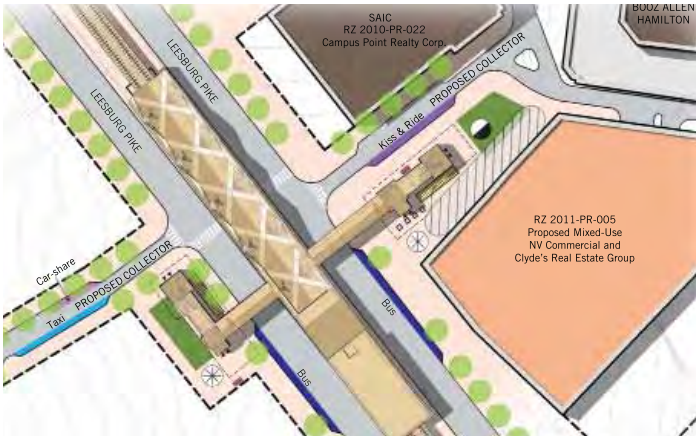
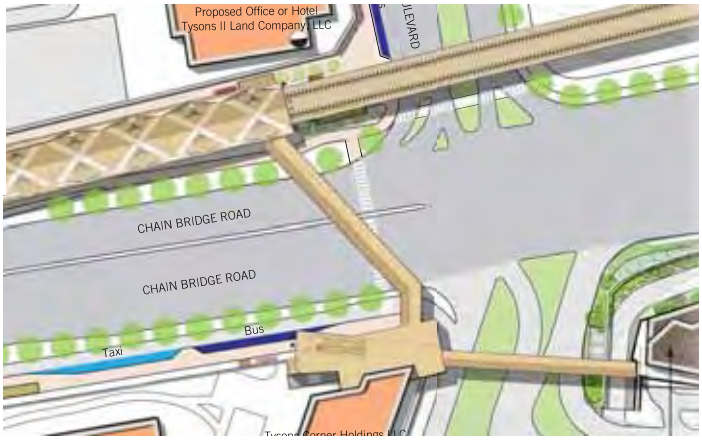
Fairfax County, Virginia



Greensboro Station

McLean Station

Spring Hill Station



Tysons Corner Station

MOBILITY HUBS FOR TYSONS CORNER METRORAIL STATIONS

Conceptual Design Plans

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RHODESIDE & HARWELL

February 27, 2013

CONTENTS

INTRODUCTION

This document presents conceptual designs for Mobility Hubs at the four Tysons Corner Metrorail stations currently under construction. These designs are the culmination of a project for Fairfax County, funded through the Metropolitan Washington COG's TLC Program (Transportation/Land-Use Connections Program). The intent of the project and the proposed Mobility Hubs is to maximize the potential synergies between fixed-route transit investments and area car-share, bike-share and other pedestrian and bicycle facilities, ultimately easing dependence on private automobiles.

The Conceptual Designs focus on the area immediately surrounding the Metro Stations (the Primary Hub Zones) and build upon previous project tasks providing the following:

- Mobility Hub implementation best practices
- Recommended Hub elements
- Recommended Hub siting and preliminary Hub configurations

The designs presented on the following pages bring together the findings and recommendations of these initial project tasks, the 2013 Metrorail construction program, station area private development proposals, and the County's transportation network plans to recommend station area designs that promote safe and comfortable pedestrian circulation, easy access to Hub elements, attractive civic space for waiting or resting, landscape features for sustainable stormwater management, and a seamless transition between the public station plaza and the privately owned/publically accessible café patios, retail spaces, etc.

In particular, these designs build on the material presented in the following documents:

- The 2013 Metro construction program, provided by the Dulles Corridor Metrorail Project office
- Station area rezoning proposals, as available on the Fairfax County web site, and
- The County's *Tysons Corner Urban Design Guidelines* and *Transportation Design Standards for Tysons Corner Urban Center*.

GENERAL APPROACH AND RATIONALE

The mobility hub site design concepts respond to the following goals for the vicinity of each Metro station:

- Maximize public accessibility to each Metro station, with the goal of providing a "public edge" along at least two sides of each station.
- Provide for a high level of safe pedestrian access to each Metro station and associated mobility hub zones and elements and from adjacent neighborhoods.
- Provide bus access to and from the Metrorail stations to make important connections to areas not within immediate walking distance.
- Incorporate civic green space with sustainable amenities at each station site to capture and treat stormwater while also providing usable public spaces.
- Minimize curb cuts along Leesburg Pike to ensure a continuous pedestrian edge along the Leesburg Pike boulevard.
- Minimize conflicts between existing or proposed roadways and mobility hub zones and elements.
- Provide a greater level of site access to potential building areas to create flexibility for development phasing.
- Apply existing standards from the Tysons Corner Urban Design Guidelines and Transportation Design Standards for Tysons Corner Urban Center.

The resulting design concepts represent a potential future scenario that merges and refines existing conditions and current Metro area construction with rezoning proposals under County review, appropriate mobility hub elements, the *Tysons Corner Urban Design Guidelines*, and the County's *Transportation Design Standards for Tysons Corner Urban Center.* Where appropriate, in order to achieve the aforementioned goals, some elements of previous proposals have been modified as noted in the accompanying station descriptions.

CONCEPT DESCRIPTIONS

Each concept consists of three graphics:

- The first graphic demonstrates existing roadway and building configurations with the addition of the Metro construction program to be completed in 2013. This includes the bicycle racks and lockers planned as part of the 2013 Metro construction program.
- The second graphic adds rezoning proposals within the Primary Hub Zone currently under County review. This includes any new roadway or roadway upgrades shown as part of these rezoning proposals.
- The third graphic, the Urban Design Framework Plan, demonstrates recommendations for hub elements and locations, and applies existing County guidelines to achieve the urban design goals outlined in Section 1.

Spring Hill Station

a) Mobility Hub Elements

The Spring Hill Metro Station Urban Design Framework Plan locates the mobility hub elements within the Primary Hub Zone as follows:

- Car-share: three spaces on-street along the proposed local street east of the Metro station. This local street is shown as part of the County's Conceptual Tysons Road Network.[1]
- Bike-share: two bike share facilities, one north and one south of Leesburg Pike. Both facilities are sited to accommodate the larger Capital BikeShare stations measuring 12 by 62 feet (supporting close to 20 bikes each). Other Capital BikeShare requirements as outlined in Appendix A are also met in these locations.[2]
- Bicycle racks and lockers: two bicycle racks each accommodating 12 bicycles, one north and one south of Leesburg Pike. Two blocks of 10 bicycle lockers, one north and one south of Leesburg Pike. This is an increase of 4 bicycle rack spaces and 10 bicycle locker spaces from those in the current Spring Hill Metro station engineering designs. The bicycle lockers and racks are relocated to compliment the urban design recommendations and take advantage of shelter under building overhangs and walkway overpasses.
- Bus bays: two 150 foot bus bay pull-offs along Leesburg Pike, one on the north side and one on the south side.
- Taxi stand: five spaces on-street along Spring Hill Road, east of its intersection with Leesburg Pike.
- Kiss & Ride: drop-off, to accommodate approximately 5 cars, on the proposed local street northeast of the Metro station. This local street is shown as part of the County's Conceptual Tysons Road Network.
- Commuter store: one 200 square foot location on the proposed civic green outside the northern Metro access.

b) Hub Urban Design Context

In addition to locating the hub elements within the Primary Hub Zone, the Urban Design Framework Plan proposes implementation of key Tysons Corner Urban Design Guidelines

[1] Transportation Design Standards for Tysons Corner Urban Center, Fairfax County Comprehensive Plan, September 2011

[2] The Capital BikeShare requirement of 4 hours of direct sunlight per day is currently available in the locations shown on the concept plan. However, this will need to be reevaluated as new structures are built around the station area.

CONCEPT DESCRIPTIONS

within the Spring Hill Station context. It also proposes specific urban design ideas that can enhance the station area and its multi-modal functionality. Recommendations include:

- Streetscape design consistent with boulevard, collector and local streetscape types. Leesburg Pike is designated as a boulevard in the Conceptual Tysons Road Network. As a result, the Boulevard Streetscape Section from the Tysons Corner Urban Design Guidelines is used in the Framework Plan. This includes build-to lines for future redevelopment around the station that meet the Guidelines as shown in Figure 1. Similarly, the Collector and Local Streetscape Sections from the Design Guidelines are used in the Spring Hill Framework (Figures 2 and 3). The Collector Streetscape Sections apply to Spring Hill Road.
- Local street design consistent with the Tysons Transportation Design Standards and the Urban Design Guidelines. The Design Standards call for 2 lanes with 10 foot lane widths and 7-8 foot on-street parking widths. Given the location of the proposed local street within a mixed-use area, the Framework Plan recommends use of 8 foot wide on-street parking on both sides of the street. On-street parking on this local street facilitates provision of on-street car-share spaces. On-street parking also slows traffic speeds, which is appropriate in an urban Metro station area such as Spring Hill.
- Clearly marked crosswalks on Leesburg Pike and Spring Hill Road, located for safe pedestrian movement through the station area at street-level. It will be important to use highly visible crosswalk marking materials and add pedestrian phasing to the signal timing in order to enhance pedestrian visibility to drivers.
- Street trees 40 foot on center (consistent with Tysons Design Guidelines) along all the streets except at key bus and car/taxi drop-off locations.
- Civic green space within the station areas on both sides of Leesburg Pike. The civic green spaces should be designed for plaza beautification, stormwater management, and public enjoyment. The green spaces should include benches or seating walls and encourage use as a resting or meeting place. The civic greens and street trees will offer an important contrast to the primarily hardscape Metro station environment. The commuter store is located within the civic green space on the east side of Leesburg Pike.
- Gateway elements/public art located at station entrances/exits on both sides of Leesburg Pike. These elements will establish a sense of arrival at Spring Hill Station.

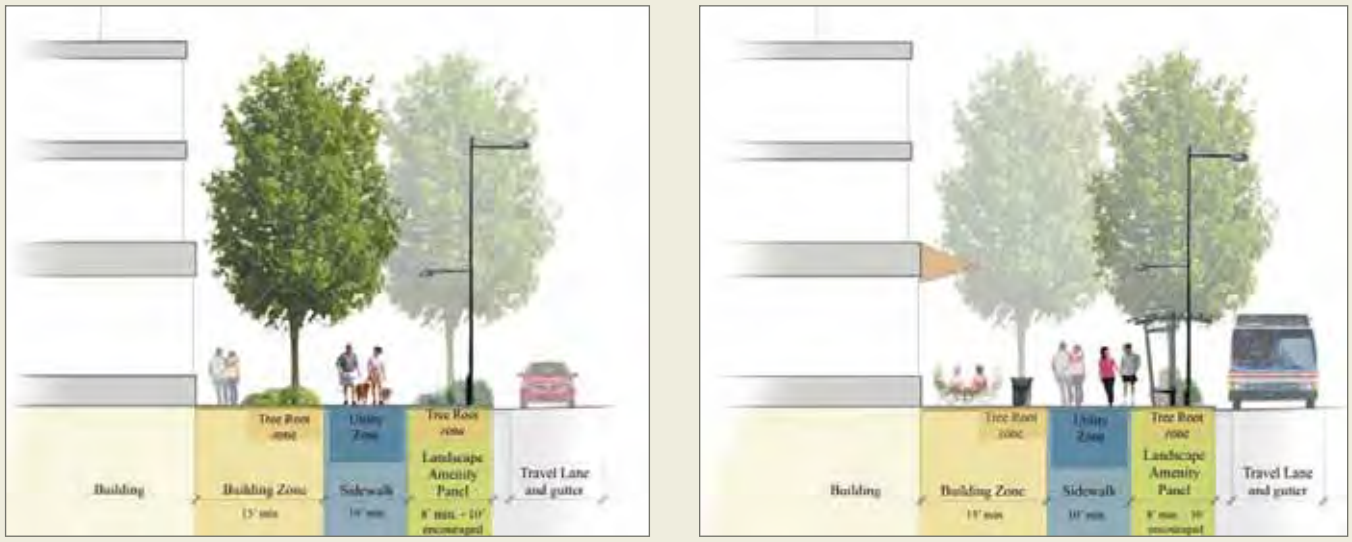


Figure 1. Boulevard Streetscape Sections, Tysons Urban Design Guidelines

CONCEPT DESCRIPTIONS

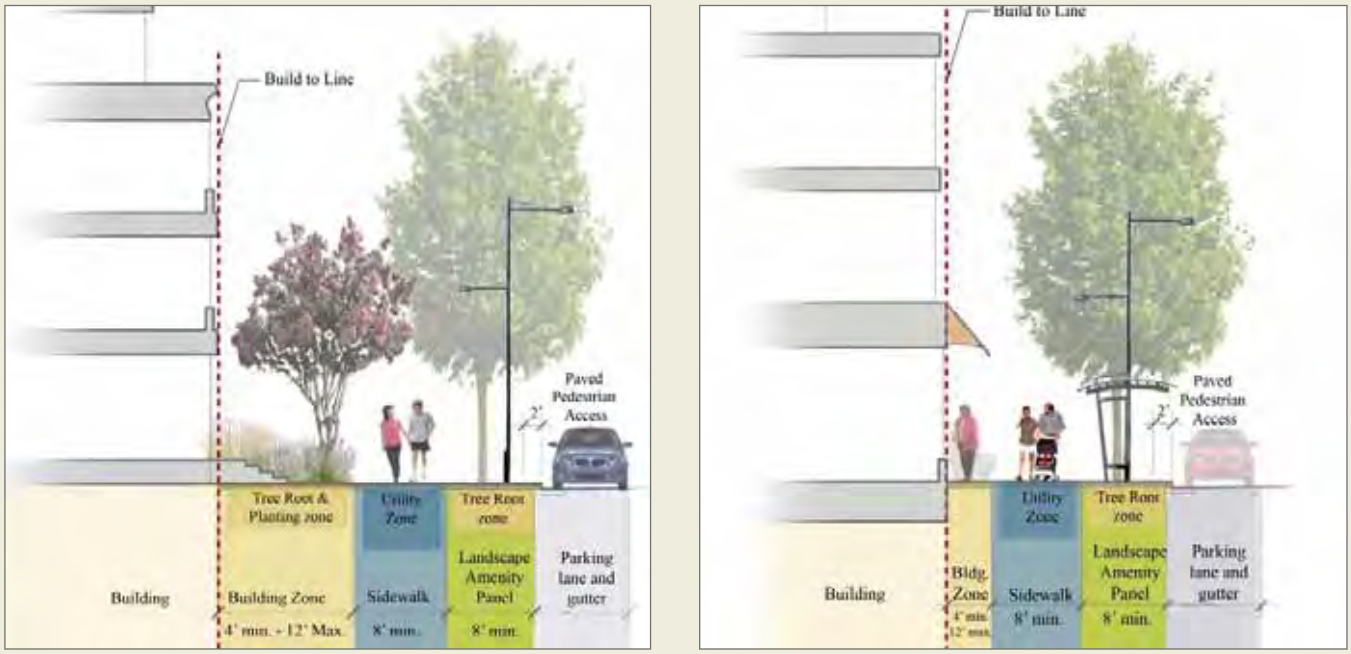


Figure 2. Collector Streetscape Sections, Tysons Urban Design Guidelines

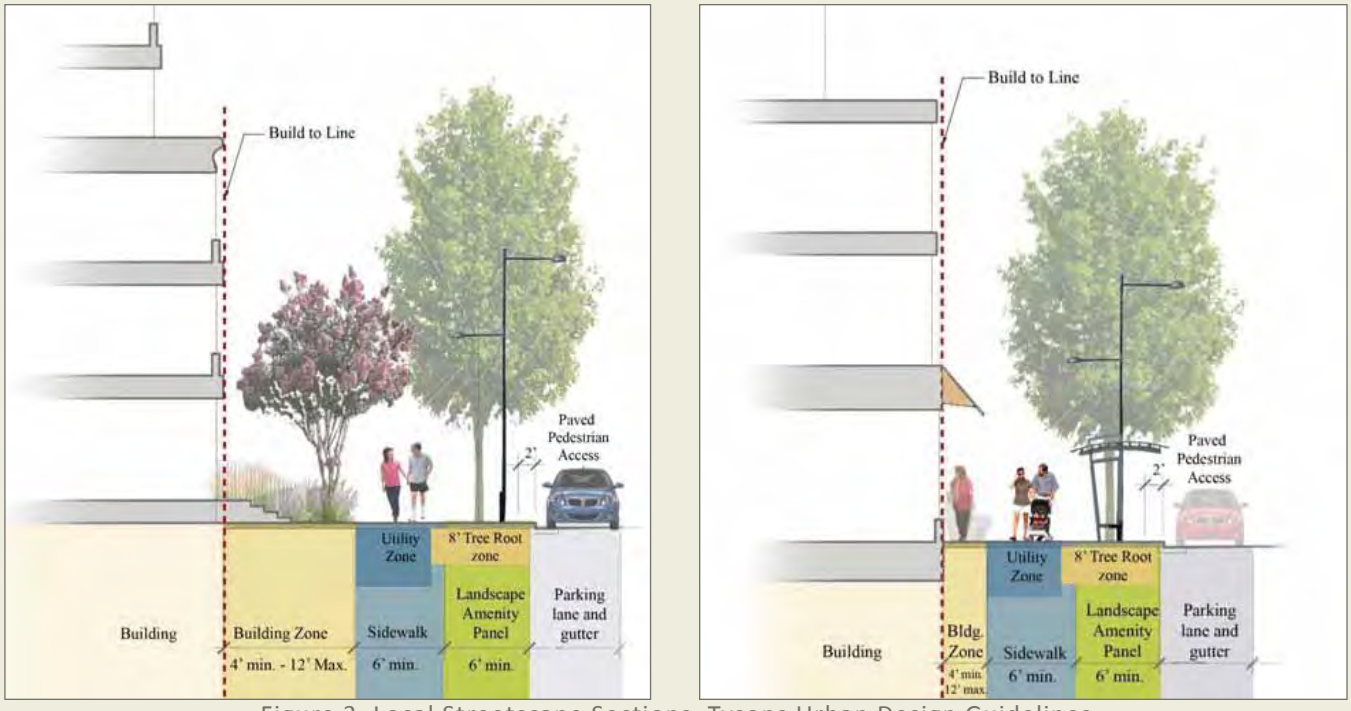
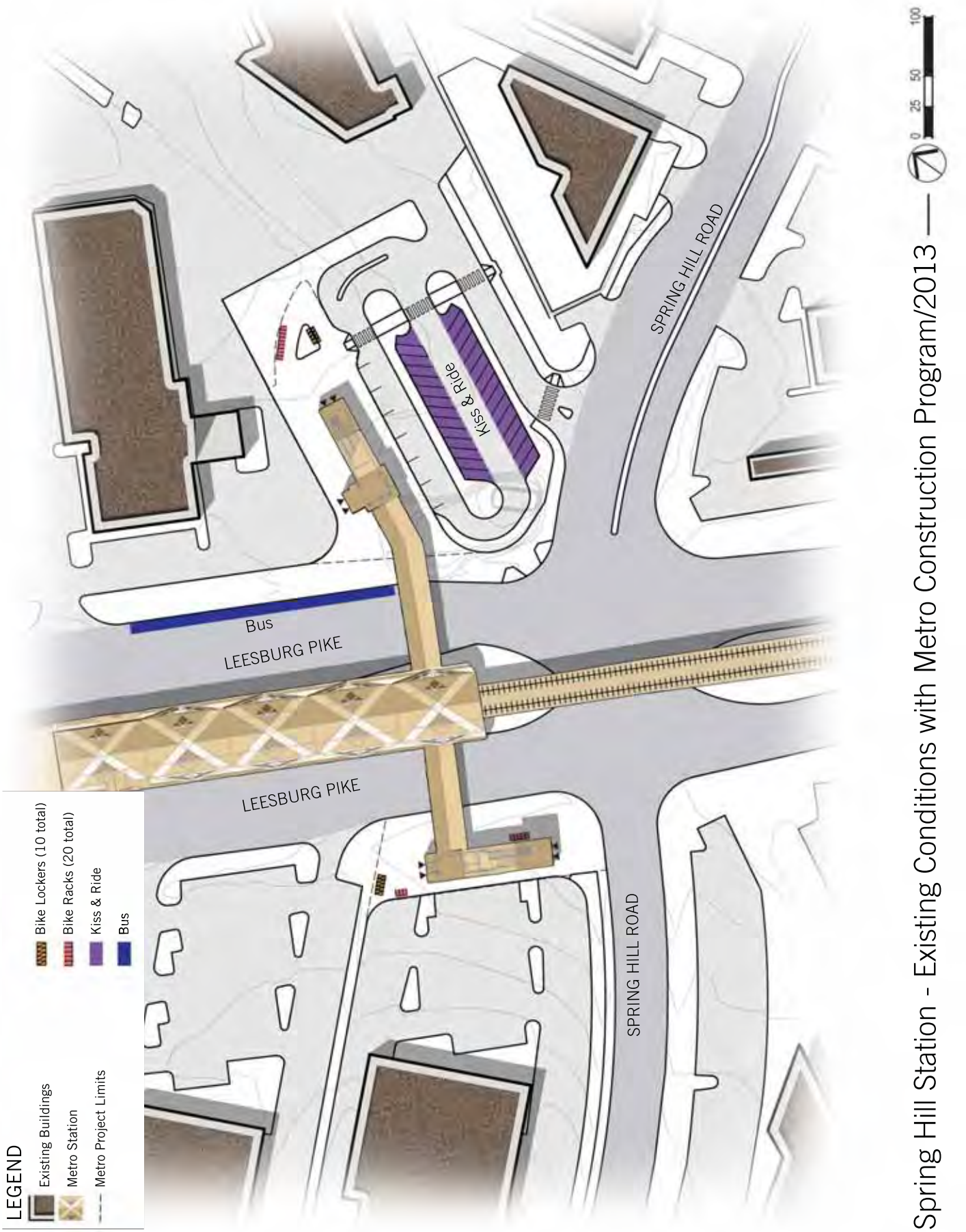


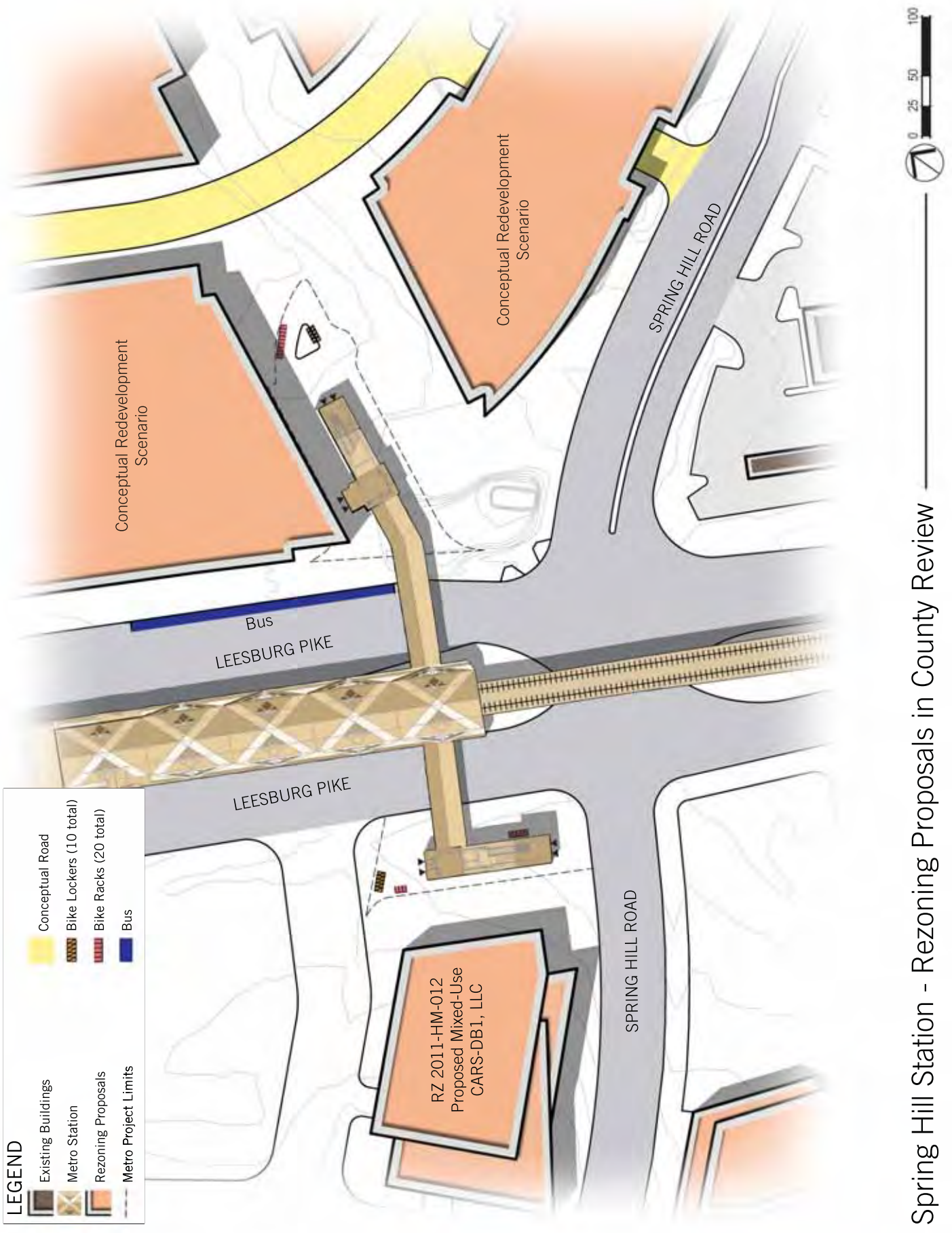
Figure 3. Local Streetscape Sections, Tysons Urban Design Guidelines

CONCEPT DESCRIPTIONS



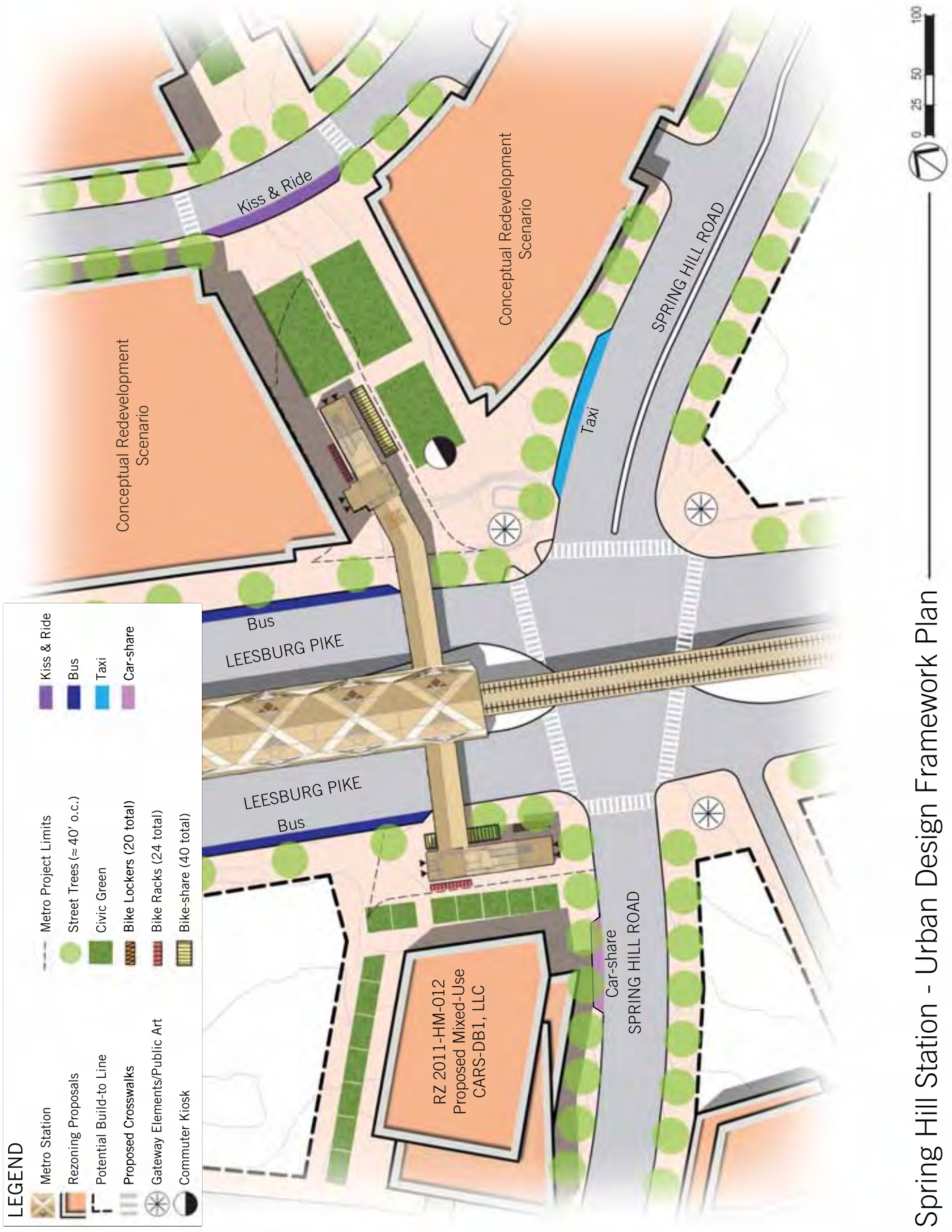
Spring Hill Station - Existing Conditions with Metro Construction Program/2013 —

CONCEPT DESCRIPTIONS



Spring Hill Station - Rezoning Proposals in County Review

CONCEPT DESCRIPTIONS



Spring Hill Station - Urban Design Framework Plan

Greensboro Station

a) Mobility Hub Elements

The Greensboro Metro Station Urban Design Framework Plan locates the mobility hub elements within the Primary Hub Zone as follows:

- Car-share: three spaces on-street along the proposed collector street south of the Metro station. This collector street is shown as part of the County's Conceptual Tysons Road Network.[3]
- Bike-share: two bike share facilities, one north and one south of Leesburg Pike. Both facilities are sited to accommodate the larger Capital BikeShare stations measuring 12 by 62 feet (supporting close to 20 bikes each). Other Capital BikeShare requirements as outlined in Appendix A are also met in these locations.[4]
- Bicycle racks and lockers: two bicycle racks each accommodating 5 bicycles, one north and one south of Leesburg Pike. Two blocks of 5 bicycle lockers, one north and one south of Leesburg Pike. This is the same number of bicycle racks and lockers shown on the current Greensboro Metro station engineering designs. The bicycle lockers and racks are relocated to compliment the urban design recommendations and take advantage of shelter under building overhangs and walkway overpasses.
- Bus bays: two 150 foot bus bay pull-offs along Leesburg Pike, one on the north side and one on the south side.
- Taxi stand: five spaces on-street along the proposed collector street southwest of the Metro station.
- Kiss & Ride: 110 foot (five spaces in length) on-street along the proposed collector street north of the Metro station. This collector street is shown as part of the County's Conceptual Tysons Road Network.
- Commuter store: one 200 square foot location on the proposed civic green outside the northern Metro access.

b) Hub Urban Design Context

In addition to locating the hub elements within the Primary Hub Zone, the Urban Design Framework Plan proposes implementation of key Tysons Corner Urban Design Guidelines within the Greensboro Station context. It also proposes specific urban design ideas that can enhance the station area and its multi-modal functionality. Recommendations include:

- Streetscape design consistent with boulevard and collector streetscape types. Leesburg Pike is designated as a boulevard in the Conceptual Tysons Road Network. As a result, the Boulevard Streetscape Section from the Tysons Corner Urban Design Guidelines is used in the Framework Plan. This includes build-to lines for future redevelopment around the station that meet the Guidelines as shown in Figure 1. Similarly, the Collector Streetscape Section from the Design Guidelines is used in the Framework (Figure 2).
- Collector street design consistent with the Tysons Transportation Design Standards and the Urban Design Guidelines. The Design Standards call for 2-4 lanes with 10-11 foot lane widths. Given the location of the proposed collector at the Greensboro Station, the Framework Plan recommends use of the 2 lane cross-section with 10 foot lanes and 8 foot wide on-street parking on both sides. The on-street parking facilitates provision of on-street taxi stand, car-share spaces, and kiss & ride facilities. On-street parking also slows traffic speeds, which is appropriate in an urban Metro station area such as Greensboro.

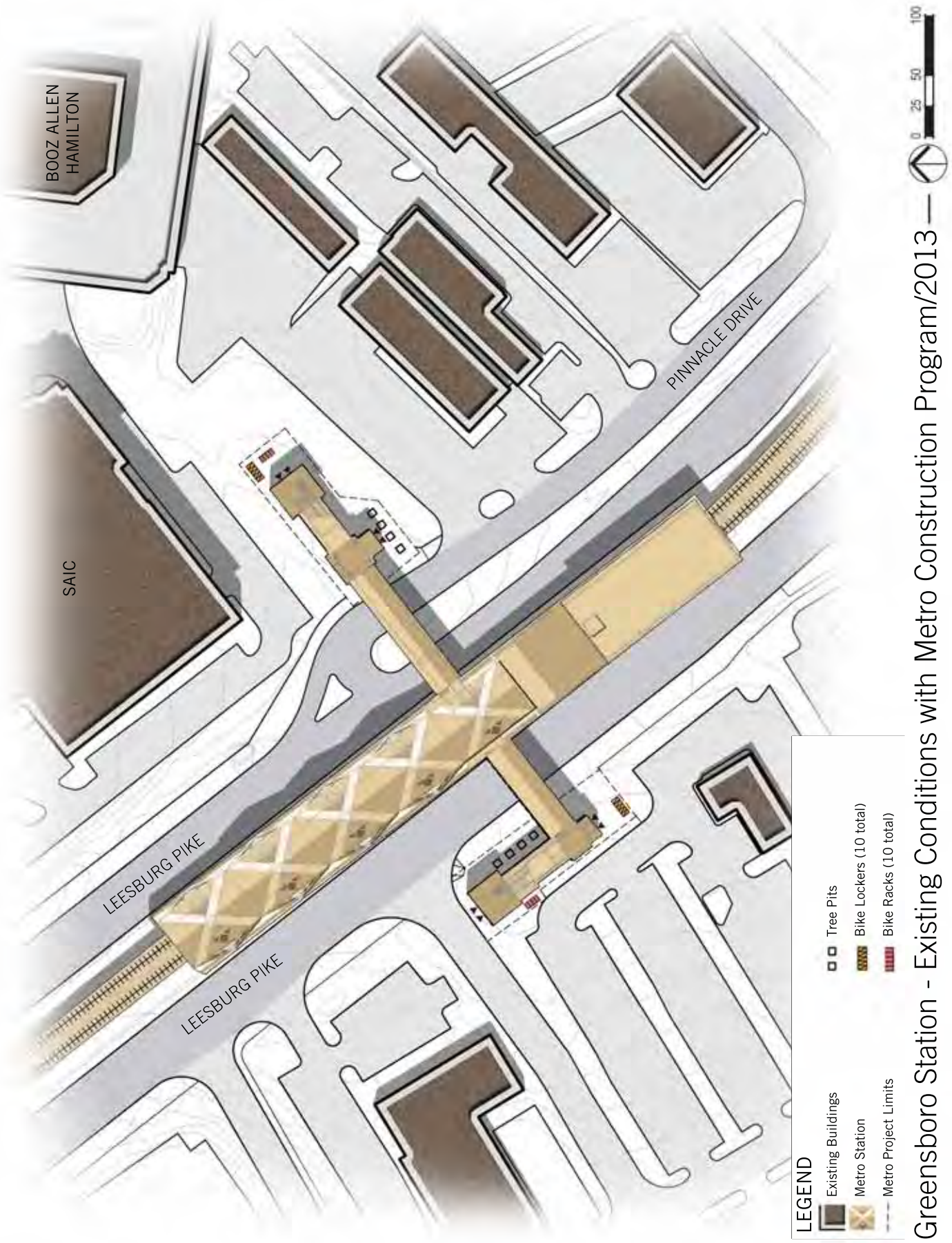
[3] Transportation Design Standards for Tysons Corner Urban Center, Fairfax County Comprehensive Plan, September 2011

[4] The Capital BikeShare requirement of 4 hours of direct sunlight per day is currently available in the locations shown on the concept plan. However, this will need to be reevaluated as new structures are built around the station area.

