional classification system of the past did not necessarily reflect the function of roadways, and in many cases focused on measures such as traffic, volume, width and speed.

All streets within a City's transportation network serve a particular function. These functions can vary from providing access to a person's home to providing residents the ease of accessibility in traveling outside the City to reach their destination. The functional classification is important for the City to qualify for state and federal transportation funds.

There are five categories of functional classification that are generally recognized by the Federal Highway Administration (FHWA) and the Virginia Department of Transportation (VDOT). The City of Alexandria adopted a classification system that is slightly different, but its characteristics are generally the same. The classifications of the City of Alexandria's streets are defined on the following page.

Street Classification

Controlled Access Facilities *(FHWA General Classification)* **- Expressway** *(City of Alexandria)*

Controlled access facilities and expressways are intended to complement the arterial street system by providing for movement of very high volumes of people and goods over long distances, typically trips of three miles or more. Expressways do not provide direct access to adjacent properties. They form a closed continuous transportation system between principal traffic generators and attractors. Expressways connect with crossings of major geographical barriers. The interstate system, freeways, expressways, and parkways are classified as controlled access facilities or, in Alexandria's classification as expressways. Examples of this type of facility include I-395 (Shirley Highway), I-95 (Capital Beltway), and the George Washington Memorial Parkway (north of Slater's Lane).

Primary Arterial - Arterials

Arterials serve the main travel corridors by connecting secondary traffic generators and mixed uses such as regional commercial, residential and employment centers with other high level street resources. Arterials provide access to adjacent properties and have limited preference at signals.

Arterials serve as the primary links to the City's portals (interchanges, Metro Stations, Smart Stations and major routes crossing City boundaries) and are intended to provide those who work or live within and visit Alexandria with general mobility and access to the greater Washington Metropolitan Area. Access is provided to adjacent land on a limited basis; however, most traffic is limited to through movements, particularly during the peak hours. Preferential signalization, signal progression, and linear continuity are essential for these streets. Arterials may provide dedicated transit lanes, providing for the efficient and congestion free movement of transit services within dedicated transit lanes. Examples of arterials include Duke Street (Virginia Route 236 from western City limits to Henry Street), King Street (Virginia Route 7), Quaker Lane, Seminary Road, U.S. Route 1 through the City (Jefferson Davis Highway, Patrick Street, and Henry Street), Eisenhower Avenues, Van Dorn Street, and Washington Street (Slater's Lane to I-95).

Secondary Arterial - Primary Collectors

Primary Collectors serve less concentrated areas such as neighborhood shopping centers, mixed use hubs, high schools. Primary collectors usually carry a mix of local and travel and visitor/tourist related travel and link arterials with other facilities. These roadways serve the function of intra-city movement of people via automobile, transit connector services such as DASH, bicycle and by foot. Primary collectors may provide some local traffic with property access, provide access to adjacent properties.

Examples of local primary collectors include Braddock Road (from Beauregard Street to Commonwealth Avenue), Commonwealth Avenue (from King Street to Reed Avenue), and East and West Glebe Road.

Collector Street - Residential Collectors

Residential Collectors provide direct service to residential areas, local parks, neighborhoods, businesses and schools by distributing traffic to and from local streets and routing it to higher classified facilities. Trips are relatively short with a lower percentage of non-residential trips.

Examples of residential collector streets include Cameron Street (from St. Asaph Street to King Street), Prince Street (from Reinekers Lane to St. Asaph Street), Russell Road (from West Glebe Road to King Street), Chambliss Street, Sanger Avenue, Taney Avenue (From Van Dorn Street to N. Jordan Street), and Old Dominion Boulevard.

Local or Residential Street - Local Street

The primary purpose of local streets is to provide direct access to individual homes, mixed use shopping and businesses areas, and similar traffic destinations that do not have direct access from higher classified facilities. Local streets provide access to each parcel of land either directly or through alleys, providing access for productive use of property. Local traffic should be encouraged while cut through traffic should be limited and discouraged. These streets connect local properties to collector streets and, in turn, to higher classified facilities.

Neighborhood Protection

There are several interrelated components of neighborhood protection that play a critical role in preserving neighborhood character and increasing the safety of City streets. These factors include wayfinding, streetscaping, traffic calming, access management, intelligent transportation systems (ITS) and signalization.

Wayfinding & Streetscaping

Wayfinding can be defined as how people understand and find their way through an environment[2]. The City of Alexandria's pattern of streets, buildings, transportation facilities, parking areas, attractions and amenities must be clearly understood by residents. There are four primary principles of wayfinding: architectural clues; lighting; sight lines and signage[3]. Each of these components play an important role in how Alexandrians, tourists and commuters navigate through the City, thus creating or alleviating movements that may disrupt traffic flow.

The integration of successful wayfinding and streetscaping policies and programs into the development process is a key practice involved in creating a liveable community that is safe and promotes healthy, active lifestyles through sustainable transportation alternatives. Amenities such as street furniture, trash receptacles, street trees and other landscaping help contribute to a pleasing environment. In addition to providing an attractive experience for pedestrians the appropriate use of landscaping in medians and at curbside can contribute to a decrease in traffic speeds along certain streets. Streetscape features serve pedestrian and outdoor activities, as well as provide lighting and signs for motor vehicle drivers. Streetscape features are the elements that furnish the street environment and enhance community livability[4].

Traffic Calming

A primary concern, expressed by many Alexandria residents, is the impact of vehicular traffic on their neighborhoods. Commuters without an Alexandria destination should be encouraged to use the freeways or transit. They should be discouraged from traveling on local streets that traverse neighborhoods. According to the 1992 Plan, the City has taken this position as a stated policy. In many areas of Alexandria, measures have been instituted to discourage or prohibit through-traffic from using streets that connect between arterials. Implementation of these measures must be continued as a coordinated effort between City staff and the neighborhoods affected by commuter traffic.

The City of Alexandria's Neighborhood Traffic Calming Program (NTCP) incorporates education, enforcement and engineered street design into protecting the quality of life in City neighborhoods. The City has developed the NTCP to provide residents with the opportunity to raise neighborhood traffic concerns and to participate in the selection of strategies that promote safe and pleasant conditions for residents, pedestrians, bicyclists and motorists in City neighborhoods.

