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A. Plans and Studies Reviewed

Tysons Corner Urban Center amendment to the Fairfax County Comprehensive Plan: The amendment provides a history of Tysons Corner and a vision for the future of Tysons. In order to implement the vision, the plan identifies recommendations for five issue areas, including Land Use, Transportation, Environmental Stewardship, Public Facilities, and Urban Design. Recommendations in this Plan are inspired by and reflect the vision of those in the Comprehensive Plan amendment.

Section 527 Report: The Section 527 legislation is intended to improve how land use and transportation planning decisions are coordinated throughout Virginia. It establishes standardized methodologies (definitions, analytical methods, etc.), for analyzing transportation impacts and providing that information to citizens and policy-makers. Section 527 establishes procedures for local submission of proposals that will affect the state-controlled transportation network to the Virginia Department of Transportation (VDOT) for review and comment. The 2009 Section 527 submission for the Fairfax County Comprehensive Plan Amendment contains information about the changes in land use, urban design, road and transit networks in Tysons Corner, and the impacts of those changes given planning horizons of 2030 and 2050. VDOT reviewed the submission and issued a report which includes recommendations for monitoring and responding to impacts. The report includes a discussion of bicycle project impacts, which were used to inform this Plan.

Grid of Streets Study: The Fairfax County Planning Commission has determined that a "grid of streets" is critical to support planned densities of residential and commercial development in Tysons Corner. According to the Fairfax County Planning Commission, the current road network 'superblock structure' needs to be transformed into an urban street grid with a smaller block form. It is anticipated that the new grid will be implemented concurrent with redevelopment. The Tysons Corner Bicycle Plan anticipates the development of the "grid of streets" in Tysons Corner, and makes policy recommendations as to the form and function of these streets in the Tysons Corner bicycle network.

Tysons Corner Circulator Study: Fairfax County is planning to undertake the Circulator Study in 2011-2012 to assess potential vehicle technology, routes, stop and station design, ridership and other issues.

Fairfax County Countywide Trails Plan: The Countywide Trail Plan is part of the county's Comprehensive Plan. In 2002, a map was developed depicting countywide trails. A map also was developed to identify deficiencies. In developing the Tysons Corner Bicycle Plan, these maps were consulted to identify deficient links in and around Tysons Corner.

Tysons Metrorail Station Access Management Study (TMSAMS): TMSAMS operates under the guidance of the Stakeholder Advisory Group. TMSAMS engages the public in identifying and prioritizing projects that provide multimodal access to the four new

Metrorail Stations in Tysons Corner. TMSAMS representatives participated in the BAC to inform this Plan. In addition, the project team presented and facilitated discussion at numerous TMSAMS meetings.

VDOT Bicycle Policy Plan: The Bicycle Policy Plan was developed by VDOT to establish a framework through which VDOT accommodates cyclists in the funding, planning, design, construction, operation, and maintenance of Virginia's transportation network. The purpose of the Bicycle Policy Plan is to establish a vision for the future of bicycling in the Commonwealth and to advance bicycle policy consistently, appropriately, and cost-effectively. The VDOT Bicycle Policy Plan provides a clear understanding of VDOT's policies for providing support of bicycling, accommodating, planning and engineering bicycle facilities, coordinating with other agencies, communities and groups to develop bicycle facilities. Technical standards and recommendations for improvements provided in the Policy Plan informed the recommendations in this Plan.

Tysons Bicycle Plan, Fairfax Advocates for Better Bicycling (FABB): The Tysons Bicycle Plan was developed by FABB in 2008. It identifies goals for bicycling in Tysons Corner as well as an overview of existing conditions. It identifies a series of recommended connections to allow bicycle access to Tysons Corner. It identifies recommended road, trail, and transit improvements. In addition, it recommends support facilities, as well as a series of education and encouragement programs targeted to employees, residents and visitors. These recommendations have been incorporated into the recommendations in this Plan.

McLean Pedestrian Task Force Pedestrian and Bicycle Recommendations: The McLean Pedestrian Task Force developed a report in 2009 outlining pedestrian and bicycle safety and access issues in and around the McLean area. While much of the report is focused on Downtown McLean, it includes specific bicycle recommendations for many areas that overlap the study area for this Plan. These recommendations were reviewed and assessed as part of the development of this Plan.

Fairfax County Transportation Plan: The Fairfax County Transportation Plan identifies enhanced public transportation corridors, new and improved roads, highway overpasses, interchange improvements and other projects that will impact bicycling in Tysons Corner.