CONCEPT DESCRIPTIONS

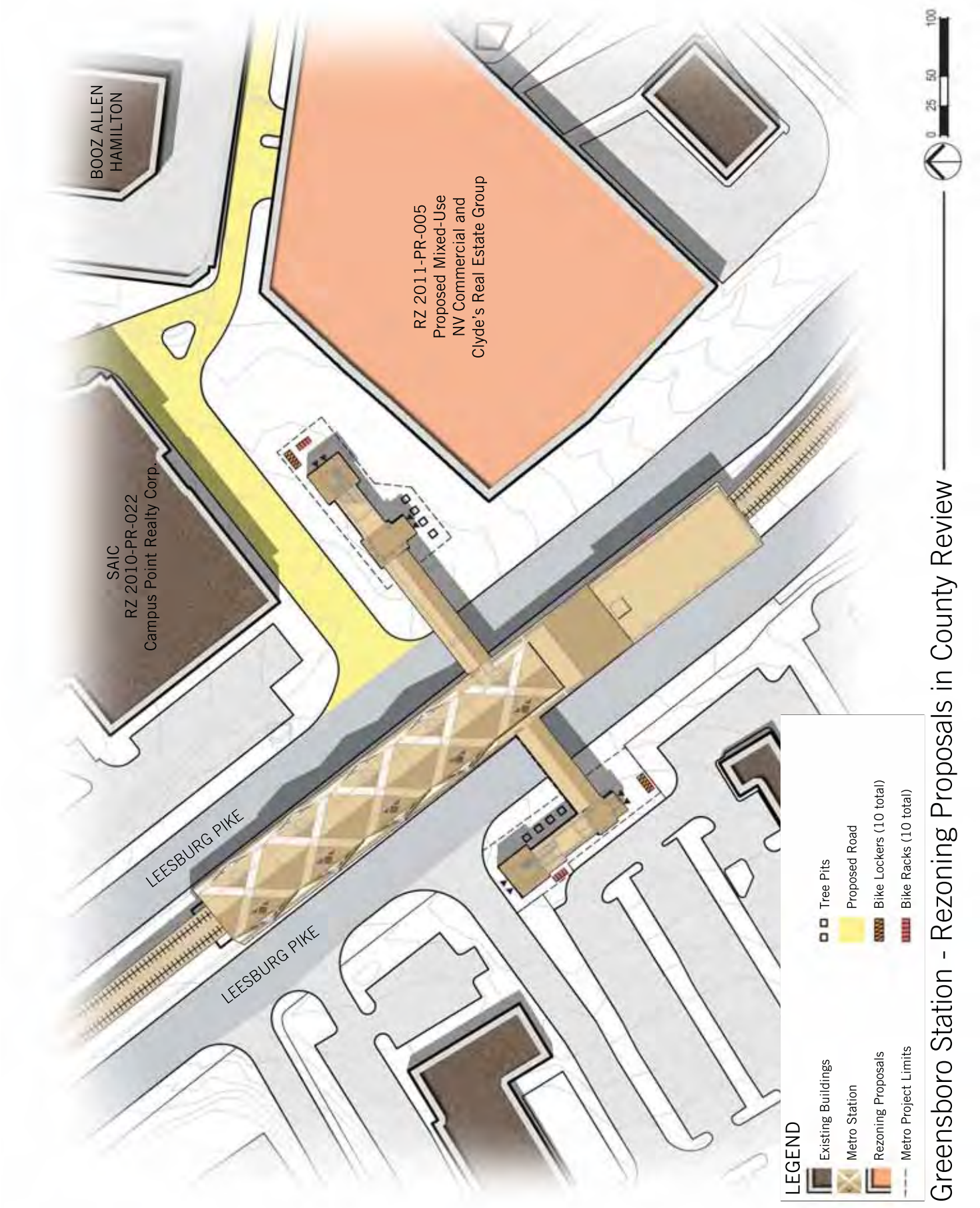
- Clearly marked crosswalks on Leesburg Pike and the new collector streets, located for safe pedestrian movement through the station area at street-level. It will be important to use highly visible crosswalk marking materials and add pedestrian phasing to the signal timing in order to enhance pedestrian visibility to drivers.
- Street trees 40 foot on center (consistent with Tysons Design Guidelines) along all the streets except at key bus and car/taxi drop-off locations.
- Civic green space within the station areas on both sides of Leesburg Pike. The civic green spaces should be designed for plaza beautification, stormwater management, and public enjoyment. The green spaces should include benches or seating walls and encourage use as a resting or meeting place. The civic greens and street trees will offer an important contrast to the primarily hardscape Metro station environment. The commuter store is located within the civic green space on the east side of Leesburg Pike.
- Promenade/café space on the east side of Leesburg Pike, between the Metro station and the rezoning proposal. This space will offer a "public edge" for the station area without introduction of a new street. It will be a gathering space and an attractive corridor for pedestrian circulation.
- Gateway elements/public art located at station entrances/exits on both sides of Leesburg Pike. These elements will establish a sense of arrival at Greensboro Station.

CONCEPT DESCRIPTIONS



Greensboro Station - Existing Conditions with Metro Construction Program/2013 —

CONCEPT DESCRIPTIONS



Greensboro Station - Rezoning Proposals in County Review

CONCEPT DESCRIPTIONS

Greensboro Station - Urban Design Framework Plan

Tysons Corner Station

a) Mobility Hub Elements

The Tysons Corner Station Urban Design Framework Plan locates the mobility hub elements within the Primary Hub Zone as follows:

- Car-share: due to significant space constraints and roadway designs, car-share spaces should be located within parking decks near the station location. The number of spaces will be determined based on the demand for car-share at the station over time.
- Bike-share: two bike share facilities, one north and one south of Chain Bridge Road. Both facilities are sited to accommodate the larger Capital BikeShare stations measuring 12 by 62 feet (supporting close to 20 bikes each). Other Capital BikeShare requirements as outlined in Appendix A are also met in these locations.[6]
- Bicycle racks and lockers: two bicycle racks each accommodating 9 bicycles, one north and one south of Chain Bridge Road. Two blocks of 5 bicycle lockers, one north and one south of Chain Bridge Road. Note: The 2013 Metro construction documents available at this time show the general bicycle rack and locker locations, but do not clearly indicate the numbers of bicycle racks and lockers. As a result, this data is not shown on the existing conditions graphic. The bicycle lockers and racks are relocated in the framework plans to compliment the urban design recommendations and take advantage of shelter under building overhangs and walkway overpasses.
- Bus bays: two 150 foot bus bay pull-offs, one along Tysons Boulevard north of Chain Bridge Road, and one along the south side of Chain Bridge Road within a buffered bus/ taxi pull-off area.
- Taxi stand: five spaces along the south side of Chain Bridge Road within a buffered bus/ taxi pull-off area.
- Kiss & Ride: due to significant space constraints and roadway designs, there is no designated kiss & ride location in the Tysons Corner Urban Design Framework.
- Commuter store: one 200 square foot location within the first floor of a proposed office/hotel building on the north side of Chain Bridge Road, adjacent to the station entrance.

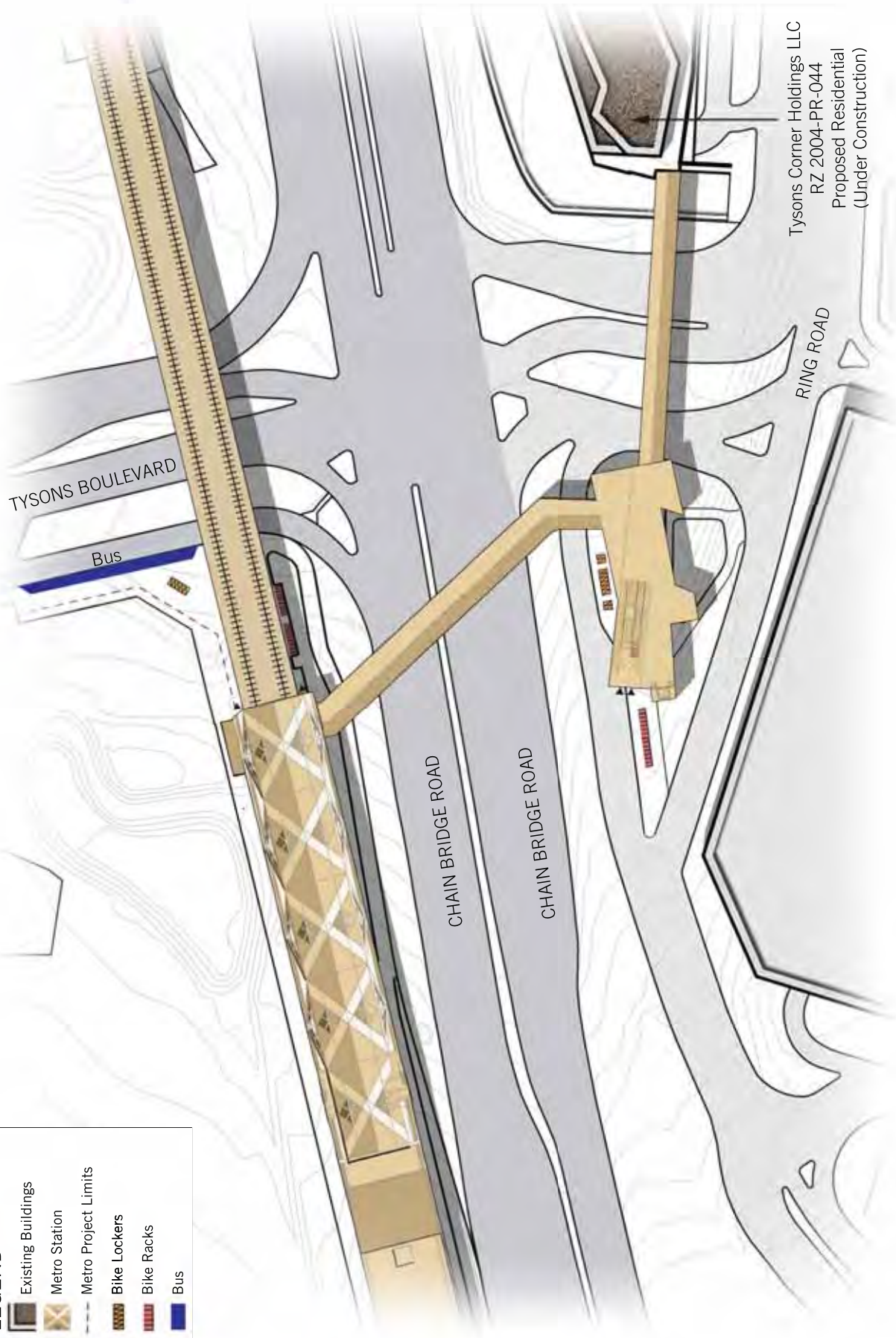
b) Hub Urban Design Context

In addition to locating the hub elements within the Primary Hub Zone, the Urban Design Framework Plan proposes implementation of key Tysons Corner Urban Design Guidelines within the Tysons Corner Station context. It also proposes specific urban design ideas that can enhance the station area and its multi-modal functionality. The Tysons Corner Station is distinct from the other three stations in that there are existing development and rezoning proposals for the full Urban Design Framework Area. Street designs are complete and there is limited street-level public realm in which to locate the Hub facilities. As a result the Urban Design Framework recommendations are fewer. Recommendations include:

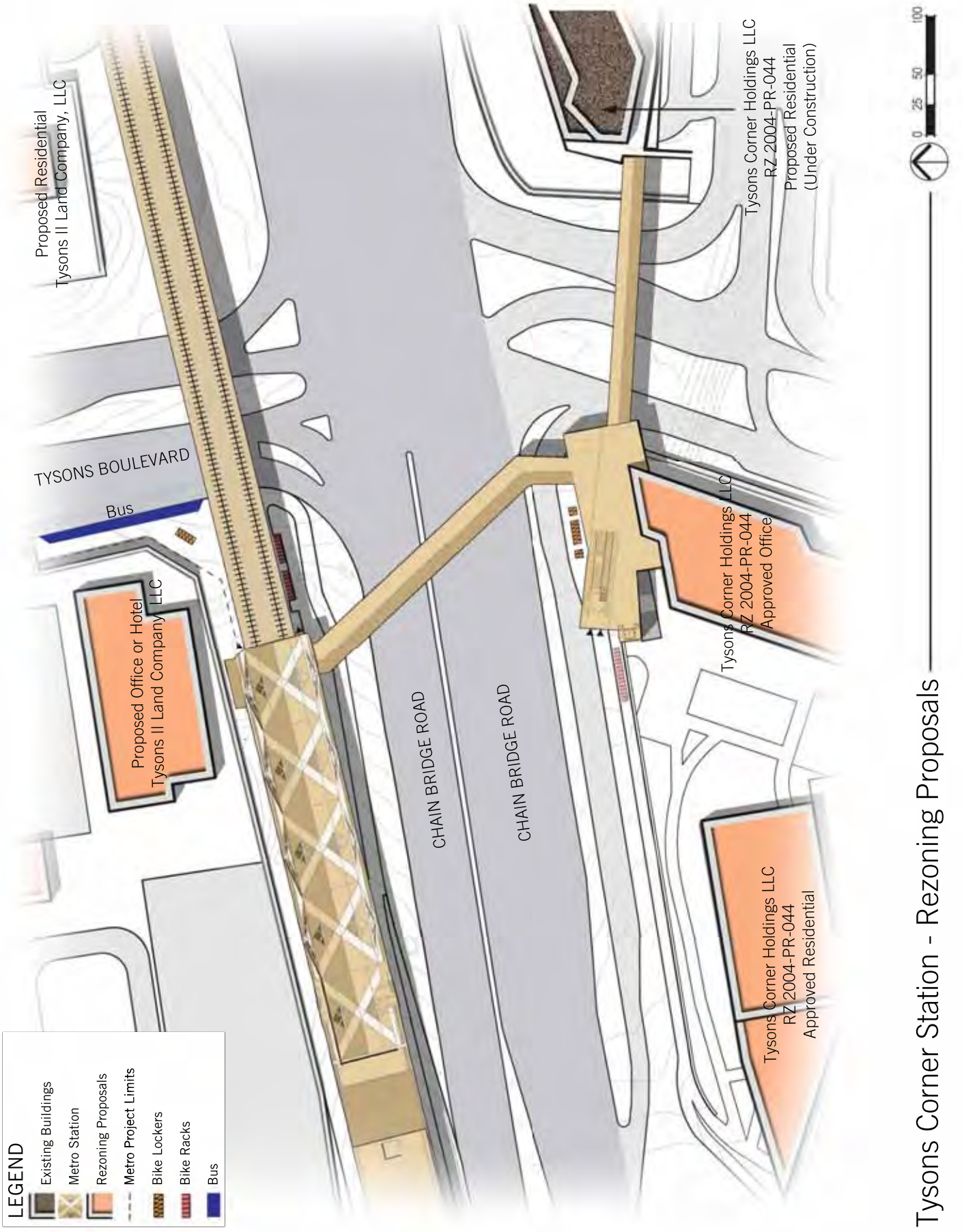
- Clearly marked crosswalks on Chain Bridge Road and Tysons Boulevard, located for safe pedestrian movement through the station area at street-level. It will be important to use highly visible crosswalk marking materials and add pedestrian phasing to the signal timing in order to enhance pedestrian visibility to drivers.
- Street trees 40 foot on center (consistent with Tysons Design Guidelines) along all the streets except at key bus and car/taxi drop-off locations.

[6] The Capital BikeShare requirement of 4 hours of direct sunlight per day is currently available in the locations shown on the concept plan. However, this will need to be reevaluated as new structures are built around the station area.

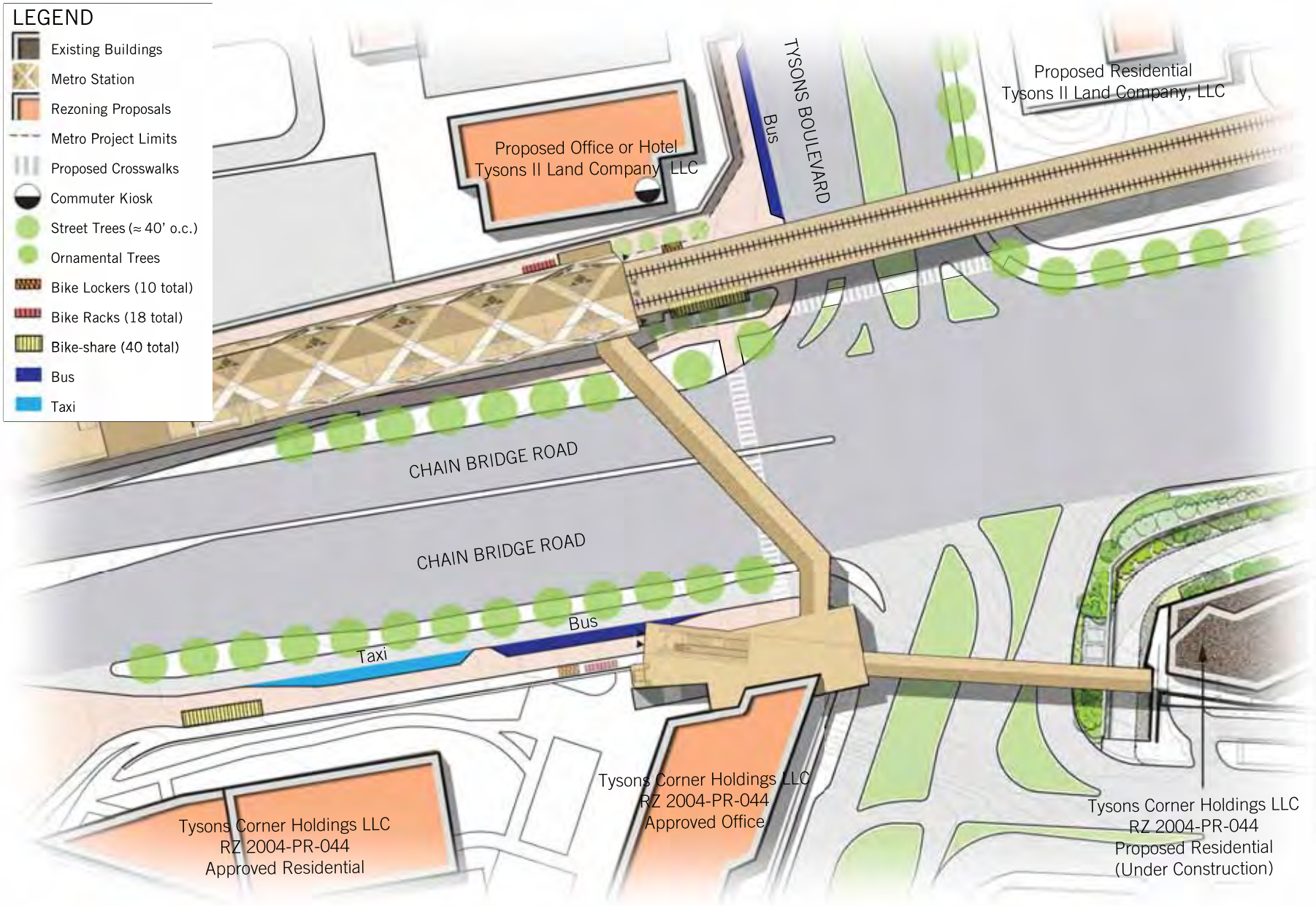
CONCEPT DESCRIPTIONS



Tysons Corner Station - Existing Conditions with Metro Construction Program/2013



Tysons Corner Station - Rezoning Proposals



Tysons Corner Station - Urban Design Framework

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McLean Station

a) Mobility Hub Elements

The McLean Metro Station Urban Design Framework Plan locates the mobility hub elements within the Primary Hub Zone as follows:

- Car-share: three spaces within the Metro parking lot south of Dolley Madison Boulevard.
- Bike-share: two bike share facilities, one north and one south of Dolley Madison Boulevard. Both facilities are sited to accommodate the larger Capital BikeShare stations measuring 12 by 62 feet (supporting close to 20 bikes each). Other Capital BikeShare requirements as outlined in Appendix A are also met in these locations.[5]
- Bicycle racks and lockers: two bicycle racks each accommodating 13 bicycles, one north and one south of Dolley Madison Boulevard. Two blocks of 10 bicycle lockers, one north and one south of Dolley Madison Boulevard. This is the same number of bicycle rack spaces and bicycle locker spaces as shown in the current McLean Metro station engineering designs. The bicycle lockers and racks are relocated to compliment the urban design recommendat ions and take advantage of shelter under building overhangs and walkway overpasses.
- Bus bays: two 150 foot bus bay pull-offs, one on the north side of Dolley Madison Boulevard and one on the west side of Colshire Drive.
- Taxi stand: nine spaces within the Metro parking lot south of Dolley Madison Boulevard.
- Kiss & Ride: 115 foot (five spaces in length) within the Metro parking lot south of Dolley Madison Boulevard.
- Commuter store: one 200 square foot location on the proposed civic green outside the southern Metro access.

b) Hub Urban Design Context

In addition to locating the hub elements within the Primary Hub Zone, the Urban Design Framework Plan proposes implementation of key Tysons Corner Urban Design Guidelines within the McLean Station context. It also proposes specific urban design ideas that can enhance the station area and its multi-modal functionality. This Design Framework recommends leaving the station kiss-and-ride lot as it is proposed in the 2013 Metro construction program. It should be noted that Fairfax County owns the station parking lot and may choose to redevelop the site at some point in the future. Other recommendations include:

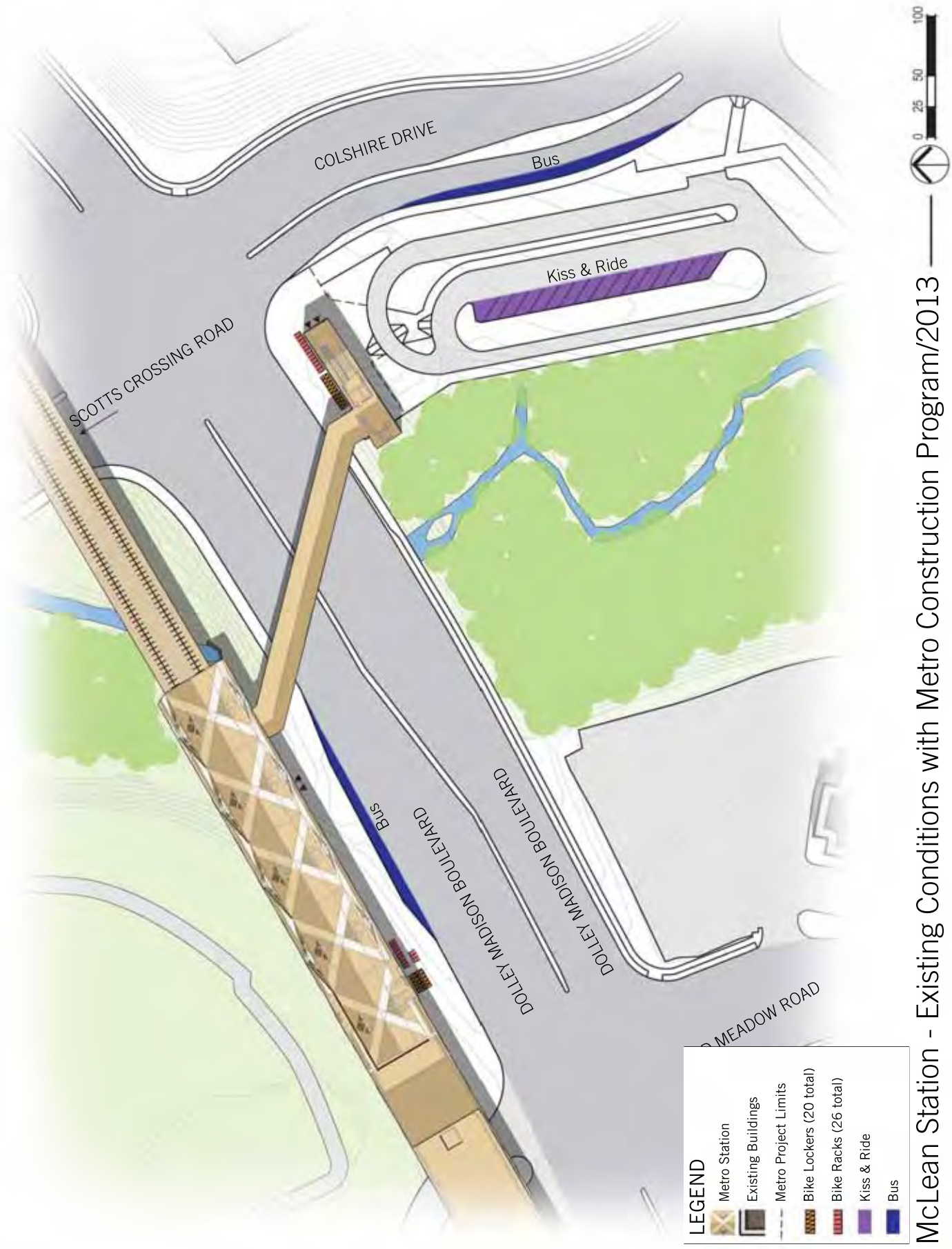
- Streetscape design consistent with boulevard and collector streetscape types. Dolley Madison Boulevard is designated as a boulevard in the Conceptual Tysons Road Network. As a result, the Boulevard Streetscape Section from the Tysons Corner Urban Design Guidelines is used in the Framework Plan, as shown in Figure 1. The rezoning plans for the area already meet these guidelines in terms of their relationship to Dolley Madison Boulevard. Similarly, the Collector Streetscape Section from the Design Guidelines is used in the Framework for Colshire Drive/Scotts Crossing Road (Figure 2).
- Clearly marked crosswalks on Dolley Madison Boulevard and Colshire Drive/ Scott's Crossing Road, located for safe pedestrian movement through the station area at street-level. It will be important to use highly visible crosswalk marking

[5] The Capital BikeShare requirement of 4 hours of direct sunlight per day is currently available in the locations shown on the concept plan. However, this will need to be reevaluated as new structures are built around the station area.

materials and add pedestrian phasing to the signal timing in order to enhance pedestrian visibility to drivers.

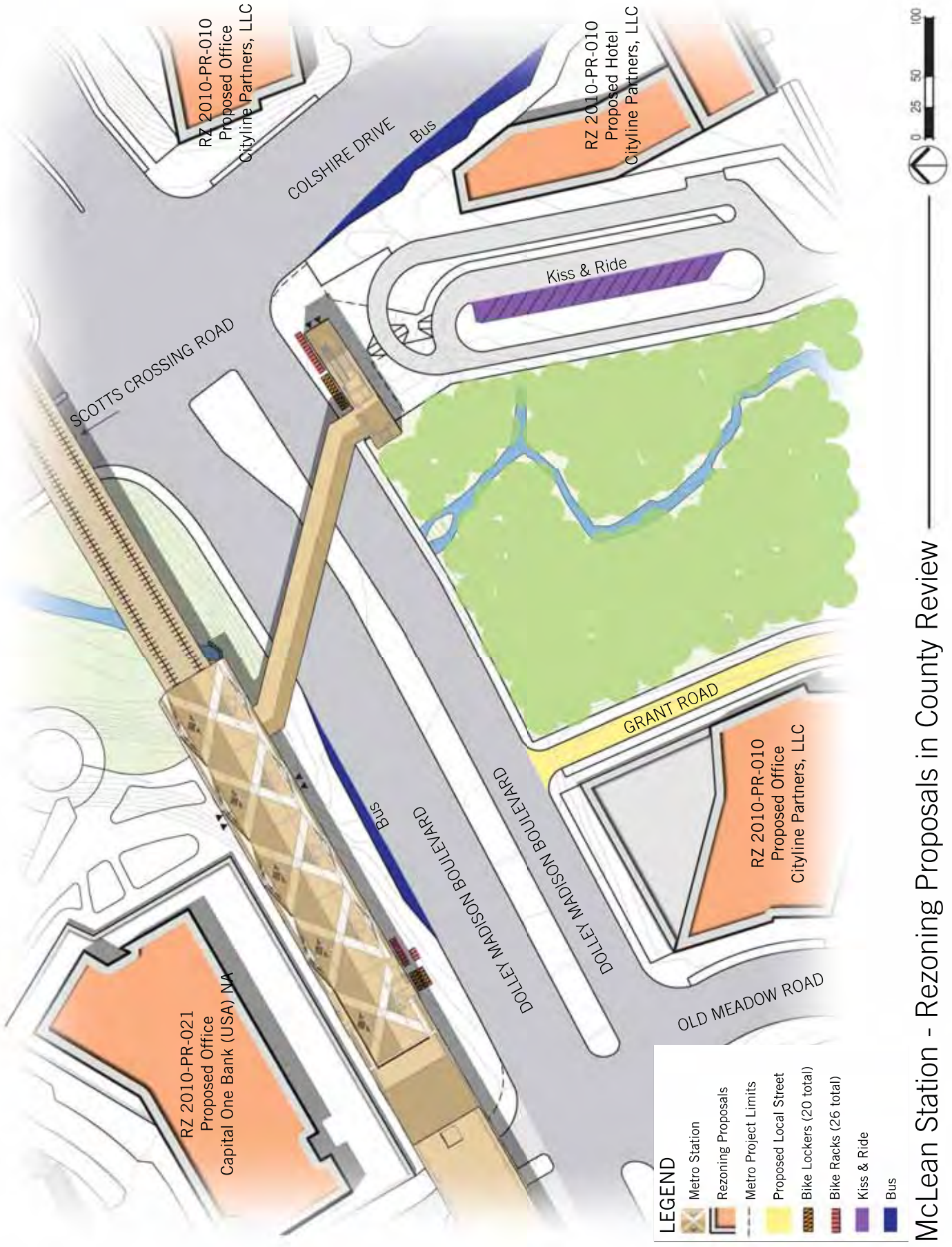
- Street trees 40 foot on center (consistent with Tysons Design Guidelines) along all the streets except at key bus drop-off locations.
- Civic green space within the station areas on both sides of Dolley Madison Boulevard. The civic green spaces should be designed for plaza beautification, stormwater management, and public enjoyment. The green spaces should include benches or seating walls and encourage use as a resting or meeting place. The civic greens and street trees will offer an important contrast to the primarily hardscape Metro station environment. The commuter store is located within the civic green space on the south side of Dolley Madison Boulevard.
- Pedestrian enhancements within the large forested parcel south of Dolley Madison Boulevard and west of the McLean station to provide an attractive and environmentally sensitive connection from the buildings along Old Meadow Road to the station.
- Rain Garden along the western edge of the station parking lot designed to capture and filter runoff from the parking lot and divert environmental pollutants away from the forest and creek area.
- Gateway elements/public art are not specifically located on the Urban Design Framework for this station, however Capital One has proposed a park space with significant design features as part of its rezoning proposal on the north side of Dolley Madison Boulevard.

CONCEPT DESCRIPTIONS



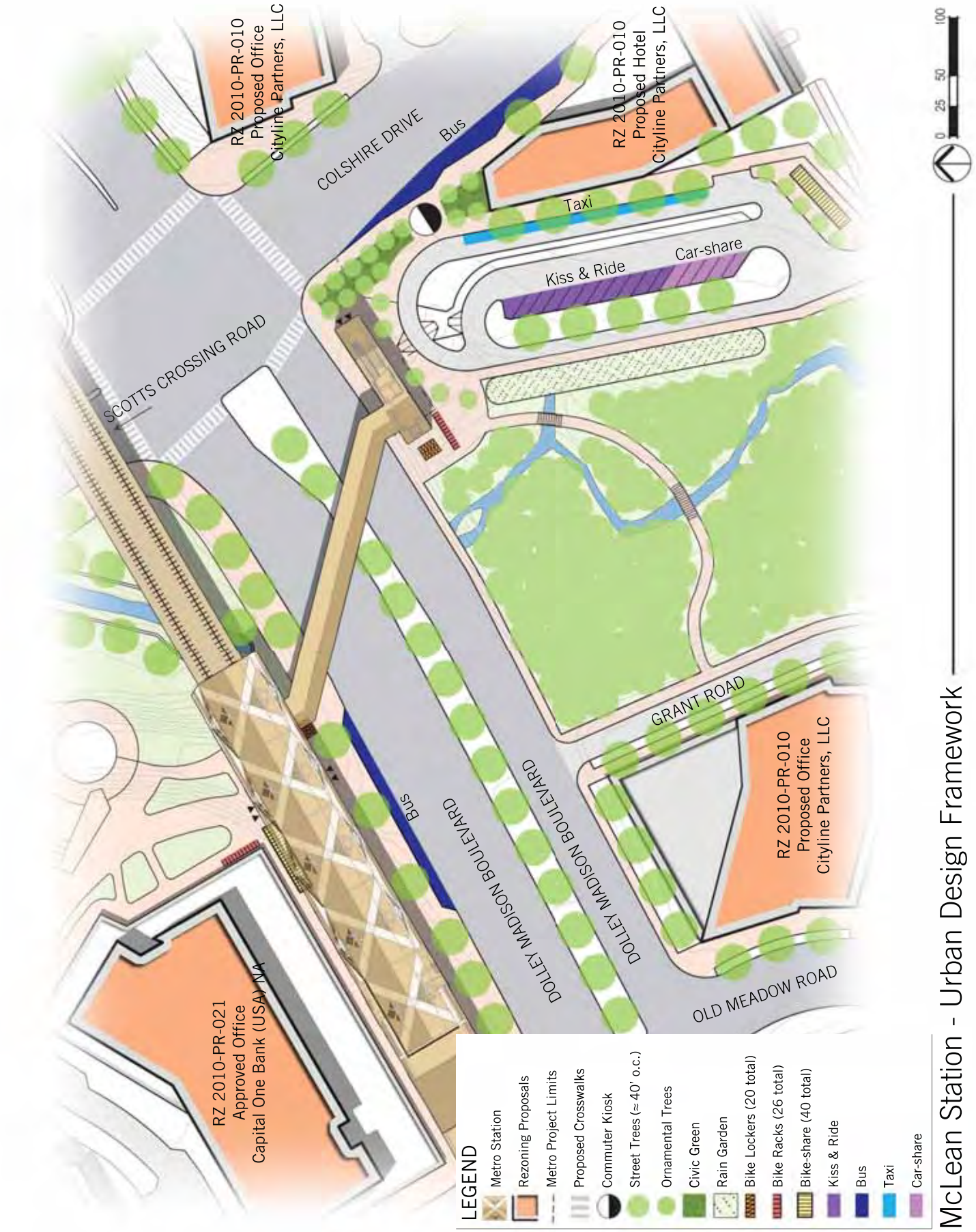
McLean Station - Existing Conditions with Metro Construction Program/2013

CONCEPT DESCRIPTIONS



McLean Station - Rezoning Proposals in County Review

CONCEPT DESCRIPTIONS



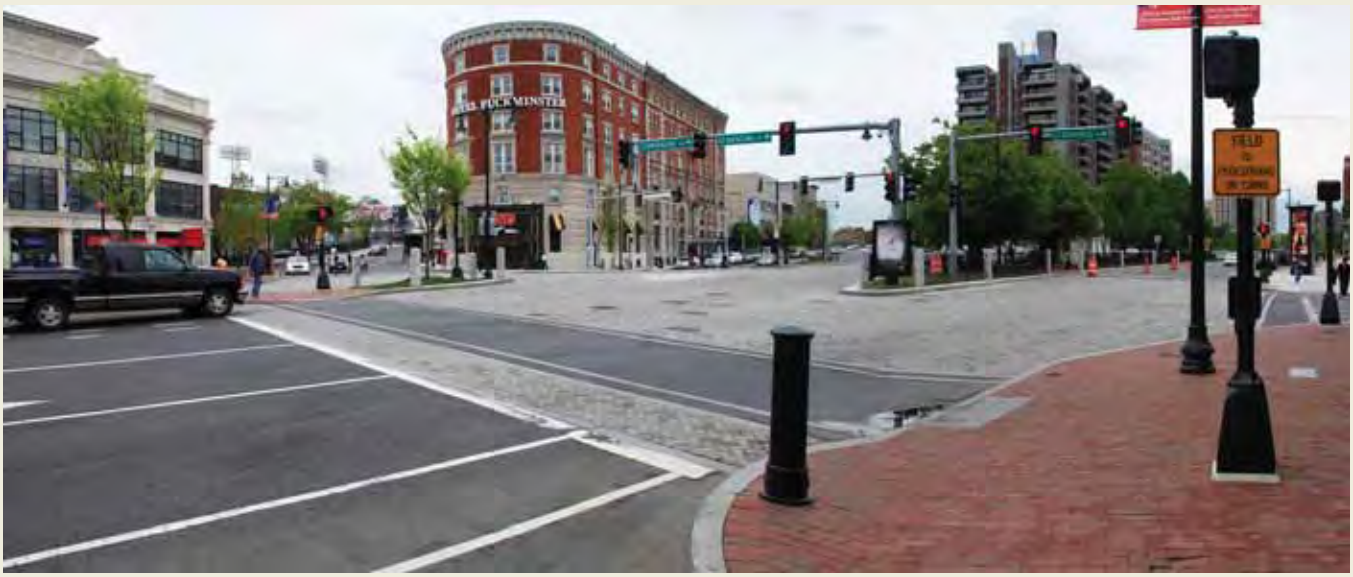
PRECEDENT IMAGES

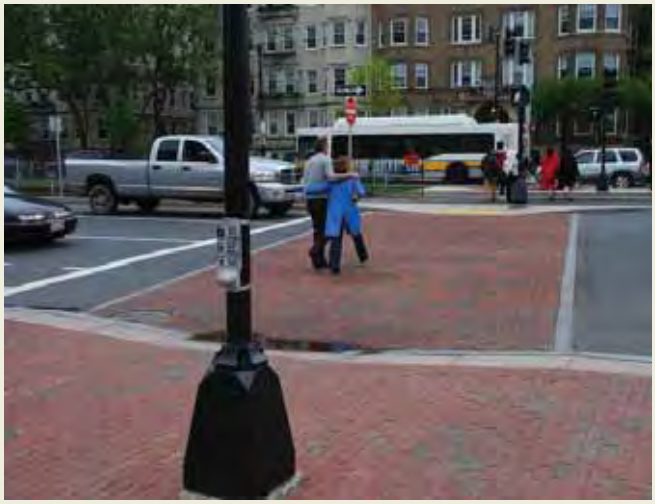
The following examples are ideas for how the station area could look, feel, and function based on the Urban Design Framework recommendations.