A variety of traffic calming measures can be used to slow traffic and make streets safer for pedestrians and bicyclists including speed cushions, bulb-outs, chicanes and bike lanes. A list of traffic calming measures that the City uses as part of its NTCP is included in the Appendix.

Neighborhood Protection

Goals of the Neighborhood Traffic Calming Program

1. Provide protection to residential neighborhoods from traffic operating at excessive speeds and excessive volumes of traffic.
2. Keep neighborhood street use, to the greatest extent possible, within the classification defined in the transportation chapter of the Master Plan (i.e. local streets, residential collectors, primary collectors).
3. Increase access, safety, comfort and convenience for pedestrians and bicyclists by changing the culture of neighborhood street use from "cars first" to "people first."
4. Base the expenditure of public resources on need.
5. Foster a collaborative working relationship between the City staff and neighborhood residents in the development of traffic calming measures.

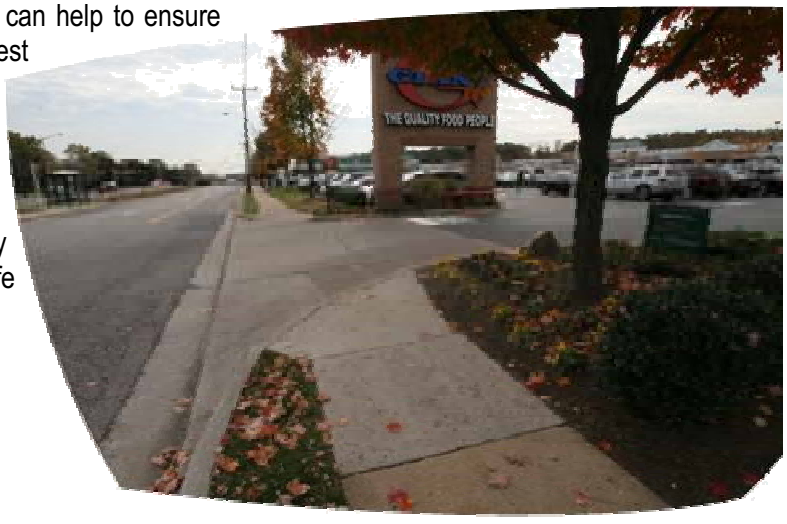
Access Management

Access management is defined as the control of driveways and intersections to maintain safety at a roadway's full traffic carrying capacity. An effective access management program will encourage smooth and safe traffic flow on the City's arterial and collector roadways and will help the City avoid some of the traffic problems caused by uncontrolled strip development.

Access design characteristics that directly impact roadway traffic flow and safety include location and design of access drives and side roads as well as location of signals, medians, and turn lanes. Effective access management includes a comprehensive package of both physical design plans for improving roadway function and local planning programs and development regulations to control access by future development onto a roadway system.

The benefits of utilizing access management in preserving and enhancing a roadway system are threefold:

1. Access management supports a safe and effective relationship between the local transportation system and land use. It can ensure that traffic can reach local development smoothly and safely and that traffic generated by local development can be accommodated on the roadway without exacerbating congestion and/or crashes. In this manner, effective access management can reduce the need for roadway widening and other costly upgrades.
2. Access management often promotes the goals and objectives of a local plan of development for the future of a community. Those related goals generally include supporting desired future development patterns with appropriate infrastructure and enhancing the streetscape. For example, where the plan of development calls for more retail business in specific locations, an access management plan can help to ensure that roads and future driveways are planned to best accommodate the increased traffic.
3. Access management helps maintain the safety and capacity of arterial and collector roadways In this way it can also minimize conflicts between pedestrian, bicycles and motor vehicles by consolidating access to land at points where safe crossings can be provided.



Travel Demand Management

Signalization and Intelligent Transportation Systems (ITS)

The City of Alexandria has a modern traffic signal system that is used to control traffic on the City's streets. Traffic signals provide safety at intersections by determining who has the right-of-way. They facilitate orderly traffic flow, allow pedestrians to cross, an provide cross-street traffic a chance to cross or enter an intersection. The installation of traffic signals can increase the capacity of the street network and reduce many types of collisions. Most signals in the City are connected to a central computer that coordinates and optimizes traffic flow to improve the efficiency of the street network.

Intelligent Transportation Systems (ITS) is the collective term for a variety of advanced technologies intended to aid travel, enhance the capacity and efficiency of the highway system, improve safety, and assist in the active management of facilities and traffic. ITS can provide real-time traffic information to motorists and emergency services, informing motorists about the best route to travel, and allowing emergency services to remove incidents quickly.

The option for adding road capacity in the form of additional lanes or roadways is very limited within the City of Alexandria. Therefore, the use of ITS strategies will allow the City to make most efficient use of its existing road system in accordance with the priority to serve Alexandria destinations in preference to through traffic. The elements of ITS may include:

- Wireless technology;
- Sensors to provide information on average traffic speed and volume;
- Closed-circuit cameras at major intersections to provide live video information on traffic flow;
- Variable message signs to inform motorists of incidents ahead and supply alternate route options;
- Synchronization of traffic signals;
- Direct emergency services tie-in for immediate response to incidents;
- Information sharing with transit centers about traffic flow;
- Information on parking availability and location; and
- Transit priority measures (i.e. que jumping).

Travel Demand Management

Travel Demand Management (TDM) strategies play an important role in the overall operation and planning of the street system. These strategies can complement other City efforts in minimizing total auto trips, educing the peak load of vehicles, and spreading traffic over a longer time period to ease peak period congestion. TDM strategies that will play an important role in the overall success of the City's transportation vision fall into two categories:

Employer Based Strategies

These strategies are based on individual companies instituting programs designed to move people from single occupant vehicles (SOV) into carpools / high occupancy vehicles (HOV) and/or public transit. Companies will implement these programs either voluntarily (they realize some internal benefit) or because a government entity has mandated that SOV usage must be reduced. Generally, the effectiveness of employer based programs is directly related to the strictness of a government mandate. Examples of TDM employer based strategies are:

- Company based rideshare program
- Company based vanpool program
- Transit fare subsidy program
- Preferential parking for rideshare participants
- Parking cost increases/subsidies based on vehicle occupancy
- Variable work hours (flex time, alternate work weeks, etc.)
- Telecommuting

The effectiveness of a TDM program is measured in terms of peak hour vehicle trips reduced. For employer based programs, this can range from around 0.5% (voluntary, modest rideshare program) to over 30% for a highly aggressive, mandated program that includes a superior rideshare and/or vanpool program, financial incentives and disincentives and variable work hours.