2030 National Capital Region Transportation Planning Board (TPB) Financially Constrained Long-Range Transportation Plan (LRTP): The LRTP identifies all regionally significant transportation projects and programs that are planned in the Washington metropolitan area between 2010 and 2040. Over 750 projects currently are included, ranging from simple highway landscaping to billion-dollar highway and transit projects. The projects and programs that go into the LRTP are developed cooperatively by local governments and agencies represented on the National Capital Region Transportation Planning Board (TPB). The LRTP provides an opportunity for bicycle facility projects to coordinate with other planned and proposed projects. This coordination occurs in the process of planning for which roads and transit facilities will be appropriate for bicycle accommodations. It also facilitates Federal and state funding opportunities by introducing bicycle facilities as mitigation projects for highway expansion or as transportation emission reduction measures.

B. Summary of Public Comments Gathered On-Line

Web-Based Interactive Map Comments

A web-based interactive map was created as part of the Tysons Corner Bicycle Master Plan to supplement feedback gathered at the public meeting, through stakeholder interviews, and from the Bicycle Advisory Committee. Members of the public were encouraged to add markers, paths, and descriptive comments to the map in 12 preselected category areas.

Between September 2010 and January 2011, 102 markers and 51 paths were added. The map was viewed 542 times. Table B.1 below shows the category areas and the number of markers assigned to each. This information has been incorporated into the maps and recommendations throughout the Tyson Corner Bicycle Master Plan.

Table B.1 Interactive Map Categories and Number of Markers

Category	Number of Markers
Important destination for bicyclists	14
Difficult intersection to navigate by bike	12
Bike route you use regularly	17
Location where you bike on the sidewalk to avoid traffic	7
Hazard	4
On-road bike facility needed	18

Meeting Notes – Public Meeting #1
September 30, 2010, 7:00PM-9:00PM

Meeting Attendees

Public: Jim McGlone, Jeff Anderson, Bob MsCahill, Roger Normand, Paul Mason Kohlenberger, Frank Tone, John Barrow, Penny Firth, Greg Griswold, Susan Stillman, Alan Douglas, Stephen Willis, Mary Cassidy-Anger, J.J. Madden, Tracy Strunk, Suzanne Lin, Fionella Quinn, Paul David, Dennis Frew, Alan Young, Kerie Hitt, Jeff Palmer, John Hamilton, Bruce Wright, Ray Duda, Mark Thomas, Rich Saunders, Chris French, John Vrankovich, Hunter McCleary, Frank Boyle, Enrique Lara, Kathie Westphely. Client Team: Jeff Hermann (FC), Charlie Strunk (FC). Consultant Team: Dan Goodman (TDG), Bob Patten (TDG), David Jackson (CS), Stacy Cook (CS).

Meeting Summary

A presentation was provided highlighting the planning process, preliminary recommendations, and next steps. During and after the presentation, there was a question/answer and discussion session, followed by breakout group discussions focusing on the following topics:

- Draft bicycle network
- Bicycle access to the future Silver Line stations in Tysons Corner
- Corridor/spot improvements

After the breakout sessions, the group reconvened to discuss lessons learned, next steps, and final questions.

Discussion Points

General

- There was a suggestion that curb-separated bike lanes should be considered.
- Many attendees expressed concern about access to Tysons Corner. Many bicyclists see getting into and out of Tysons as the greatest challenge, more so than biking within Tysons.
- Connectivity is a critical issue. It is important that the proposed bicycle facilities link where people want to go (e.g., connect neighborhoods to schools, employment, community features, shopping, etc.).
- Several attendees asked about the concept of the three-mile buffer and wondered whether recommendations from the Tysons specific plan will address needs in the broader area. There was a discussion of how the Fairfax County Bike Master Plan will build on and support the Tysons plan. The general concern is that even if there is a high-quality bike network in Tysons, it will only reach full potential if access to and from Tysons is improved.
- There is a need to incorporate and account for street trees and impervious surface requirements in the planning process. New tree box technology should be considered.