Sustainable Design/Raingardens

Promenades/Cafes

Pedestrian Crossings





Gateway Elements

IMPLEMENTATION PLAN

Concept to Hub Development

The following is a series of recommended steps for implementing the Mobility Hubs conceptualized for this study, beginning with details on any anticipated site-acquisition challenges associated with each proposed Hub site, as well as a phasing strategy that focuses on the strategic importance of each site. Following that, several implementation partnerships and funding opportunities to help the County realize these conceptual plans forward are identified. Finally, an outline of Next Level Mobility Hub implementation is proposed, based less on structural or site-based hubs, and more on mapping and raising awareness of existing and future modal-connection opportunities available throughout Tysons Corner.

Site Acquisition Challenges

The urban design framework plan for each of the station areas carefully integrates the public and private realms to make transitions between these areas imperceptible to the user. When passengers exit the station, the environment should be green and inviting, with easy access to bicycle, bus, and sidewalk facilities. This civic realm should extend to the entrances of the adjacent buildings or cafes.

Given the locations of existing property lines and rights-of-way, creating a well-integrated civic realm will require locating some mobility hub elements and other civic realm amenities on land owned by private landowners/developers, WMATA and VDOT. As a result, the County will need to work closely with these entities to make the vision for the station area environment a reality. A clearly documented vision for these urban station areas, and the streets that surround them, will provide an opportunity for all parties to "buy into" the idea and contribute to a unified design. The County will also need to have a clear strategy for ensuring that these immediate station areas remain publicly accessible and pedestrian-friendly.

It is likely that the rezoning process and proffers will be the best opportunity to obtain public access easements and public/private agreements on civic space construction, funding, and maintenance. The location, construction and maintenance of the following hub elements and civic realm amenities will need to be coordinated as part of public/private agreements:

- Trees and other landscaping
- Stormwater management/raingardens (as appropriate)
- Benches
- Hardscape (plaza treatments, etc.)
- Bicycle racks (in addition to those provided by WMATA)
- Bicycle lockers (in addition to those provided by WMATA)
- Space for BikeShare
- Space for Car-share (ideally this will occur on public streets, but in some cases private garage spaces may be needed)
- Space for the commuter store

- Public art/gateway features
- High quality crosswalks at street level

The County will need to coordinate with VDOT regarding:

- Bus pull-offs, especially on major roadways
- Street trees on medians and roadway edges
- High quality crosswalks and pedestrian signals at street level

The County will need to coordinate with WMATA regarding:

- Bus facility needs and funding
- Location and maintenance of bicycle racks and lockers
- Location of the Commuter Store
- Location of BikeShare facilities
- Design of stations over time and integration with the surrounding station area (public and private)
- Location and maintenance of landscaping and public art

Strategic Phasing

The phasing for implementation of the station area Mobility Hubs and Urban Framework Plans will be largely dependent on:

- Adjacent development timing
- Agreements reached during the rezoning process
- The market for BikeShare in the area
- The market for car-share in the area

However, it will still be important to prioritize certain aspects of Mobility Hub and Urban Framework Plan implementation. For example:

- Once station construction is complete and trains are arriving at the stations, we know there will be a demand for pedestrian crossings at street level. As a result, a high priority should be placed on crosswalks at key intersections. These crosswalks, which will require coordination with VDOT, could begin with a standard zebra stripe, but as soon as possible these should be upgraded to higher quality crosswalk materials that are highly visible to drivers.
- The station construction drawings show some bike racks and lockers at every station (generally 10 total per station). The use of these facilities should be carefully monitored and the County should be ready to add/upgrade the bicycle parking as soon as it is needed. In order to create the active station area environment, it will be important to sufficiently support pedestrian and bicycle needs.
- BikeShare and car-share companies will not likely invest in the Tysons stations immediately. However, preparations can be made in order to facilitate the process as soon as the demand arrives. For example, parking spaces can be reserved up front for car-share parking but used temporarily for regular short-term parking (until there is enough car-share demand). When there is not sufficient on-street parking to support future car-share, the County should work through the rezoning and proffer system to reserve spaces in private decks or parking lots close to the station.

This process should begin with a focus on those developers who control sites connected to the site acquisition challenges identified above. Establishing strategic partnerships with these developers, including the negotiation of key proffers, will be a necessary first step in moving from challenges to opportunities at each site. Beyond these core partnerships, however, several other local and regional organizations offer critical strategic and/ or funding resources for realizing the big-picture benefits of the proposed Mobility Hubs.

Funding Partners

Fairfax County Planning Commission

Tysons Funding Program

In October, 2012, the Fairfax County Board of Supervisors voted to back a 40-year funding plan that would require developers and landowners in Tysons Corner to pay for billions in transportation improvements as the county seeks to transform the area. This local funding effort includes a tax increment financing (TIF) district that will tax developers, businesses, and residential property owners, and will in part fund transportation improvements.

The funding is designed to fund the construction of parks, athletic fields and community centers, as well as a new grid of streets and major road projects. The program breaks expenses into categories and identifies who should pay for each: Public-transit projects, major roads leading to Tysons, and neighborhood access improvements such as sidewalks and bike lanes should be the public's responsibility.

In total, the plan calls for more than $1 billion to come from sources funded exclusively by developers.

http://www.fairfaxcounty.gov/tysons/implementation/trans_funding_followonmotions_fall2012.htm

VDOT

Six-Year Improvement Program (SYIP)

This program allocates funds for transportation projects proposed for construction, development or study in the six fiscal years from 2012 to 2017. The program is updated annually. Allocations are applied to projects in the SYIP based on the type of funding (special program funds, urban and secondary formula funds, statewide discretionary funds). SYIP funds come from a variety of Federal, State and local sources, including CMAQ and SAFETEA-LU.

Recently funding projects can be found at:

http://syip.virginiadot.org/Pages/allProjects.aspx

http://virginiadot.org/projects/syp-default.asp

Transportation Infrastructure Bank

Virginia Transportation Infrastructure Bank: The VTIB is a special non-reverting, revolving loan fund that is a sub-fund of the Transportation Trust Fund. Monies deposited into the VTIB are to be used for making loans and other financial assistance to localities, private entities and other eligible borrowers and grants to localities to finance transportation projects. Monies loaned from the VTIB are to be repaid, with interest, to provide loans, grants and credit assistance to additional projects. The bank is intended to alleviate, in part, a critical need for additional sources of funding to finance present and future needs of the Commonwealth of Virginia for the design and construction of roads and highways. This includes toll facilities, mass transit, freight, passenger and commuter rail, including rolling stock, port and airport and other transportation facilities.

Current approved projects have been granted loans ranging from $80 to $152 million.

http://virginiadot.org/projects/virginia_transportation_infrastructure_bank.asp

Transportation Partnership Opportunity Fund

VDOT Transportation Partnership Opportunity Fund: The TPOF is to be used by the Governor to encourage the development of transportation projects through the design-build provisions of the Code of Virginia and pursuant to the Public-Private Transportation Act of 1995. The Governor may also use the TPOF to provide monies to address the transportation aspects of economic development opportunities. The financial assistance may be used for transportation capacity development, on and off site; road, rail, mass transit or other transportation access costs

beyond the funding capability of existing programs; studies of transportation projects including but not limited to environmental analysis, geotechnical assessment, survey, design and engineering, advance right-of-way acquisition, traffic analysis, toll sensitivity studies, financial analysis, or any other transportation development activity permitted by law.

Loans from the fund are capped at $30 million and are not to exceed seven years. Grants of up to $5 million are also allowed.

http://virginiadot.org/projects/tpof.asp

Office of Transportation Public-Private Partnerships

Virginia's Office of Transportation Public-Private Partnerships: The OTP3 is responsible for developing and implementing a statewide program for project delivery via the Public-Private Transportation Act (PPTA) of 1995. The office works in conjunction with VDOT and other agencies and focuses on the development of public-private projects across all modes of transportation. Among its many objectives, the OTP3 seeks to develop multi-modal and inter-modal solutions consistent with state, regional and local transportation policies, plans and programs.

The Metro Rail extension to Dulles is already a PPTA project, and the air rights to develop the area around the future stations is a PPTA candidate project.

http://www.vappta.org/default.asp

FHA

Transportation Infrastructure Finance and Innovation Act

The TIFIA program guide, application form and related materials are currently under review and being revised to reflect MAP-21 changes. This program provides credit assistance for qualified projects of regional and national significance. Eligible applicants include state and local governments, transit agencies, railroad companies, special authorities, special districts, and private entities. The TIFIA credit program is designed to fill market gaps and leverage substantial private co-investment by providing supplemental and subordinate capital. Each dollar of Federal funds can provide up to $10 in TIFIA credit assistance and support up to $30 in transportation infrastructure investment.

Unlike private commercial loans with variable rate debt, TIFIA interest rates are fixed. Any project that is eligible for Federal assistance through existing surface transportation programs (highway projects and transit capital projects) are eligible for the TIFIA credit program. An eligible project must be included in the applicable State Transportation Improvement Program. Major requirements include a capital cost of at least $50 million, or 33.3 percent of a state's annual apportionment of Federal-aid funds, whichever is less. TIFIA credit assistance is limited to a maximum of 33 percent of the total eligible project costs. The project also must be supported in whole or in part from user charges or other non-Federal dedicated funding sources and be included in the state's transportation plan.

http://www.fhwa.dot.gov/ipd/tifia/defined/

FTA

New Starts

The New Starts program provides funds for construction of new fixed guideway systems or extensions to existing fixed guideway systems. Eligible applicants under the New Starts program are public bodies and agencies (transit authorities and other state and local public bodies and agencies thereof) including states, municipalities, other political subdivisions of states; public agencies and instrumentalities of one or more states; and certain public corporations, boards, and commissions established under state law. Historically, the program has been fully earmarked. However, if un-allocated

or discretionary funds are available, those funds may be allocated at the discretion of the Secretary of Transportation.

http://www.fta.dot.gov/grants/13094_3559.html

http://www.vappta.org/resources/Air%20Rights%20High%20Level%20Screening.pdf

Capital & Preventive Maintenance Program

The Urbanized Area Formula Funding program makes Federal resources available to urbanized areas and to Governors for transit capital and operating assistance in urbanized areas and for transportation related planning. Eligible activities include, but are not limited to planning, engineering design and evaluation of transit projects; capital investments in bus and bus-related activities ;passenger facilities; and capital investments in new and existing fixed guideway systems. Funding is apportioned on the basis of legislative formulas. For areas of 50,000 to 199,999 in population, the formula is based on population and population density. For areas with populations of 200,000 and more, the formula is based on a combination of bus revenue vehicle miles, bus passenger miles, fixed guideway revenue vehicle miles, and fixed guideway route miles as well as population and population density. The Federal share is not to exceed 80 percent of the net project cost.

http://www.fta.dot.gov/grants/13093_3561.html

HUD

Community Development Block Grant Entitlement Communities Grants

The program provides annual grants on a formula basis to entitled cities and counties to develop viable urban communities by providing decent housing and a suitable living environment, and by expanding economic opportunities, principally for low- and moderate-income persons. HUD awards grants to entitlement community grantees to carry out a wide range of community development activities directed toward revitalizing neighborhoods, economic development, and providing improved community facilities and services. Entitlement communities develop their own programs and funding priorities.

CDBG funds may be used for activities which include, but are not limited to:

- acquisition of real property;
- relocation and demolition;
- rehabilitation of residential and non-residential structures;
- construction of public facilities and improvements, such as water and sewer facilities, streets, neighborhood centers, and the conversion of school buildings for eligible purposes;
- public services, within certain limits;
- activities relating to energy conservation and renewable energy resources; and
- provision of assistance to profit-motivated businesses to carry out economic development and job creation/retention activities.

http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/communitydevelopment/programs/entitlement

Strategic Partners

WMATA

A critical strategic partner in the development of the Mobility Hubs, particularly for strategic Hub-integration with final Metrorail station design and construction.

Capital Bikeshare

Early engagement with the planning staff for the region's primary bike-share program will be critical to ensure that Hub deployment and supportive planning efforts respond to opportuni-

ties to accelerate the expansion of this program into Tysons Corner.

Tysons Transportation Association

TYTRAN is a transportation management association (TMA) that has been in operation in the Tysons Corner area since 1981. TYTRANS provides a forum for area employers, landowners, residents, County and State Transportation Department staff, and elected officials to address transportation issues and concerns. TMAs can be a great resource for promoting non-driving mobility options among local commuters and businesses. TYTRAN may be a critical partner in promoting the new mobility options available in Tysons Corner, including providing educational resources to help commuters and other travelers asses their modal and connectivity options.

Tysons Partnership

The Tysons Partnership was created on January 25, 2011 after the Fairfax County Board of Supervisors directed County staff to create a stakeholder partnership organization to guide redevelopment activity in Tysons. Tysons Partnership is a non-profit association of individuals and organizations working together with County staff to identify, discuss, and resolve redevelopment issues. Specific areas addressed by the Partnership have included marketing and branding; transportation; urban design/planning; public facilities and community amenities; finance; and, sustainability initiatives.

Major Employers and Building Tenants

Major tenants of future Tysons Corner developments, including employers, retailers, and condominium associations will provide critical opportunities and target markets for promoting an expanding array of non-driving mobility options in the new Tysons Corner.

Next Steps: Revealing the Grid

Once most of the redevelopment is in place in Tysons Corner, and Metrorail service and the County's Mobility Hubs are up and running, it will be important to ensure that all the "dots" are connected between these primary mobility assets. The following presents an overview of a process recommended to reveal the full range and connectivity of existing mobility assets across the area and to point the way to next steps that will enhance the system, serving the needs of the user door to door.

While promoting the emergence of new, major assets like Metrorail and Mobility Hub services, this process will also identify and underscore the benefits of often-overlooked resources that are already in place. Just as importantly, it is one of the most effective ways to quickly identify network gaps and spur both immediate- and longer-term innovation and enhancement

Below is an overview of the the most critical step in this process — mapping existing connectivity assets — and its benefits.

The New Mobility Grid - Mapping a Connectivity Landscape

This process begins with convening 8 to 15 selected representatives from relevant government and non-government organizations, private sector, and research partners to collaboratively identify and map existing transportation systems, services, corridors, portals, and amenities. Once these systems are mapped, all points where two or more systems connect (bus service adjacent to a parking lot, for example) are marked. These two steps alone frequently reveal a multi-modal, multi-service grid that even the transportation professionals and operators at the mapping table didn't know existed. It will also highlight, fairly quickly, any remaining gaps in services, amenities, locations and populations served.

This map is then used as the focus for one or more collaborative working sessions to identify a set of next steps for implementing and marketing door-to-door sustainable transportation. For Fairfax County, this process will help connect and complement the new Mobility Hubs, and continue to expand door-to-door mobility and accessibility options across Tysons Corner. By design, this process brings diverse participant groups (city leaders, businesses, politicians, entrepreneurs, developers, transportation practitioners, NGOs and academics) to the table together, often for the first time. One of the primary benefits of this process is, therefore, the development of a "Link Tank" charged with ongoing collaboration in moving mobility improvements work forward.

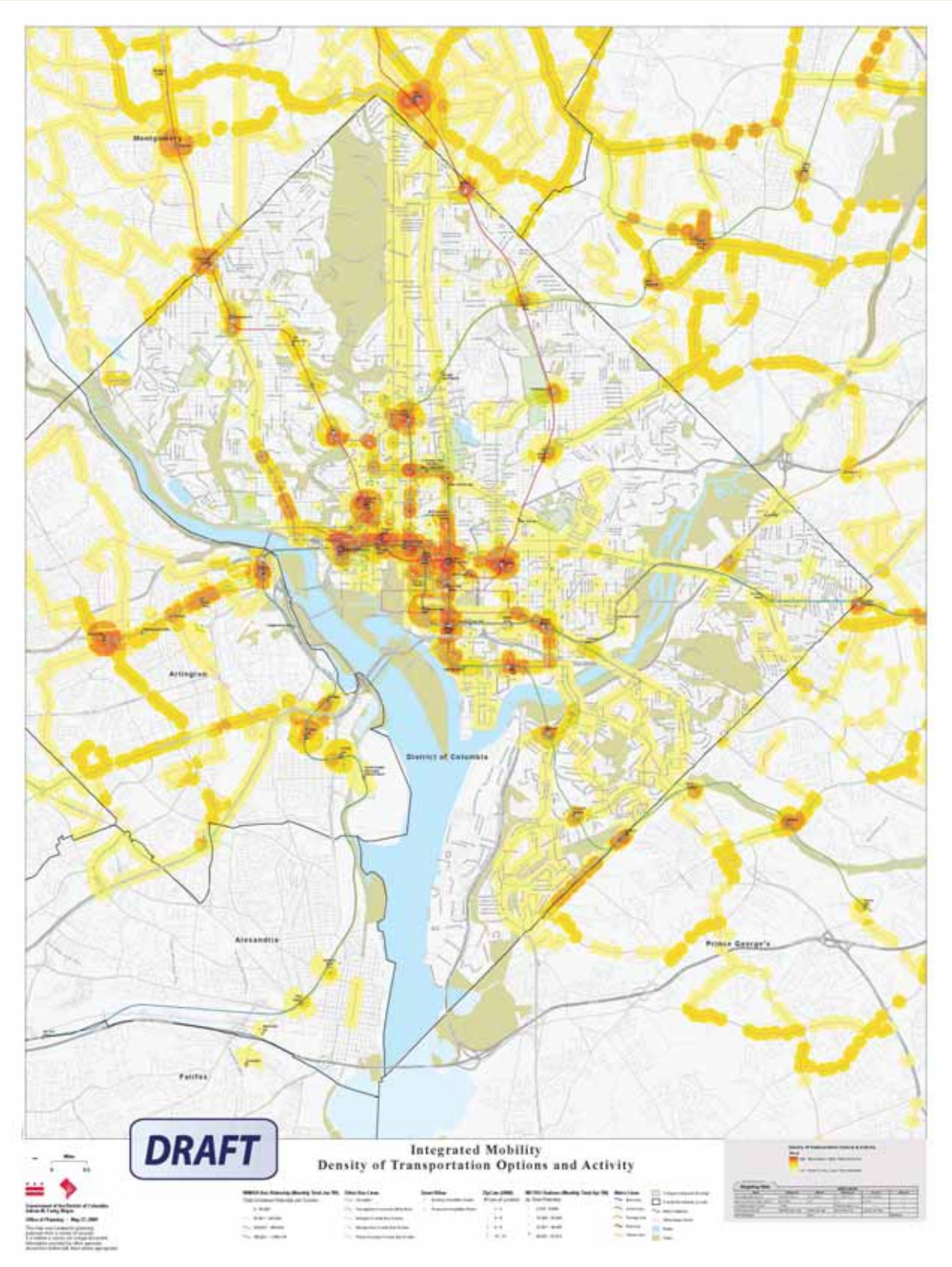
Often the process shifts paradigms altogether. Participants immersed in a single-mode level of operations (local bus operator, for example) become part of a multi-mode, multi-service, accessibility-focused network. It has also sparked new ideas for businesses and innovations to fill connectivity and infrastructure gaps. Meeting notes, materials, and web supports keep the progress and dialogue of the meetings going — helping the Link Tank stay linked.

An immediate, concrete outcome of the process, of course, is a comprehensive mobility/connectivity map that can be a useful tool for users and can help inform policy-makers and stakeholders promoting the full range of transportation options across Tysons Corner. For example, few users or operators or even planners are aware of the full grid of existing transporta-

tion options door to door. Access to such a map, in print or on line offers a cost-effective, highly-transformative platform for innovative multi-modal transportation planning and investments. It also provides a base upon which a wide range of possible web- and mobile-phone-based applications can be developed to provide real-time linked-travel support

An example of a “heat” map generated through this process is the Integrated Mobility maps created for the District of Columbia Office of Planning - see opposite page.

IMPLEMENTATION PLAN



APPENDICES

Task Memos and Supplementary Material

Presented on the following pages are the final drafts Technical Memoranda summarizing key project task findings, including:

- Mobility Hub concept overview and best practices
- Recommended Hub elements
- Recommended Hub siting and preliminary Hub configurations

An overview of Capital BikeShare's expansion approach is also provided as an additional appendix.

APPENDIX A
TECHNICAL MEMO: CONCEPT OVERVIEW AND BEST PRACTICES

NELSON
NYGAARD

MEMORANDUM

To: Kris Morely-Nikfar, Fairfax County Department of Transportation

From: Tom Brown

Date: January 11, 2012

Subject: Task Memo: Concept Overview and Best Practices

MOBILITY HUBS: OVERVIEW AND BEST PRACTICES

> *"Mobility hubs are about making it easier to move from one mode of transportation to another, anchoring seamless, convenient connections across the region... mobility hubs need to be located close to many people, whether they are at work, at home, or at play."*
> — Rob MacIsaac, Chair, Metrolinx (Toronto's regional transportation planning agency)[1]

The Mobility Hub concept focuses on marking and enhancing points of intersection between various mobility options as a cost-effective strategy to reduce dependence upon personal autos. By marking these intersections, and providing information on how to access each option, travelers can quickly assess the most efficient route and set of modes and services to reach their destination. By combining signage, wayfinding tools, fare information and real-time travel information at on-street kiosks and on personal mobile devices (cell phones, tablets), travelers can plan their trips in a convenient and cost-effective manner. When combined with rapid transit service, Mobility Hubs can provide a powerful resource for addressing "first-mile/ last-mile" barriers to transit use.

This approach focuses on the entire transportation network, connecting seemingly disparate systems such as surface transit, subway, bike-share, car-share, taxis, and walking, and integrating them into one cohesive system. Through the electronic kiosk or mobile device, detailed transportation information can be accessed in one convenient location, providing the user with the ability to make care-share reservations, access bike-share, or know how long it will take and how much it will cost by mode.

Mobility Hubs first emerged as a significant new mobility strategy in Bremen, Germany in 2003, when the City developed "mobility points" to connect transit, cycling, car-sharing and taxis at single, marked locations. Electronic kiosks at these transfer hubs were installed to provide information to travelers on accessing and using these services to complete or begin their trip. The following provides a more detailed look at the Bremen model, as well as other leading examples of

[1] "Message from the Metrolinx Chair", page 1.

implementing this strategy as a first step toward identifying recommended services and amenities for future Mobility Hubs in Tysons Corner.

IMPLEMENTATION BEST PRACTICES

Bremen's Mobile Points

> *" (Mobility hubs) provide citizens with a supplement to public transport and the bicycle: the car on call. This type of integrated traveler service is an important element of our entire mobility strategy."*
>
> Michael Glotz-Richter, City of Bremen[2]

Since 1998, the City of Bremen, Germany has offered an integrated fare-card that provides access to all area transit services as well as the City's car-share program. Since then, the City has continued to develop this strategy, seeking to integrate the full range of mobility services available within the city to streamline connections between them as a way of reducing reliance up on private autos. Central to this strategy today is the distribution of neighborhood mobility hubs across the city — highly visible modal transfer points featuring kiosks and a pillar carrying the brand name "mobil.punkt" (mobile point).

The project was launched in 2003, beginning in two downtown neighborhoods. These hubs typically combine a transit stop with access to car-sharing, taxis, and bicycle facilities. The hubs are built by the City's parking authority, which then leases on-street parking spaces to Cambio, the City's car-share provider.[3]

Early hubs were also equipped with electronic wayfinding, journey planning, and ticketing kiosks that provided real-time information including mode-specific trip-time estimates. This hub component, however, has been phased out in more recent hubs, due to low utilization rates and the increasingly common access to such information via smartphones.

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[2] http://www.ecomobility.org/ (http://tinyurl.com/75n6a6v)
[3] "New Mobility HUB Network Feasibility Report", Beth Jones, 2006. Page 7.

Figure 1 Mobil.Punkt Mobility Hub

Image Source: Free Hanseatic City of Bremen

Figure 2 Customers Using Dynamic Information Kiosk

Image Source: www.carsharing.de

The success of Bremen's hub strategy has helped establish some impressive mode share measures for the city. Among the roughly 550,000 central city residents in 2008, 14% commute via public transport, 20% via walking, and 25% via cycling. These modes are favored not merely for their ecosystem impact, but also because in many areas of the city, thanks to the mobility hubs, they are the best way to get around.[4]

Today, mobil.punkt includes 43 car-sharing stations, offering 130 cars for 5,500 members. All cars are parked on public streets, increasing their ease of access. This aspect of Bremen's mobility hub implementation has been credited with reducing vehicle ownership in the city by roughly 1,000 vehicles.[5] This is a critical measure for the City, as the decision to lease public street spaces to a private company was largely driven by the promise that car-sharing would relieve pressure on the City's constrained on-street parking spaces.

Beyond the Hubs

To complement the city's mobility hubs, enhancements to transit, pedestrian, and bike networks were made to help make each mode more viable and attractive, and to further help the hubs create a seamless modal-transfer user experience.[6]

- Transit:
  - Accurate, real-time information on waiting times for trams and buses is updated at each stop.
  - Trams receive "signal-priority" at signalized intersections, as sensors trip signal timers to give trams the right-of-way as they approach.
- Bicycle:
  - All streets accommodate two-way bicycle traffic, even when car traffic is reduced to a single direction.
  - The city's main train station contains a full service bike station with options for rental, supplies and repairs, secure storage, and even bike washing.
  - Reduced car ownership as a result of car-sharing has led to parking space on public streets being reclaimed has meant more space for cyclists throughout the city.
- Pedestrian:
  - Reduced car ownership as a result of car-sharing has led to parking space on public streets being reclaimed for pedestrians throughout the city.

[4] http://www.um-smart.org/resources/enews/070317.php
[5] http://www.mobilpunkt.info/start_englisch.html
[6] "Mobility Hubs - Development of A Regional Transportation Plan for the Greater Toronto and Hamilton Area", Metrolinx, 2011. Page 16.

Toronto's New Mobility Hubs

> "A liveable, competitive, and environmentally sustainable urban region requires fast, frequent and well-connected means of movement."
>
> "Mobility Hub Guidelines for the Greater Toronto and Hamilton Area", Metrolinx, 2011

In Toronto, the rollout of Mobility Hubs is still largely in the planning stage. However, they are investing in this stage at unprecedented levels. Currently spearheaded by the region's transportation planning agency, Metrolinx, these intermodal stations are planned for widespread implementation across the Toronto-Hamilton region.

Metrolinx has defined their mobility hubs as:

> "places of connectivity where different modes of transportation – from walking to rapid transit – come together seamlessly and where there is an intensive concentration of working, living, shopping and/or playing."
>
> Metrolinx, 2011

The hubs are targeted for areas containing high residential and employment potential within walking distance of major transit stations, and are being planned as places of:

- Connectivity, where different modes of transportation come together seamlessly;
- Attractive, intensive, mixed-use development around a transit station;
- Attractive streetscapes and open space;
- Active transportation, high levels of pedestrian and bicycle mobility and accessibility;
- Easily accessible information on local and regional mobility;
- Safe, convenient, and attractive public space.

Typical services being planned by Metrolinx include:

- Short and long term bicycle storage
- Bike-share access (https://toronto.bixi.com/)
- Car-share access (AutoShare and ZipCar)
- A taxi hotline
- A wireless hotspot
- Bicycle and transit route maps

One important and unique level of planning detail that is provided by the evolving Toronto model is the distinction of mobility hub zones within the planned hub area; zones within which different levels and types of modal connections are anticipated, and zones that will therefore offered appropriately distinct levels and types of mobility accommodations.

Mobility Hub Zones

Metrolinx has also identified three distinct Mobility Hub" zones" within the overall hub — primary, secondary, and tertiary — as well as a "catchment area" surrounding the hub.[7] Modal connection opportunities and constraints will be planned to transition as the potential connection

[7] "Mobility Hub Guidelines for the Greater Toronto and Hamilton Area", Metrolinx, 2011. Page 16.

point moves farther from the transit station. In the immediate area, supporting direct and safe walking connections is an obvious top priority. Further away, supporting connections made by transit, bicycles, and autos become more important.

Metrolinx elaborates on distinctions between the three primary zones, as follows:

- The Primary Zone - The area with greatest potential for improved connections between the various modes of transportation. The highest intensity and greatest mix of uses are encouraged within this area.
- The Secondary Zone - Emphasis on improved transit connectivity and streetscapes, as well as encouraging sidewalk-oriented, active, ground-floor land uses.
- The Tertiary Zone - the transition zone from the Mobility Hub to the broader context area, these primarily stable residential neighborhoods will be subject to little change.

Figure 3 - Default Hub Zones

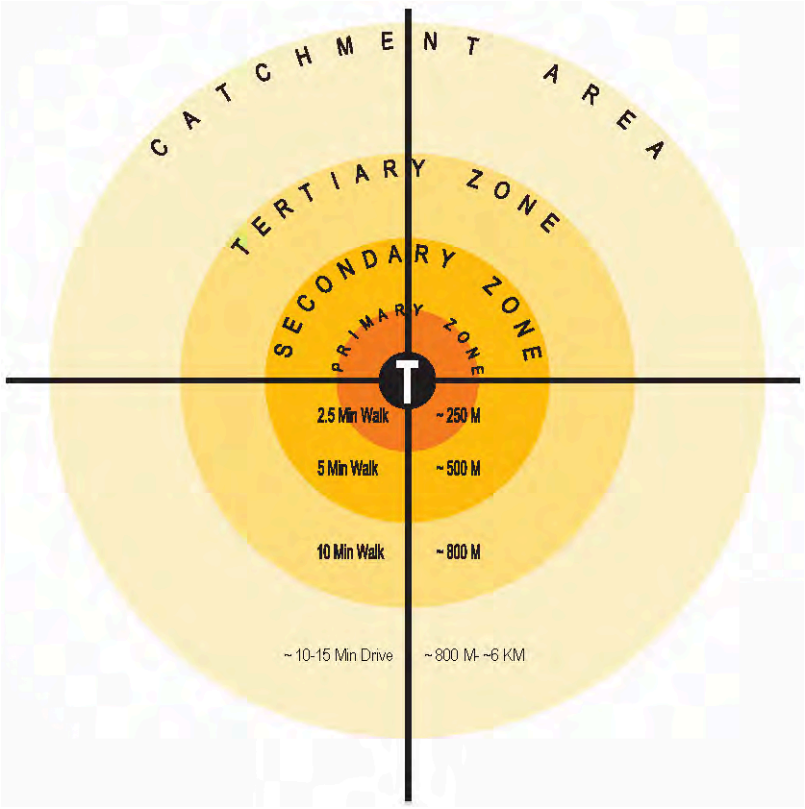

Image: Metrolinx

For each hub, a key first step will be establishing the hub area and zones. This will largely be done qualitatively, based on an understanding of existing local land use characteristics, and a general assessment of 5- and 10-minute walking distances from the transit station. An example, as developed for an early hub pilot, the Dundas West-Bloor Mobility Hub, is presented below.

Figure 4 - Hub Zones as Implemented for and Early Pilot Hub

Image: Metrolinx

Although planning for each hub and its respective zones will be highly context-sensitive and dependent upon the location and nature of local land uses and transit services, Metrolinx has identified basic characteristics and planning approaches for each, as summarized below.

Figure 5 Hub Zone Characteristics

Hub Zone	Mobility Context	Land Use Context
Primary Zone		
Includes Metrorail station and associated facilities as well as immediately surrounding area.	Highest levels of pedestrian and transfer activity of any Hub zone. Parking should be minimized or eliminated here. Seemless bus connections can extend the reach of transit commutes.	Highest densities and varieties of land uses. Vibrant activity node for local community. Provision of land uses such as daycare and banking can expand the impact of transit on trip volumes.
Secondary Zone		
Extends from Primary Zone to about a third of a mile, or about a 5-minute walk.	Non-motorized connections between the station and destinations in this zone should be prioritized.	This the hub's primary TOD-opportunity zone. Dense, diverse land uses should be promoted here, with buildings oriented toward sidewalks and transit-connections, rather than arterial roads and parking.
Tertiary Zone		
Extends from the Secondary Zone out to about a half-mile, or about a 10-minute walk.	Walking and cycling are still a top mobility priority, although cycling and local transit services will begin to serve a larger role for station access.	Density and height of development will taper off toward the edge of this zone, as distance to transit begins to reduce TOD viability.
Catchment Area		
The broader area of influence outside of the hub. The size of this area will vary based on the type and quality of transit service and the location and nature of the transit stop within the regional transit system (terminal station vs. midline station vs. central city station).	Most transit riders will connect via bicycle, transit, or auto.	Metrorail station will have a more limited influence on land use in this area.

Performance Measures

Metrolinx has also identified a series of Mobility Hub performance measures — targeted transit mode shares for trips originating within the hub — based on the level of transit service and development density at each hub. These are summarized in the Metrolinx-created table below.

TABLE ii.3 Suggested Land Use Densities by Transit Technology and Transit Mode Share for Mobility Hubs.

PREDOMINANT TRANSIT MODE SERVING MOBILITY HUB (SEE NOTE)	TRANSIT SUPPORTIVE DENSITIES (RESIDENTS AND JOBS COMBINED PER HECTARE, WITHIN MOBILITY HUB)	SUGGESTED TRANSIT MODE SHARE (TRIPS ORIGINATING WITHIN MOBILITY HUB)
Subway	250+	40%
• Subways, as a transit mode, have the ability to carry the greatest number of customers. Land use targets should reflect the ridership levels needed to justify investment in subway infrastructure. • It should be noted that traditionally, land use densities along some subway lines and stations in the City of Toronto have been moderated by high volumes of feeder transit that provide a significant proportion of ridership.		
Express Rail	150-300	30-60%
• Express rail is the enhancement of regional rail services to provide high-speed, frequent and reliable long-distance travel across the region. Mobility hubs served by express rail should have land use targets that reflect the high regional level of service provided by express rail.		
Light Rail Transit (LRT)	200-400	30-50%
• Flexibility in implementation of LRT results in a greater range of applicable contexts, resulting density, and mode split targets. Targets for transit supportive densities should reflect the ultimate configuration of LRT lines. • Higher targets should be set in LRT corridors with exclusive right-of-way, such as tunnels, elevated structures, or with complete signal protection, reflecting the higher passenger capacity of these lines.		
Bus Rapid Transit (BRT)	100-250	20-35%
• Initial implementation of BRT systems can sometimes consist of buses running in mixed-traffic with transit priority at intersections and improved customer amenities. • Higher densities should be targeted for mobility hubs on BRT corridors with service on dedicated right-of-ways.		
Regional Rail	50-200	10-25%
• Expansion, as envisioned in The Big Move, includes improving service from peak-direction and period rail service to all-day, two-way service. Land use density and mode share targets should reflect the existing and planned service levels for regional rail corridors. • In most cases, regional rail attracts the majority of its riders from a large catchment area beyond the mobility hub. As a result, ridership is less sensitive to the densities within the hub.		
Bus/Streetcar	50-150	10-25%
• Bus/streetcar service is most appropriate as an access/feeder mode to higher-tier rapid transit service in mobility hubs.		

NOTES
- The transit supportive densities and suggested mode shares presented above are intended to serve as a guide and are based upon existing research on the connection between transit, land use, and mode shares. These may vary dependent on the modes of rapid transit and quality of feeder transit, land use mix and built form characteristics, and the quality of the pedestrian and cycling environment. In mobility hubs where Growth Plan targets also apply, the latter shall prevail.
- The predominant transit mode refers to the highest-order transit mode serving the mobility hub. In most cases, other rapid transit modes will be present at a mobility hub. While density targets do not compound with multiple rapid transit modes, it should be recognized that with multiple transit modes, a higher density target could be considered.
- Density ranges provided here are for guidance only. The upper portion of these ranges should not be considered as a limit.