It should be noted that some employer-based strategies and transportation services (shuttles, etc.) have different impacts depending on the type of employment in a study area. Rideshare programs work better where many employees have the same work schedule. A variable work hours strategy is more effective in an office setting where people can follow more independent work schedules.

Areawide Strategies

These strategies are based on government entities implementing changes designed to encourage people to use carpools or public transit. Examples of areawide strategies are:

- Transit service improvements
- Transit fare reductions
- Parking cost increases
- HOV Lane Implementation

HOV Lane Implementation

As an areawide TDM strategy that is quite common in the Northern Virginia Region the implementation of additional or expanded HOV lanes is a strategy that must be explored closely for the City of Alexandria. HOV priority refers to strategies that give priority to High Occupant Vehicles, including transit buses, vanpools and carpools. HOV priority is a major component of many regional TDM programs. Two, three or four occupants may be required to be considered an HOV, depending on circumstances. HOV priority provides travel time savings, operating cost savings and increased travel reliability. HOV lanes typically provide time savings from 0-5 minutes per mile on arterial streets[5]. A study by Ewing sited in the Victoria Transportation Policy Institute's TDM Encyclopedia estimated that HOV facilities can reduce peak-period vehicle trips on individual facilities by 2-10 percent.

Funding

The City of Alexandria does not propose the construction of any new streets with the adoption of this Transportation Plan. Any new street connections required from new or redevelopment activities will be paid for by developers. Therefore, costs associated with City streets are limited to maintenance and repair. The Street Maintenance Section is responsible for repairing all sidewalks, curbs and gutters, pavement areas in the public right of way. In addition this Section is responsible for snow removal, pothole patching, guardrail, fence and barrier repairs, as well as bike path and trail repairs on request. The Street Maintenance Section places and programs variable message boards as part of the traffic management and control associated with it's activities, as well as for other City Departments. This Section also supports other City Departments with their construction activities.

Each year the Street Maintenance Section resurfaces approximately 60 lane miles of City streets using funds provided. Funding for this work is provided annually by the Virginia Department of Transportation based upon a formula that is derived from the total lane miles of paved roadway within the City of Alexandria. This funding also provides for concrete curb and gutter work, asphalt patching and localized repair and engineering studies. The State inspects the City streets, in conjunction with City inspectors, and directs which streets are to be repaired each year. Additional annual improvements and repairs to the City's roadways are typically funded out of the City's General Fund.

With the passage of HB 3202 on April 4, 2007, the Commonwealth of Virginia offered a number of new transportation funding initiatives at the State, regional and local levels including authority for the City to increase its motor vehicle registration fee, increase its real estate tax rate and levy commercial/residential impact fees.

Revenue sources and the allocation of funding are discussed in detail in the funding and implementation Section.

Actions & Strategies

In order to comprehensively address the City's street system and to enhance the transportation network for the City of Alexandria the City has identified the following actions and strategies to be implemented.

S1. The City will ensure that its streets safely accommodate all users

- S1.A. Evaluate and, if necessary, re-write design manuals to encompass the safety of all users
- S1.B. Keep neighborhood street use, to the greatest extent possible, within the classification defined earlier in this chapter of the Master Plan (i.e. local streets, residential collectors, primary collectors).
- S1.C. Continue funding, improving and evaluating the City's Neighborhood Traffic Calming Program.
- S1.D. Foster a proactive working relationship between City Staff and neighborhood residents in the development of traffic calming measures.

S2. The City will formally develop and adopt a "Complete Streets" Policy.

- S2.A. Increase access, safety, comfort and convenience for pedestrians and bicyclists by changing the culture of neighborhood street use from "cars first" to "people first."
- S2.B. Ensure that the entire right of way is routinely designed and operated to enable safe access for all users.
- S2.C. Develop means of data collection that provides an efficient means of tracking the success of streets serving all users.

S3. Develop new and enhance existing education programs to market and educate the public on Travel Demand Management (TDM) strategies.

S4. The City will improve mobility on the City's arterial streets through the development of a comprehensive policy for incorporating technology into all aspects of transportation infrastructure.

- S4.A. Redesign signal timings and coordination to coincide with the main flow of traffic during peak periods.
- S4.B. Install traffic response program using roadway sensors to adjust signal timings according to directional traffic flow.

S5. The City will improve safety at signalized intersections.

- S5.A. Use signal technology and sensors to reduce speeding on arterial streets.
- S5.B. Use cameras and law enforcement, and signal timing to minimize red-light running.
- S5.C. Convert all pedestrian signals to countdown signals.
- S5.D. Install signal pre-emption for emergency vehicles and transit.

S6. The City will focus on improvements that improve the natural and human environment, preservation of historic resources, and creation of more enjoyable public street spaces.

- S6.A. Incorporate attractive landscaping, pedestrian amenities and public art into all improvement projects.
- S6.B. Incorporate street trees into all improvement projects where possible.
- S6.C. Incorporate traffic calming features in street improvement projects whenever possible.

S7. The City will develop a comprehensive design manual for City streetspace.

S7.A. Planning & Zoning, Transportation & Environmental Services and other departments will coordinate efforts to effectively link land-use and transportation planning.

S7.B. Develop multi-modal corridor design guidelines focused on preserving and enhancing the character and identity of City neighborhoods, streets and corridors.

S7.C. Develop policies to require the incorporation of pedestrian amenities to promote walking, bicycling and transit use into the planning, design and construction all development and redevelopment efforts.

S7.D. Identify policy for access management along applicable corridors to improve safety, function and appearance.

S7.E. Develop overlay corridors that will guide the integration of design elements into a system of multimodal corridors.

S8. The City will explore opportunities to enhance the use of high-occupancy vehicle (HOV) lanes as a traffic management strategy for periods of peak travel demand.

S8.A. The City will study its existing HOV travel lanes to determine if changes in their operations would improve traffic flow during peak travel periods.

S8.B. The City will evaluate opportunities for implementation of additional or expanded HOV travel lanes or reduction of existing HOV travel lanes on City streets.