International Boulevard, VA Route 7, and other Spot Improvements

- Participants noted that International Boulevard would be a viable route (especially when bike facilities are added) to connect communities to the north and south of Tysons. It would also provide connections to a variety of features within Tysons. Safe bicycle passage across/along the major highway barriers was cited as a critical challenge.
- The main concern for this route and the immediate area surrounding International Boulevard was in regards to school children, and safe routes to school. Questions asked included the following:

- Where do the school kids go that are living in Tysons, especially in the apartments near International Boulevard?
- Can we focus on Tysons bike routes that foster connections to schools?
- Can this route connect over/under VA Route 267 to the school to the north? Will the bike/pedestrian bridge over VA Route 267 be possible?
- Several comments were made about the challenges of intersections and safety in the corridor.
- Attendees noted that while International Boulevard may have favorable traffic conditions for a lane or road diet today, future development will increase volumes on this facility. Data showing future development locations and traffic forecasts should be incorporated.
- Some sections of International Boulevard have significant landscaped areas (for example in front of the mall) that could potentially be utilized for a trail/cycle track. Most of this area is likely outside of the International Boulevard right-of-way. This will need to be confirmed with the County and VDOT.
- A citizen's concern was expressed about the ability to cross the beltway near John Marshall High School on VA Route 7. The residents on one side of the beltway are bussed to schools on the other side of the Beltway. A facility crossing the beltway that is suitable for children is desired.

Silver Line Station Access

- As a way of addressing the barrier created by the I-495/VA Route 123 interchange, special bus service was suggested that would create a "bus bridge" through the interchange. It could go from Tysons East station to Tysons Center 123 station.
- Another option is the peddle-powered Bike Monorail. A question of how users would transport their own bike was raised: http://inhabitat.com/2010/09/27/google-invests-in-shweebs-peddle-powered-bike-monorail/
- Attendees from the Forestry Department asked that we make sure that the plan references the Tree Action Plan adopted by Fairfax County. It calls for street trees and trees along trail corridors to be planted in conjunction with facility construction.
- It is important to talk about the fact that there will be new residential development in Tysons, and where it will be. Maps should show how facility improvements will relate to the new residential areas, and thus serve future residents.
- Attendees from Pimmit Hills were very concerned that the neighborhood not be cut off from Tysons Corner, like it is today. Connections between the neighborhood and the Silver Line Stations should be preserved and enhanced. West Falls Church is virtually inaccessible by bicycle or walking from Pimmit Hills because of the VA Route 7 and I-66 interchange.

- The proposed trail along Scotts Run from Westgate Park to the Tysons East Silver Line Station is very important.
- School catchment area boundaries were discussed. These have been researched by the consultant team and they are being factored into the plan. Kids who live near Scotts Crossing Road go to Westgate Elementary School on Magarity Road.
- The Fairfax County Planning and Zoning office is trying to get a public access easement on Colshire Drive through the office park that links Dartford Drive with VA Route 123. This is a key route for McLean neighborhoods to access the Silver Line Station.

Draft Bicycle Network Recommendations

- A comment was made about Mill Road access from the W&OD trail to the neighborhood to the north, as a first step in connecting the W&OD trail to Tysons.
- A comment was made about access from the neighborhoods southwest of Tysons into Tysons via a utility underpass on southwest side of Tysons.
- It was noted that a strategy of bike bridges/grade separation at critical crossings was not mentioned in the presentation as a viable strategy. Route 123 and Route 7 were noted as examples of where this could work. Recent project examples in the region and implementation costs should be considered.
- Proposed and potential additional connections to the W&OD Trail were discussed. Attendees stressed the importance of improving connections between the trail and the heart of Tysons.
- The role of transit in improving access to and from Tysons was discussed. The idea of a transit center in Vienna that brings bicyclists into Tysons was mentioned, but attendees questioned whether bicyclists would utilize the service rather than ride directly to their destination.
- The opportunity to provide curb-separated bike lanes were raised and discussed.
- Additional signed routes were suggested.
- Proposed improvements on VA Route 7, VA Route 123, International Boulevard, and along a power line easement near the Tysons West station were discussed.
- The intersection of Westwood Drive and Old Courthouse Road was discussed and proposed improvements were noted.

C. Bicycle Transportation Proffer Checklist

(Working Draft not approved by the FC Department of Planning and Zoning)