Sources:
1. Toronto Transit Commission. Toronto Transit Commission, Rapid Transit Expansion Study, 2001
2. City of Toronto. Toronto Plan: Development and Rapid Transit Stations, March 2002.
3. Ministry of Transportation and Ministry of Municipal Affairs and Housing. Transit Supportive Land Use Guidelines, 1992.
4. Bernidge et al. Study of the Reurbanisation of Metropolitan Toronto. 1991.

Table: Metrolinx

Implementation guidelines

Metrolinx has also developed an extensive set of guidelines for implementing its Mobility Hub plans, as summarized below.

Create Seamless Transfers

"One of the essential functions of mobility hubs will be to foster seamless integration between transit modes, systems, and routes, while accommodating efficient connections to all modes of access to and from the station."[8]

- Create clear, direct, and short transfers between transit modes and routes, including accessible conventional and specialized transit.
- Coordinate local feeder transit service schedules and routes to provide seamless connectivity between local, regional, and rapid transit services.
- Create safe and direct pedestrian and cycling routes to rapid transit stations from major destinations and regional cycling and pedestrian networks.
- Provide secure and plentiful bicycle parking at station entrances with additional cycling amenities at high volume locations.
- Adopt transit priority measures to ensure the efficient movement of surface transit to and from the station.
- Provide clearly marked and protected access for pedestrians and cyclists at station areas to minimize conflicts, particularly at passenger pick-up and dropoffs, bus facilities, and parking access points.

Set Transportation Performance Targets

"Planning, design and implementation of mobility hubs will build upon the traveler transportation hierarchy... to promote a shift in mobility behaviour and support a balanced transportation system."[9]

- Define mode share targets and other transportation performance measures to inform the development of land use and transportation planning and policy in mobility hubs.
- Develop Transportation Demand Management (TDM) plans for mobility hubs and integrate development-specific travel plans into the planning approvals process.

Provide Complete Streets

"Complete streets should be implemented throughout the mobility hub, in the primary, secondary and tertiary zones."[10]

- Build or retrofit a network of complete streets to create a balance between the movement of pedestrians, cyclists, transit, and vehicles. Adopt road design standards that ensure safe movement of all road users.
- Provide an attractive pedestrian environment with a high level of priority, safety and amenities.
- Create cycling-supportive streets and communities.
- Adopt goods movement strategies within mobility hubs that support complete streets, while ensuring the efficient delivery of goods and services.

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[8] Page 31.

[9] Page 41.

[10] Page 50.

Manage Parking Strategically

" A progressive approach to parking management and reduction will encourage sustainable mobility and create opportunities to build compact, people-oriented communities."[11]

- Assess commuter parking needs on a corridor or system basis and locate and design parking to maximize development and ridership potential at transit stations.
- Limit commuter parking expansion by prioritizing feeder transit services to mobility hub stations.
- Implement commuter parking pricing with incentives for carpooling and alternative fuel vehicles.
- Develop a short and long term area-wide parking strategy with maximum and minimum parking standards and shared-use parking practices.
- Implement parking pricing strategies as part of an overall transportation demand management program.
- Minimize surface parking
- Design parking facilities to minimize negative impacts on walking, cycling, and transit mobility.

Emphasize Quality Placemaking and Urban Design

"(T)he combination of basic employment opportunities and a mix of housing typologies supported with major retail, civic, cultural, entertainment, and community facilities... encourages more efficient travel behaviour, reduces the need for travel, (and) increases accessibility."[12]

"A safe, interesting, and engaging public realm encourages walking or cycling and makes the transit system more attractive to potential users. Providing visual interest at the pedestrian scale through thoughtful landscaping and building design will encourage people to use the public realm and help contribute to an active street life."[13]

- Seek a diverse mix of uses, including a desirable jobs-housing balance, at transit-supportive densities.
- Develop a strong sense of place around hubs and transit stations to encourage pedestrian activity. "A safe, interesting, and engaging public realm encourages walking or cycling and makes the transit system more attractive to potential users. Providing visual interest at the pedestrian scale through thoughtful landscaping and building design will encourage people to use the public realm and help contribute to an active street life."

Promote General Sustainability

"Mobility hubs should be planned to become examples of well integrated land use and transportation policies with environmentally sustainable design."[14]

- Prioritize and implement innovative sustainable energy, water, landscape and waste-management practices.

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[11] Page 73.

[12] Page 89.

[13] Page 99.

[14] Page 109.

Use Flexible Planning to Accommodate Growth and Change

"(D)etailed phasing strategies are required to plan how infrastructure improvements and development will occur over time in a coordinated manner."[15]

- Develop detailed phasing strategies connected with infrastructure improvements.
- Develop performance measures to evaluate and monitor implementation progress connected to the phasing strategy.

Develop Strategic Partnerships and Incentives for Public-Private Investment

"Provide the development industry with some direction on the key features and type of development that stakeholders are looking for around mobility hubs."[16]

- Encourage development by providing developer incentives such as height and density exchange, flexible zoning and through mechanisms like bonds, debentures, and Tax Increment Financing (TIF).
- Plan public investment and infrastructure to create and/or enhance development potential.
- Engage in joint development and other public-private partnership models to capture the land value uplift from transit infrastructure investments.
- Establish a development checklist as a tool for new projects within mobility hubs.
- Consider design competitions for public facilities.
- Incorporate design review panels into the municipal development approval process.

[15] Page 117.

[16] Page 135.

Chicago's Cycle Center

Image: Flickr User, Steven Vance

The current McDonald's Cycle Center (Cycle Center) opened as Millennium Park Bicycle Station in July, 2004 and is located in the northeast corner of Chicago's Millennium Park, a new downtown park and outdoor performance venue built within historic Grant Park. The Cycle Center is located 500 feet from the newly renovated Metra Millennium Station commuter rail facility and the McCormick Place Busway, which is served by 17 Chicago Transit Authority bus lines. The Cycle Center offers free, secure, sheltered parking for up to 300 bikes.

It also offers a wide variety of services on a membership basis, including showers and lockers, a shared-bike program, discounts on bicycle repairs and retail items and $25 off an I-GO (car-sharing) membership. The monthly membership rate is $30, while the annual membership rate is $169. The Cycle Center also provides free special-event valet bicycle service for events such as the Chicago Marathon. The bike station also provides space for the Chicago Police Department Bike Patrol Group.

Figure 6 - Indoor Bike Parking at the Cycle Center

Image: Flickr User, Chris Brunn

The bicycle station is located within the Millennium Parking Garage. Features and available services at the station include:

- Secure heated bicycle parking for 300 bikes
- Free bicycle valet parking for outdoor performances at Millennium Park
- Lockers, showers and towel service (members)
- Bicycle rentals
- Bicycle repair
- Guided bicycle tours
- I-GO car sharing (5 cars located within ¼ mile)
- Coffee bar
- Internet access
- Transit and tourist information
- Proximity to transit, commuter rail, and busway terminals
- 120 solar panels that provide 6.5% of the electricity needed to run the facility.

Bikestations

Bikestation (http://www.bikestation.org) is a private company that develops bike-transit centers and services near public transportation hubs. Local operators are responsible for running each facility, while parent organizations coordinate information and support. All Bikestations offer dues-paying members 24-hour access to secure indoor bicycle parking. The specific services offered at each Bikestation varies, but standard features include:

- Secure indoor bicycle parking (either valet style or self-serve lockers);
- Bicycle rentals;
- Access to public transportation;
- Convenient operating hours;
- On-site staff ; and
- Trip Planning information.

Bikestation Long Beach, CA (with bus stop and light rail line out front)

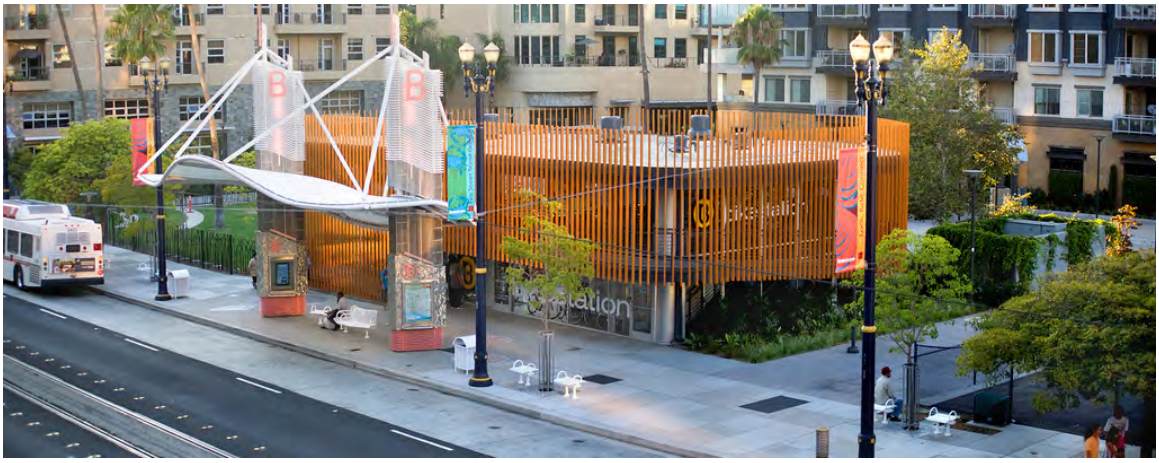

Image: Streetsblog Los Angeles

Bikestation Long Beach opened in 1996 as the first bike-transit center in the US. The City-owned facility is strategically located on the City's transit-only mall on First Street, one block from the last stop on the Blue Line of the City's light rail service. The First Street mall is also a nexus for numerous City buses and a local neighborhood shuttle. From this station, transit riders can access more than 30 miles of dedicated, shoreline and riverside bicycle paths, as well as Class II paths (routes accommodating both bicycles and cars) that connect to other parts of the city.

Bikestation Long Beach services include:

- For the Public:
  - Free bike parking during business hours, for a total of 71 hrs/week
  - Bicycle repairs
  - Retail sales
- For Members Only:
  - 24 hour bike parking
  - Showers

– Changing room and day-use lockers for rent

Bikestation Washington, DC

Image: Institute for Transportation and Development Policy

Bikestation DC is located adjacent to Union Station with access to Amtrak, Marc, Virginia Railway Express, and Metrorail services, as well as numerous Metrobus lines. Bikestation Washington DC is a members-only facility offering the following services:

- Parking for 100 bicycles
- Staffed by Bike and Roll DC 66 hrs/week
- Changing room and day-use lockers for rent
- Repairs and retail sales

From Hubs to Networks and Grids

The Mobility Hub concept continues to evolve, adapting to highly variable sets of constraints and opportunities found around the world, transitioning from simply "a smart way to integrate modes and services" at a small set of connection points, to creating a seamless network of corridors (large and small) and connectivity points (large and small) and spaces (large and small) that are supported by physical, institutional, and information technology infrastructure and service. This collaborative evolution has generated very immediate, practical, optimized, and cost-effective results. It has also, in many cases, provided an effective platform for public-private innovation – a necessary consideration in financially constrained times and in largely built-out areas.

Building upon the hub models developed in Bremen and Toronto, the University of Michigan SMART program has been working with partners across the world to accelerate the piloting of integrated sustainable-transportation systems ("New Mobility Hub Networks" or the "New Mobility Grid") and related innovation, technology, and promotion. What has emerged is a 4-step approach to revealing and enhancing the existing grid within communities as small as Mystic, Connecticut and regions as large as Washington, D.C.. This process uses simple mapping techniques to identify what's already there, so this can be built upon these resources before or instead of investing in new ones.

The seemingly simple exercise of mapping an existing grid or network of parking lots, transit stations, car-share stations, etc. has yield significant lessons.

- In most communities, some sort or grid, however thin, already exists, and there is often more to build on than has been anticipated. For example, in Washington, D.C., planners did not realize how many of their bus stops already connected directly with Zipcar stations.
- A grid of different sized connection points can provide greater robustness than simply one or two centrally-located hubs, especially if people know where they are and how to access the connecting services. For example, in Mexico City, mega-hub developments are moving toward filling in the gaps within a more robust grid.
- Low-cost initial interventions (distributing a connected transportation map to users, providing a simple website, putting up signage at connection points, adding mobile phone apps, moving a car-share station or taxi stand across the road, etc.) can yield fast and significant results. For example, in Cape Town, South Africa, a group of entrepreneurs took three weeks to create a website linking all the transportation services and information in one place so people would not have to visit five websites to plan their door-to-door trip.
- Hubs can be grand (like big, beautifully-designed station redevelopments) or minimal, in terms of both cost and infrastructure. For example, using a bus shelter and/ or secure bike parking at a suburban parking lot to link vanpools and shuttles to the wider transportation system.
- A network approach can begin to address "tough nuts" like linking suburbs and exurbs into the whole system, by focusing on connecting minimal infrastructure, services and supportive technologies out to the regions. For example, Washtenaw County (Ann Arbor region) is working to link bus service and vanpool programs among its 28 communities.
- In some cases, the small, quick changes can inspire broader, coordinated policy and land use change. For example, in Cochin, India, where policy change is even more difficult

than in the U.S., breaking ground on hub network development attracted policy makers to become involved and develop new policy frameworks.

- The grid approach can inspire innovations to which communities were previously not receptive. For example, in Chennai India, they have chosen to pilot an upscale IT corridor to send the message that sustainable transport is suitable for the higher strata of society. They have connected trains, taxis, auto rickshaws, vanpools, and bicycles. The most surprising thing is that this has led to the installation of a bike lane in a corridor where the simple notion of lanes itself is foreign.
- A great deal of connective-/ complementary-services implementation often comes from "third parties". Examples include bike-share organizations and car-share companies, smartphone apps that give real-time travel information, hub space provided by private developers (grocery store parking lots), and employers' commuter benefits programs.

These are just a few examples of how the very real process of implementing, mapping, and connecting more disparate connecting services can reveal significant integrated-mobility opportunities inherent within existing resources. Almost every new trial in every new community has brought a lesson or a new idea. In almost every case, both decision makers and users go away thinking about transportation differently. In many cases solutions appear that can be applied and benefit users and leaders immediately.

SUMMARY OF KEY HUB SERVICES AND COMPONENTS

The following table presents a summary of the types of mobility services and connecting elements that have been critical to the success of the today's best-known mobility hub models.[17] Individually, most of the modal elements are fairly commonplace in urban areas. What has driven the unique success of these hubs, by contrast, has been their capacity to create seamless connections between them, primarily by providing information that is comprehensive, easy to access and interpret, and available either on-demand or at common modal-transition points within the region

Modal Element Modes or Mode Oriented Services	Bremen	Bikestation Long Beach	Bikestation DC	Millennium Park Bike Station
Rail Station	X	X	X	X
Bus Stop	X	X	X	X
Car-share Station	X			X
Taxi Stand	X			
Bike Rental		X	X	X
Bike Shop/ Services		X	X	X
Bike Parking	X	X	X	X
Innovative Modal Connection Services and Information	**Bremen**	**Bikestation Long Beach**	**Bikestation DC**	**Millennium Park Bike Station**
Real-Time Travel Information	X			
Trip Planner Services	X	X	X	

[17] Note that Toronto is not included here, as they were primarily examined as a best practice for further developing the concept of, and planning for, mobility hubs, and have not yet begun significant implementation.

The absence of smartphone apps here is noteworthy. The current rapid expansion of smartphone use is likely to make this a vital component of future hub deployment, while making these hubs even more successful than those in place today. Smartphone apps will also be essential in complementing mobility hubs by providing virtual connections to the valuable mobility resources that lay beyond the hubs.

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APPENDIX B
TECHNICAL MEMO: RECOMMENDED HUB ELEMENTS

NELSON
NYGAARD

MEMORANDUM

To: Kris Morley-Nikfar, Fairfax County DOT

From: Thomas Brown

Date: March 2, 2012

Subject: Task Memo: Recommended Hub Elements

RECOMMENDED HUB ELEMENTS

Following is a summary of Hub Elements recommended for the Mobility Hubs proposed for Tysons Corner. This Memo is organized into three sections, as follows:

- Elements that exist now, or are planned for the area, that should be incorporated into the proposed Hubs;
- Elements that were identified in the Best Practices summary text; and
- Additional Elements that are recommended for the Tysons Corner Hubs.

EXISTING/ PLANNED TRANSIT SERVICE ELEMENTS

Rail Transit

Proposed Service

As part of Phase I of the Metrorail Silver Line, four new Metrorail stations— three elevated and one partially below grade — will be constructed in Tysons Corner by the end of 2013. The new rail line will run along the existing Metrorail Orange Line tracks between Arlington County and Washington, DC. New, dedicated Silver Line track will extend west from the Orange Line tracks just east of West Fall Church. At the conclusion of Phase I, this new track will run along the Dulles Toll Road between this point and a new station on Wiehle Avenue, roughly three miles west of Tysons Corner. Phase II will extend the new service to Washington Dulles International Airport and terminate just a few miles northwest of the airport at Route 772 in Loudon County.[1]

[1] Dulles Corridor Metrorail Project http://www.dullesmetro.com/stations/ (accessed January 2012).

Figure 1 Proposed Silver Line Route

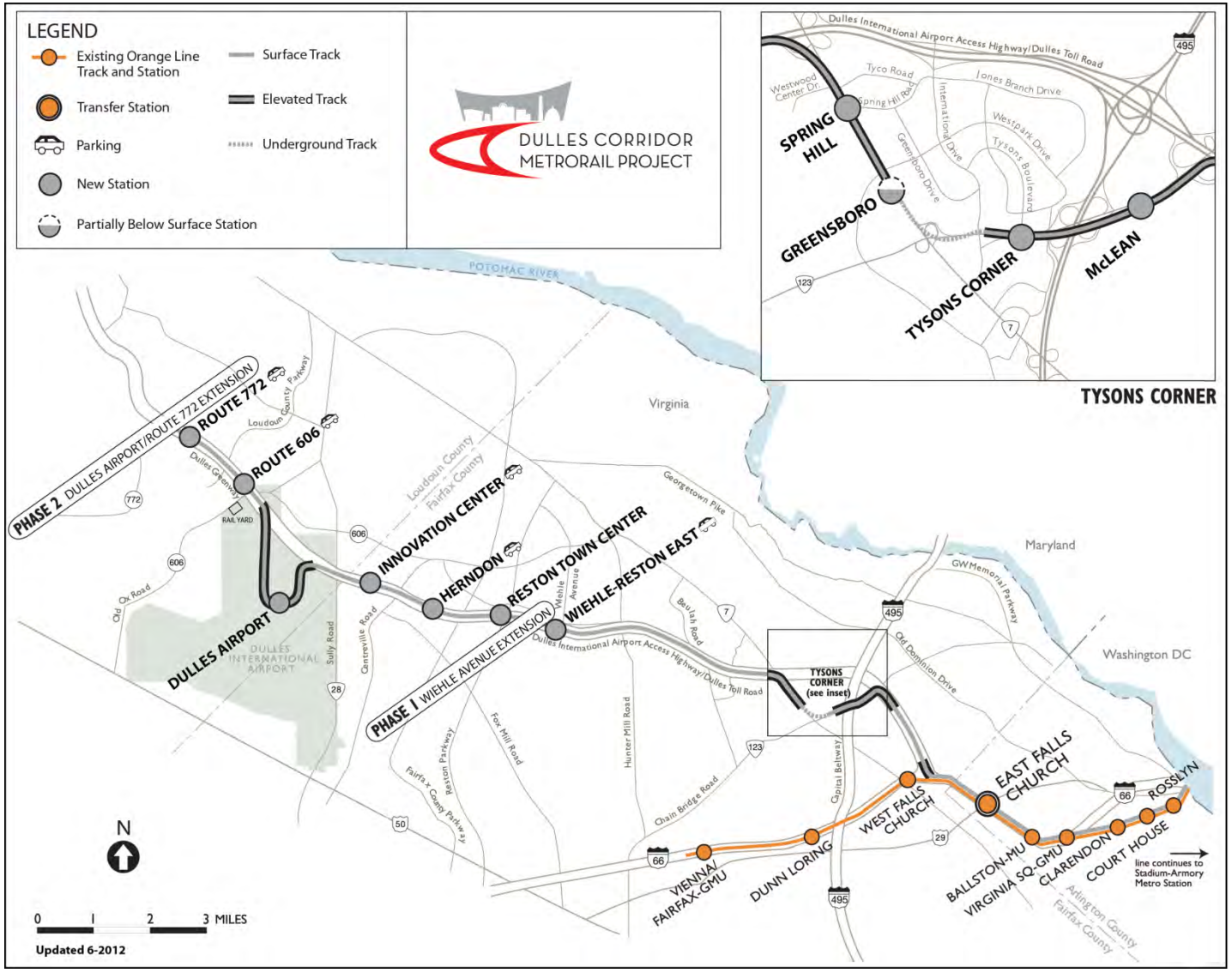
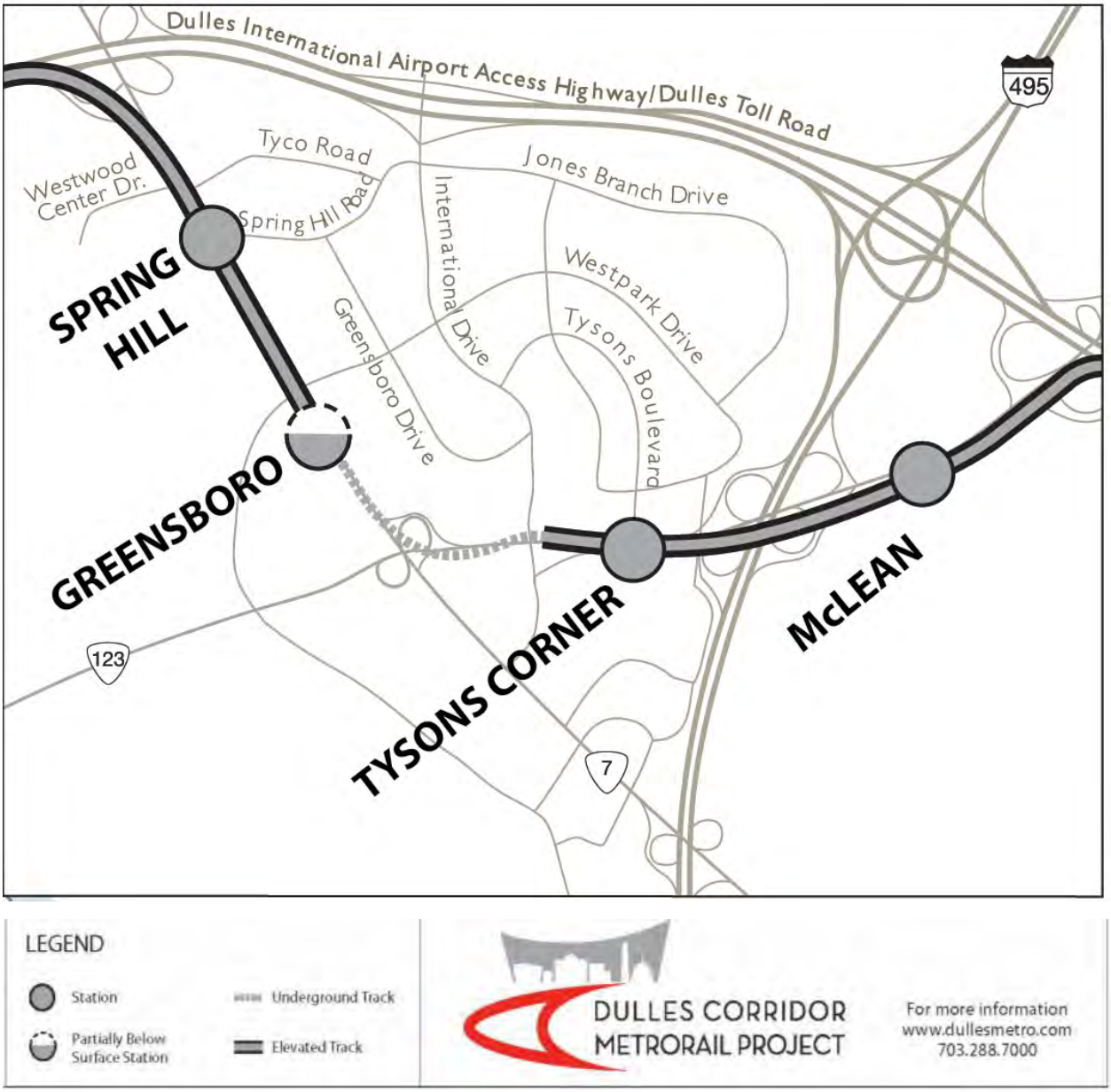


Figure 2 Proposed Silver Line Stations in Tysons Corner



Bus Transit

Current Express and Local Bus Service

Current express bus service in Tysons Corner includes the Tysons Express, a service provided by Loudon County, which travels between Tysons Corner and Hamilton, VA. In Tysons Corner, this service makes stops at both the Tysons West Park Transit Station and Tysons Corner Center.[2]

WMATA Metrobus provides express bus service between L'Enfant Plaza Metrorail Station in Washington DC to the Tysons West Park Station on the 5A route terminating further west at Dulles Airport.[3] The WMATA 28A and 28X – Leesburg Pike routes offer local and express service, respectively, from King Street Station in Alexandria and Mark Center to Tysons Corner Center.

WMATA Metrobus provides local bus service along several bus routes. The 2T bus route serves the Dunn Loring – Merrifield Metrorail Station into and around Tysons Corner. The 3T route offers local service from Tysons West Park Station to Tysons Corner Center onto West Falls Church Metro Station. The 15K and 15L bus routes offer connections from Tysons Corner Center to the Rosslyn Metrorail Station in Arlington County. Also, the 15M route connects Tysons Corner Center to the City of Fairfax and George Mason University. Local service within Tysons Corner is also provided by the 23A and 23C routes traveling from Tysons West Park Transit Station through Tysons to Ballston-MU Metrorail Station and the Crystal City Metrorail Station. Tysons is connected to East Falls Church by the 24T route, providing service from Tysons West Park Station to the Metrorail station at East Falls Church. The 28T bus route, running parallel to the 28 A route, offers connections from Tysons West Park Station and Tysons Corner Center to the West Falls Church Metrorail station via Leesburg Pike.

Fairfax County Connectors provide service in Tysons, the 401 and 402 routes connect Tysons West Park Transit Station to Tysons Corner Center and further south through the county to the Dunn-Loring Metrorail Station, terminating in Springfield at the Metrorail station. The Fairfax Connector 425 and 427 routes offer service from the West Park Transit Station along Highway 267 to West Falls Church Metrorail Station. Local service in the residential areas to the southwest of Tysons Center is provided by the Fairfax Connector 462 and 463, connecting these areas with the Dunn Loring and Vienna Metrorail Stations. Fairfax Connector 574 provides bus connection from Tysons Corner Center to West Park Transit Station via Leesburg Pike to Reston Town Center's Transit Station in North Fairfax County.

Proposed Bus Service

The following information for proposed bus service in Tysons Corner refers to routes outlined in Fairfax County's Transit Development Plan (TDP). The TDP was completed in December, 2009 and is Fairfax County's ten year bus plan. The Transit Development Plan describes all planned bus service enhancements, based on existing and projected customer demand. The following bus services is expected to be available in Tysons Corner when Metrorail service is introduced in 2013. [4]

Proposed routes for bus service in the county's Transit Development Plan included the addition of five link routes within Tysons. The Beltway Link serves the area inside the Capital Beltway connection to the new Tysons East Metrorail station, also providing connection to Tysons Central 123 Metrorail Station via Dolley Madison Drive. The East Link will serve Jones Branch and the eastern edge of Westpark Drive, connecting the Hilton hotel with the Galleria at Tysons II. It runs between Tysons West and Tysons Central 123 Metrorail stations, and also would make the lunchtime loop through the Galleria. The Central Link serves residential areas such as the Rotonda and housing along Westpark Drive through to the heart of the

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[2] Tysons Express Bus Service http://www.loudoun.gov/Default.aspx?tabid=3061 (accessed January 2012).

[3] WMATA Bus Timetables http://www.wmata.com/bus/timetables/timetables-state.cfm?State=VA (accessed January 2012).

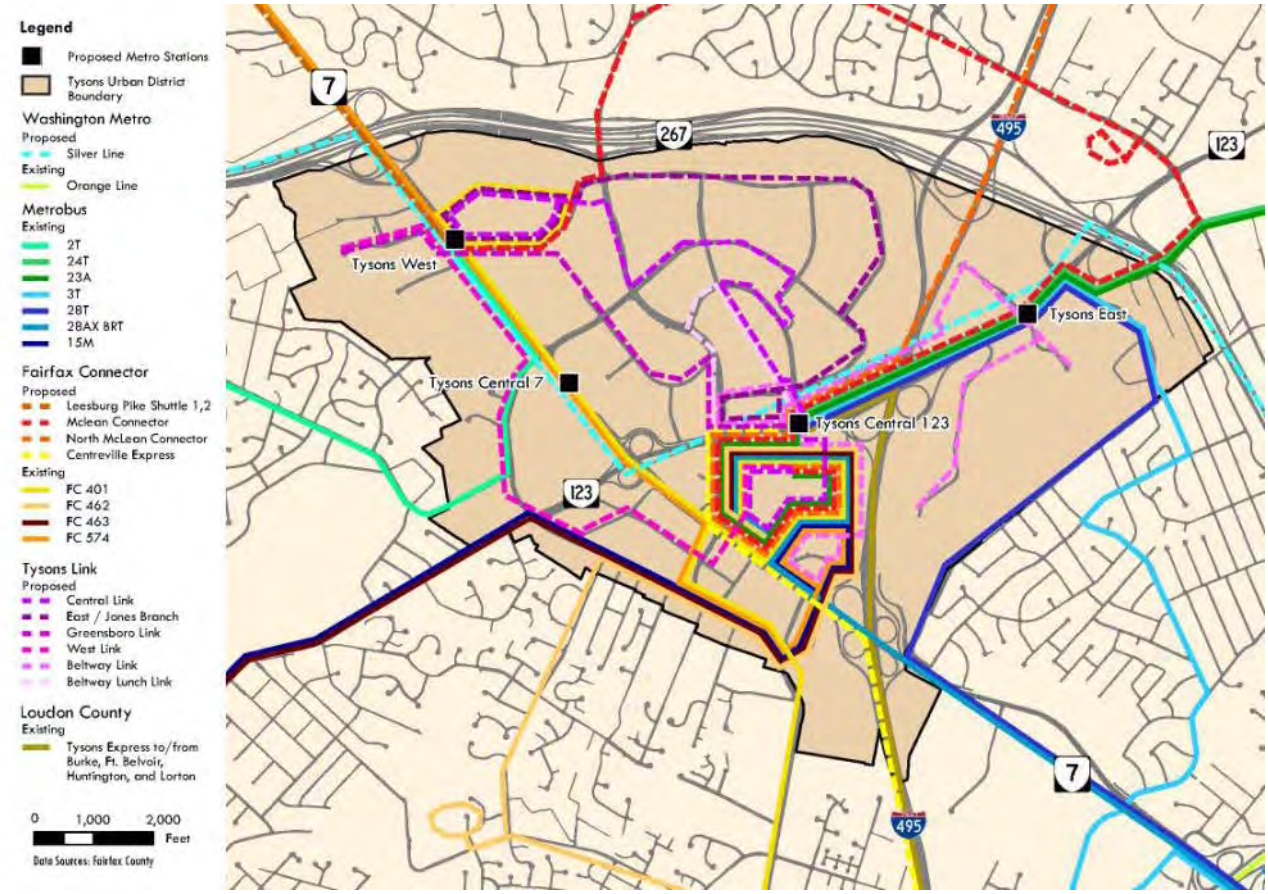
[4] "Fairfax County Transit Development Plan: Tysons Corner Analysis," (2009). http://www.fairfaxcounty.gov/fcdot/pdf/tdp/chapter_8_tysons_analysis.pdf (accessed February 2012).

Galleria and then a loop through Tysons Corner Center. The Greensboro Link operates between Tysons West and Tysons Central 123 Metrorail stations, and connects to Tysons Corner Center and Westwood Center Drive. The West Link provides access to areas along VA 7 and to the west connecting Tysons West and Tysons Central 123 Metrorail stations, while also serving Westwood Center Drive.[5] Two additional connector routes will be developed to connect McLean to new Metrorail stations in Tysons and onto West Falls Church Metrorail Station.[6]

Future express bus service is also planned to utilize the new HOT lanes, expected to be completed in 2013, between Springfield and the Dulles Toll Road, though accessibility for buses, on and off the HOT lanes will need to be resolved. Fairfax County has proposed express bus service into and out of Tysons to Burke Center, Springfield, Lorton and Ft. Belvoir, in southern Fairfax County, utilizing the I-495 HOT lanes.[7]

Other regional routes are proposed such as the Leesburg Pike Shuttles, rerouted Fairfax Connectors such as 574 and an express route to Centerville in western Fairfax County. New neighborhood and local routes have also been proposed by Fairfax County, primarily adjustments to Fairfax Connectors within Tysons to accommodate the new Metrorail stations.[8]

Figure Existing and Proposed Transit Service in Tysons Corner



[5] Ibid (18).

[6] Ibid (38).

[7] Ibid (121-130).

[8] Ibid.

HUB ELEMENTS FROM BEST PRACTICES

Following is a series of overviews of services recommended for incorporation within Mobility Hubs proposed for Tysons Corner, based on the above review of Mobility Hub Best Practices.

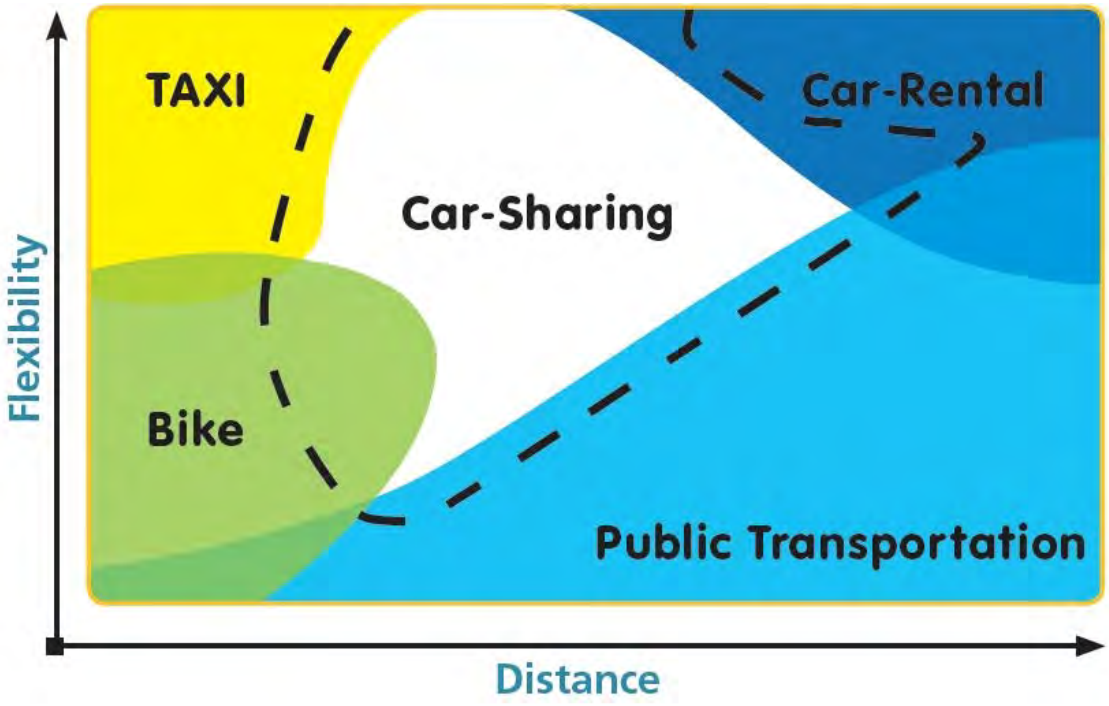
Car-share

Overview

Car-sharing programs allow people to have access to a shared fleet of vehicles on an as-needed basis. Shared-cars reduce the need for businesses or households to own their own vehicles, and reduces personal transportation costs and vehicle miles traveled (VMT). Car-sharing has sometimes been referred to as the "missing link" in the package of alternatives to the private automobile.

Car-sharing complements alternative transportation modes and can help address first mile/last mile gaps by facilitating transit access either on the home- or destination-end of a trip. For example, vehicles available near a person's workplace or school can enable them to commute to work via transit or other means, and use a car during the day as necessary. Near the home, access to car-share vehicles has been shown to induce households to reduce levels of car-ownership.