Endnotes

1. Southworth, Michael & Ben-Joseph, Eran. 2003. Streets and the Shaping of Towns and Cities

2. Asheville – Wayfinding

3. University of Michigan Studio. 2002. Wayfinding: Navigating Human Space. http://www.umich.edu/ ~wayfind/ flash_home.htm

4. METRO. 2002. Creating Livable Streets: Street Design Guidelines

5. Victoria Transportation Policy Institute. 2007. TDM Encyclopedia. HOV Priority: Strategies to Improve Transit and Ridesharing Speed and Convenience. http://www.vtpi.org/tdm/tdm19.htm

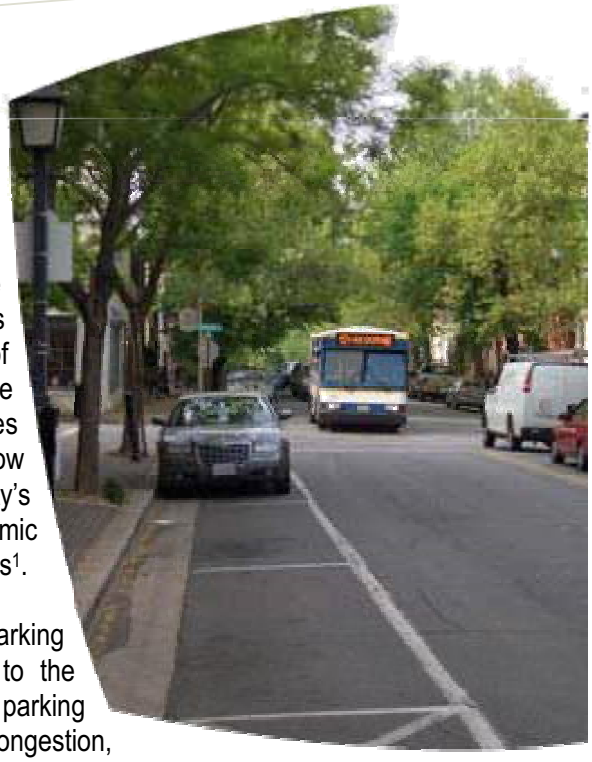
- On- & Off-Street Parking

- Pricing & Prioritization

- Parking Management

Parking

Introduction



Parking is an essential component of the City of Alexandria's transportation system. The City's parking resources consist of private and public parking garages, lots, and curbside parking. All of these resources must be managed effectively in order to provide residents and visitors with needed parking. Long- or short-term parking is part of every car trip, and parking, especially when free, is a key factor in the mode choice for a trip. The availability and price of parking influences people's housing and transportation choices about where to live and how to travel to work, shop, and conduct personal business. The City's challenge is to provide enough parking to meet mobility and economic needs, while limiting supply to encourage people to use non-auto modes[1].

A typical automobile is parked 23 hours each day, and uses several parking spaces each week, making parking availability a key contributor to the financial health of the City's commercial areas[2]. At the same time, parking management is one of the most important tools for managing congestion, increasing transit ridership and achieving the wider goals of the Transportation Master Plan[3].

This parking section of the Transportation Master Plan provides a background of the City of Alexandria's existing parking policies, identifies the guiding principles for the City in the management of parking, and identifies specific actions and strategies for the City to undertake in order to manage parking resources in a cost effective manner that contributes toward the overall vision of the City. The development and implementation of a comprehensive parking strategy will work in tandem with and serve to further the goals, actions and strategies of the City's plans for transit, streets, bicycle and pedestrian infrastructure.

Goal: A comprehensive parking management strategy that is fully integrated with the city's plans for transit, streets, bicycles and pedestrians and functions in coordination with these plans - furthering the city's overall goals and wider transportation vision.

What's Different about this Plan for Parking?

- Identifies parking and curbspace management priorities to increase parking efficiency and further the city's wider transportation vision.
- Establishes guiding principles to direct the decision-making process regarding parking policy and programs.
- Establishes a diversity of demand, cost and supply related actions and strategies to comprehensively address parking within the city.

The City currently has twelve designated residential parking districts. The districts require residents to display a residential parking permit on their vehicle to park. The annual fee for the residential parking permit is $15 for the first vehicle, $20 for the second vehicle, and $50 for each additional vehicle. The parking permit allows residents to park vehicle anywhere within the permit parking district for which it was issued, provided no other parking restrictions apply. The City code prohibits parking a vehicle in the same place for more than 72 continuous hours. The parking permit does not override this restriction.

It is important to consider the character of distinct areas within the city and what the overall goals for these areas are in order to effectively develop parking policy and programs that are context sensitive. The prioritization matrix below was developed by Arlington County — but is directly applicable to the city of Alexandria's decision making process regarding parking management.

Minimum requirements for parking throughout the City of Alexandria are established in the City's zoning ordinance. In addition, parts of the Eisenhower East plan establish maximum limits on parking. The existing minimum parking requirements for the City of Alexandria are outlined in the following table. In addition, Table 2 outlines the required number of parking spaces for retail uses within the City.

Selected Minimum Parking Requirements[4]	
One- and two- family dwellings	2 spaces per unit
Row or townhouse dwelling	2 spaces per unit
Multifamily dwellings	
-one bedroom	One and three tenths spaces per unit
-two bedroom	One and three quarters spaces per unit
-three bedroom or larger	Two and two-tenths spaces per unit
Restaurants	*One space per each four seats**

Existing Parking Requirements

For all single-family detached and two-family residential dwellings, required off-street parking facilities are required to be located on the same lot as the main building. For all multifamily dwellings, required off-street parking facilities are required to be located on the same lot as the main building lot, on a lot separated from the main building lot by an alley or directly across the street from the main building when separated by a minor local street only. For all commercial or industrial uses, the distance from the off-street parking facility to the commercial or industrial use which it serves shall not exceed 500 feet from the nearest corner of the lot containing the structure to the nearest usable portion of the lot used for parking, provided that such off-street parking facility shall be permitted on land in a commercial or industrial zone only.