Table C.1 Bicycle Transportation Proffer Checklist

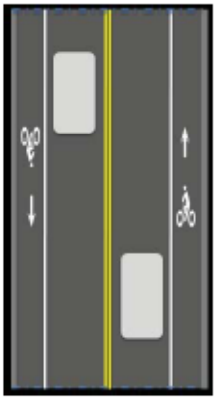
Check if Applicable	Proffer Item	Description	
	Installation of planned bicycle facilities adjacent to and/or through development.		General
	Installation of planned bicycle facilities on streets or at intersections where traffic impacts are being mitigated.		Facilities
	Completion of partially completed bicycle facilities within a ½ mile of development.		
	Bicycle parking type, quantity, and location provided consistent with the *Fairfax County Policy and Guidelines for Bicycle Parking*, or interim guidelines provided in the *Tysons Corner Bicycle Master Plan.*		Bike Parking
	Space provided for a commercial bicycle station operation.		
	Space provided for future bicycle sharing operations.		
	Trails provided as a recreational contribution.		Trails
	Trails provided as a transportation contribution.		
	Bicycle facilities used to reduce required mitigation of traffic impacts. *Note: The comprehensive plan states: "Impact studies within TOD areas should quantify the level of service for all applicable modes (vehicular, transit, pedestrians, and cyclists) by applying up-to-date, standard techniques. Accepted Bicycle Level of Service models and calculators are available for on-street bicycle travel and travel on shared use paths (multi-use trails).*		
	Bicycle and pedestrian detours provided adjacent to and around development project during construction.		

Check if Applicable	Proffer Item	Description
	Bicycle access provided through parking lots and driveways. *Note: Providing public bicycle accommodations through select private parking lots is critical to improving bicycle access along high-speed, multilane, congested arterials where private streets and parking lots provide alternative circulation routes for motorists.*	
	Bicycle accommodations provided on private roads that serve public access purposes.	
	Easement on private property provided for public access, trails, public bicycle parking, or other bicycle facilities to maximize the connectivity and continuity of the bicycle network.	
	Contribution to bicycle safety education, encouragement, or evaluation programs recommended in the *Tysons Corner Bicycle Master Plan*.	
	Additional contribution to the physical bicycle network recommended in the *Tysons Corner Bicycle Master Plan*.	
	Additional contribution to the overall goals and objectives outlined in the *Tysons Corner Bicycle Master Plan*.	

D. Bicycle Facility and Action Toolbox

Bicycle Facility and Accommodation Toolbox

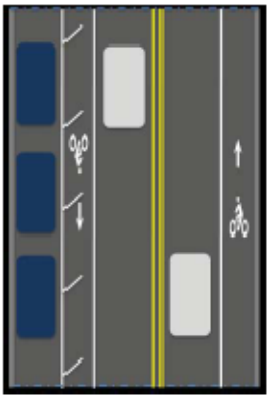
Bike Lane



A bike lane is a pavement marking that designates a portion of a roadway for the preferential or exclusive use of bicycles. Bike lane markings are dashed where vehicles are allowed to cross the bike lane, such as for right turns or at bus stops. Bike lanes are recommended on two-way arterial and collector streets where there is enough width to accommodate a bike lane in both directions, and on one-way streets where there is enough width for a single bike lane.

Sample Locations: Jones Branch Drive, Spring Hill Road, Old Courthouse Road

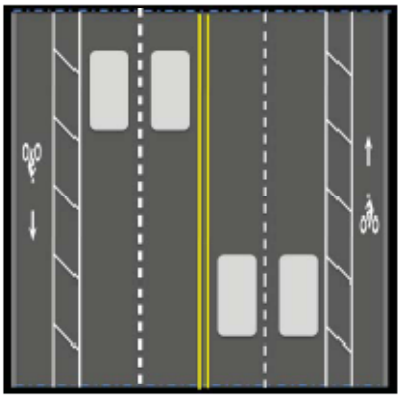
Bike Lane with Door Zone Markings



Diagonal lines within the bicycle lane may be utilized to guide bicyclists away from the space where the doors of parked vehicles may open, which is also known as the "door zone." In dense urban areas with narrow streets, the potential of being "doored" is one of the cyclist's greatest concerns. This treatment may be important to use on the avenue and collector streets with on-street parking.

Sample Locations: Boone Boulevard, new streets in the downtown grid

Buffered Bike Lane

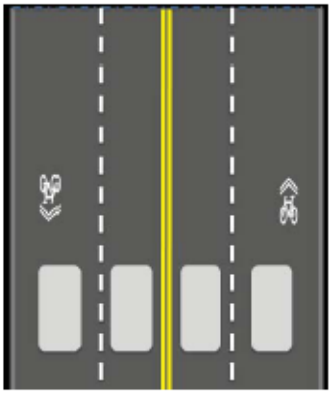


Buffered bike lanes are created by striping a buffer zone between a bike lane and the adjacent travel lane. Buffered bicycle lanes should be considered at locations where there is excess pavement width or where adjacent traffic speeds are above 35 mph.