Figure 3 -Car-sharing Supports Other Modes of Transportation[9]



Typically, car-share usage charges are assessed at an hourly and/or mileage rate, in addition to a refundable deposit and/or a low annual membership fee. Car-sharing is similar to conventional car rental programs with a few key differences:

- System users must be members of a car-sharing organization.
- Fee structures typically emphasize short-term rentals rather than daily or weekly rentals.
- Vehicle reservations and access is "self-service."
- Vehicle locations are widely distributed rather than concentrated.

Benefits

Car-sharing offers a range of individual and social benefits. Car-sharing can help fill in the occasional service gaps left by other transportation modes such as walking, cycling, and transit, making these modes more viable for those interested in using them. Car-sharing can offer economic savings as well. The average car costs more than $500 per month to own and operate, which contributes to U.S. households spending nearly 20 percent of their income on transportation — second only to the cost of housing.[10]

On a societal level, car-sharing encourages more careful consideration of the necessity, duration, and distance of automobile trips, which results in decreased vehicle use and ownership. Studies show that each car-sharing vehicle takes between 5 and 15 private cars off the road. Furthermore, by applying a cost to each use of a vehicle, reliance upon car-share vehicles tends to reduce VMT compared to reliance upon owned vehicles. Research indicates that car-sharing members drive 44% less than they would if using their own car.[11] Zipcar reports that 90% of its members drive less than 5500 miles per year[12].

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[9] *Eric Britton (1999), "Carsharing? A roadmap and compass for this long trip," World Transport Policy and Practice, 5(3): 1-8.* Permission is granted to use the image. This beautiful color version of the image is from IBI Group (2009), "On Street Carshare Parking Demonstration Project,"

[10] American Automobile Association (AAA), 2007, http://www.aaa.com (accessed July 2009).

[11] Shaheen, Susan, Cohen, Adam and , and Martin, Elliot (2010), "Car-sharing Parking Policy: A Review of North American Practices and San Francisco Bay Area Case Study," Transportation Research Record. March 15, 2010

From an economic development perspective, shared vehicles are an attractive amenity for both residential and commercial customers. By adding an additional transportation alternative, car-sharing can provide urban properties with increased accessibility, making them more attractive sites for tenants who might otherwise look for a suburban location.[13] Reduced parking costs help reduce development costs and open up opportunities for more intensive development, affordable housing and open space.

State of the Practice

Peer to Peer Car-sharing

Peer to peer car-sharing (P2P) uses privately owned vehicles for car-sharing. Given that most private vehicles sit idle 75% of the time, P2P allows for better use of an existing resource as well as a way for vehicle owners to share with others some of the high-costs of car-ownership.

Hub Siting Considerations

Spatial Requirements

There are no specific spatial requirements for car-sharing beyond the dedicated parking spots for the provided cars. These can be provided on- or off-street. Most of the Bremen Mobil.Punkt hubs include between four and five car-share vehicles, located in on-street parking spaces. [14] In Fairfax County, Zipcar currently provides one compact car at the Vienna and Dunn Loring-Merrifield Metrorail stations, and two compact cars at the West Falls Church station. Each of these cars is located in an off-street, WMATA-provided parking facility.[15]

Other Considerations

The viability of including car-share at any hub will be dependent upon the car-share service provider's assessment of the local market for such services. Discussions with ZipCar and any other viable car-share operation should begin immediately. These discussions should be focused on developing a sense of the market-assessment metrics that they will use to gauge the attractiveness of locating vehicles at the proposed Mobility Hubs. Particularly if there is some competition among various providers, and if prime parking spaces are being offered for free, spaces at the Mobility Hubs could be seen as attractive much earlier than standard space options.

The County's proffer system could potentially be leveraged in cases where private streets are planned that could provide free, designated parking for car-sharing at or near a Mobility Hub.

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[12] http://www.zipcar.com/is-it/greenbenefits

[13] Cohen, Adam P., Susan A. Shaheen, Ryan McKenzie. "Car-sharing: A Guide for Local Planners," (2008), Institute of Transportation Studies, University of California, Davis, Research Report UCD-ITS-RP-08-16.

[14] Interview with Michael Glotz-Richter, February 6, 2012.

[15] Zipcar DC Car Finder http://www.zipcar.com/dc/find-cars

Taxi Stand

Overview

A taxi (or taxicab) is an automobile with a driver for hire which conveys passengers between locations of their choice. This "vehicle for hire" taxi service differs from rental car and car-sharing services in that the person making the trip: a) does not drive themselves, b) does not need to reserve in advance, and c) can access the service at many different locations. Taxis provide on-demand door-to-door travel and are best for short-distance trips. For these reasons, taxis are an excellent first / last mile connector to bridge the gap between a transit station and a person's origin or destination.

Benefits

The benefits of taxi service include:

- Taxis approximate the convenience and door-to-door flexibility of driving oneself.
- Passengers can talk on the phone, email, or work on a laptop or tablet computer while en-route.
- In many locations, passengers do not need to reserve in advance.
- Allows for "front-door" pick-up and drop-off.
- Offers flexible payment options.
- Can set up to offer subsidized rides to seniors.
- Allows those without vehicles to have access to a vehicle for certain types of trips without the cost of vehicle ownership, and can serve as a "second car" for one-car households.

State of the Practice

Most cities license the operation of taxicabs. These services, however, are rarely structured as a cost effective solution for daily transportation needs. Outside of extremely high-density locations, and except for passengers with relatively expansive transportation budgets, taxicabs rarely play a role in daily commutes.

Effective taxi services can fill an important role in encouraging transit commutes, however, by providing a viable and appealing option for unexpected trip needs such as when a commuter needs to work late, leave early, or make a trip during the workday. Furthermore, the practice of cab-sharing, long a staple in global locations, is making inroads in the US – see Best Practices below.

Taxi Pool / Taxi Share

Taxi passengers are now able to share rides under a pilot program approved by New York City's Taxi and Limousine commission which regulates the city's 13,000 yellow cabs. As many as 1,000 taxis will eventually be outfitted with meters to allow for multiple fares and electronic signs showing their neighborhood destination. These taxis will operate along high-volume corridors, and pick up groups of two to four passengers at Group Ride stands. Passengers will pay a per-person flat fare of $3 - $4 for a ride to common destinations along these corridors. Passengers can get out anywhere along their paid route. Group ride stands are active on weekdays from 6 – 10am. Matthew Daus, the commission's chairman, stated that, "using the same number of vehicles to serve more people is good for the environment, and passengers will pay less while drivers will earn more."[16]

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[16] Chris, Dolmetsch, "New York to Allow Shared Taxis Under Pilot Program, "Bloomberg Press [New York] 29 May 2009, http://www.bloomberg.com/apps/news?pid=20601093&sid=amxbdcrsRPkQ&refer=home (accessed July 2009).

Other best practice strategies

- Dedicated taxi phones at rail stations and major bus stops. Precedent: London Underground.
- Advance taxi dispatch service available from transit vehicles. Precedent: Several German cities.
- Integrated transit-taxi fare payment, potentially using "smart card" technology. Precedent: Hong Kong's Oyster Card.
- Streetside taxi stand infrastructure (shelters, lighting, emergency call boxes). Precedent: Outdoor advertising companies often subsidize the capital and maintenance costs of transit shelters and associated infrastructure as part of their franchise agreement.
- Development of enhanced reservation system (online, text messages, etc.). Precedent: Online car-sharing reservation systems and "call-a-bike" text reservation systems.
- Development of a "flat fare" pricing structure for targeted areas (such as downtown and near transit stations) to simplify customer experience. Precedent: Airport flat fare structures in numerous cities.

Hub Siting Considerations

Spatial Requirements

Like car-share elements, the only real spatial requirements for a taxi stand are based on the number of standing bays to be provided.

Other Considerations

The effectiveness of this hub component may vary depending on the market appeal of local taxi services. Modest market appeal could be broadened by establishing a taxi-sharing program or protocol at Mobility Hubs, including standardized fares for shared rides within a specified catchment area. This may also be deployed as a place-holder Hub element until a market for car-sharing emerges.

The County's proffer system could potentially be leveraged in cases where private streets are planned that could provide free, designated curb space for a taxi stand.

Bike Shop/ Service Center

Overview

Bike shops provide the critical service of bicycle retail and repair to their communities. They also serve as an information center, where cyclists and potential cyclists can seek advice about maintenance, commuting, routes and other services. Bike shops can be a focal point of the cycling community, where cyclists can meet other riders, plan activities and learn from each other.

Benefits

Like bike-share and bike-rental services, the placement of bike retail and repair shops at critical multi-modal transfer points is an emerging best practice with a growing presence in vibrant urban centers. Like these services, convenient access to quality bike repair and maintenance services, parts and amenities, and expert rider and owner information can remove many common barriers to the adoption of cycling as a regular mobility option.

Bicycle shops provide valuable repair service access for cyclists. Many bike owners don't have the knowledge or tools to repair their own bicycles, and if a bike shop is not within walking distance, minor

repair needs can result in bikes remaining idle for months or years. Convenient access to bike maintenance services offered at local bike shops can also significantly extend a bicycle's "useful life".[17]

State of the Practice

Appreciation for the role of bike shops in promoting and maintaining a robust urban bicycle culture is on the rise as more and more cities seek to raise US-based bike mode shares above their traditionally low levels. As cycling rates increase – bike commuting increased 39% nationally from 2000 to 2010, and 63% in the 70 largest cities[18] – the quantity and diversity of bike shops has also increased.

Community Bike Shops

These organization typically combine education, advocacy, and the development of "do it yourself' bike maintenance skills with traditional "drop-off" repair services. These organizations are growing in number, particularly within high-ridership cities like Portland, Minneapolis-St. Paul, and San Francisco.[19] Most offer low-cost, "salvaged" bikes that have been repaired on-site, as well as used bike parts, as part of an overall mission to remove entry barriers to cycling. Many also incorporate a job-training component, focused on providing opportunities for "at-risk" youth to develop marketable job-skills in a friendly environment.[20]

Hub Siting Considerations

Spatial Requirements

To get a sense of the spatial requirements for these potential Hub elements, the following are rough measures of the interior and exterior areas of the bike station and cycle center facilities profiled in the Best Practices section above.

- Bikestation DC at Union Station – 3,600 square feet
- Bikestation Long Beach – 7,500 square feet
- Chicago Cycle Center – 17,000 square feet

Other Considerations

Retail space costs are one of the most significant barriers to maintaining neighborhood bike shops — whether traditional commercial stores or non-profit community-based operations. The potential to use the County's proffer system to secure free or subsidized space for a hub-based shop should be explored if this potential Hub element is desired.

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[17] One Street, http://www.onestreet.org/resources-for-increasing-bicycling/53-bike-shops

[18] League of American Bicyclists, https://public.sheet.zoho.com/public/bikeleague/2000-to-2010-bike-commuters-largest-70-2-1

[19] http://www.northportlandbikeworks.org/ http://www.pedalrevolution.org/ and http://www.sibleybikedepot.org/

[20] http://experimentalstation.org/blackstone-bikes

Bike Parking

Images: New York City Department of Transportation, Flickr User: Luton

Overview

Bicycle parking facilities can consist of a series of outdoor bicycle racks, bicycle lockers, automated access-controlled facilities, or attended facilities. High-quality, secure, and ample bicycle parking facilities are essential for encouraging bicycle-to-transit connections. Bicycle parking at transit stations is most commonly used on the home end of a transit trip, but may also be used on the activity end. Providing parking at high-volume transit stations can reduce demand for bicycle space on transit vehicles; shift current drive-to-transit trips to bicycle; and expand the market capture of each transit stop.

Providing well-designed and conveniently-located bicycle parking can also improve station function by reducing the number of bicycles parked in undesirable locations such as access ramps, stairwell railings, or landscaped fence lines. While bicycle parking can be a simple outdoor rack, many bicyclists are unwilling to lock their bicycle for more than a short time because of concerns about theft and vandalism. Most bicycles today cost $350 to over $2,000 and are one of the most-often stolen items in all communities, with components frequently stolen even when a bicycle is securely locked in public. Theft can be a serious deterrent to bicycle riding. In order to achieve significant usage of bicycle parking, higher-security parking should be provided that affords weather, theft and vandalism protection.

Benefits

People combine bicycling with transit for a number of reasons. A 2007-2008 Bike-MAX Survey by the Portland, Oregon transit agency (TriMet) bike program found bicyclists use the MAX for trips that are too far or would take too long on a bicycle, in order to avoid transfers and hills and to take advantage of the speed of trains. During peak months, 3.8% of MAX passengers bring their bicycles on the light rail. Thirty-nine percent of respondents, when asked what their alternative would be if bicycles were not allowed on the MAX, reported that they would drive, and only 28% would take transit without their bicycle.

The survey results suggest that inadequate bicycle parking is one reason that more people do not bike to transit. Three-quarters of riders surveyed said they were not willing to leave their bicycles at light rail stations instead of bringing them onboard and 40% agreed that lack of safe bike parking was a reason they brought their bike onboard. However, 41% of people interested in bicycling to MAX would consider using

bike parking, and participants responded favorably to bike parking options that are not currently available in Portland. Finally, the survey also found the average access and egress distance to and from MAX to be two miles, a distance that suggests improved provisions for bicycles might substantially increase station catchment area.

Providing secure bicycle parking at transit encourages both transit use and bicycling, while not limiting transit capacity by requiring passengers bring their bicycles with them on transit. It encourages people to bicycle to the transit station, which can increase the catchment area of a transit center in a low density area. It also provides people with an alternative on a route where the bike rack on the bus or rail is usually full, and they would otherwise be required to wait for the next bus or train.

State of the Practice

Usually considered short-term parking, inverted U-racks or wave racks can be designed and placed in a way that bicyclists may be willing to lock their bicycles for a day or more. To facilitate longer-term parking with basic racks, it is essential that they are located in well-lit areas, within view of security personnel, and covered wherever possible. Bay Area Rapid Transit is currently experimenting with providing basic racks within the paid area, under the assumption that security will be improved by placing racks within view of station attendants and due to the fact that station gates are locked overnight.

If there is insufficient space on the sidewalk near the station or bus stop, or if on-sidewalk bicycle parking will interfere with pedestrian movement, converting an on-street automobile parking space to bicycle parking is an affordable and simple solution. Alternatively, bike racks can be placed on a mid-block or corner curb extensions, as long as the minimum 4' Paved Accessible Route (PAR) is maintained as required by the Americans with Disabilities Act (ADA) Public Rights of Way Advisory Guidelines (PROWAG).

Hub Siting Considerations

All of the Metrorail Stations in Tysons Corner will have designated bicycle parking. Bike parking at Mobility Hubs is, therefore, only recommended in cases where demand for additional bike parking is expected, given the expected quantity or location of bike parking at the station.

Spatial Requirements

Bike racks and lockers be provided at the same grade as the sidewalk. Each bike should be provided an area of 2 feet by 6 feet (12 square feet for each bike). Racks should be sited:

- 5 feet from fire hydrants and crosswalks;
- 4 feet from loading zones, bus stops, bus stop shelters and benches;
- 3 feet from parking meters, newspaper racks, mailboxes, poles, driveways, trees and planters, trash cans, utility meters, manholes, and any street furniture or other sidewalk fixed obstructions; and
- 2 (minimum) to 3 (preferred) feet from street curbs'
- Racks set parallel to a wall should be sited 2 (minimum) to 3.5 (preferred) feet from the wall. Racks set perpendicular to a wall should be sited 2.25 (minimum) to 3.5 (preferred) feet from the wall.

Other Considerations

Use of one or more of the many new, innovative, best-practice rack designs can help enhance the visual appeal and impact of Mobility Hubs. Following are some examples of recommendable alternative design concepts.

Figure 4 Nationals Ballpark

Image: Flickr User: Kevin H.

Figure 5 Melbourne, Australia

Image: Flickr User: UrbanCyclist.

Figure 6 Minneapolis

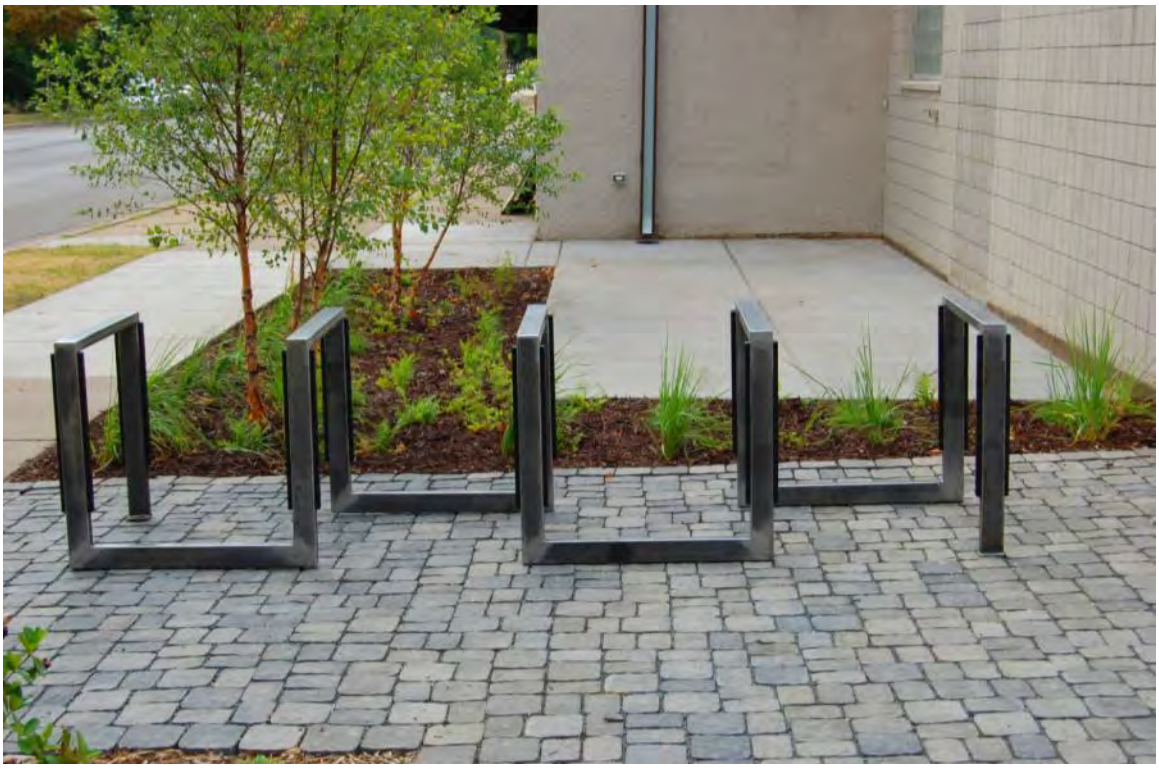

Image: Flickr User: RoLu

Figure 7 New Jersey

Image: Flickr User: placenamehere

Figure 8 Portland

Image: Flickr User: Mark Stosberg

Use of the County's proffer system should be explored wherever the location of a particular development provides distinct locational advantages over bike parking provided at the closest Metrorail station or Mobility Hub. For example, providing bike parking at a local retail center or office building that is beyond walking distance from a Metrorail station or Mobility Hub will encourage use of bikes to connect from a Hub- or station-based transit ride to work or shopping.

Real-Time Travel Information

Background

Real-Time travel information (RTTI) is increasingly incorporated into transit systems to provide users up-to-the-minute information on arrival times and/ or delays. Real-time travel information is a recent development as Global Positioning Systems (GPS) has become more widespread in electronic and mobile devices. Frequently real-time transit information systems provide the following types of information.

- Arrival times (clock or count-down formats)
- Vehicle location (live mapping)
- Service disruption/delays
- Other information, such as date, time, and weather [21]

Users are informed of service and travel information through both interactive and non interactive media. Non-interactive media includes electronic displays or televisions in or around stations and transit stops as well as automated telephone hotlines. Interactive media for transportation users can be provided through internet portals or interactive voice response via telephone as well as mobile applications available on users' smart phones.[22]

In New York City, text message or Sort Messaging Service (SMS) technology has been implemented to allow users to receive information by texting a bus stop code to a central phone number. The computer system connected to the phone number determines the distance between the closest bus and the user, using GPS, and relays this information via a response text message.[23]

Other cities have begun piloting similar technology. In Pittsburgh, a Carnegie Mellon University Heinz College (CMUHC) research team began a bus tracking project in 2009 called myRide. "Using the GPS function of Google G1 phones that were deployed on the CMUHC shuttle system, the project team built a tool called myRide that identifies a vehicle's location, predicts its arrival time at a future stop, and displays the information on the myRide website. Although real-time bus information systems are already in place in cities like Chicago, this project is unique because it incorporates a Twitter feed riders can use to provide instant feedback and commentary on CMU Shuttle travel."[24]

Benefits

The primary RTTI benefit is making public transit easier to use, and thereby increasing transit ridership. To quantify potential ridership impacts, the CMUHC research team gathered public

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[21] 'White Paper on Literature Review of Real-Time Transit Information Systems.' Federal Transit Administration (2002) http://ntl.bts.gov/lib/jpodocs/repts_te/13845.html

[22] Ibid.

[23] Rosenberg, N. "Anywhere on Staten Island, Technology Shows Where Bus Is." New York Times (accessed February 2 2012) http://www.nytimes.com/2012/01/12/nyregion/anywhere-on-staten-island-technology-shows-where-next-bus-is.html?_r=1&scp=1&sq=bustime&st=cse

[24] Heinz College News. "Heinz College Project Team Offer Carnegie Mellon Students a Better Ride," (accessed February 3 2009) http://heinz.cmu.edu/news/news-detail/index.aspx?nid=1085

feedback through user surveys. The research team surveyed 148 faculty and students, transit riders, and pedestrians in Pittsburgh's Oakland-Downtown Corridor. The research team concluded from survey responses that 90% of respondents would either increase or greatly increase their bus ridership if a real-time information system was accessible to them.[25]

Real-time travel information can also assist transit operators in providing reliable service. According to the Federal Transit Administration, "real-time vehicle information helps operations management maintain buses on schedule, which reduces service variability and increases passengers' perception of performance. Real-time information is most valuable to passengers in departure time decisions, i.e., what time to depart to a stop, which requires access to pre-trip information.

By knowing next-bus arrival information, passengers may be able to make better use of their time or seek alternate modes of transportation (e.g., if the wait time is too long)."[26] Real-time travel information for rail and bus integrated with multi-modal transportation hubs would allow riders greater mode choice when planning their trips or in emergency situations. For example, users may choose to use cycle or walk to their destination, using services like bike-share or trip planning, if transit systems are delayed due to traffic or service disruptions.

State of the Practice

In 2009, Tysons Corner Center installed a multi-modal transportation display, developed by the Redmon Group, at the request of Virginia Department of Transportation. The display shows transit maps, real-time travel information for buses, local roadway construction and traffic conditions.[27] In 2010, the Redmon Group developed a pilot, multi-modal real-time travel information display at the Reeves Center for the District Department of Transportation . The display shows multiple transportation options layered on a single map, coupled with real-time information for buses, Metrorail service and vehicle-availability at nearby car- and bike-share locations.[28]

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[25] Chen, Daiying, et al. (2009) myRide™ A Real-Time Pilot for the CMU Shuttle. Heinz College, Carnegie Mellon University (accessed February 3 2012) http://www.slideshare.net/kmesko/myride-realtime-system-for-carnegie-mellon-university-shuttle

[26] Cham, Laura, et al. (2006) "Real-time Bus Arrival Information Systems Return-On-Investment Study." Federal Transit Administration, 18.

[27] Redmon Group Portfolio. "Tysons Corner Center Traveler Information Displays," http://www.redmon.com/portfolio/tysons.cfm (accessed March 8, 2012)

[28] DDOT Press Release. "DDOT Unveils Districts First Multi-Modal Digital Display," http://ddot.dc.gov/DC/DDOT/About+DDOT/News+Room/DDOT+Unveils+Districts+First+Multi-Modal+Digital+Display (accessed February 3, 2012).

Figure 9 DDOT's Multi-Modal Real-Time Information Display

Source: WTOP News "DC Offers Real-time Transit Information" http://wtop.com/?sid=2208567&nid=30 (accessed February 2, 2012).

In both Washington DC and Virginia, NextBus, an independent real-time transit information provider provides real-time transit information for WMTMA buses, DC Circulator buses, and Fairfax's CUE bus system. NextBus provides:

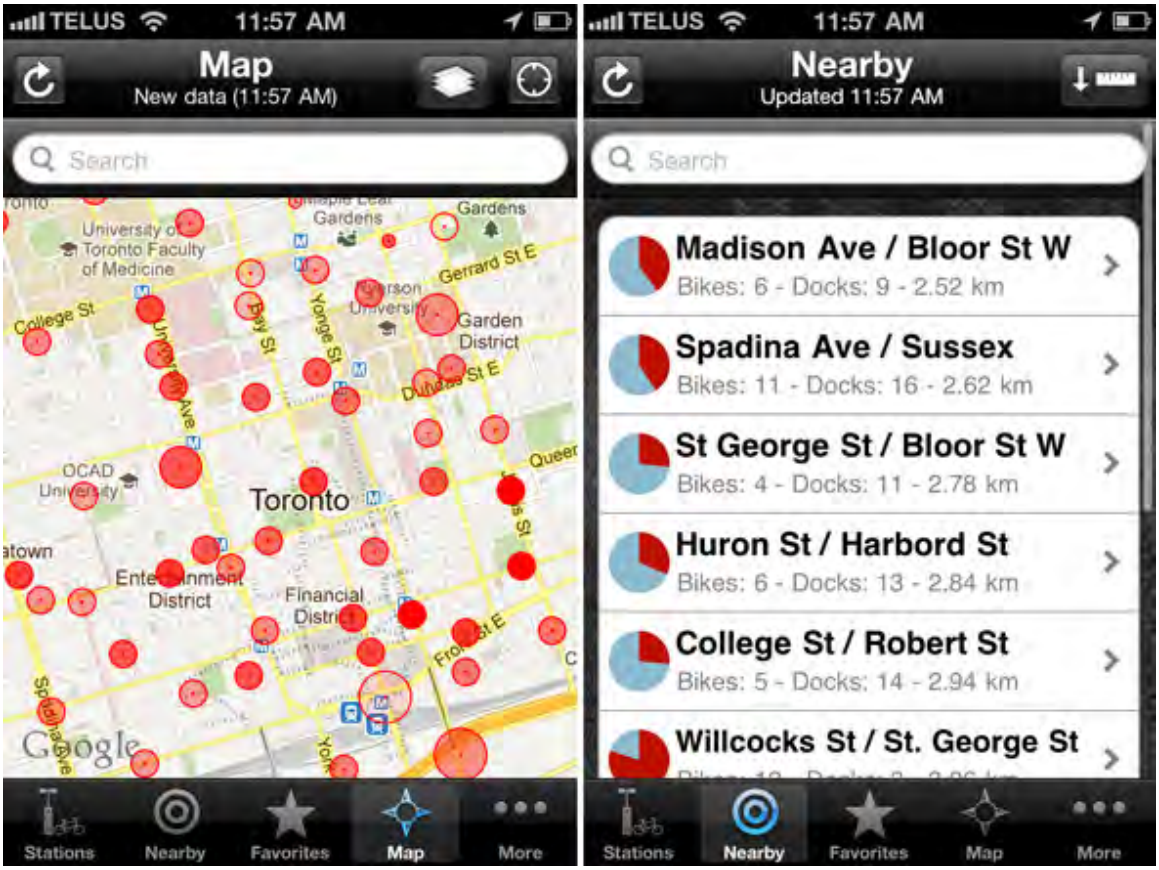
- A web portal equipped with countdown information on bus arrival at bus stops as well as live map tracking;
- An SMS text service to provide real-time bus arrival information as well as user requested alerts for bus arrivals via SMS;
- A mobile-phone-compatible website for users with internet-enabled phones

Additonally, NextBus information has been utilized by third-party developers to create interactive smart phone apps to view bus arrival times as well as track bus locations.

Smart phone applications have also been developed for real time information for bike-share. Spotcycle provides smart phone users the ability to find bike share stations and determine the number of available bicycles for use at each location.[29] Below is an example of the Spotcycle application in use in the Toronto area.

[29] Spotcycle. http://www.spotcycle.net/ (accessed February 3, 2012).

Figure 10 Spotcycle iPhone App



Source: BlogTO, Toronto "Create Annotated Bike Rides with Spotcycle Mobile App," http://www.blogto.com/tech/2011/11/create_annotated_bike_rides_with_spotcycle_mobile_app/ (accessed February 3, 2012).

Hub Siting Considerations

Spatial Requirements

Multi-modal information displays are generally the size of a television screen and can be mounted in a variety of ways in a variety of locations. Mobile phone and smart phone applications are user-maintained and do not require any on-site infrastructure. Fairfax County has started to implement bus tracking technologies on their local buses and continuing to do so will expand the usefulness of mobile applications, such as NextBus, among transit users.

Siting opportunities, as well as the expected level of bus connections, at each station area may determine whether physical displays are advisable. These considerations will be explored in more detail in the next study task.

Other Considerations

Increasing reliance upon websites and mobile-phone applications for such information presents an opportunity to reduce necessary spatial and infrastructure investments.

The County's proffer system could potentially be used to fund Real Time Information investments — developing, deploying, and maintaining Dynamic Information Kiosk and/ or web-based programs that seamlessly incorporate all the various travel options that are and will be available to travelers in Tysons Corner.

Trip-Planner Services

Background

Trip-planner services are typically web portals or mobile applications that provide detailed routing, mode/ service alternatives, and trip time estimates based on a set of user-provided origination and destination points. Frequently, trip-planners can prioritize options based on a user's stated modal preferences and priorities such as minimizing transfers minimizing walking distances, or minimizing total travel time.

Benefits

Similar to Real-Time Information systems, Trip Planner Services make using transit easier, which, in turn, should increase ridership. Primarily, these services make transit use easier by removing (or at least improving the quality of) the "guess work" involved in anticipating such trip components as:

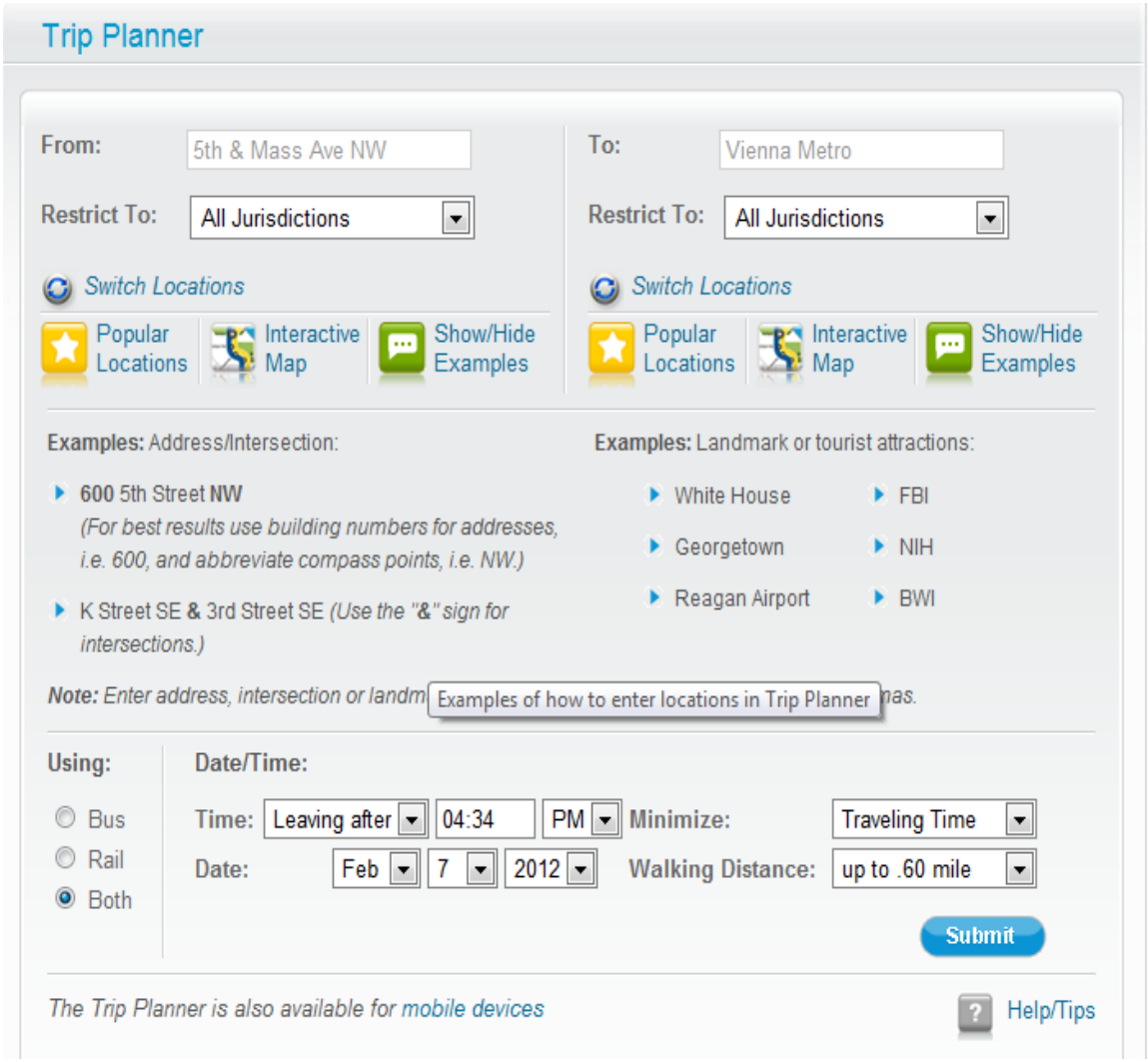
- Total trip time;
- Optimal mode and route combinations;
- Schedule-coordination and "dwell" times between connections; and
- Response to service and schedule changes (instead of reading a static schedule to see if services run on a holiday, weekday, or other schedule during Presidents' Day, the trip planner automatically incorporates the correct schedule in its outputs).

State of the Practice

Currently in Fairfax County, the WMATA Trip Planner provides trip planning information that includes Fairfax Connector routes as well as the Metro System. The WMATA Trip Planner is both a web portal and an interactive mobile website for internet-enabled mobile phones. Several third-party developers have adapted the WMATA trip-planning services into interactive mobile applications for smart phones.

Smart phone users can also access the Google Maps application for trip-planning services to automatically detect their location and provide routing to their destination for walking, biking, driving or public transit.

Figure 11 WMATA's Trip Planner Tool



Hub Siting Considerations

Spatial Requirements

Trip-planner services can be incorporated into dynamic information kiosks, such as those provided at many of Bremen's Mobil.Punkt hubs. Increasingly, however, these services can be made available via websites and smart phone apps. The fact that, Mobil.Punkt implementation has largely abandoned these kiosks due to lack of utilization, emphasizes the current reality that such an investment may not be advisable at most Tysons Corner Mobility Hubs. Siting opportunities, as well as the expected level of bus connections, at each station area may determine whether such a kiosk is advisable. These considerations will be explored in more detail in the next study task.

Other Considerations

The growing reliance upon mobile-phone applications to access this sort of information may be reducing the impact and value of investing in dynamic information kiosks to provide this information. Increasing reliance upon websites and mobile-phone applications for such information presents an opportunity to reduce necessary spatial and infrastructure investments. The County's proffer system, however, could potentially be used to help offset the cost of developing, deploying, and maintaining web-based programs that seamlessly incorporate all the various travel options that are and will be available to travelers in Tysons Corner.

If kiosks are desired at one or more Mobility Hubs, however, trip planner systems could be complemented by additional real-time services commonly associated with mobile-phones, such as:

- Yelp - Local dining and shopping information, including user reviews;
- UrbanSpoon - Local dining information, including user reviews;
- Where? - Real-time information and recommendations on restaurants, movies, weather, news, cheap gas, friends and more.

The County's proffer system could potentially be used to fund Trip Planner Services investments — developing, deploying, and maintaining Dynamic Information Kiosk and/ or web-based programs that seamlessly incorporate all the various travel options that are and will be available to travelers in Tysons Corner.

ADDITIONAL RECOMMENDED ELEMENTS

Bike-Share

Overview

Bike sharing is a form of bicycle rental where people can access a shared fleet of bicycles on an as-needed basis. What most distinguishes bike share from bike rental is the provision of a network of stations from which bikes can be accessed, and an emphasis on short-term, one-way sharing (most bikes are checked out for an hour or less and are not returned to the location from which they were checked out).

Bike-share programs provide safe and convenient access to bicycles for short trips, such as running errands or transit-to-work trips. The international community has experimented with bike-share programs for nearly 40 years. Until recently, bike-share programs worldwide have experienced low to moderate success; in the last five years, innovations in technology have given rise to a new (third) generation of technology-driven bike-share programs. These new bike-share programs can dramatically increase the visibility of cycling and lower barriers to use by requiring only that the user have a desire to bicycle and a smart card, credit card, or cell phone.