Parking Spaces Required for New Retail Uses [5]

Total Floor Area in Square Feet per Floor		Required Number of Parking Spaces per Given Square Feet of Floor Area											
Not Less Than	Not More Than	Ground floor Parking Districts						Other Floors Parking Districts					
			1	2	3	4	5	6	1	2	3	4	5
--	1,500	1 per 200	1.1 per 200	1.2 per 200	1.2 per 200	1.2 per 200	1 per 200	1 per 300	1.1 per 300	1.2 per 300	1.2 per 300	1.2 per 300	1 per 300
1,500	5,000	1 per 210	1.1 per 210	1.2 per 210	1.2 per 210	1.2 per 210	1 per 210	1 per 310	1.1 per 310	1.2 per 310	1.2 per 310	1.2 per 310	1 per 310
5,000	20,000	1 per 220	1.1 per 220	1.2 per 220	1.2 per 220	1.2 per 220	1 per 220	1 per 320	1.1 per 320	1.2 per 320	1.2 per 320	1.2 per 320	1 per 320
20,000	--	1 per 230	1.1 per 230	1.2 per 230	1.2 per 230	1.2 per 230	1 per 230	1 per 330	1.1 per 330	1.2 per 330	1.2 per 330	1.2 per 330	1 per 330

Within the Old and Historic Alexandria District, access to all parking is required to be provided from an alley or interior court. Upon a finding by the planning commission or director that it is clearly not feasible to provide such access, a waiver as to part or all of any parking requirement may be granted during the site plan review process. Additional requirements for parking access apply to select districts and buildings throughout the city.

The City of Alexandria's on-street parking resources are becoming increasingly complex as new uses and services are introduced within the City. Some of the uses that compete for the City's curbspace include loading zones, bus stops, tour bus parking and taxis. With these competing uses it is imperative for the City to have clear and concise goals, objectives and strategies to guide the decision making process when it comes to parking.

The foundation of this process is the formation of the below parking management principles. The City of Alexandria has adopted the following parking management principles to guide their parking policies and programs. These principles were initially established by the Victoria Transportation Policy Institute and provide the foundation for parking policy in the City of Alexandria.

Parking Management Principles

Parking Management Principles[6]

- **User information** – Motorists should have information on their parking and travel options.
- **Sharing** – Parking facilities should serve multiple users and destinations.
- **Efficient utilization** – Parking facilities should be sized and managed so spaces are frequently occupied.
- **Flexibility** – Parking plans should accommodate uncertainty and change.
- **Prioritization** – The most desirable spaces should be managed to favor higher-priority uses.
- **Pricing** – As much as possible, users should pay directly for the parking facilities they use.
- **Peak management** – Special efforts should be made to deal with peak-demand.
- **Quality vs. quantity** – Parking facility quality should be considered as important as quantity, including aesthetics, security, accessibility and user information.
- **Comprehensive analysis** – The City will complete a comprehensive study of City parking supply, demand and parking policies.

Funding

The City of Alexandria parking program is funded through revenues generated from parking fees. Currently the City of Alexandria has approximately 1,000 metered parking spaces within the City limits. This total is estimated to increase to approximately 1,500 meters with the completion of the East Eisenhower development. These meters provide approximately $1 million in revenue to the City annually, with a projected increase to $2 million with the completion of the East Eisenhower development. The revenue generated from parking meters is required under City Code to be used for the provision of parking.

In addition to the above future development and redevelopment within the City will contribute to the provision of parking resources. However, efforts will be made by the City to limit the required number of parking spaces and provide incentives to developers for the provision of travel demand management strategies as identified in the required transportation management plan and implemented accordingly.

Actions & Strategies

P1. The City will complete a comprehensive study of City parking supply, demand and parking policies.

- P1.1. The City will identify and designate priority parking districts with common characteristics and goals and reduce the impacts of parking spillover in surrounding neighborhoods.
  - P1.1.a. The City will modify/revise parking policies based on neighborhood and community characteristics.
  - P1.1.b. The City will identify incentive and disincentive policies that encourage transit use.
- P1.2. The City will designate a Parking Authority to manage the allocation of parking spaces, management, enforcement, development of additional parking,
- P1.3. Supply/Demand Study (Include pricing, demand, policy)
- P1.4. The City will develop comprehensive guidelines for the management of on-street parking.
- P1.5 The City will identify, evaluate and adopt appropriate "best practices" for municipal parking management to more effectively manage its parking resources.

P2. The City will develop and implement comprehensive guidelines and requirements for transit-oriented development (TOD) that support the principles of TOD and include maximum parking ratios, unbundled parking infrastructure, and parking cash-out programs as parking management strategies for development/redevelopment of properties proximate to Metrorail stations.

P3. The City will ensure parking availability within the City's commercial, residential and tourist districts through the development of a comprehensive curbspace management program.

- P3.1. The City will establish a method to systematically prioritize curbspace.
  - P3.1.a. In commercial districts prioritize curb space in the following order: 1) transit stops and layover, 2) passenger and commercial vehicle loading, 3) short-term parking (time limit signs and paid parking); 4) parking for shared vehicles; and 5) vehicular capacity.
  - P3.1.b. In residential districts, prioritize curb space in the following order: 1) transit stops and layover; 2) passenger and commercial vehicle loading; 3) parking for local residents and for shared vehicles; and 4) vehicular capacity.
- P3.2. The City will designate meter rates that are based on desired occupancy rates as established by the parking study findings (P5).
- P3.3. The City will designate parking for zip cars and flex cars.
- P3.4. Create designated parking zones and spaces for car-sharing parking
- P3.5. Consider installing longer-term paid on-street parking along edges of commercial districts or in office and institutional zones to regulate curb space where short-term parking demand is low.
- P3.6. The City will explore opportunities to increase the implementation of commercial and residential shared parking.
- P3.7. Develop and promote parking management strategies that favor short-term customer parking over long-term commuter parking.

Actions & Strategies

P4. The City will implement policies to discourage the development of surface parking lots.

P4.1 The City will study the feasibility of constructing parking structures at the south, west and eastern portals located at the city boundary aimed at increasing transit ridership.

P4.2. Encourage parking cash-out and rideshare programs.

P5. The City will increase the use of information technology to provide real-time parking location and availability information.

P6. Educate the property development and management community about unbundling parking from building leases.

P7. The City will seek parking and transit solutions to minimize, if not eliminate, tour bus traffic in the residential areas of Old Town Alexandria.

P8. The City will seek parking and transit solutions to minimize, if not eliminate, tour bus traffic in the residential areas of Old Town Alexandria.

Endnotes

1. *City of Seattle Transportation Strategic Plan*. http://www.seattle.gov/transportation/tsphome.htm
2. Litman, Todd. *Parking Management: Strategies, Evaluation and Planning*. Victoria Transport Policy Institute. 2006.
3. County of Arlington, Virginia Master Transportation Plan. 2006.
4. City of Alexandria Zoning Ordinance
5. City of Alexandria Zoning Ordinance
6. Litman, Todd. *Parking Management: Strategies, Evaluation and Planning*. Victoria Transport Policy Institute. 2006.