Sample Locations: Dolly Madison Boulevard, Great Falls Street

Bicycle Facility and Accommodation Toolbox

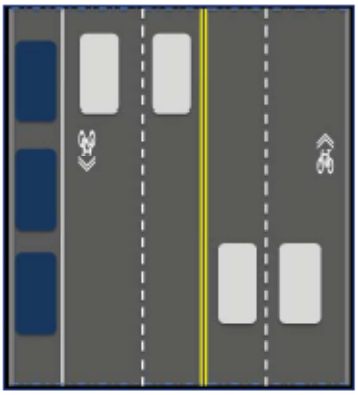
Shared Lane Markings- 4 Lane Street



Shared lane markings (sharrows) are used on roadways where bicyclists and motor vehicles must share the same travel lane. The sharrow helps position bicyclists in the most appropriate location to ride. It also provides a visual cue to motorists that bicyclists have a right to use the street. On a four lane street, sharrows should be placed in the outside lane. If the outside travel lane is too narrow for a motorist to comfortably pass a cyclists while staying within the travel lane (generally less than 13 feet) the sharrow marking may be centered in the lane. This encourages cyclists to "take the lane," and encourages motorists to use the left lane to pass. In a 12-14 foot lane, the marking may be offset from the curb by 4 feet. For 10-12 foot lanes, the BIKES MAY USE FULL LANE SIGN is recommended in Tyson's, because drivers are not used to sharing the road with cyclists and may not provide comfortable clearance when passing. Sharrows are not appropriate on streets with speed limits greater than 35 mph.

Sample Location: Tyco Road

Shared Lane Markings- Wide Outside Lane



Wide outside travel lanes are typically designed to be 13-15 feet wide. This width allows most motor vehicles to pass cyclists within the travel lane. Shared lane markings (sharrows) should be provided within the wide outside lane, offset 11 feet from the curb when parking is present, and 4 feet from the curb when parking is not present. Sharrows in wide outside lanes can be used to connect gaps between other bicycle facilities, such as a narrow section of roadway between road segments with bicycle lanes.

Sample Locations: Gallows Road, Idylwood Road Bridge

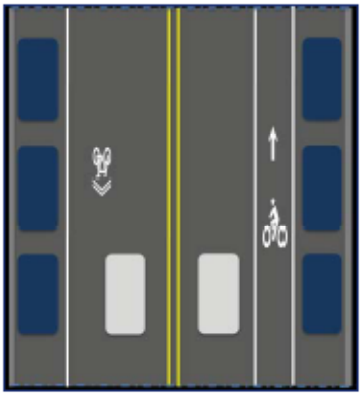
Shared Lane Markings- Residential

Shared lane markings (sharrows) may also be used on residential streets to designate bicycle facilities where there is not sufficient width for bike lanes. Studies have shown that sharrows direct bicyclists away from the "door zone" of parked cars, alert motorists of appropriate bicyclist positioning and encourage safe passing of bicyclists by motorists.

Sample Locations: Lisle Avenue, Oak Street

Bicycle Facility and Accommodation Toolbox

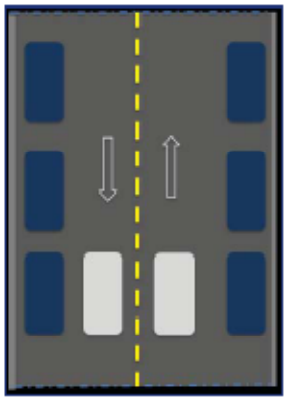
Climbing Lane



A climbing lane is a bikeway design for a two-way street that has a steep slope and insufficient width to permit bike lanes in both directions. A bike lane (climbing lane) is provided in the uphill direction to accommodate slow moving bicyclists and a shared lane marking is provided in the downhill direction, where bicyclists can typically travel at speeds close to motor vehicles.

Sample Locations: Greensboro Drive, Creek Crossing Road, Westpark Drive

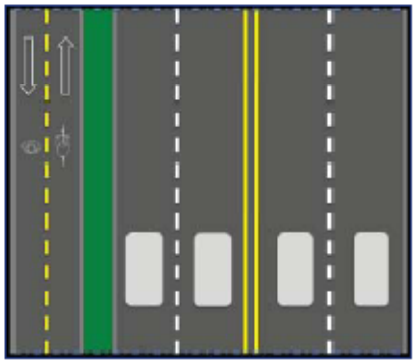
Shared Roadway



A shared roadway consists of a low volume, low speed street that is compatible with bicycling without any striping, marking or geometric change to the roadway. Bicycle route signs are often used on shared roadways especially where a through route may be hard to find due to the configuration of neighborhood streets. Shared roadways are typically residential streets but can also be in commercial or institutional areas. Park roads can also often operate as shared roadways.