Bike-share programs have helped to increase bicycling mode share, provide access to the public transit system, reduce a city's travel-related carbon footprint, and provide additional 'green' jobs related to system management and maintenance. In the US, many cities are considering bike-share programs, though they have not yet been widely implemented. These systems are not foolproof: poor design, inadequate supply of bicycles, and lack of maintenance are among the potential pitfalls faced when building and implementing a bike-share system.

State of the Practice

Two general operational models exist.

- The first, and most common, model is advertising-based, where large outdoor advertising companies are given exclusive rights to urban advertising space in exchange for installation and maintenance of the bicycle-sharing system. The "Velib" system in Paris is an example of this first model.
- The second is operated by a city or other public agency as part of a larger TDM or parking management strategy. Montreal's "Bixi" and Long Beach's employee-based program are examples of this second model.

Bike-share programs have many common elements including equipment and systems (e.g. bicycle fleets, parking and locking mechanisms, user interface and check-out protocols, and station networks), as well as maintenance and management requirements (e.g. fleet and station maintenance, status information systems and bicycle redistribution systems). In most systems, bicycles come equipped with a Global Position System (GPS) unit, and a Radio Frequency Identification (RFID) tag used to locate the bicycle within the system. This function is typically used in fleet management (maintaining even distribution across bicycle station by carting bicycles from over-supplied locations to under-supplied stations) , utilization analysis, and location of lost or stolen bicycles.

Pricing of bike-share programs is often structured to encourage short trips.

Figure 12 – State of the Practice by Bike-Share Component

Equipment	State of the Practice
Bicycles	• Easy and comfortable with adjustable seats • Utilitarian, durable • Distinctly 'branded' to permit easy recognition and reduce the chance of theft.
Parking and Locking Mechanisms	• Secure, and easy to use • Visible and well-lit • Denote availability (online, or red or green light on-site) • Should provide a map of other nearby stations w/ directions • Clear information about rental costs, check-out, and return options
Station Design and Use-protocols	• Automated, simple and easy to use • Resistant to damage and vandalism • Accessible to casual users • Provide a method for initial registration

Benefits

In general, bike-share programs improve mobility options, increase cycling and reduce drive-alone trips. Bike-share systems have proven to be particularly effective ways of encouraging bicycle use for short trips. Such systems also clearly demonstrate a city's commitment to investing in non-motorized transportation options. In addition, providing people with a safe and comfortable opportunity to bicycle may also encourage them to consider bicycling as a viable mode of transportation throughout their daily lives.

Figure 13 Capital BikeShare Station

"There's a lot of stress on our transit systems currently… [the D.C. BikeShare Program] will help us reduce congestion and pollution."

– Jim Sebastian, Manager of Bicycle and Pedestrian Programs in Washington, D.C.[30]

Hub Siting Considerations

Spatial Requirements

Alta Bike Share currently designs, deploys and manages the bikeshare stations for Capital Bikeshare. Each Capital Bikeshare station has one solar power payment kiosk and the addition of a minimum of seven modular bike docks, requiring approximately the size of a parking space, 8 by 20 feet, though Capital Bikeshare sited the majority of their stations at 8 by 40 feet providing 15 docking points.[31] The docking stations with a bicycle docked are 6 feet deep and an additional 6 foot sidewalk clearance is recommended by Alta, ideal spatial requirements are then a minimum of 12 by 20 feet for a seven dock station.[32] Additional bike docks can be added to the station as desired. Because the units are modular, the spatial configuration of a bikeshare station is adaptable; bike docks can be added on either side of the kiosk in a linear fashion or configured into a square, what Alta terms a U-shaped station.[33] Alta provided Capital Bikeshare with groupings of six additional dock only units that were added at a rate of 10 linear feet.[34]

Average size of a Capital Bikeshare station:

- Capacity: 13 bike docks
- Size: Sited for 8' x 40' (linear configuration)

Largest Station at US Dept. of Agriculture on 12th & Independence, Near Smithsonian Metro Station:

- 39 bike docks

Capital Bikeshare's racks are solar-powered (off grid) modular units. Alta's modular system allows for up to 63 bicycle docking stalls to be added to one solar powered kiosk. [35]

Other Considerations

The viability of including bike-share at any hub will be dependent upon the bike-share provider's assessment of the local market for such services.

The County's proffer system could potentially be used to improve the market viability of bike-sharing by providing prominent outdoor locations for stations, or by providing funding for the capital and installation costs of a station.

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[30] Becker, Bernie, "Bicycle-Sharing Program to be First of its Kind in U.S," The Wall Street Journal [New York] 27 April 2008, http://www.nytimes.com/2008/04/27/us/27bikes.html (accessed March 2009)

[31] Interview with Karina Ricks, January 13, 2012.

[32] Interview with David Moskovitz, Alta, February 2, 2012

[33] Ibid.

[34] Ibid, Karina Ricks

[35] Ibid, David Moskovitz

Casual Carpool

Overview

Casual carpooling refers to the sharing of a ride with a driver and one or more passengers, where the ridesharing between the individuals is not established in advance but coordinated on the spot. Casual carpooling provides an alternative to traditional ride-matching programs. It differs from traditional carpools in that it is designed as an instant-match by maximizing flexibility and accommodating last minute requests to share a ride.

Casual carpooling is characterized by informality and lack of governance. Meeting sites tend to evolve where there is reasonable parking (for passengers who may drive to the site and leave their cars), safe waiting area for queuing cars, proximity to major transportation corridors, and is often near public transportation stops. Casual carpoolers do not exchange money.

Benefits

While there may be a variety of motives for carpooling, casual carpooling is primarily used for commuting where the driver is incentivized to pick up passengers in order to allow for the use of high occupancy vehicle (HOV) lanes or to avoid (HOT lanes) or share toll costs – resulting in a savings of both time and money. The major benefits of this approach to carpooling are that it requires minimal advance planning and accommodates changing travel times, reducing the barriers to traditional carpooling.

Like traditional carpooling, societal benefits are primarily reduced road congestion and emissions tied to a higher overall drivers-to-vehicles ratio. Casual Carpooling can work well with traditional transit, by increasing high-occupancy-vehicle travel within geographical service gaps or by providing complementary service along transit routes with more demand than capacity.

State of the Practice

This type of carpooling has been around for quite awhile. Meeting sites tend to evolve where in proximity to major transportation corridors that provide HOV lanes. Casual carpooling has become a recognized cultural phenomena in places as diverse as Washington D.C., Pittsburgh, Houston, and San Francisco.[36]

Hub Siting Considerations

Spatial Requirements

Like car-share elements, the only real spatial requirements for a taxi stand are based on the number of standing bays to be provided.

Other Considerations

A unique advantage of this potential Hub element is that the space it requires can be temporarily programmed for this use for just a short period of time in the morning commute peak, and re-programmed for other purposes such as general parking, loading/ unloading, etc. Like taxi

[36] "Casual Carpooling - Enhanced" Kalon L Kelley, Journal of Public Transportation, Vol. 10, No. 4, 2007

stands, this Hub element can also serve as a placeholder for curb space that can be used for Car-Share or EV-Charging when markets for such uses emerge.

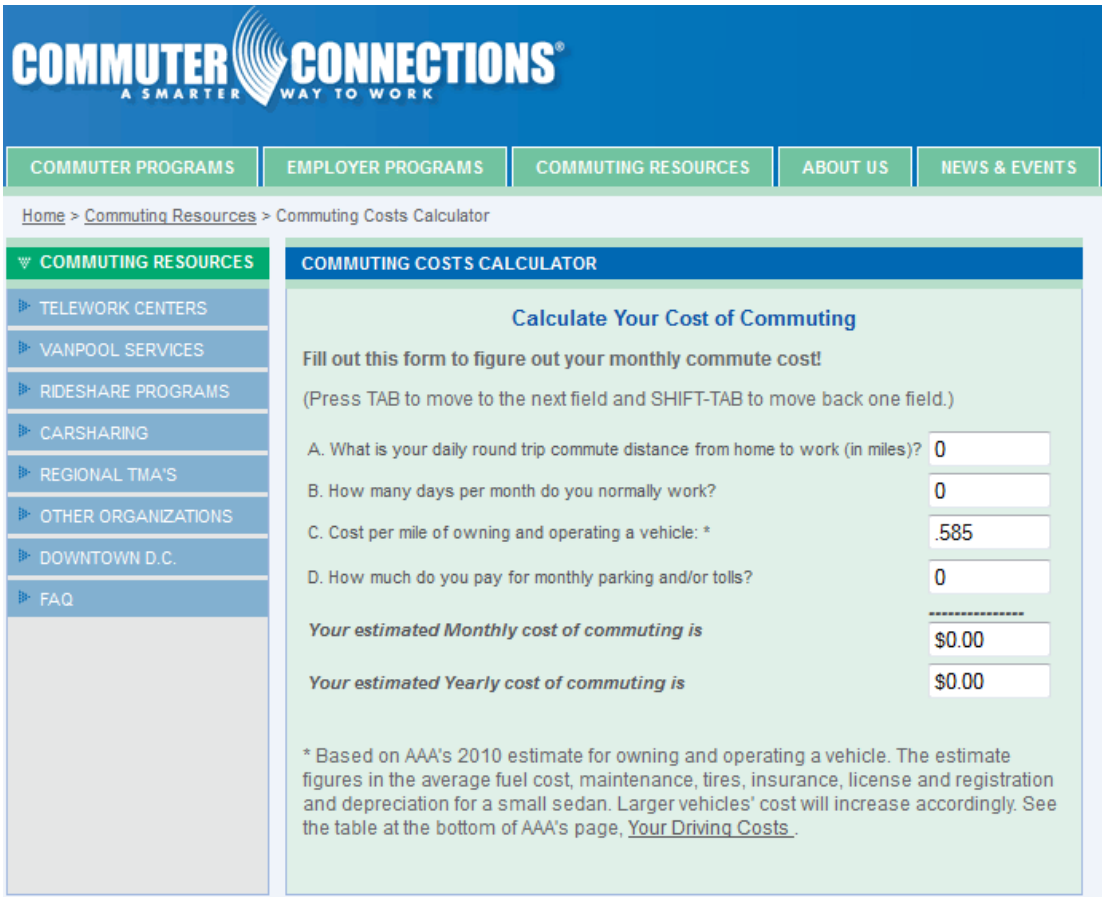
For development projects that including new, private roads, the County's proffer system could potentially be used to set aside curb space for this Hub element.

Commuter Store

Overview

Commuter stores provide one-stop shopping for commuters interested in exploring alternatives to a drive-alone commute, in the form of a retail center, typically located near a transit station or intermodal center. While many such stores focus primarily or exclusively on transit services, and particularly providing schedules, brochures and fare media for a range of transit options, many also provide information on ride-sharing and non-motorized commute options. Typically, these stores provide staff that can help travelers evaluate the many available modal options, analyze their cost, and plan efficient commute itineraries.

Figure 14 - Information Available at Many Commuter Stores - Real Cost of Drive Alone Commuting



MWCOG's Commuter Connnections Webpage: http://www.mwcog.org/commuter2/resources/commutingcalc.html

Benefits

Such stores can overcome common barriers to transit use or other non-drive-alone commutes by providing a single, convenient location at which interested commuters can receive comprehensive information and compare the costs and benefits of the full range of available commute options. These stores and their online complements are, in fact, some of the few places where commuters can directly compare and contrast the real cost of a drive-alone commute with a range of alternative options.

State of the Practice

The following commuter stores provide at a minimum; transit maps, information about transit schedules and fares, staff on hand to assist in trip planning and transit ticket and pass sales.

Fairfax County

Fairfax County operates four Connector Stores to provide the basic commuter store services noted above. One Connector Store is already located in Tysons Corner, at the Tysons West Park Transit Station. Additional Connector Stores are located at the Franconia-Springfield Metro Station, Herndon-Monroe Park and Ride, and Reston Town Center Transit Station

Arlington County

Arlington County Commuter Services, through its Arlington Transportation Partners operates five fixed-location commuter stores and one mobile commuter store, which travels to local employment and shopping centers. Fixed-location stores are located near Metrorail stations in Ballston, Crystal City, and Rosslyn, as well as at the new Shirlington Bus Station and the commuter rail (MARC) station in Odenton, Maryland.

In addition to the core, transit-store offering identified above, Arlington's stores provide the following services:

- Staff to assist trip planning for travel by bus, rail, carpool, vanpool, or bicycle.
- Integration with the SmartBenefits program allowing customers to redeem SmartBenefits vouchers for transit passes or SmarTrip cards or to pick up tickets for MARC or VRE ordered through CommuterDirect.com.
- The Commuter Store adds a 25 cent convenience fee to the cost of WMATA products (Metrobus and Metrorail fares and SmarTrip cards). There is no convenience fee added for seniors and persons with disabilities.[37]

Washington, DC

WMATA has five commuter stores (primarily sales offices, located at the Metro Headquarters on 5th and F Streets, Metro Center Station, the Pentagon Transit Center, the Northern Metrobus Garage, and the Anacostia Metro Station.[38]

[37] The Commuter Store – Arlington. (accessed March 2, 2012). http://www.commuterpage.com/stores.htm

[38] Metro Sales Offices (accessed March 2, 2012). http://www.wmata.com/fares/purchase/where.cfm#commuterstores

Montgomery County

Montgomery County Commuter Services operates two TRiPS (Transportation Resources, Information & Places to See) Commuter Stores. TRiPS Commuter Stores are located near the Friendship Heights Metro Station and the Silver Spring Metro and MARC stations.

All stores provide the following services in addition to transit information and fare-media sales.

- Rideshare (Carpool/Vanpool) and Car-sharing Assistance
- Pedestrian and Bicycle safety information
- Transit-Related Merchandise [39]

Hub Siting Considerations

Spatial Requirements

Although not large, these stores do require building-interior space on the scale of a small- to modest sized newsstand.

Other Considerations

Retail space costs are one of the most significant cost challenges for providing Commuter Stores. The potential to use the County's proffer system to secure free or subsidized space for a hub-based Commuter Store should be explored if this potential Hub element is desired.

[39] TRiPS Commuter Stores (accessed March 2, 2012).
http://www.montgomerycountymd.gov/tcotmpl.asp?url=/content/DOT/transit/commuter/page4.asp

SUMMARY TABLE

The following table provides an overview of the recommended Hub elements, including relative cost levels, implementation timing, and the most suitable Hub Zone locations for each.

Recommended Element	Relative Cost	Implementation Timing	Most Suitable Hub Zones				
			Immediate Station Area	Primary	Secondary	Tertiary	Catchment
Rail Transit	Already Funded	2014					
Bus Transit	No Additional Costs	Ongoing expansion of existing resources					
Car-Share	Low (Maintenance of Curb Space)	Market-Driven (Outside provider must sense market demand sufficient to cover operational costs)					
Taxi Stands	Low (Maintenance of Curb Space)	Immediate					
Bike Shop/ Services	High (Building Space)	Coordinated with Development					
Bike Parking	Low (capital and maintenance/ upkeep costs)	Immediate					
Real-Time Information	Moderate to High (Software, Displays, Maintenance)	Immediate (planning), Medium-Term (funding and deployment)			(via smart phones)		
Trip Planner Services	Moderate to High (Software, Displays, Maintenance)	Immediate (planning), Medium-Term (funding and deployment)			(via smart phones)		
Bike-Share	Low (capital and maintenance/ upkeep costs)	Market-Driven (Outside provider must sense market demand sufficient to cover operational costs)					
Casual Carpool	Low (Maintenance of Curb Space)	Immediate					
Commuter Store	High (Building Space)	Coordinated with Development					

APPENDIX C
TECHNICAL MEMO: HUB SITING AND PRELIMINARY CONFIGURATION

NELSON
NYGAARD

MEMORANDUM

To: Kris Morley-Nikfar, Fairfax County DOT

From: Thomas Brown

Date: June 12, 2012

Subject: Task Memo: Hub Siting and Preliminary Configuration

HUB SITING AND CONFIGURATION

This memo summarizes recommendations for siting Mobility Hub elements at and surrounding Tysons Corner's four in-development Metrorail stations. It is organized into four parts, as follows.

- Overview of recommended siting approach - what should be sited at the station and where additional services should go;
- An overview of existing and expected development patterns around the four stations;
- A summary of WMATA's Station Guidelines; and
- Detailed siting recommendations for hub services at the four stations.

RECOMMENDED SITING APPROACH

We recommend a siting approach that focuses on two levels of Mobility Hub development:

1. **Primary Hub Zones** that combine key, recommended Hub elements placed within or adjacent to each station.
2. **Auxiliary Hub Elements** that expand the impact of the Primary Hub Zone by offering additional mode-connection points throughout the areas surrounding each station.

Primary Hub Zones

These zones have been drawn around the areas included in the WMATA Station Area Plans for the four Metrorail stations — essentially, the grounds that are expected to be controlled by WMATA. The graphics on the following pages depict these zones at each of the four stations.

121 WEST 27TH STREET, SUITE 705 NEW YORK, NY 10001-6207 212-242-2490 FAX 212-242-2549

www.nelsonnygaard.com

Figure 1 Primary Hub Zone at Spring Hill Station

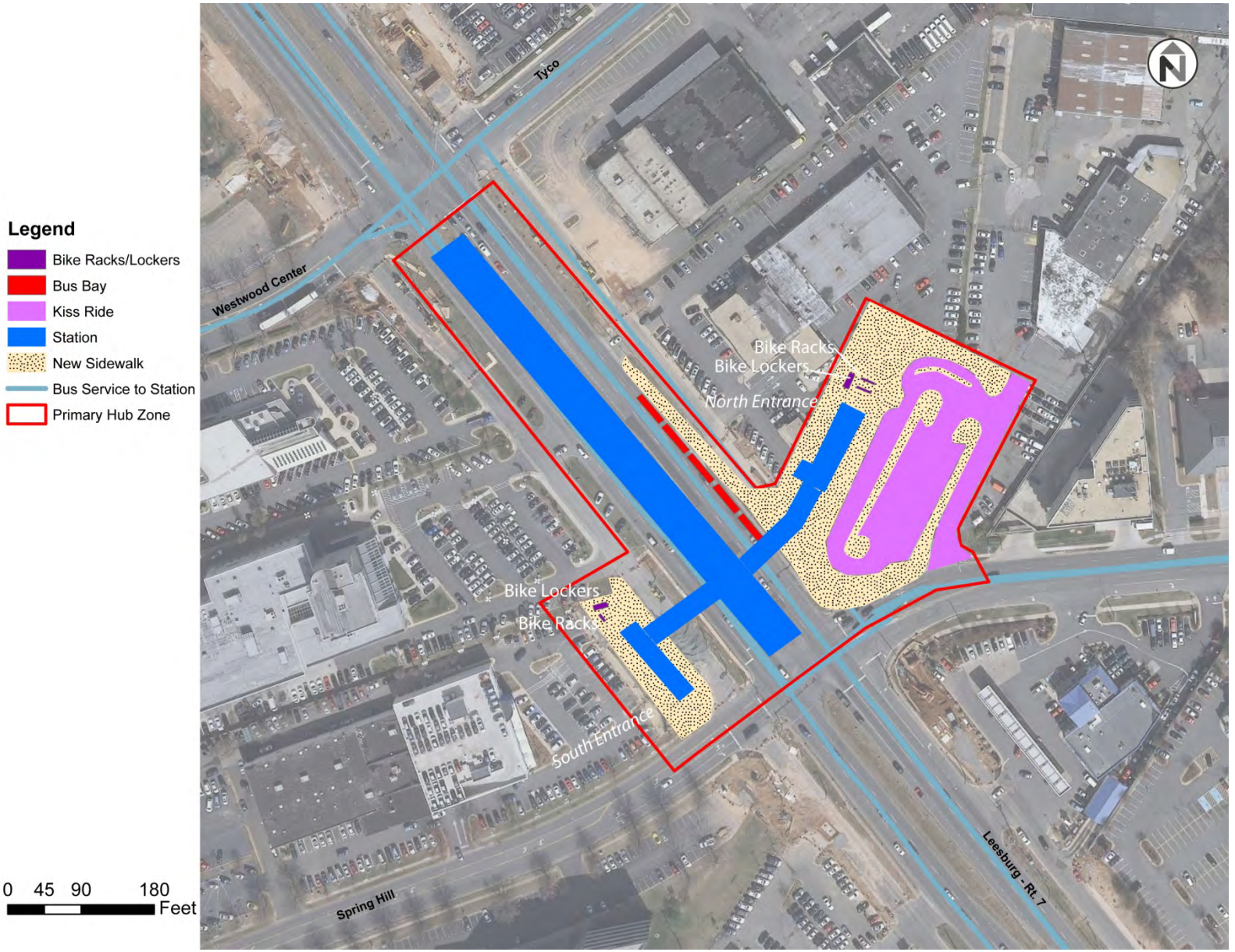


Figure 2 Primary Hub Zone at Greensboro Station

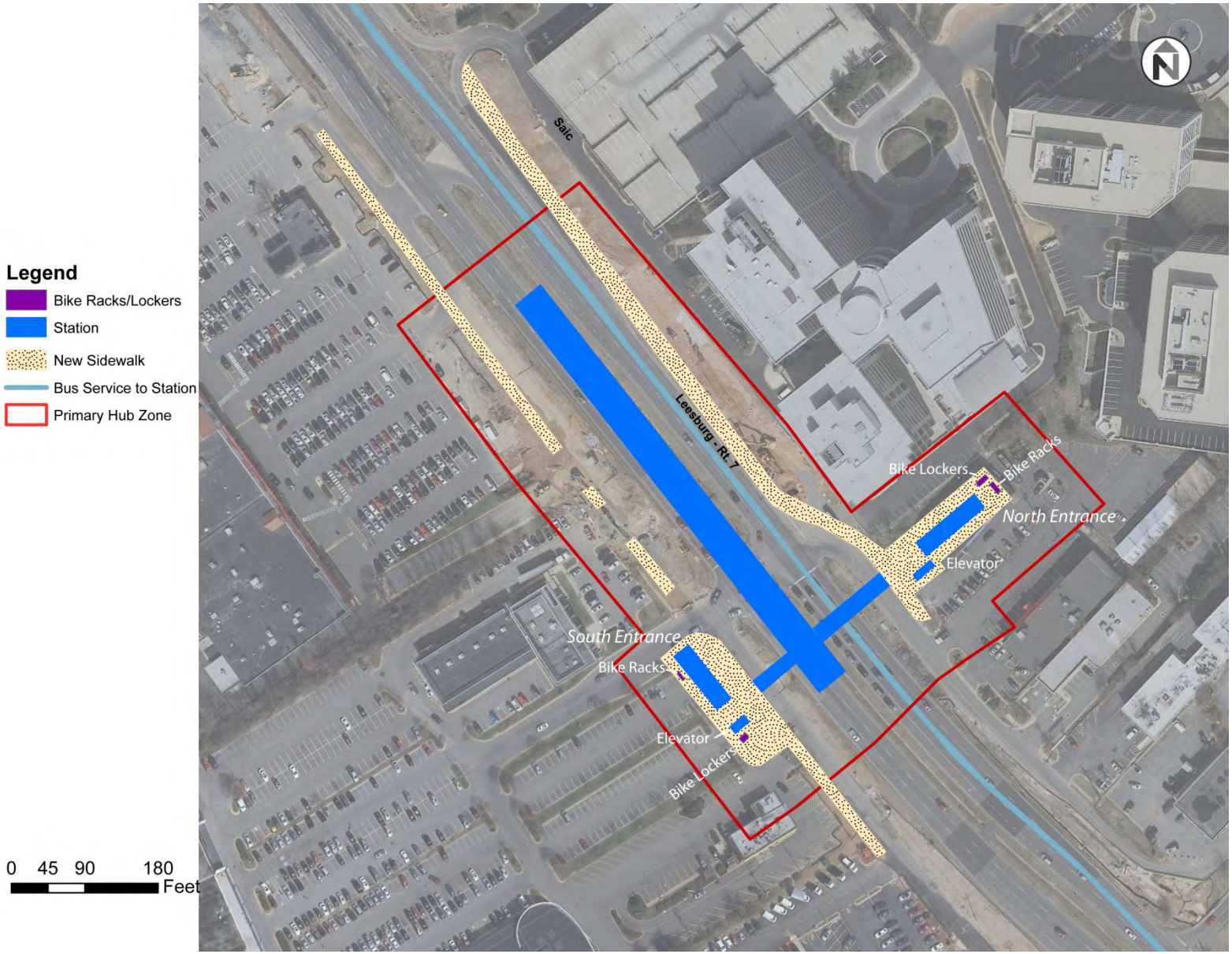


Figure 3 Primary Hub Zone at Tysons Corner Station

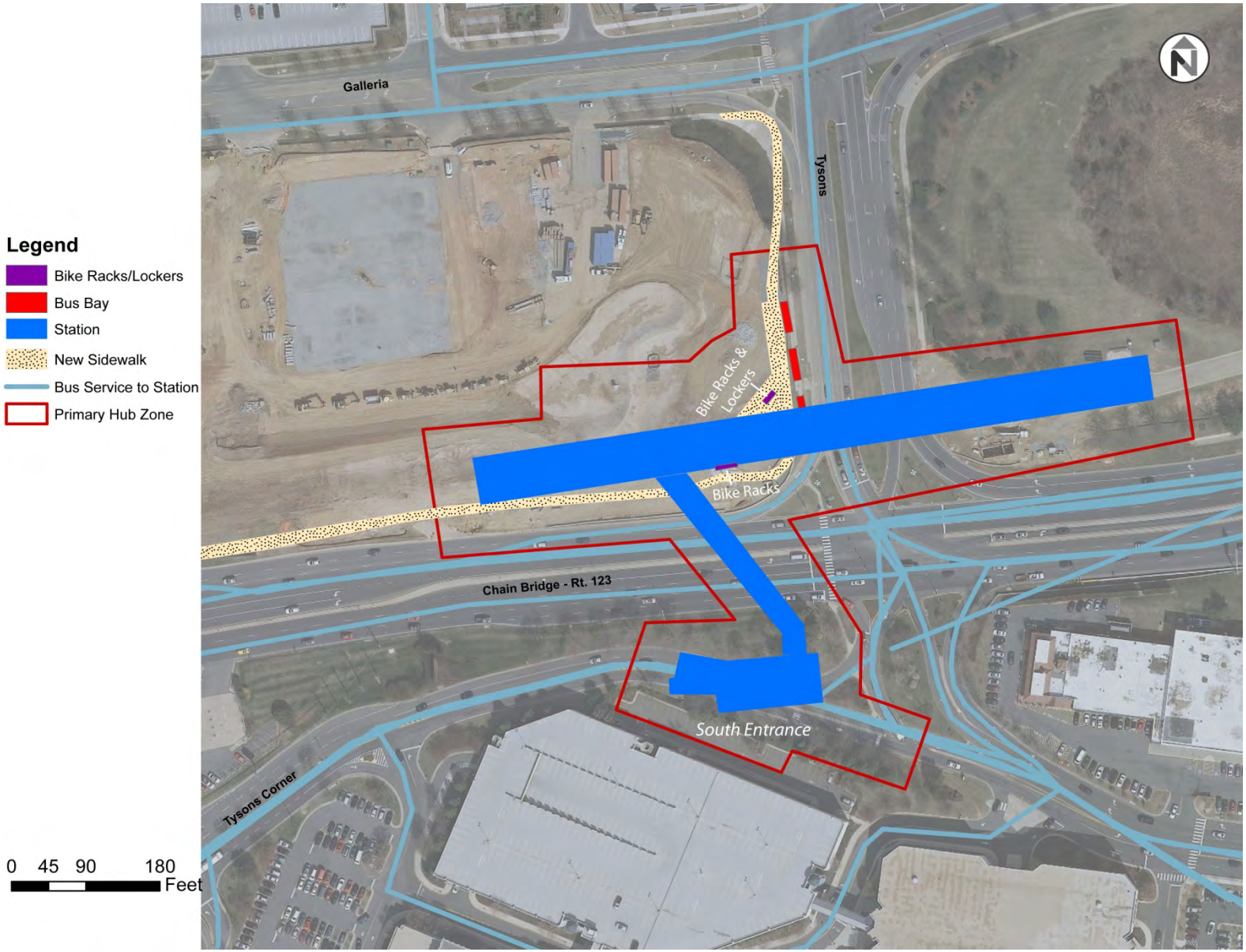
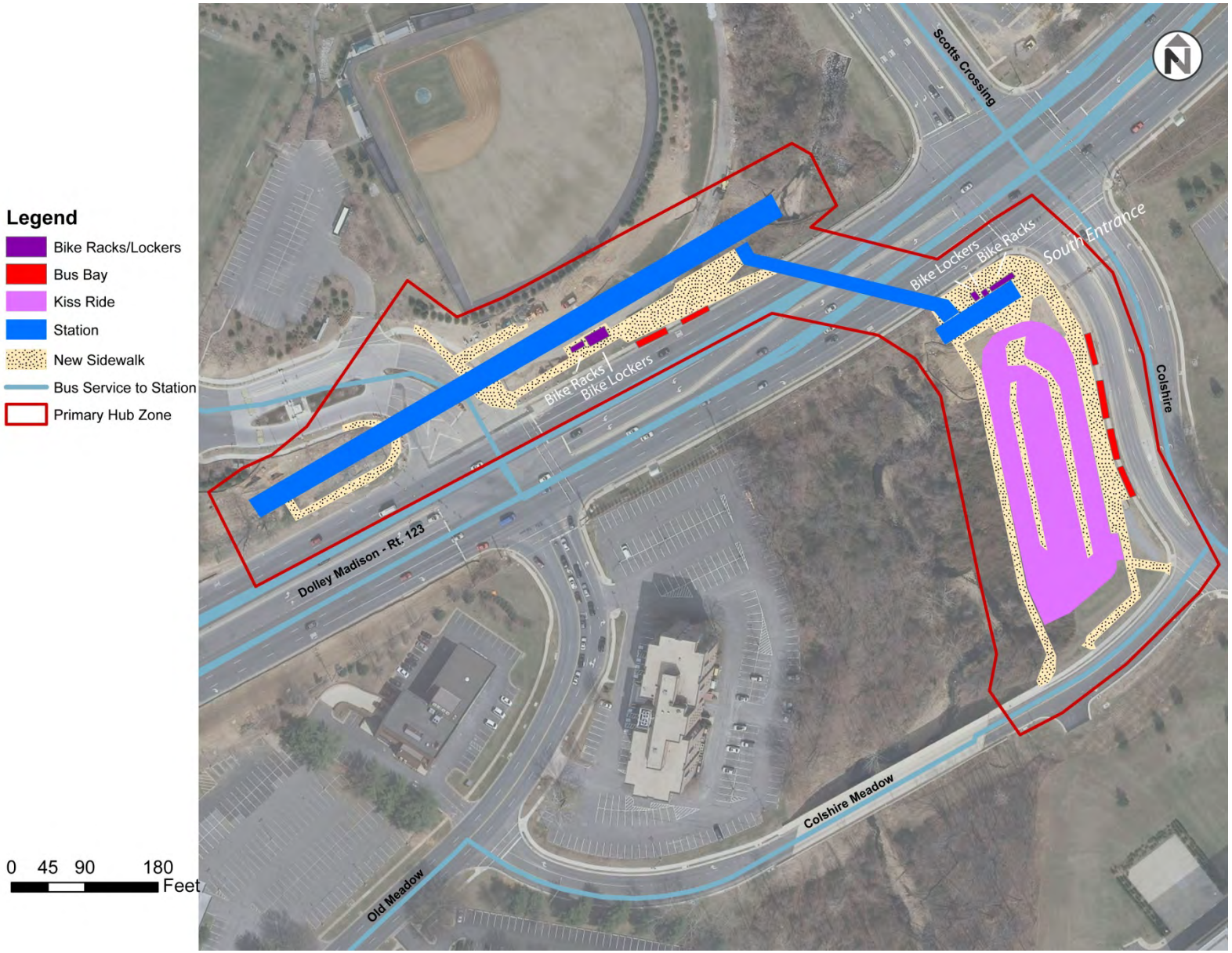


Figure 4 Primary Hub Zone at McLean Station



These areas have largely been programmed for each of the four stations. However, this is the ideal location for a Primary Hub Zone consisting of key, recommended Hub elements brought together in a single, prominent location. As such, the following suite of Mobility Hub elements is recommended to be located within this zone at each station.

Recommend Suite of Primary Hub Zone Elements

Car-Share - Minimum of Three Spaces

Image: Mobilpunkt

Three standard curb spaces to be offered to Zipcar, car2go, or other recognized organization, free of charge, on a right-of-first refusal basis, should be sited within each Primary Hub Zone. Until occupied, these spaces can be programmed as best suits the development of the Mobility Hub concept. For example, these spaces could be used for extra Taxi Stand or Casual Carpool capacity (see below). Or they could be used for bike corrals, depending on the level of unmet demand for bike parking at each station.

Bike-Share Facility - Minimum Set Aside of 240 Square Feet

Image: Norman Chadwick

A dedicated, sheltered short-term bike-parking facility of at least 240 SF should be provided within each Primary Hub Zone. In anticipation of future bike-share service focused on the new rail stations, this would accommodate Capital BikeShare's smallest (7-bike) station configuration. Until it is used for bike-share, these facilities can provide weather-protected space for those making modal connections at the station, or provide extra bike parking capacity if/ when WMATA's bike racks become over-subscribed. Based on the rack and locker capacities identified in WAMTA's station plans, as shown below, the proposed facilities could add significantly to bike parking capacities at each station.

- Spring Hill - 24 rack spaces, 20 locker spaces – 500 sq. ft.
- Greensboro – 10 rack spaces, 10 locker spaces – 240 sq. ft.
- Tysons Corner – 18 rack spaces, 10 locker spaces – 300 sq. ft.
- McLean – 26 rack spaces, 20 locker spaces – 525 sq. ft.

Taxi Stand/ Casual Carpool (Slugging) - Minimum Three-Vehicle Capacity

Image: Alfred Molon

Three standard curb spaces to be reserved for taxi stand capacity as demand suggests (likely weekdays from morning- through evening-peak periods) should be sited at each Primary Hub Zone. Where demand exists, these spaces should be set aside for Casual Carpool loading (Slugging) on weekdays during the morning-peaks. If such spaces prove under-utilized, these curb resources can be reprogrammed as best suits the development of the Mobility Hub concept until and unless greater demand emerges.

Commuter Store (+ Trip-Planner Services) Kiosk

Image: Beyond DC

A "kiosk" similar to the new Ballston Station Commuter Store in Arlington County is recommended for each Primary Hub Zone. Where and when feasible, this should include a state-of-the-art, interactive Trip Planner display to complement the personal trip assistance offered by the staffed kiosk. The Ballston Station kiosk measures roughly 200 square feet in size, making it highly suitable as a Primary Hub anchor.

Real-Time Travel Information

Bus Arrival Information Display in Java Shack, near Court House. Image: Mobility Lab

Real-Time information displays, with Next Train and Next Bus information, should be included at each Primary Hub Zone, preferably at or near the Commuter Store Kiosk.

Beyond Primary Hub Zones: Siting Auxiliary Hub Elements

Siting Auxiliary Hub Elements in the areas beyond the Primary Hub Zones is intended to expand the mobility network outward from each new Metrorail station — extending the benefits and impact of the new transit service while also creating a "web" of connectivity independent of any central connection point. Furthermore, the expected intensity of redevelopment in these area presents a unique opportunity to:

- Guide the development of land uses and multi-modal infrastructure to further the impact of the new rail service in moving Tysons Corner toward a fully multi-modal, car-independent mobility future;
- Use development proffers to install modal-connection points and amenities beyond the four immediate station areas; and
- Ensure that County policies, actions, and investments are well-aligned with these opportunities to maximize the potential synergies between public and private investments.

The Toronto model of defining concentric, hierarchical zones surrounding a transit station offers a useful precedent for organizing the siting considerations for areas within 5- and 10-minute walking distance of each station (Secondary and Tertiary Zones, respectively), and those areas beyond what most people will consider "walking distance" (Catchment Zones).

Secondary Hub Zones

These areas surround the Primary Hub Zone and extend out to about a quarter-mile (a 5- to 8-minute walk) from the center of the station. Still a short walk from train service, this is an ideal location to concentrate mobility investment that will benefit most from high levels of visibility and foot traffic. .

Tertiary Hub Zones

These areas surround the Secondary Hub Zone and extend out to about a half-mile (a 10- to 15-minute walk) from the center of the station. This is about the distance at which the influence of high-level transit access on ridership and car-ownership/-use starts to decline. Auxiliary Hub Elements, such as car-sharing, bike parking, bike-sharing, and trip-planner services, sited and made apparent in these areas could provide an opportunity to extend the geographic impact of the new rail service, while also creating new webs of multi-modal connectivity that can, in themselves, reduce auto-reliance and promote sustainable forms of local mobility.