Funding and Implementation

Introduction

Large capital investments require comprehensive financial planning in order to assure the construction, maintenance and continued operation of the envisioned investment. This City Transportation Plan identifies an innovative, ambitious vision for the City in regards to its transportation infrastructure. The Plan identifies numerous goals and objectives that will result in the need for increased revenue and funding to achieve, the largest investment being the proposed transit concept.

The Alexandria Transit Concept represents a significant undertaking and presents the most significant funding need component of this Master Plan. The transit concept can be thought of as a capital project still in its preliminary stages. This chapter explores decisions that impact the ultimate Transit Concept project cost and the funding mechanisms and implementation approach to make it a reality. Where applicable, other Master Plan elements that can be funded by similar sources and coordinated in unison with delivery of the Transit Concept project will be incorporated in the presentation of funding options.

The first section of this section details the cost estimation methodology and the resulting order of magnitude capital and operating cost estimates for the Transit Concept. Since no one source is likely to provide the entire funding for any one element of this plan, specifically the transit concept, the focus of this section is upon formulating funding "packages" of multiple options. While capital construction and vehicle acquisition costs represent the most pressing funding need of this plan, funding options that provide a continuing source of local revenue for the ongoing operation, construction and maintenance are also outlined.

Second, this section addresses the funding needs of plan initiatives as a whole providing a summary of project delivery approaches, a variety of funding options from various sources and an overview of the continued implementation and planning process required to make the elements of this plan a reality.

Cost Estimation Process

The cost estimation process divides the project into specific component categories, each with a different impact on the ultimate image and performance of the system based on the funding level provided. Various national and local indicators were utilized to developing unit costs for the major items that comprise each of these components. While these figures represent average costs, there is a great degree of variability. A comparison of different modes and assumptions has been used to provide the widest range of project scenarios. Throughout subsequent planning and engineering phases leading up to construction and operation of the system, these costs estimates will account for mode selection, design criteria and local conditions, thereby increasing accuracy through continual refinement.

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Typical Right-of-Way Costs by Mode	
Mode	Cost Range per Mile (Millions)
Bus Rapid Transit (BRT)	$0.8 - $11.0
Streetcar	$6.0 – $19.0
Light Rail Transit (LRT)	$14.0 - $31.0

Right-of-Way - Represents the cost to prepare a running surface for transit vehicles. While the Transit Concept anticipates utilizing existing roadways, surface improvements, lane markings, and access control are required for rubber-tired vehicles. For fixed-guideway rail vehicles, additional costs include track, power supply, and controls. The costs reflected here are significantly lower than costs for constructing new, purpose-built right-of-way for the exclusive use of transit vehicles.

Typical Vehicle Costs by Mode	
Mode	Cost Range (Millions)
Bus Rapid Transit (BRT)	$0.5 - $1.2
Streetcar	$1.5 – $3.5
Light Rail Transit (LRT)	$2.5 - $4.5

Vehicles - The number of vehicles required by a transit project is derived from service plans, with the total vehicle requirement accounting for running times (speed) within a corridor, frequency of service along the route, and required spares. Higher vehicle costs reflect modern technology, amenities, and propulsion systems, factors directly related to the attractiveness of the service.

Stations - This includes the design, construction and the technology incorporated into the "Smart Stations" that will be located along the routes. Final design criteria will greatly influence the project cost for station construction, but basic elements envisioned for the Transit Concept include a boarding platform, passenger information displays, and distinctive design.

Traffic Improvements - This includes smaller components, such as signal priority, vehicle location technology, and intersection redesigns that enable features such as queue-jumping (rubber-tire vehicles only).

Estimated Transit Concept Costs

Capital Costs

For each corridor illustrated in the Alexandria Transit Concept, the right-of-way type, number of stations, and sketch service plan were developed to achieve capital and operating cost estimates. The estimates reflect present-day costs, since the future start of construction and vehicle procurement dates are unknown. The following assumptions are reflected in the results of cost estimation for the Transit Concept. Any changes in these assumptions could result in significant changes in the results of project cost estimation.

The Transit Concept consists of three (3) primary corridors, Route 1, Van Dorn/Shirlington, and Duke Street, comprising a system total of 17 miles. The per-mile capital costs for various transit modes were applied, in addition to the assumptions, to derive a system-wide order of magnitude cost. The results for this project range from $115 million for a BRT system to $665 million to utilize a LRT mode (see graph below). It is important to note that individual corridors could be implemented incrementally, as funding allows, rather than constructing the project as an entire system. More advanced planning will reveal corridor-specific cost factors which may influence an appropriate sequence of implementation.

Major Transit Cost Assumptions

(1) On-street right-of-way within the existing highway profile, thus reducing impact on surrounding land-uses and resulting in minimal property acquisition costs.

(2) Maintenance facility costs are included in construction cost estimates for rail modes (Streetcar and LRT). The BRT mode is assumed to utilize the expanded DASH maintenance facility.