Sample Locations: Davis Court, Percussion Way, Rupert Street, Madrillon Road

Sidepath

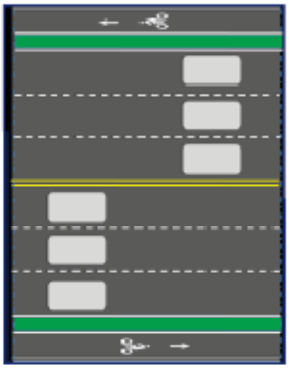


A sidepath is a shared-use path located adjacent to roadway. It is designed for use by bicyclists and pedestrians and each may travel in either direction. Sidepaths are sometimes created by designating a wide sidewalk for shared use; or they may be a segment of a longer trail or network of trails. Sidepath are sometimes provided to facilitate connections to on- and off-street bicycle facilities. A sidepath is not generally a substitute for on-road bicycle facilities, but may be considered in constrained conditions, or in addition to on-road facilities. Sidepaths may not be appropriate in areas of high pedestrian activity unless there is space to successfully manage conflicts.

Sample Locations: Route 123, Route 7 NW of Tysons Corner

Bicycle Facility and Accommodation Toolbox

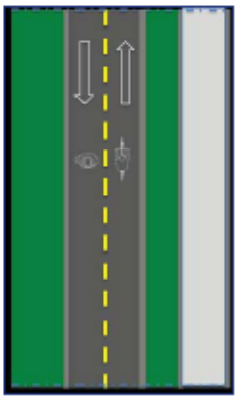
Cycletrack



A cycletrack is a bicycle facility that is physically separated from both the roadway and the sidewalk. A cycletrack may be constructed at the roadway level using roadway space, or at the sidewalk level using space adjacent to the road. Cycletracks separate bicyclists from motor vehicle traffic using a variety of methods, including curbs, raised concrete medians, bollards, on-street parking, large planting pots/boxes, landscaped buffers (trees and lawn) or other methods. Cycletracks designed to be level with the sidewalk should provide a vertical separation between bicyclists and pedestrians, as well as a different surface treatment to delineate the bicycle from the pedestrian space. Cycletracks can be one way for bicycles on each side of a two-way road, or two-way, and installed on one or both sides of the road. Cycletracks provide cyclists with a higher level of comfort relative to motor vehicle traffic, and are typically used on large multi-lane arterials where higher vehicle speeds exist. They may also be appropriate on high-volume but low-speed streets such as in a commercial downtown.

Sample Locations: Route 7, International Boulevard

Trail or Shared Use Path



A trail or shared-use path is an off-street bicycle and pedestrian facility that is physically separated from motor vehicle traffic. Typically trails are located in an independent right-of-way such as in a park, stream valley greenway, along a utility corridor, or an abandoned railroad corridor. Shared-use paths are used by other non-motorized users including pedestrians, skaters, wheelchair users, joggers, and sometimes equestrians.

Sample Location: WO&D Trail

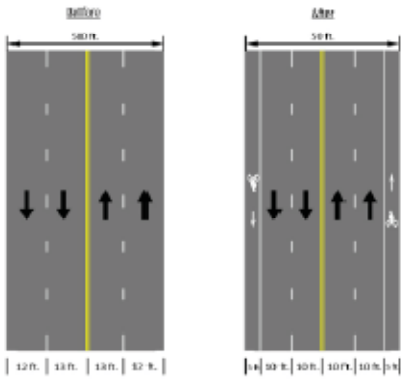
Signed Bike Route

Signed bike routes provide distance and directional information as a wayfinding aid for bicyclists. Signed routes may be established on streets, trails or any combination of facility types that offer a continuous bicycling environment. Signs offer cyclists information about alternative routes and accessible destinations from their current location. They also can be used to suggest the types of conditions cyclists can expect on a route by referencing trails or roadways by name. Signed routes provide new cyclists greater confidence when they are exploring utilitarian cycling for the first time or when they are in unfamiliar territory. Signed routes can also prevent cyclists from getting lost in residential areas with curvilinear street layouts and few through streets.