The long-term objective for these areas should be to continue to expand the web of multi-modal connections begun within the more-central zones, though a combination of public investment, development proffers, and zoning strategies. In particular, zoning strategies will become increasingly important further away from the station.

Catchment Zones

These areas surround the Tertiary Hub Zone and extend out to one mile (about a 5-minute bike ride) from the station. This is where policies that promote the provision of many Auxiliary Hub Elements, such as bike parking and car-share at multi-family buildings and places of employment, can help address common "First Mile-Last Mile" barriers to transit reliance. Homes with ample, secure bike parking, in conjunction with station-area or Primary Hub bike racks, can provide vital support for cycling connections to transit or other Hub services. Likewise, the development of high-quality, coordinated Real-Time Information and Trip Planner websites and phone apps can reduce resistance to relying on bus connections to Metrorail. Finally, while most residents in these areas may find not having a car to be impractical, a local proliferation of car-share vehicles tends to encourage households to keep just one car.

Figure 5 Secondary Hub Zone at Spring Hill Station

Figure 6 Tertiary Hub Zone at Spring Hill Station

Figure 7 Secondary Hub Zone at Greensboro Station

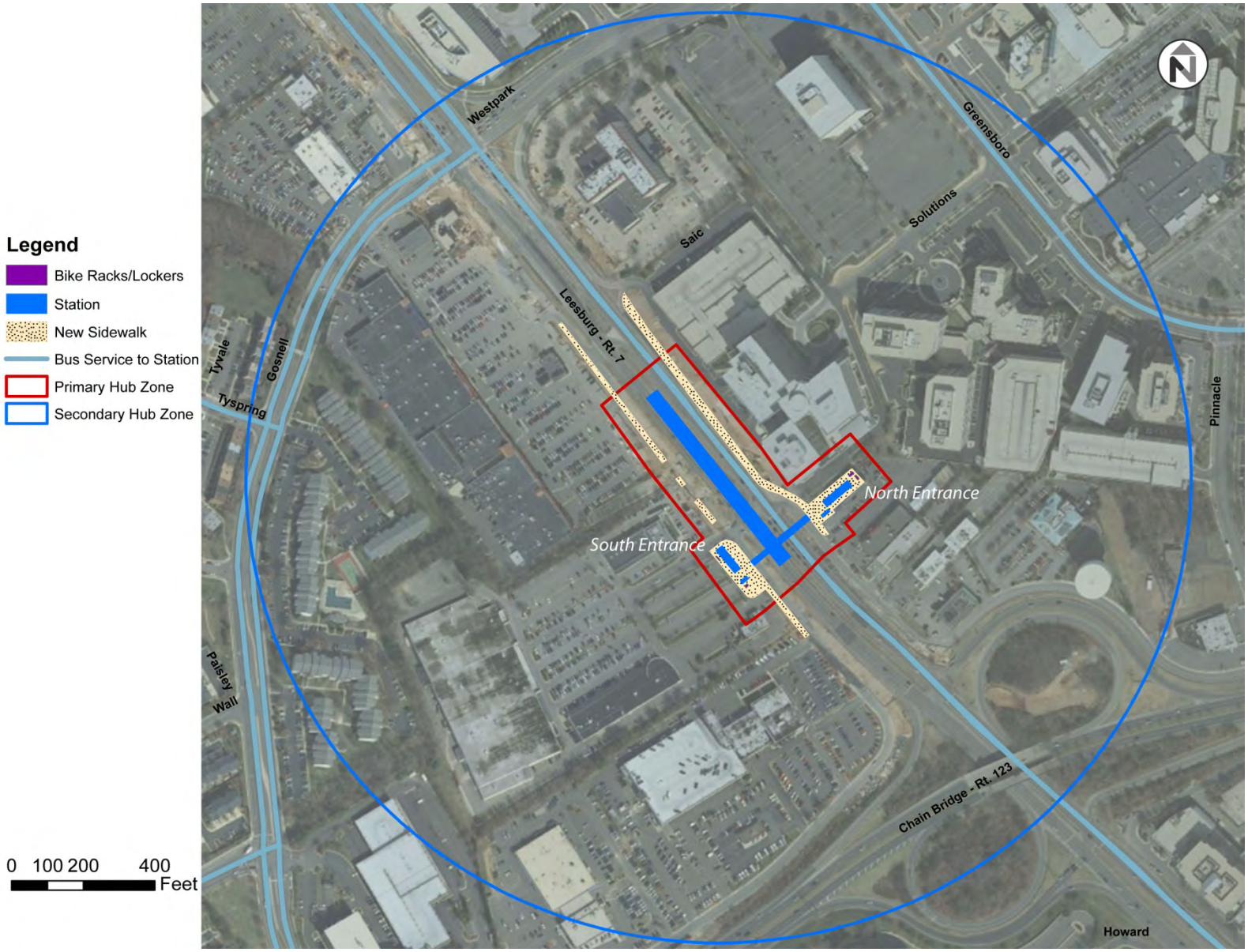


Figure 8 Tertiary Hub Zone at Greensboro Station

Figure 9 Secondary Hub Zone at Tysons Corner Station

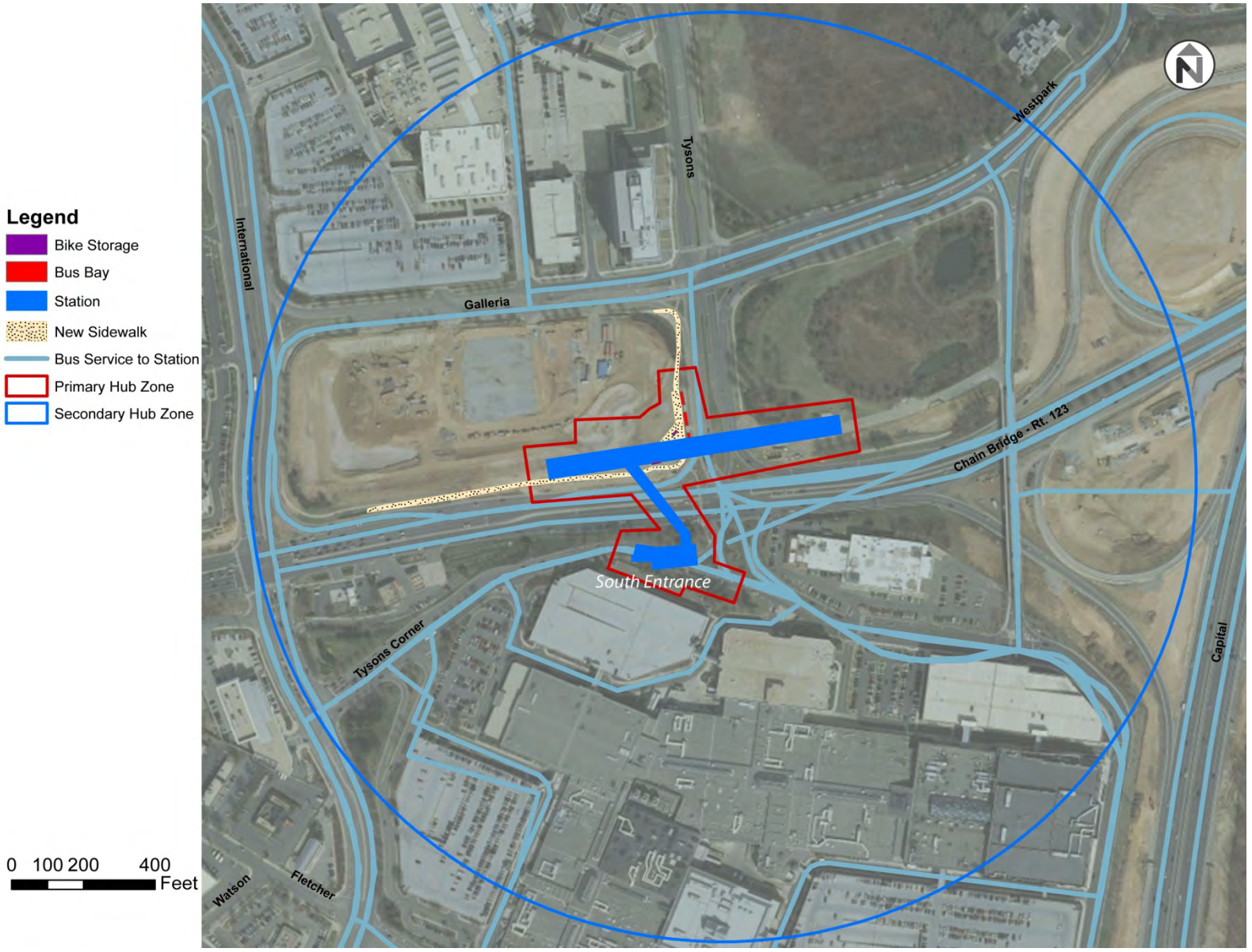


Figure 10 Tertiary Hub Zone at Tysons Corner Station

Figure 11 Secondary Hub Zone at McLean Station

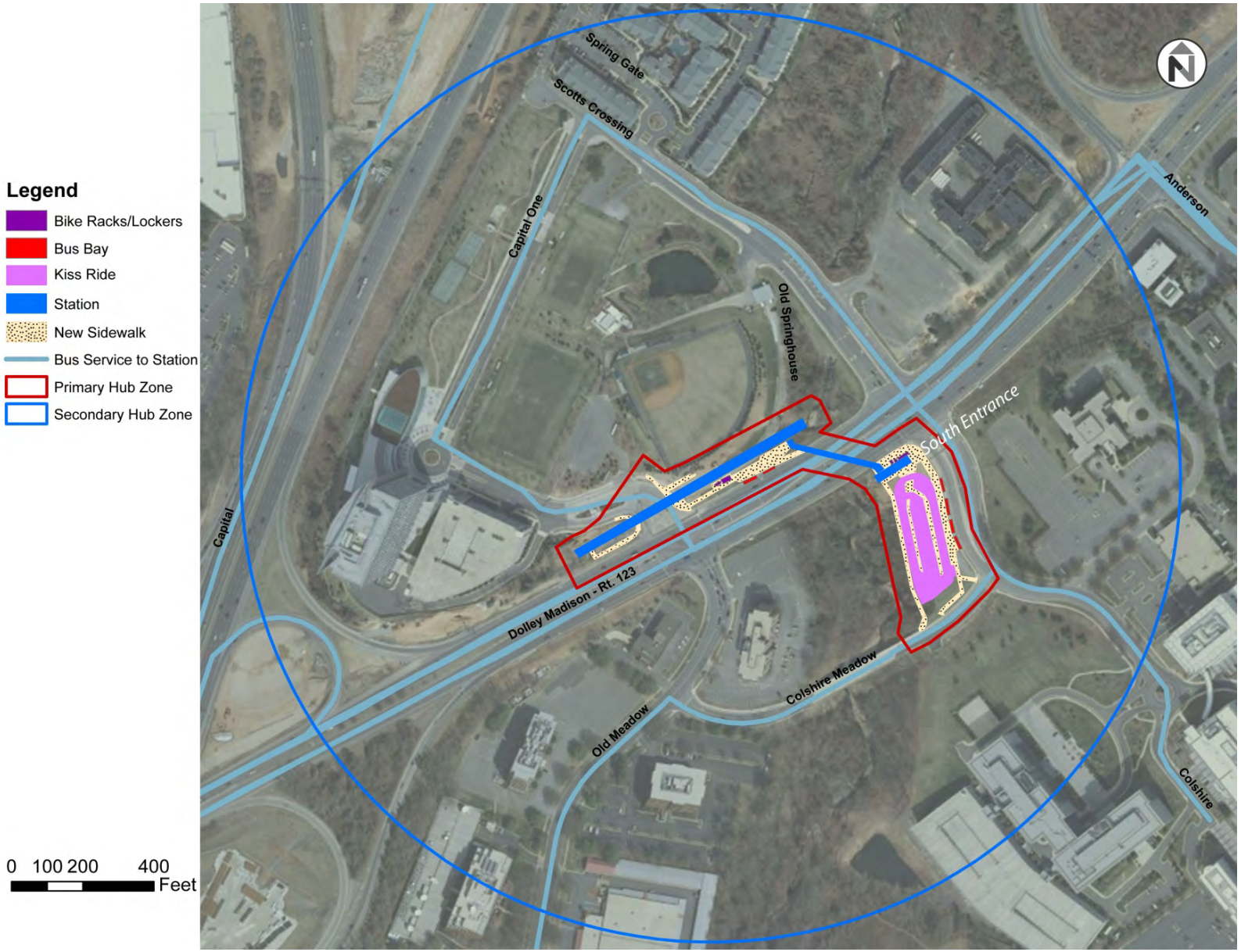


Figure 12 Tertiary Hub Zone at McLean Station

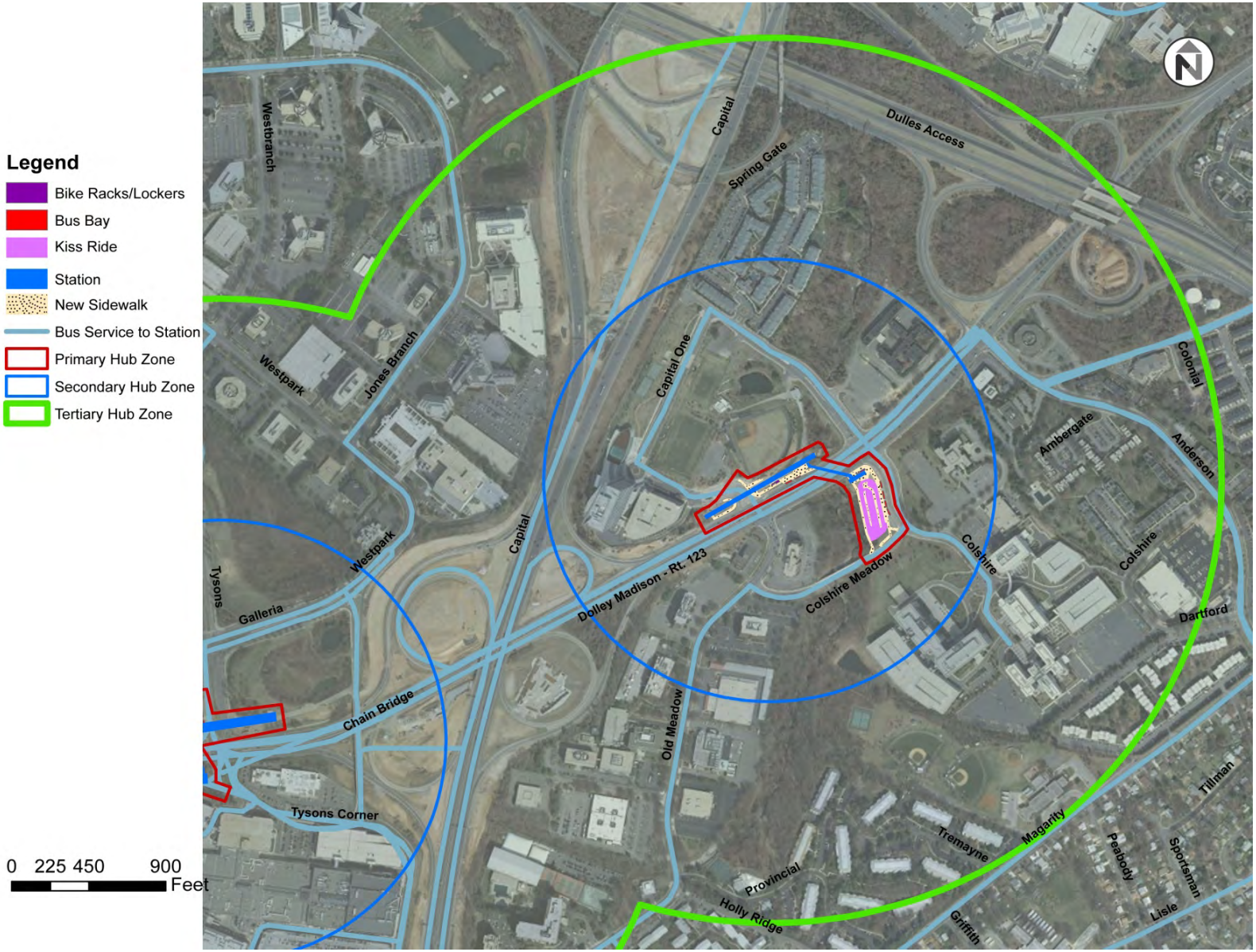
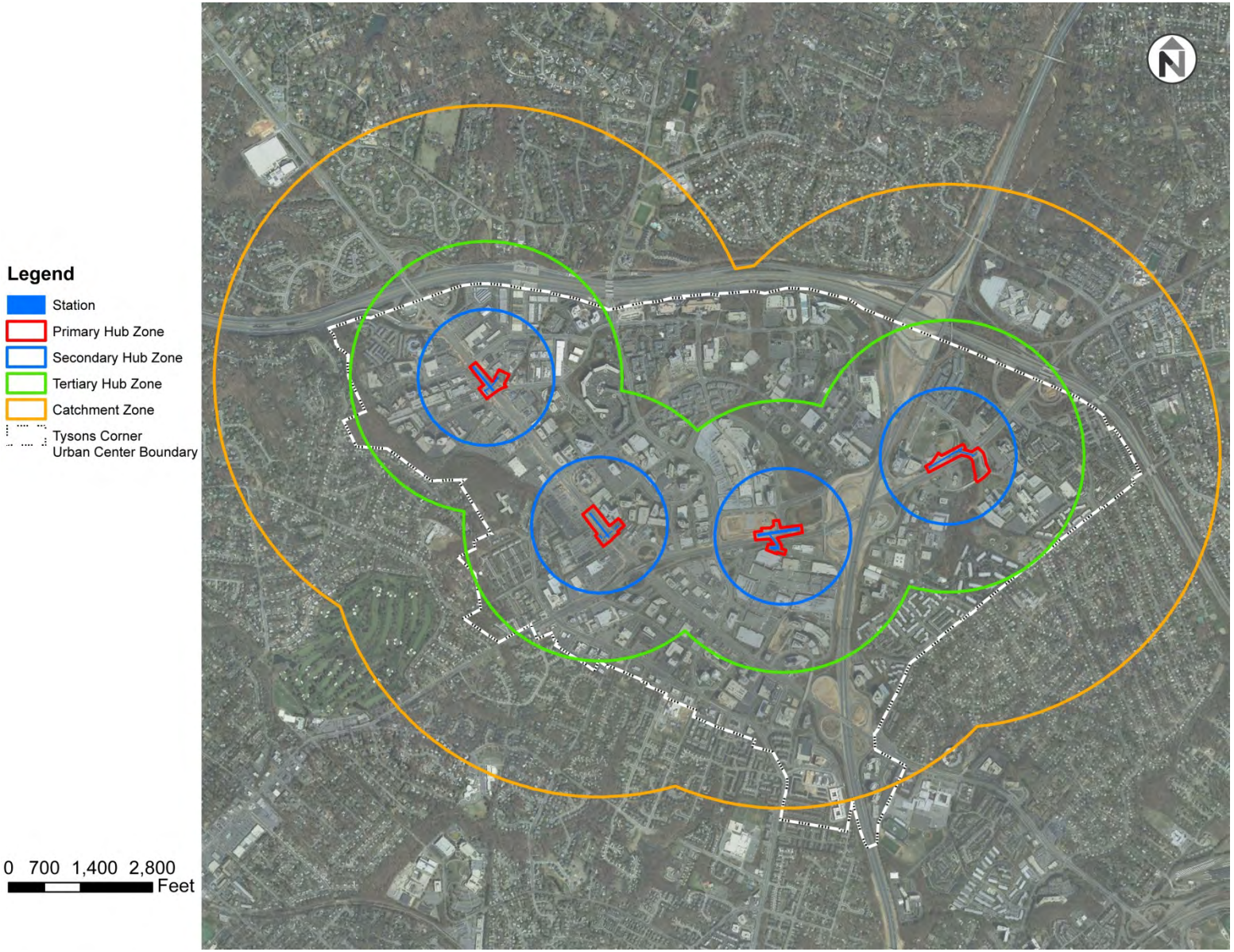


Figure 13 Catchment Zones



Car-Share

On-street space dedication and off-street facilities serving new land uses in these areas can effectively expand car-share access beyond the Primary Hub Zone. Siting objectives should include station access points not served by the Primary Hub and any significant bus stops outside the Primary Hub Zone.

Secondary and Tertiary Hub Zones

In these areas, siting car-share spaces should focus on locations within private developments. Any developer providing significant on-site parking facilities in these areas should be encouraged to set aside space for a few car-share vehicles, to be offered on a "right of first refusal" basis — meaning they will be made available for car-sharing if and when a recognized car-share organization expresses interest in them.

Options for providing on-street locations, whether on new or existing, public or private streets, should also be sought in these areas. On-street spaces are preferred, as these locations increase the public awareness of car-share services, and many car-share users prefer to access car-share via these locations compared to locations within unfamiliar off-street facilities.

Consider offering density bonuses or other incentives for developments providing on-site car-share access.

Implementation Timing

Implementation in these areas will rely primarily upon the timing of private development projects that offer suitable car-share parking opportunities. Opportunities to designate on-street car-share parking may also be pursued as demand merits.

Implementation Mechanisms

Implementation within these zones will rely upon finding suitable on-street locations as well as locations within private development. Siting car-share spaces within private developments can be accomplished through the development approvals process, either through proffers or by using zoning incentives, such as reduced parking requirements. Use of designated spaces as car-share parking will depend on the ability to attract interest from a car-share provider.

The Catchment Zone

Developers in these areas should be provided incentives for locating car-share vehicles within private developments. Studies have consistently shown that car-share membership induces households to shed vehicles.[1] And once these vehicles are shed, car-share members tend to

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[1] Studies include:

Martin, Elliot and Shaheen, Susan, "The Impact of Carsharing on Public Transit and Non-Motorized Travel: An Exploration of North American Carsharing Survey Data," Energies, 4 (2011), http://76.12.4.249/artman2/uploads/1/The_Impact_of_Carsharing_on_Public_Transit_and_Non-Motorized_Travel.pdf (accessed April 4, 2012).

Martin, Elliot and Shaheen, Susan, "Impact of Carsharing on Household Vehicle Holdings: Results from North American Shared-Use Vehicle Survey," Transportation Research Record, No. 2143 (2010): 150-158.

Kathleen Maclay, "Car sharing spurring fundamental travel changes, says UC Berkeley study," UC Berkeley News, http://berkeley.edu/news/media/releases/2003/10/23_car%20sharing.shtml (accessed April 4, 2012).

Adam Millard-Ball et al., *Car-Sharing: Where and How It Succeeds*, Transportation Research Board, Report 108 (2005).

increase their reliance upon transit, walking, and biking for trips that they would otherwise have made by car. The catchment zone areas represent ideal locations to foster such transitions — homes and jobs are close enough to rail to generate higher than average transit commute rates, yet development patterns likely encourage driving for most other trips.

Consider offering density bonuses or other incentives for developments providing on-site car-share access.

Implementation Timing

Implementation in these areas will rely upon the timing of private development projects that offer suitable car-share parking opportunities. Spaces on public streets in these areas are unlikely to contribute significantly to Hub functionality.

Implementation Mechanisms

Implementation within these areas will rely upon finding suitable locations within private development. This can be accomplished through the development approvals process, either by using incentives, such as reduced parking requirements, or through proffers. Use of designated spaces as car-share parking will depend on the capacity to attract interest from a car-share provider.

Bike Parking

Automated Bike Parking Portal in Tokyo Image: Owen Finn

A combination of public investments and development proffers can ensure the proliferation of convenient, attractive, well-maintained, bike racks across all Zones. Opportunities to develop off-street, long-term, public bike parking facilities should also be a priority in these areas. Recent zoning code changes will help ensure consistent access to accessory parking facilities at newly developed buildings, while proffers may provide opportunity to seek innovative solutions to meet public parking demand.

Secondary Hub Zones

Secondary Hub Zones may provide very suitable opportunities to provide innovative, commuter bike parking solutions, with minimal impact on local streetscapes and sidewalks, within a short walk of the new stations. This could include automated facilities that combine convenient public-realm pick-up and drop-off with space-efficient, indoor or subsurface storage.

Secondary Hub Zones are also prime locations to begin expanding local bike rack inventories. Providing this sort of supportive infrastructure will be critical to increasing local bicycling rates, which in itself will be critical to developing a market for bike-sharing services.

Implementation Timing

Off-street parking within new buildings will follow the timing of private development in these areas.

Placement of bike racks in these areas will need to respond to the land uses that will be in place after rail transit comes online. Immediate installation at suitable, current uses in these areas that

are likely to remain after redevelopment may be desirable. But, for the most part, implementation should probably wait until expected redevelopment begins to take shape.

Implementation Mechanisms

Long-term parking implementation in these zones will be largely dependent upon provision within new development.

While bike racks tend to be on the low end of transportation infrastructure costs, development proffers provide a unique opportunity to deliver high-quality racks throughout these zones. This provides another argument for short-term, rather than immediate, implementation here.

Tertiary Hub Zones

Siting bike parking within these areas should focus on facilitating bike mobility for local trips. The more that local residents and employees choose walking and cycling for local trips, the more likely they are to use transit to reach more distant destinations. Two distinct siting approaches should be pursued.

1. Installing attractive, high-function bike racks in prominent locations near commercial (shopping, services, and dining) and civic destinations (parks, plazas, libraries, schools, government services, etc.).
2. Seeking provision of quality, indoor parking facilities at local multi-family residential and employment-oriented developments.

Implementation Timing and Mechanisms

Same as for Secondary Hub Zones above

The Catchment Zone

A scaled-back version of the same approach recommended for the Secondary and Tertiary Hub Zones is recommended for these areas. Placement of bike racks should be more selective, particularly if proffer-based opportunities are fewer here. Provision of tenant bicycle parking within residential and employment-based buildings, however, will be very useful for encouraging bike-to-train and train-to-bike commutes among local residents and employees.

Implementation Timing

Timing bike rack installations in this area should depend on the identification of prudent public investment opportunities (large or clustered commercial destinations, significant civic uses, etc.) and opportunities to encourage private investment at new development. Provision of tenant parking within residential and employment-based uses will necessarily follow the timing of redevelopment. However, any zoning changes necessary to ensure appropriate facilities in these areas (see Implementation Mechanisms below) should be pursued immediately.

Implementation Mechanisms

Bike rack installation in these areas will likely rely more heavily on public funding compared to closer-in zones. The development approvals process is likely to be a less effective route to encouraging bike parking facilities within new development in these areas. Rather, it will be important to develop bicycle parking requirements within applicable zoning codes.

All Zones

New zoning code requirements for quality, convenient bike accommodations to serve tenants and visitors at newly developed land uses, as identified in the most recent Comprehensive Plan, will help expand parking options across all Zones. A few examples of these requirements are presented below.

Type of Use	Requirement
Multi-Family Residential	▪ 1 space for every 5 units ▪ 1 visitor space for every 25 units ▪ Min. 2 spaces
Commercial-Retail	▪ 1 space per 10,000 sq. ft. ▪ 1 visitor space per 5,000 sq. ft. ▪ Min. 2 spaces
Office	▪ 1 space per 7,500 sq. ft. ▪ 1 visitor space per 20,000 sq. ft. ▪ Min. 2 spaces

Taxi Stand

Siting objectives for Auxiliary taxi stands beyond the Primary Hub Zones should include serving any significant bus stops outside the Primary Hub Zone .

Secondary and Tertiary Hub Zones

Focus on curbside opportunities near transit stops. Siting will be most effective if within public rights of way. PM-peak pickup space on private roads and driveways may be occasionally important to provide taxi services to large employment.

Implementation Timing

Locations for taxi stands within these Zones should be identified as suitable locations are identified near major bus transfer locations or large employment sites.

Implementation Mechanisms

Implementation within this area should primarily focus on curbside opportunities on public roads.

Bike-Share

While the Primary Hub Zones are the most obvious locations for placing bike-share services, to serve as a First Mile/ Last Mile connection to and from these locations, bike-share will need to expand into the surrounding Zones.

The most important means of supporting this expansion will be to implement the siting recommendations for bike parking in these areas, as described in the Bike Parking section above. This will directly support the feasibility of dock-less bike-share operations — an emerging model that may eventually be adopted by established programs, such as Capital Bikeshare —by expanding the public infrastructure they utilize in lieu of formal docking stations. It will also indirectly support the feasibility of all forms of bike-share by supporting an increase in cycling

throughout the Tysons Corner area. While such infrastructure investments alone will not increase the popularity of cycling, they have proven very effective in tapping latent demand.

Furthermore it is recommended to coordinate with the planners for Capital Bikeshare to identify potential station locations beyond the Primary Hub Zones as new land uses and land use patterns emerge in these areas, and to track their interest in commencing operations in the Tysons Corner area. In particular, input on the types and densities of land uses that create suitable locations for their stations should help guide the County in seeking proffers for appropriately-sized plaza-space set asides.

Implementation Timing

Placement of bike racks in these areas will need to respond to the land uses that will be in place after rail transit comes online. Immediate installation at suitable, current uses in these areas that are likely to remain after redevelopment may be desirable. But, for the most part, implementation should probably wait until expected redevelopment begins to take shape.

Coordination with Capital Bikeshare planners will be critical for anticipating where and when to negotiate for plaza space that can accommodate future stations.

Implementation Mechanisms

See Bike Parking above for public bike rack placement. For bikeshare stations, negotiations with Capital Bikeshare and private developers will be the primary siting mechanism.

Casual Carpool (Slugging)

Casual carpool loading spaces near freeway entrances can provide another mobility element that reduces solo-driving dependence within Tysons Corner Mobility Hubs. Furthermore, such spaces need only be reserved as such during weekday morning hours.

Secondary and Tertiary Hub Zones

This element can be strategically located along public or private streets throughout these zones, with an emphasis on sites near freeway entrances.

Implementation Timing

This element is not likely to be a priority, but rather something to add where and when the opportunity presents itself.

Implementation Mechanisms

Depending on the location of the identified opportunity, implementation will either require dedication of public street curb space, or accommodation within private driveways or parking facilities.

Real-Time Travel Information

Image: Paul Masck

Selective investments in on-site displays, combined with web- and phone-based applications providing Next Bus information can help develop reliance upon local bus and rail options throughout the greater Tysons Corner area.

Secondary Hub Zones

Providing Next Bus information signs at all bus stops should be a short-term objective. The County should also coordinate with staff at Mobility Lab to explore strategies to install their real-time transit screens at businesses within these station-adjacent areas. [2]

Tertiary Hub Zones and Beyond

In these areas, well-designed and comprehensive web- and phone-based applications can be highly effective means of expanding the benefits of tracking real-time locations of transit vehicles. Also consider offering density bonuses or other incentives for developments to provide on-site bus stop amenities and/ or fund installation of "next bus" signs at local bus stops.

Implementation Timing

Funding opportunities to install displays and/ or kiosks should be sought immediately if they are desired for any of the Hubs. Likewise, development of comprehensive web- and phone-based applications should begin immediately, by reviewing the process by which similar applications have been designed and distributed.

[2] http://mobilitylab.org/2012/01/05/experimental-real-time-transit-screens-come-to-arlington-and-dc/

Implementation Mechanisms

Ultimately, developer proffers may be critical to securing adequate funding for both physical installations and web/ phone applications of desirable design and functionality. Opportunities may exist to partner with local Fairfax colleges among others to help develop web and phone applications.

Trip-Planner Services

Outside Primary Hub Zones, the value of installed kiosks will drop significantly. One exception, however, might be large developments that could incorporate suitable space for a kiosk at which visitors, residents, and employees could explore the area's many mobility options, and assess their utility in meeting their travel needs.

For the most part in these areas, however, well-designed and comprehensive web- and phone-based applications should be emphasized, as highly effective means of expanding the benefits of the trip planning technologies that are becoming increasingly common regional-mobility tools.

Implementation Timing

Funding opportunities to install displays and/ or kiosks should be sought immediately if they are desired for any of the Hubs. Likewise, development of comprehensive web- and phone-based applications should begin immediately, by reviewing the process by which similar applications have been designed and distributed.

Implementation Mechanisms

Ultimately, developer proffers may be critical to securing adequate funding for both physical installations and web/ phone applications of desirable design and functionality. Opportunities may exist to partner with local Fairfax colleges among others to help develop web and phone applications.

Bike Shop/ Services

Due to the current, low volume of bike ridership in Tysons Corner, and the spatial requirements of this element, siting these services is not recommended for Primary Hub Zones. A Bike Shop/ Service center, however, could complement a Primary Hub Zone, and help raise the local cycling profile, from a suitable location within a Secondary Hub Zone, and may prove a worthwhile element to pursue through a proffer as new development and cycling demand increase.

Secondary Hub Zones

Secondary Hub Zones are ideal locations to seek these mobility elements. This would place a highly-visible means to promote cycling within immediate proximity of thousands of daily transit riders, complemented by access to information and repair services that can reduce purchase and maintenance barriers.

Implementation Timing

Opportunities to develop this element should be pursued as development patterns change and cycling activity increases.

Implementation Mechanisms

Proffers from private developers to provide free or significantly-discounted retail space are likely the most feasible options for implementing this Hub element.

Beyond Secondary Hub Zones

Where neighborhood-level interest in cycling for station-area or other local trips is high, this element could be sought through proffers on the site of new development, particularly new commercial centers.

Implementation Timing

This element should be sought only as unique opportunities present themselves.

Implementation Mechanisms

Proffers from private developers to provide appropriate retail space at a significant discount.

EXISTING AND PLANNED DEVELOPMENT PATTERNS

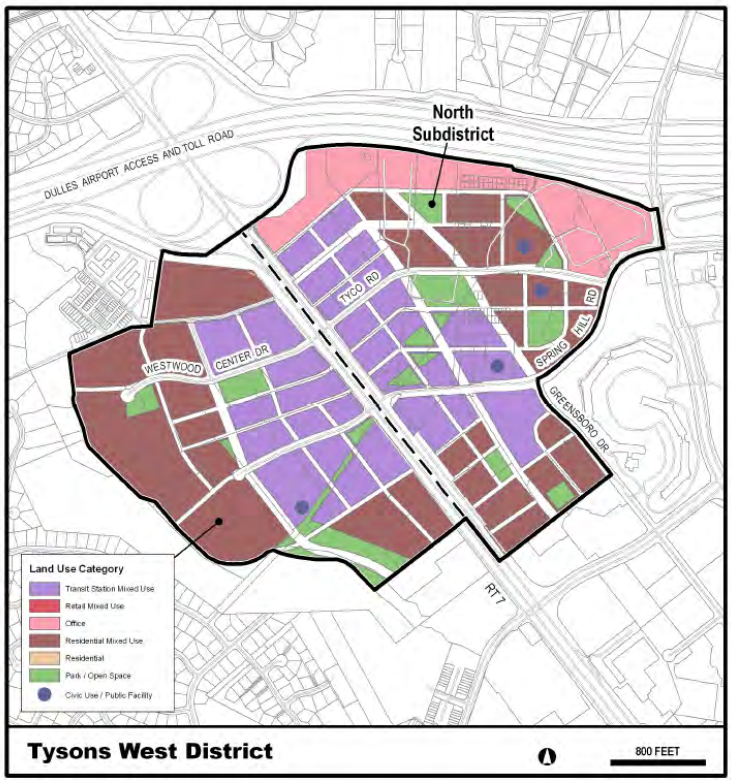
To determine the most appropriate location, design, and elements for each station's mobility hub, and to understand how these hubs will evolve over time, it is critical to evaluate the station area land uses today and those anticipated in the future. The following sections outline existing land use conditions, based on previous County site analyses, site visits and aerial photography; and future land uses, based on the 2010 Tysons Corner District Recommendations adopted as part of the County's Comprehensive Plan.

Spring Hill

Existing Development Patterns

The Spring Hill station is located at the intersection of Leesburg Pike (Route 7) and Spring Hill Road. Auto oriented businesses, such as car dealerships and car repair, are a primary land use at this time. Other land uses include small retail and national hotel chains with large parking lots fronting the streets. Just beyond the quarter mile radius of this station are single-family residential neighborhoods to the north and west. The existing street and trail network, however, offers minimal connectivity from these residential neighborhoods to the station area.