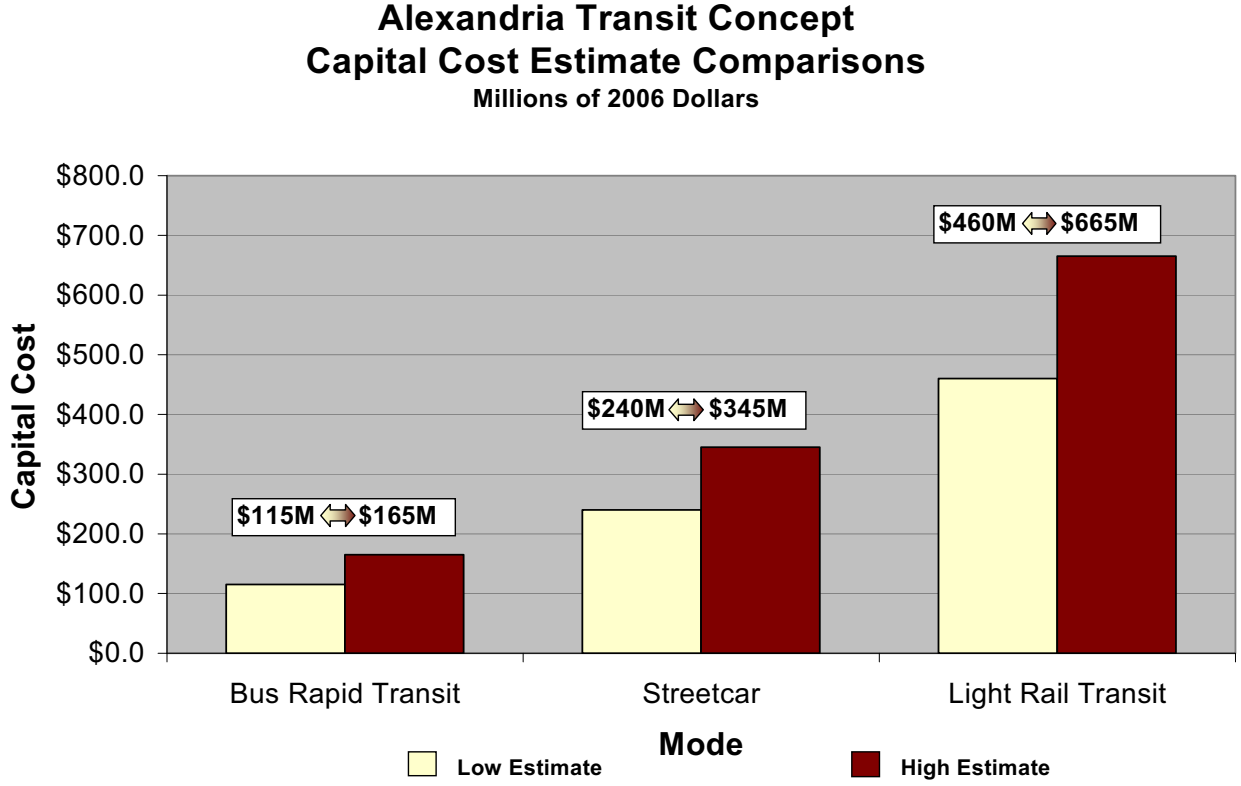
(3) Circulator vehicle costs and operations have not been incorporated. Transit Concept service will replace some existing bus service on the same route, freeing these resources for circulator service.

(4) Smart Stations will be located every ½ mile

(5) Design and Management fees will total 15% of capital costs

(6) Average speeds from 12-20mph (no express service reflected)

(7) Peak headways from 5-10 minutes, off-peak from 10-15 minutes.



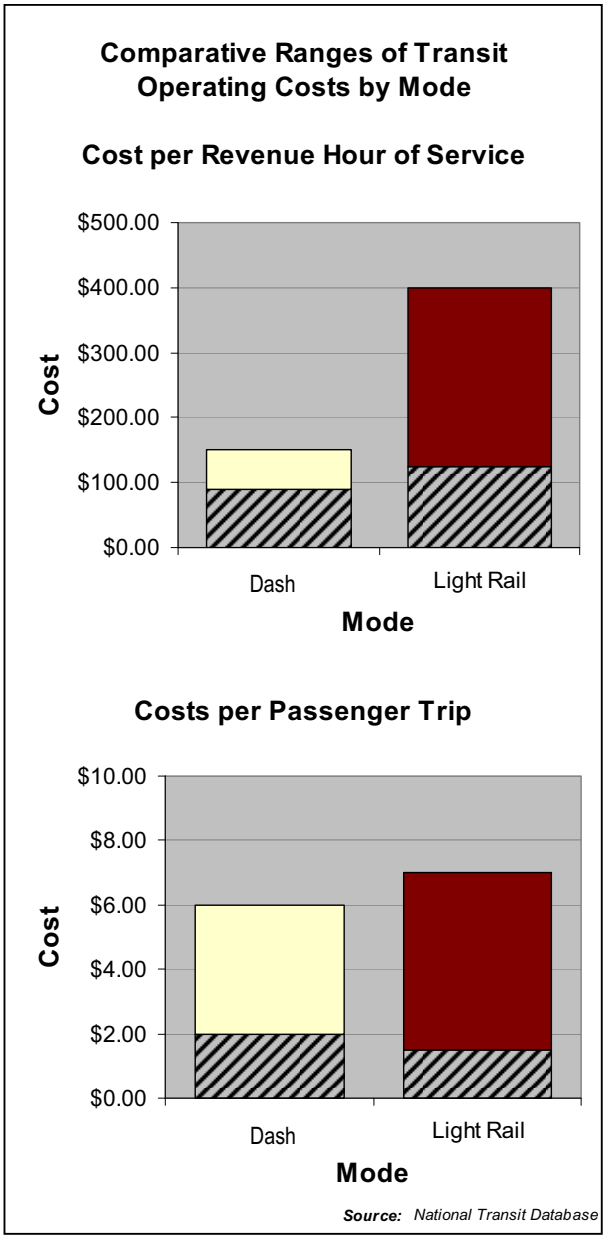
Estimated Transit Concept Costs

Operating Costs

Peer system operating costs were applied to sketch service plans for each mode to approximate the annual cost to provide service. The results indicate a funding need of approximately $16-$25 million/year based on projected revenue hours of service. Cost ranges for important cost measures of Cost Per Revenue Hour of Service and Cost per Passenger Trip are provided in the adjacent graphs. Cost data on a national basis is best reflected in Bus and Light Rail modes, as separate reporting is not yet required for Bus Rapid Transit or Streetcar service. In these graphs, revenue Hours of service reflect the costs incurred regardless of ridership, while cost per passenger trip reflect certain efficiencies gained through moving larger groups of people within single vehicles. Note that the span of these ranges reflect local conditions, labor rates, and regulations, which would be unique to Alexandria upon implementation of the Transit Concept.

It should be noted that at the conceptual stage of planning, the operating costs for such transit systems are complex to calculate, as they involve knowing the current and future vehicle speeds, the time saved from faster boarding times and other parameters. Compared to traditional bus service, the Transit Concept would likely cost more to operate. However, cost per passenger trip would likely decrease. Faster travel times allow the same number of vehicles and drivers to make more trips per day, thereby carrying a greater number of passengers, increasing revenues from passenger fares and thus decreasing overall costs. These efficiencies explain how, based on a certain ridership threshold, Light Rail can prove more efficient then BRT provided it carries vastly larger volumes of riders in fewer and larger vehicles.