Sample Location: Northbound on Gallows Road at Kidwell Drive

Bicycle Facility and Accommodation Toolbox

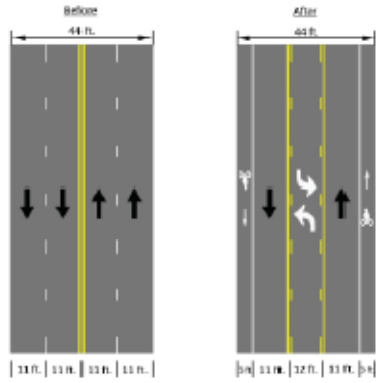
Lane Diet



A lane diet narrows the width of existing motor vehicle travel lane(s) and redistributes that space for bike lanes or other bikeway improvements. In some situations, a lane diet may be recommended for installation of shared lane markings. For example, a four lane road with 12 foot travel lanes can be restriped with 10 foot interior lanes and 14 foot wide outside lanes where the shared lane marking can be placed.

Sample Locations: Jones Branch Drive, Tysons Blvd

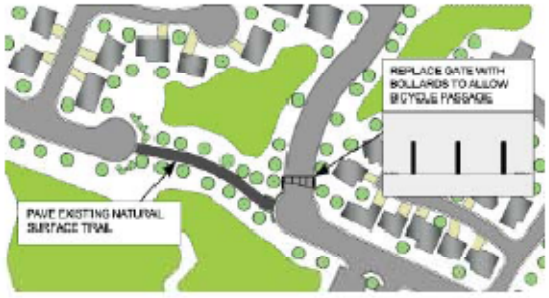
Road Diet



A road diet eliminates one or two travel lanes in order to provide a bicycle lane, or a buffered bicycle lane, within the existing width of the road. Typically, a center turn lane is provided for left-turn movements. In many situations, the resulting three-lane cross section functions more efficiently for motor vehicle traffic (and with fewer crashes) as well as allowing for bicycle lanes.

Sample Location: Old Meadow Road

Spot Access Improvement

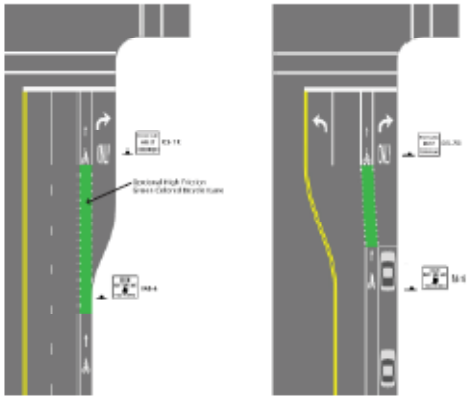


A spot bicycle access improvement is a relatively simple and low-cost solution for a location where bicycle access is blocked by a gate, fence, stream or lack of a paved path. The solution may require one or more of a variety of actions to create access, such as replacing a gate with bollards, installing a curb ramp, building a small bridge, or paving an unpaved path.

Sample Locations: Davis Court Cul de Sac Link, Madron Lane Passage, Kidwell Drive Trail Link

Bicycle Facility and Accommodation Toolbox

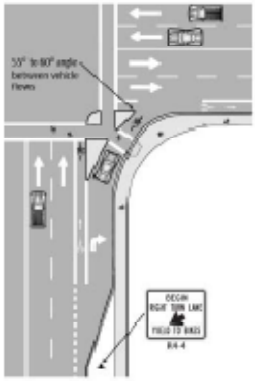
Right Turn Only Lane - Urban Intersection



At all urban intersections with a right turn only lane, the bicycle lane should always be to the left of the turn lane. Typical treatments for right turn only lanes include: dashed bicycle lane lines for the transition from right to left of the vehicular turn lane, high-friction green paint in the transition area, and BEGIN RIGHT TURN LANE YIELD TO BIKES (R3-7R), and RIGHT TURN ONLY (R4-4) MUTCD signs installed according to MUTCD standards. Note that engineering judgment and context-sensitive design approaches are required since every intersection is different.

Sample Location: Westmoreland Street at Chain Bridge Road

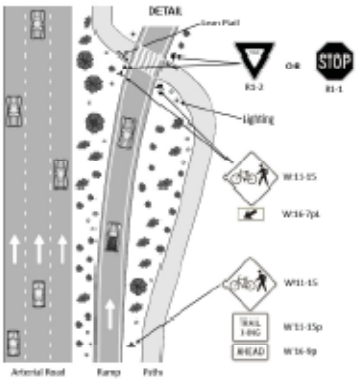
Right Turn Only Lane - With Crossing Islands



Many intersections in Tysons Corner have a channelized right turn lane on approaches. This design can be made both bicycle- and pedestrian-friendly by using the following key design features: provide a maximum right turn lane width of 16 feet, 14 feet recommended; stripe a lane between the curbs at 11 or 12 feet-in-width; provide a 55-60 degree angle between vehicle flows, rather than the typical 35-45 degree; and do not provide a dedicated receiving lane.