Planned Development Patterns



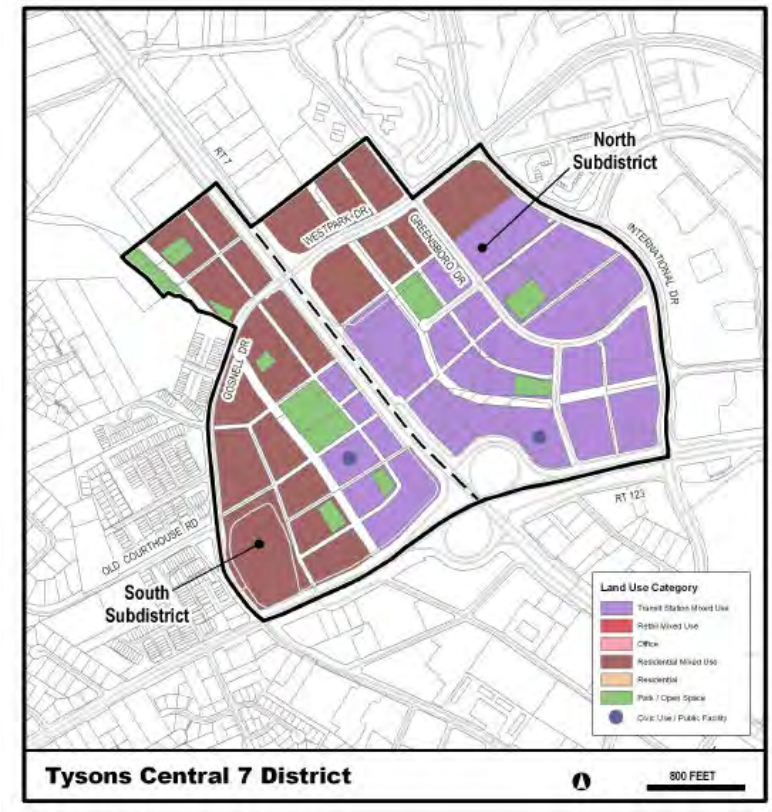
As envisioned in the County's Comprehensive Plan, a more diverse land use configuration will emerge in the Spring Hill station area. Office uses will benefit from immediate adjacency to the metro station. Overall, the area will support after-work arts and entertainment uses fronting on tree-lined pedestrian-oriented streets. Over the ¼ to ½ mile distance from the station, these uses will merge with new higher density mixed-use residential neighborhoods.

Greensboro

Existing Development Patterns

The Greensboro station is located on Leesburg Pike between its intersection with Westpark Drive and its interchange with Chain Bridge Road (Route 123). A key land use feature is its location immediately west of the corporate headquarters for SAIC, a Fortune 500 technology company. SAIC has a multi-story parking deck fronting Leesburg Pike. Other land use features are similar to Spring Hill, including automotive businesses, small single story retail, and a franchise hotel, all with large parking lots fronting the streets. Within 1/8 to ¼ mile west of the station are townhouse and multi-family residential neighborhoods. Although there are sidewalks connecting these residential areas to the station location, they area situated between parking lots and high-speed roadways, creating an unsafe and uncomfortable pedestrian environment. Beyond the ¼ mile station radius are single-family detached residential neighborhoods to the west and south.

Planned Development Patterns



Located less than three quarters of a mile down Leesburg Pike from Spring Hill station, a re-envisioned streetscape for Leesburg Pike is intended to visually and physically link these two station areas. Leesburg Pike will become a tree-lined boulevard with wide sidewalks and street-level retail. A grid of streets north of Route 7 will provide parallel links. Similar to Spring Hill, Greensboro will support highly concentrated office uses immediately adjacent to the station. The broader concept for the Greensboro station area is a 24 hour/7 day mixed-use center. The offices will concentrate on the north side of Leesburg Pike, while the south side will center on a major public building(s) and a significant public space amenity. Street design around the station will slow traffic to facilitate pedestrian and bicycle connectivity between the station and activities north and south of Route 7.

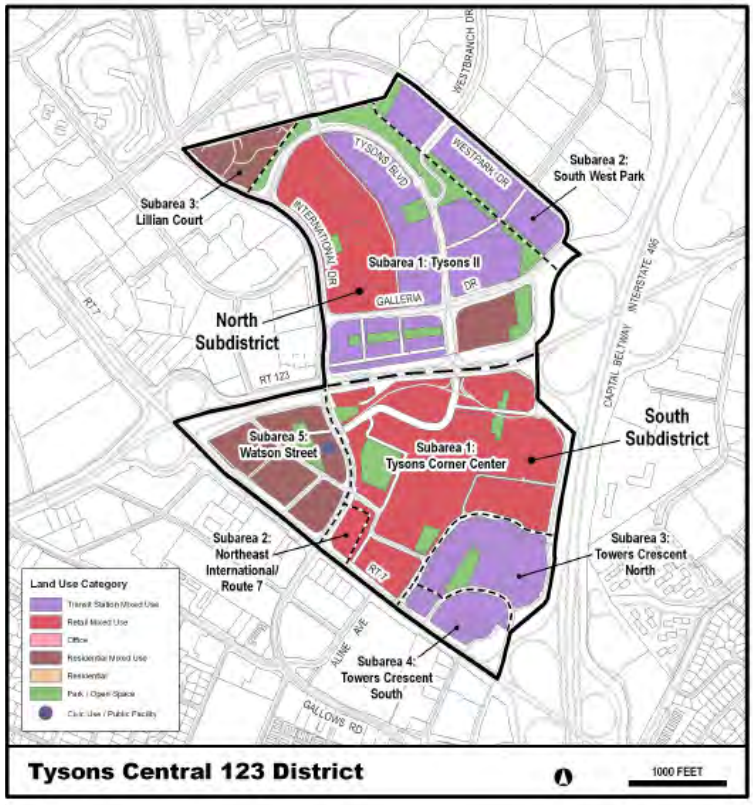
Tysons Corner

Existing Development Patterns

The Tysons Corner station is located on Chain Bridge Road (Route 123) between International Drive and Westpark Drive. It is immediately west of the I-495 interchange and between the multi-story buildings at Tysons Galleria mall to the north of Chain Bridge Road and Tysons Corner Center mall to the south of Chain Bridge Road, the area's two primary regional retail destinations. As with the other station locations, parking lots dominate the landscape. At Tysons Corner, these include both surface parking lots and large structured parking lots associated with the malls. There is no residential development within a ¼ mile of the station location. There is limited multi-family development within ½ mile radius. Multi-family residential, including high-

rise tower residential to the northwest, are just beyond the ½ mile radius. Single-family residential neighborhoods are located within a ¾ mile radius to the south. Sidewalks connections exist, but, as with Tysons 7, are not generally comfortable or safe for pedestrians. The distances on sidewalks are also much further than the radius distances.

Planned Development Patterns



The Tysons Corner station area will remain the primary shopping and retail center in Tysons Corner, however existing structures will be supplemented with mixed-use development fronting the streets and creating an active street-level environment. The additional mix of uses will include entertainment, residential, office, and a conference or convention center within walking distance of the station. Route 123 will transform into a pedestrian-oriented, tree lined boulevard, and a pedestrian-friendly network of streets and pedestrian/bicycle amenities will emerge throughout the station area. In particular, a major grade change northeast of the station location will need to be addressed as part of redevelopment.

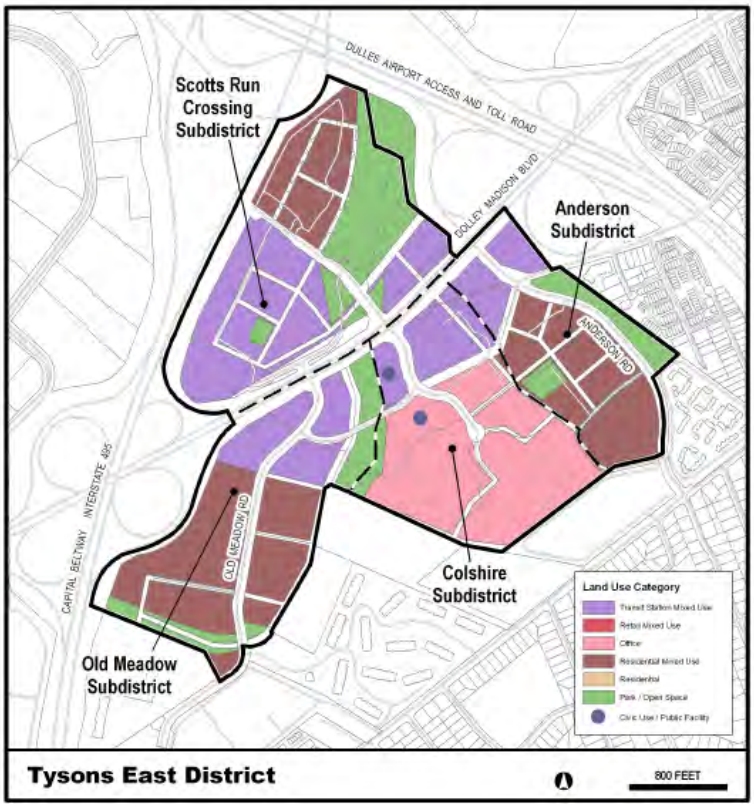
McLean

Existing Development Patterns

The McLean station is located immediately east of I-495, on Dolly Madison Boulevard (Route 123). It is on the north side of Route 123, adjacent to Capital One's McLean Headquarters. The headquarters includes a nine-story parking garage and a large park space with tennis, soccer, and

baseball facilities. These recreation facilities are also used by community organizations. To the south and east of the station are several other multi-story office buildings with large surface parking lots surrounding the buildings and fronting Route 123. Scotts Run Park begins across Route 123 from the station location and extends in a linear path south into a residential area and into Westgate Elementary School property. There are a few multi-family residential units within ¼ mile of the station location. Larger multi- and single-family neighborhoods are located within and beyond ½ mile of the station (such as the neighborhood around Scotts Run Park). As with the other stations, pedestrian connectivity between the residential areas and the station location is limited.

Planned Development Patterns



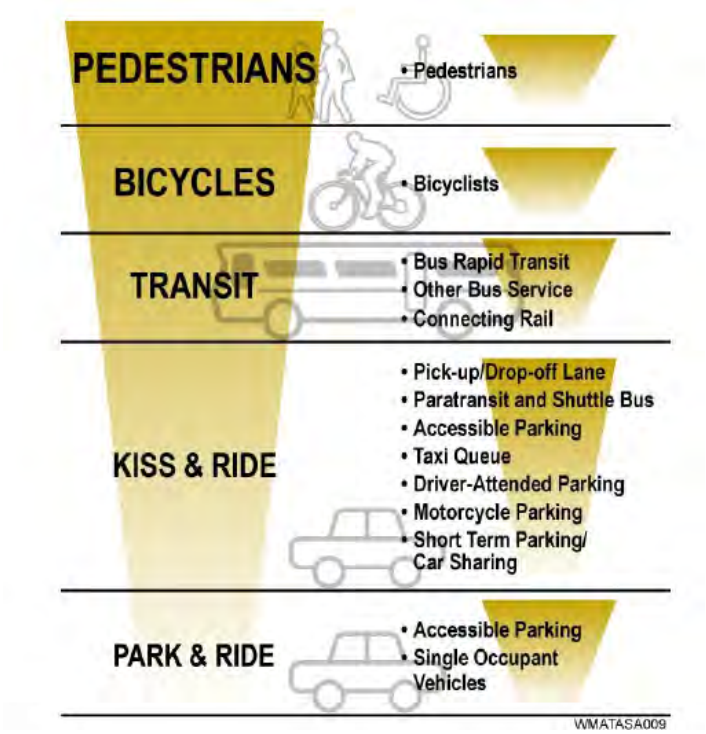
The re-envisioned McLean station area will focus on an expanded Scotts Run Stream Valley Park. The current park area will expand further through the stream valley, improving both park accessibility and general connectivity throughout the McLean district. Public and institutional facilities will be central amenities, surrounded by a mix of uses, including office, hotel, residential, and support services and retail. As with Route 123 west of I-495, the eastern section will transform into a boulevard with wide sidewalks, street trees, and buildings fronting the street with ground-level activity.

WMATA'S STATION GUIDELINES

In May 2008, WMATA released its *Station Site and Access Planning Manual.* This guide provides direction for locating pedestrian, bicycle, bus transit, and auto-related access facilities in

station areas, and is a key resource for this Tysons Corner Mobility Hubs study. The figure below demonstrates the Access Hierarchy as presented in the *Access Planning Manual*. This hierarchy notes many of the features recommended for inclusion in the Mobility Hubs, and indicates the relative proximity each of these elements should have in relation to the stations.

Figure 14 WMATA's Access Hierarchy



Recognizing the range of station types throughout the Metrorail system, the Manual includes a section for access within the context of transit-oriented development. None of the Tysons Corner stations are intended to have significant parking accommodations and all emphasize mixed-use pedestrian-oriented development around the stations. The TOD section of the Manual will provide particularly applicable guidance in the Mobility Hubs study. Key relevant guidelines from this section include:

- Integration of land development and transit management priorities. The range of transit support facilities (maintenance equipment, bus accommodations, parking and bicycle facilities, landscaped open spaces, etc.) can use up to 40% of the land in a TOD site. As a result, the two must be carefully coordinated and integrated.
- TOD and station area design emphasizing direct pedestrian access to the stations, including non-circuitous, continuous pedestrian connections; minimal driveway or other auto/pedestrian conflict points; and universal wheelchair and stroller access.
- Building design with ground floor activity lining the pedestrian path to the stations, therefore creating a safe and attractive environment.
- Bus and bicycle facilities within easier access to the station than the closest parking space.

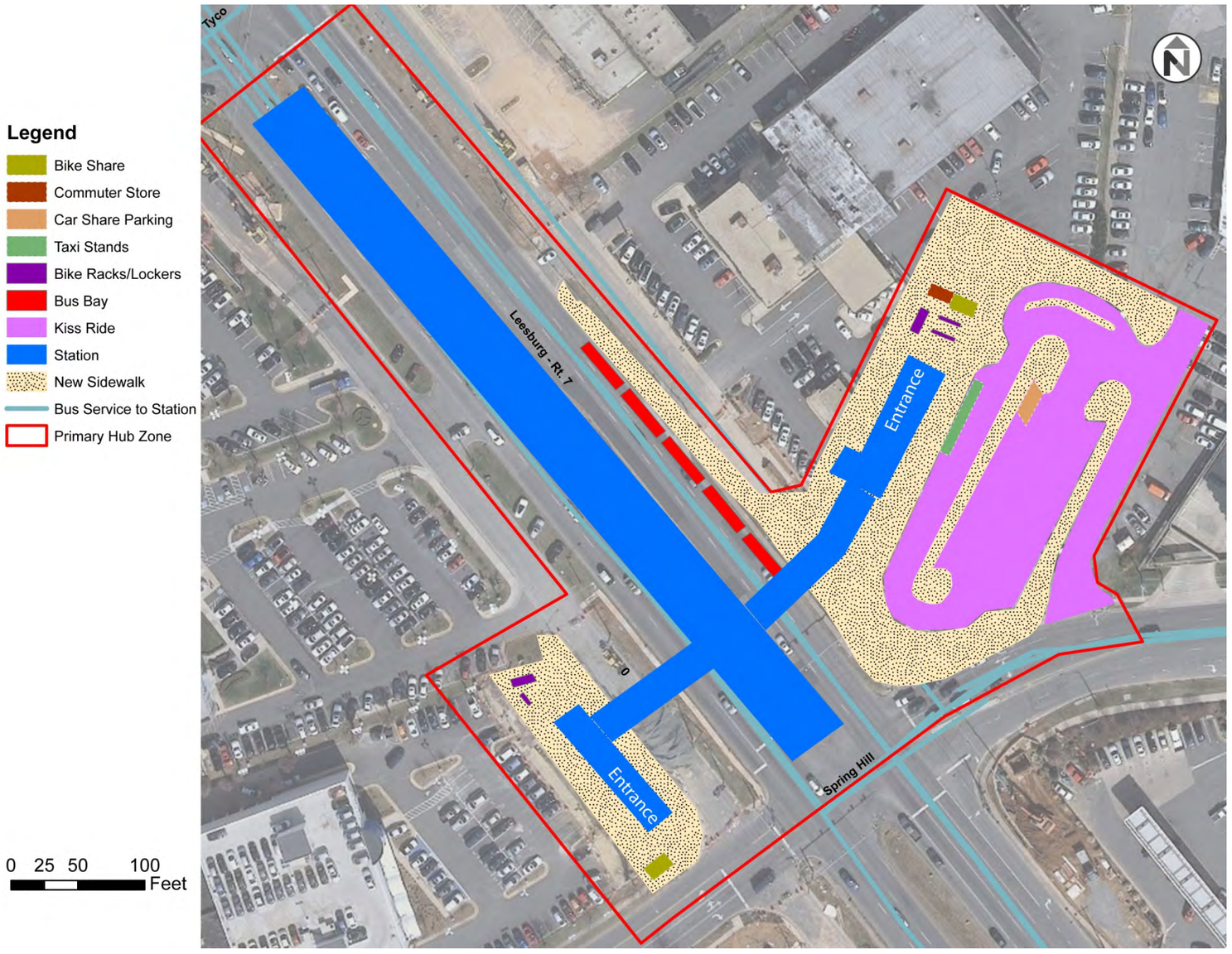
- On-street parking to provide direct retail access and buffers for pedestrians. These spots must discourage all-day parking.

PREFERRED SITING OF PRIMARY MOBILITY HUBS

Following is a summary of siting recommendations for the four recommended Primary Mobility Hubs, based on the suite of recommended mobility elements described above.

Spring Hill

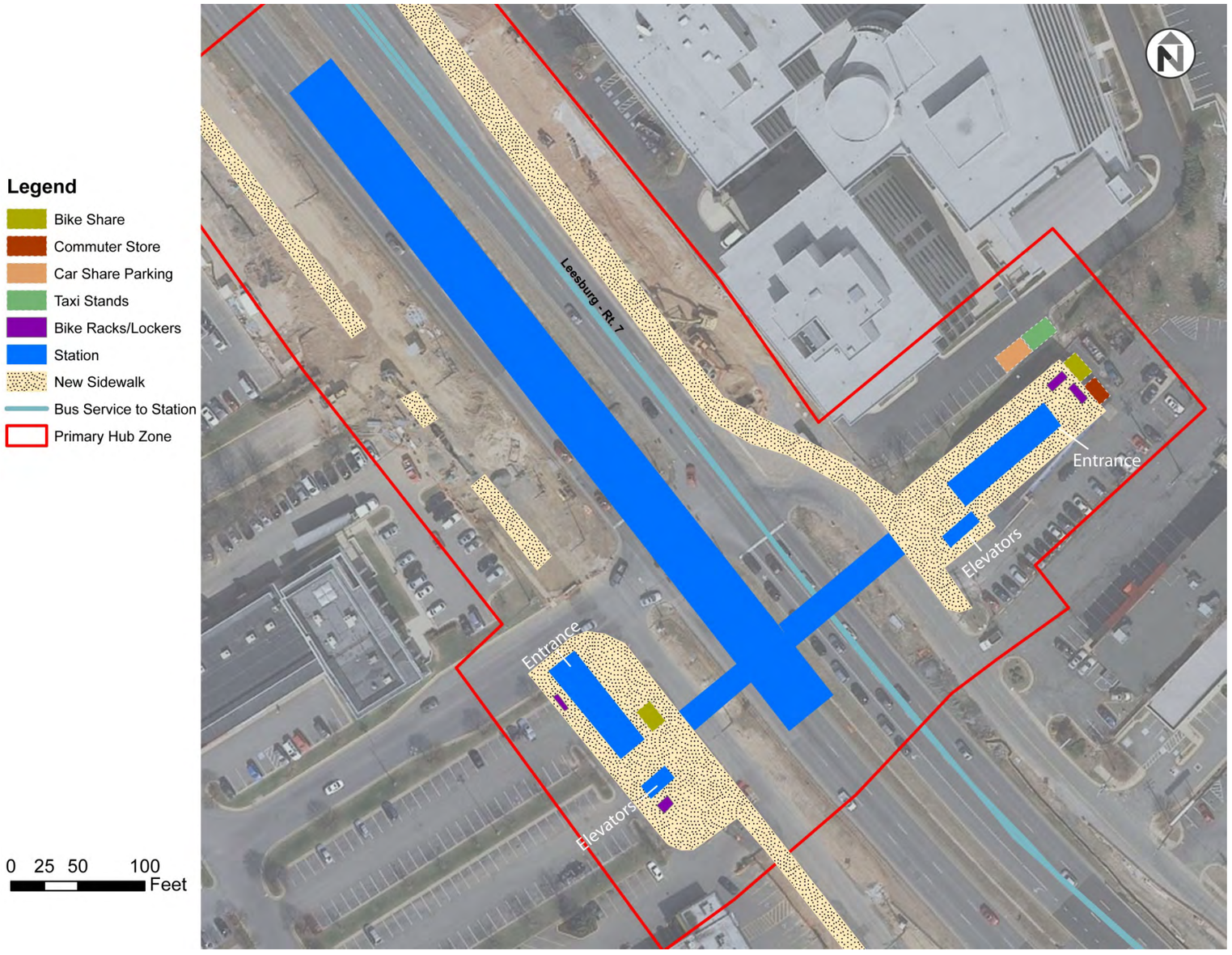
Figure 15 Preferred Spring Hill Option



One of the core Primary Mobility Hub elements, Taxi Stand space, is incorporated within WMATA's station plan for this location. If the option to convert Kiss-and-Ride spaces to Car-share parking is not feasible when interest from a car-share provider emerges, car-share spaces could be located along Spring Hill Road, adjacent to the Kiss-and-Ride lot. The plaza outside the northeastern station entrance presents an ideal opportunity to prominently place both the Commuter Store and bike-share facility adjacent to high-volumes of pedestrian traffic. Additionally, plaza space around the southwestern entrance provides sufficient space for a second bike-share facility.

Greensboro

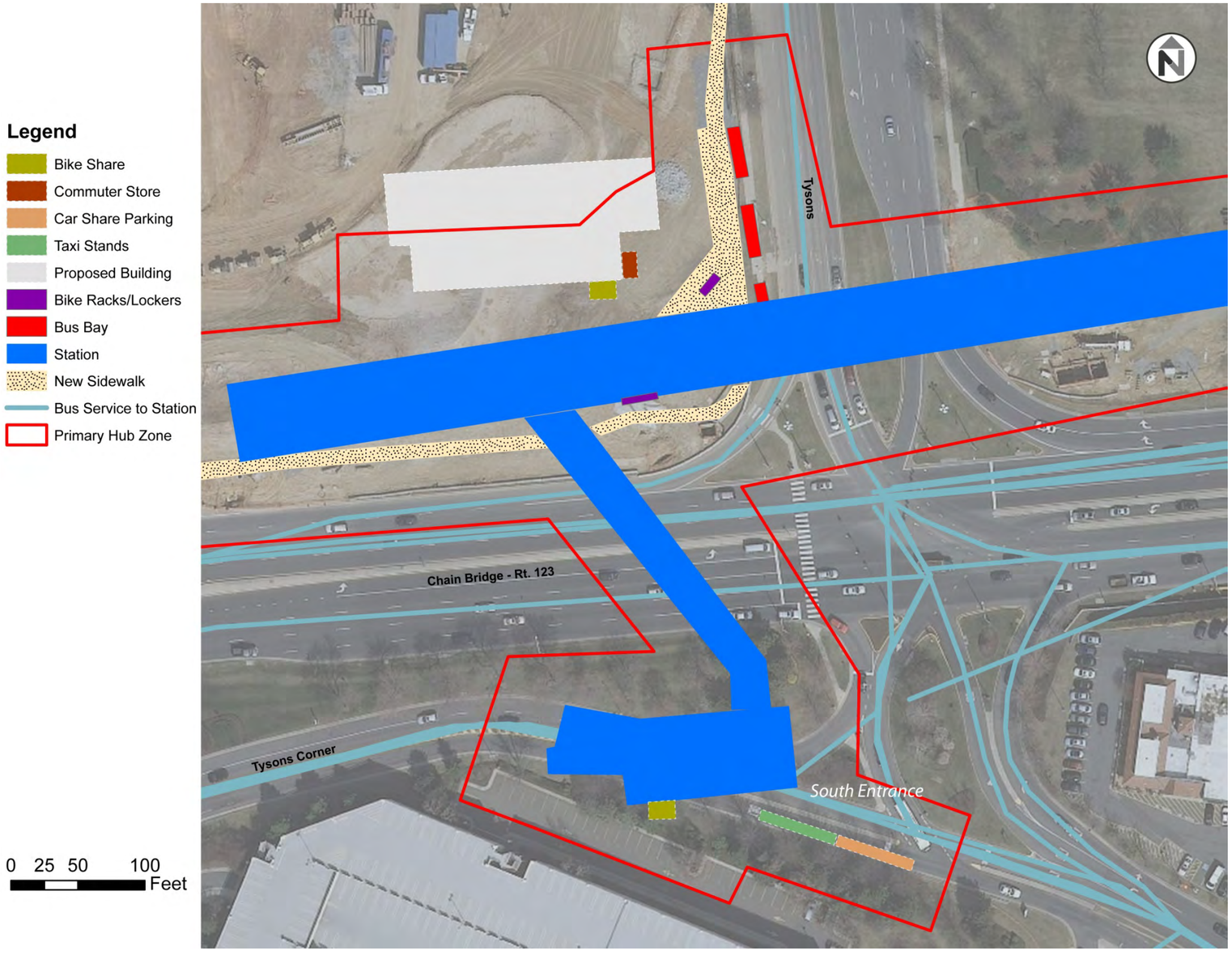
Figure 16 Preferred Greensboro Option



The existing row of head-in 90-degree parking adjacent to the station-plaza planned on the east side of Route 7 is ideally situated to accommodate both Taxi / Casual Carpool and Car-share parking. The six spaces at the eastern end of this row could be sought through proffer, or other negotiation based on the high value-added benefits that the new Metrorail service will provide to the property owner. If these spaces can be sited here, they will work well as part of a hub, with a Commuter Store and bike-share facility located on an extension of that plaza so that riders face it upon exiting this side of the station.

Tysons Corner

Figure 17 Recommended Tysons Corner Siting



Ideally, hub siting at this station would place most elements on the north side of Route 123, to take advantage of the higher volume of bus-train and bus-bus transfers, the more spacious plaza area, and the potential for ground-floor retail activity here. However, the high-volume and high speeds of traffic along Route 123, and the dominance of bus bays along Tysons Boulevard, leave no obvious, suitable options for placing Taxi Stand/ Casual Carpool and Car-share parking around this side of the station. Unless opportunities arise to locate these services along newly developed roads, or within newly developed off-street parking facilities (suitable only for the car-share parking), the services should be located on the other side of Route 123, along Ring Road, adjacent to the southern station entrance.

The Commuter Store and bike-share facility, however, can be incorporated within the plaza space on the north side of the station — or within adjacent ground-floor commercial space if such an opportunity arises. A second bike-share facility, located on the south side of the station, should be sited adjacent to the Taxi/ Carpool and Car-share spaces.

McLean

Figure 18 Recommended McLean Siting

One of the core Primary Mobility Hub elements, Taxi Stand space, is incorporated within WMATA's station plan for this location. If the option to convert Kiss-and-Ride spaces to Car-share parking is not feasible when interest from a car-share provider emerges, Car-share spaces could be located along Capital One Drive, adjacent to the northern station plaza. A preferable option would be to locate these spaces along a new road that abuts the southern station plaza/ parking areas, but it is too early to know if such a road may emerge with new development.

Given the greater number of bus bays, the location of the Taxi Stand/ Casual Carpool spaces, and the resulting prominence of the southern station plaza over the north side plaza, it would be preferable to site the Commuter Store somewhere within or adjacent to this plaza. Likewise, this area would be an ideal location for the recommended bike-share facility — facing the planned Kiss-and-Ride parking area. The ample plaza space surrounding the northern station entrance presents an ideal location for a second bike-share facility.

APPENDIX D
TECHNICAL MEMO: CAPITAL BIKESHARE EXPANSION ASSESSMENT

NELSON
NYGAARD

MEMORANDUM

To: Meredith Judy, Rhodeside & Harwell

From: Alyssa Pichardo

Date: June 27, 2012

Subject: Tech Memo: Capital BikeShare Expansion Assessment

CAPITAL BIKESHARE EXPANSION AND TYSONS CORNER

Charlie Denny of Alta Design + Planning, the firm which helped develop Capital BikeShare, acknowledges that Tysons Corner is an emerging market for bike-share. There are however certain developments which will need to take place before Alta begins exploring the extension of Capital BikeShare to Tysons. The opportunities for bike-share in Tysons Corner are likely to be focused around the Metrorail Silver Line Stations with the addition of bicycle infrastructure, mixed-use development and expansion of proffers playing crucial roles in creating bike-share. Areas of primary concern are the development of bicycle infrastructure, bike-share station placement and operations of bike-share in Tysons Corner.[1] The following report summarizes personal interviews with Charlie Denny of Alta Design + Planning and DDOT publications on station placement.

Bicycle Infrastructure

Of greatest concern to Alta staff is the development of bicycle facilities, including bicycle lanes on local streets and separated cycling infrastructure such as cycle tracks on major thoroughfares throughout Tysons. Bicycle facilities need to provide through routes along the corridor of Leesburg Pike and connecting thoroughfares, since cyclists are more likely to choose main arterials over winding side streets to reach their destinations. The investments in bicycle infrastructure will provide safe bicycle routes for users of bike-share. Furthermore, the redevelopment of roadways to decrease automobile speeds through traffic calming and road diets would create safer conditions for cycling and greater opportunities for bike-share.

Station Placement

Mixed-use areas are the best opportunities for bicycle share. The mix of land uses figures much more predominately in Alta's station placement metrics than does housing density. A strong mix of land uses results in a system that requires less balancing to redistribute bicycles between bike-share stations. A mixture of land uses and varied times of use minimizes the frequency of empty or overfilled bicycle racks which makes the system less useful because patrons can neither take a bicycle nor return it at their convenience.

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[1] Personal Interview with Charlie Denny, Senior Associate, Alta Planning + Design, June 22, 2012.

The larger Capital BikeShare stations are 12 by 62 feet and accommodate close to 20 bicycles. These larger bike-share stations should be located within the immediate area of a Metrorail station. Bike-share stations should be located no more than 1/4 of a mile from one another. Stations can be spaced at 1/4 mile intervals to extend the bike-share system to within 1/2 or 1 mile of Metrorail stations. Mr. Denny stated that the largest bike-share stations would likely be located at the Tysons Corner, Greensboro and Spring Hill Metrorail stations to take advantage of the centrality of these Metrorail stations. Any satellite system in Tysons would likely radiate outward from these stations. Smaller bike-share stations could be located at and around the McLean Station due to its proximity to major interstate highway ramps and is therefore more difficult to access by bicycle.

Proffers with developers have been used in both Arlington and Alexandria, VA, however, development has been slow and as of now proffer-acquired sites do not currently have bike-share implemented. It is important to note that developer proffers will not determine the location of bike-share stations. Proffers are usually employed to acquire land in locations which have already been deemed appropriate station sites according to Capital BikeShare station placement policies and analysis.

Alta and DDOT worked together to develop the following Station Placement Policy for Capital BikeShare operations. The following information is from a public presentation given by DDOT staff on May 25, 2011.2

Station Placement Policy

The Policy: DDOT will evaluate the system and expand in a manner that supports the need of its users, promotes the use of bike sharing and strengthens its operability.

The Process: DDOT evaluates the system by looking at four matrices:

1. Station Performance
2. User and public feedback
3. Sighting requirements
4. Heat Map (census data, commercial/ residential density and bike ability)

User and Public Feedback: Through Facebook, Twitter, scheduled meetings and member surveying, DDOT collects and analyzes suggestions and comments and uses this information to aid in the expansion of the program.

Preliminary Siting Criteria for Bikeshare Station

For use in preliminary identification of candidate sites [link]

1. Size: 8 ft X 40 ft (minimum) [this allows for a 6 ft wide dock plus 2 ft of clearance for bikes to be taken out of dock]
2. Visible location
3. Public access agreement (if on private property)
4. 4 plus hours of direct sunlight daily

[2] DDOT (2011). "Public Meeting: Expansion of Capital BikeShare." Public Presentation

5. If on sidewalk, minimum pedestrian clearance of 5 ft required
6. Level, firm surface ideal -but can have gentle slope
7. Clear of manholes, Metro or utility grates, tree planting boxes
8. No obstruction created with bus stops, fire hydrants, ADA ramps
9. Can be placed on sidewalks, grassy areas, or in street
10. If in street, must be location that permits bicycle users to safely dock and undock bikes without conflict with traffic (e.g., breaks in traffic adequate to permit safe use of dock! "quiet" street)
11. Location where lighting is adequate or can be made adequate for nighttime use
12. Preference given to high activity areas, including locations near higher density development (commercial or residential) and locations near significant attractions

Bike-share Operations

Bike-share stations docks must be refilled as bicycles are used and then distributed to other docks in the system. Staff is deployed from operations centers to repair kiosks and bicycles and to redistribute bicycles throughout bike-share system. This operational aspect of bike-share means there must be a critical mass of bicycles in the system to justify the use of existing, or the development of new, operations centers. Smaller satellite systems which use existing operations centers range between 8 to 10 bike-share stations, larger systems which logistically require their own operations centers have approximately 20 stations.

Satellite Capital BikeShare systems geographically close to DC and Arlington can share operations with existing operations centers. This is currently the planned operation strategy for the system soon to begin in Alexandria, which includes 8 stations in the Old Town neighborhood, with the largest bike-share stations at the two Metrorail stations (Braddock Road and King Street). Coordination with staff of the City of Alexandria may provide a valuable opportunity to learn from their experiences in creating a small satellite Capital BikeShare program.

Rockville, MD, another Capital BikeShare satellite has plans for 20 stations. The location and size of the system warranted the development of a new bike-share operations facility. Reston, VA, which is currently exploring the possibility of bike-share, has discussed sharing this new operations facility with Rockville. Tysons Corner operations could potentially be run in a shared facility with other satellite Capital BikeShare programs in Virginia, encouraging greater bike-share expansion in Tysons.

IMPLICATIONS AND NEXT STEPS FOR COUNTY DOT

Given the plans for creating new Mobility Hubs at each of the four new Tysons Corner Metrorail stations, and the above summary of Capital BikeShare's approach to expansion and station development, the following are recommended steps for FCDOT"s interest in accelerating this program's expansion into Tysons Corner.

Get the Hubs Right

This is where Capital BikeShare planners are going to focus when assessing the viability of expanding into Tysons Corner. While expansion is not likely to occur if these are the only appealing station siting options, it is impossible to imagine a scenario in which expansion is

considered without these stations serving as the area's largest and best-connected stations. The Hubs will also be high-visibility places for the County to showcase the new mobility environment envisioned for Metrorail-era Tysons Corner — with walkable development and multi-modal connectivity characterizing and radiating outwards from each station.

Develop a Robust Bicycle Infrastructure

The level of developer investment catalyzed by future Metrorail service will allow County planners to guide a physical transformation of Tysons Corner that is largely paid for with private money. There is no similar such opportunity to fund a transformation of Tysons Corner roadways, currently, distinctly dominated by high-volume automobile traffic. Reconfiguring the rights-of-way on many of these streets to better accommodate cycling, however, will be necessary to develop a meaningful level of cycling activity in the area.

Perhaps the biggest challenge will be providing "separated cycling infrastructure such as cycle tracks on major thoroughfares throughout Tysons", a Capital BikeShare concern regarding Tysons Corner, as identified above. Not only are such installations expensive, they tend to be politically-charged and will necessitate coordination with VDOT to identify acceptable redesign options.

Creating bicycle lanes on local roads, by contrast, should not be nearly as challenging, and much less expensive. Options to use development proffers to catalyze these changes, and to implement general, complete-streets investments on local streets, should be explored to accelerate these investments, as options for changes to major roadways are explored.

Mix it Up

The above input from Capital BikeShare planners underscores the importance of developing clusters of diverse land uses beyond the four Metrorail stations. Over-dominance of jobs-based or residential building space outside immediate station areas is likely to deter Capital BikeShare expansion. Guiding development toward a greater distribution of retail, civic, and open space uses beyond the rail station areas will help create demand for "re-distributional" trips that help avoid " empty or overfilled bicycle racks".

Connect

Perhaps the most valuable step County planners can take is to reach out to their peers in Alexandria and Rockville to learn their perspective on what it took to get Capital BikeShare expansion in their communities. Even reaching out to planners whose expansion campaigns have not been successful to-date may provide valuable information on what will work for and against a Tysons Corner expansion, including identifying potential satellite-station locations that will appeal to Capital BikeShare planners.

One option for this step would be to identify someone with the Tysons Partnership to liase with other communities and staff at Alta Design + Planning. This person could identify specific strategies for Tysons Corner, while also keeping Alta staff abreast of progress as the new mobility culture in Tysons Corner evolves.