Case studies, reflecting costs and funding approaches for systems representing Bus Rapid Transit, Streetcar, and Light Rail modes have been detailed in the Appendix of this report.



Calculating Funding Needs

Transportation projects are typically funded through a variety of sources. In many cases, a significant portion of the capital cost can be funded through Federal grant programs. These programs have specific eligibility requirements and often require the project to compete nationally for limited funds. Even with grant funding, local funding commitments must be secured to match grant contributions. In one such scenario, Federal Transit Administration funding could be anticipated to account for 50% of the project cost. According to the Transit Concept cost estimates, approximately $136-$196 million in other funding would be needed. This section looks at both the Federal programs available as well as various other project delivery methods to secure the needed funding to construct the Transit Concept.

Project Delivery Approach

Project delivery refers to the relationship between public and private funding partners of a transportation project, and ultimately impacts the timeline of beginning revenue service. The traditional approach assumes an approximate 50% contribution of federal funds for capital costs. In this role, only an authorized recipient of Federal funds (state or local government agency) can engage in the planning, construction, financing, and operation of the system. There are significant requirements involved with Federal funding, and some similar projects have completed analysis indicating that this pay-as-you-go approach adds several years and significant cost to the overall project.

In place of federal discretionary funds, more innovative approaches for financing involve significant local and private contributions. Often, these projects entail design-build strategies. In such a scenario, one private company provides bundled services throughout project implementation, including some private financing in return for a stake in operating profits. Various components of the Transit Concept could potentially have different project delivery approaches. Typically the system (right-of-way, vehicles) is better suited for traditional financing while development of station areas has significant potential to attract private interest and funding. The funding mechanisms available to project sponsors and local partners are outlined in the following sections.

Local/Private Funding Options

Local and Private options are also available as funding options for the Transit Concept. These options are particularly useful in enticing private development to occur along improved corridors, necessary to further support the high frequency service envisioned. Other options are better suited to defray operating subsidies, which is essential to demonstrate the long-term financial health of the sponsoring agency to be able to continue to afford to provide the envisioned service. The best suited examples to the Transit Concept include:

Business Improvement District – Added tax or fee placed on all businesses within a service district. This is often an ideal mechanism for funding incidental project costs, such as lighting, security, street cleaning, and the unique branding of an area or transportation system.

Joint Development - This opportunity exists particularly with regard to facilities that provide a logical activity center, such as a tourist information kiosk, multi-mode transfer center, or bus system transfer center. Such facilities often provide substantial traffic flow for potential businesses in the surrounding areas.

Tax Increment Public Infrastructure Fund - Used in redevelopment and improvement of specific areas. As new development increases land value, the higher tax returns are captured and set aside to help retire the debt that funded the public infrastructure improvements that enticed the new development.

Impact Fees – Represent exactions upon developers for the incremental impacts upon transit service required to service the trips generated by the facility.

Motor Vehicle Registration Fee – A modest increase in vehicle registration fees could be utilized to generate additional local funds to leverage further Federal funding.

Implementation & Plan Process

Public participation and involvement is central to all steps in the project implementation process. The role, mechanism, and information conveyed from the public varies for each step, providing critical guidance as the definition of the project evolves. This assures the public is kept abreast as the project moves along the project development and implementation process and is instrumental in shaping key details and outcomes. The methodology describing this process is detailed on the associated process chart, and outlined below:

Public Involvement
Occurs throughout process via a variety of media and methods including:

- Newsletters
- Project Website
- Open Houses
- Facilitated Meetings
- Email Notification
- News Articles

1. FORMULATION

Potential transportation and capital projects may be initiated as the result of public requests, advocacy group recommendations, city department and city council actions. During project formulation, a project may be identified at a conceptual level and corresponding policy changes, if needed, are also developed. Ideally, project formulation occurs through a comprehensive or localized planning process, thereby relating potential projects to overarching goals, funding opportunities, and long term vision. The outcome of the project formulation stage is a "Long List" of potential projects, including preliminary project details and funding needs estimates. At this point, these project lists can be classified according to various market/policy criteria, such as:

- Street
- Transit
- Bicycle/Pedestrian
- Beautification
- Parks and Recreation
- Safety

Following the creation of this pool of potential projects, they then need to be evaluated and compared to determine the most beneficial and goal-oriented projects to advance forward into the project development process.

2. SCREENING

This step brings many factors together to identify more promising projects. In order to balance multiple interests and definitions of a "promising" project, the criteria are objective and derived from multiple sources. Examples of the evaluation and screening process include:

Public Input - The public re-affirms that this project meets stated goals. Public facilitation methods can reveal those projects that are most favored by the broadest constituency.

Policy - The screening seeks to use quantifiable measures of how well a certain project meets stated policy. For example, a policy stating that the city is committed to reduction of traffic congestion would result in a project being ranked on the basis of traffic reduction potential.

Market - The ability for projects to improve conditions in local areas where issues have been previously identified through the planning process, as well as focus on a disadvantaged or underrepresented population would lead to comparison with other projects and thus rank those which have the best potential to meet these needs and serve their target market.

Constraints - Projects must be realistically practical, and this screening mechanisms takes into account cost factors, constructability, and other measures which capture the limitations on the resources of the city.

Implementation & Plan Process

3. PRIORITIZATION

This step establishes among the feasible projects a logical sequence of development. The sequence is determined by reaffirming the most pressing needs of the public and accounting for those projects that might provide the biggest benefit based on overall cost. At this point, there may also be unique opportunities, such as a grant awarded to the city, that may dictate an eligible project be prioritized to take advantage of the available funds. The result of this step is a preferred project, one that meets public desires, funding eligibility requirements, and is best integrated with existing facilities or future planning initiatives. For projects seeking federal funding support, it is often a requirement prior to award of funding to demonstrate the completion of this step.

4. IMPLEMENTATION

The final step in this process is finalizing the project delivery mechanism. This includes entering the project into local, regional, and state processes. Here, funds will be programmed, contracts awarded and construction oversight conducted. Additionally, final public and elected official buy-in on the associated costs, impacts, and benefits of the project is essential to generate momentum and commitment to champion the project and achieve a timely completion.

THE PROCESS IS CONTINUAL

The process doesn't conclude here, as projects that are implemented often derive other new projects, thus beginning the process anew. Also, any projects that did not advance past previous stages could eventually be modified or reconsidered in light of any changes in policy. In this sense, the project implementation process is constantly evolving and continual.