Sample Locations: Tysons Blvd and Galleria Drive, Leesburg Pike and Gallows Rd/International Drive

Shared-Use Path Crossing of Expressway On-Ramp

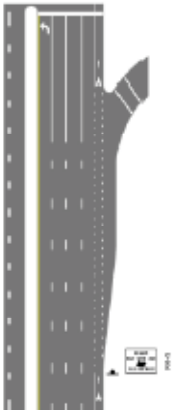


Shared-use path crossings at on-ramps present a greater number of potential conflicts (4) than a bike lane crossing (1) because of bi-directional travel on the path which serves both pedestrians and bicyclists. A stop condition is appropriate for trail users, however for a cyclist, stopping always means starting again; identifying a sufficient gap in 60 mph traffic while at the same time preparing to start from a stop is unsettling because there is little margin for error. A railing should be provided on both path approaches to allow the cyclist to come to a stop while keeping both feet on the pedals and thus prepared for a quicker start.

Sample Locations: Leesburg Pike and Capital Beltway, Leesburg Pike and Dulles Toll Road

Bicycle Facility and Accommodation Toolbox

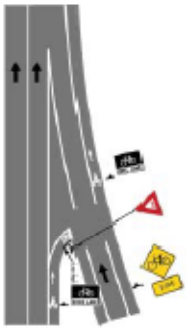
Bike Lane Crossing of Expressway On-Ramp



Bicycle lanes can be striped through an arterial exit to an expressway on-ramp. Important design considerations include the following: develop a right-turn lane prior to the point where the ramp diverges from the arterial road; always place the bicycle lane to the left of the right-turn lane; place the R4-4 BEGIN RIGHT TURN LANE YIELD TO BIKES at the beginning of the diverge area. In places where motor vehicle speeds are high and sidewalks are present, bicyclists should be given the option to exit onto the sidewalk and to proceed through the interchange along the pedestrian route.

Sample Locations: Dolley Madison Boulevard and Dulles Toll Road, Spring Hill Road and Dulles Toll Road

Bike Lane Crossing of Expressway Off-Ramp



Bicycle lanes can be designed to align the cyclist to cross an exit ramp at a right angle in order to improve sight distance and encourage slower speeds. A yield or stop condition is provided for the cyclist, who must identify a sufficient gap in motor vehicle traffic to safely cross the ramp. Advance warning signs of a bicycle lane crossing should be provided for exiting motorists who are likely to be traveling at high speeds. A railing can be provided to allow the cyclist to come to a stop while keeping both feet on the pedals and thus be prepared for a quicker start.

Sample Location: Dolley Madison Blvd and Dulles Toll Road

Expressway Overpass

Overpasses of major highways eliminate bicycle interaction with motor vehicle traffic and offer grade-separated crossings. Overpasses often provide a perferred alternative to crossing through an expressway interchange where there may be up to four or more locations (on each side of the arterial) where bicyclists will need to cross free-flowing entrance and exit traffic. This task is daunting for most people, and even well-designed at-grade ramp crossings are a deterrent to bicycle use in such cases.

Sample Locations: Capital Beltway Crossing near Marshall High School, Dulles Toll Road Overpass from Leesburg Pike to Greensboro Drive

E. Fairfax County Policy Recommendations: Zoning, Development Review and Trail Management

To set the stage for redevelopment that fully supports creation of a bicycle-friendly Tysons Corner, the following policy changes are recommended for detailed development and County adoption in Phase 1:

- Fairfax County should update its list of recommended proffers from developers in Tysons Corner to include the following:
  - Trails as both a recreational and transportation contribution;
  - Space for a commercial bicycle station operation;
  - Space for future bicycle sharing operations; and
  - Completion of partially completed bicycle facilities within a half mile of their development.
- Fairfax County and VDOT should determine how the provision of planned bicycle facilities can be used to replace a portion of the requirements placed on developers to mitigate the traffic impacts of their projects. The Comprehensive Plan states: "*Impact studies within TOD areas should quantify the level of service for all applicable modes (vehicular, transit, pedestrians, and cyclists) by applying up-to-date, standard techniques.*
  - Accepted Bicycle Level of Service models and calculators are available for on street bicycle travel and travel on shared use paths (multi-use trails).
- Required contributions toward the bicycle transportation network should include the following:
  - Installation of planned bicycle facilities adjacent to and/or through their development; and
  - Installation of planned bicycle facilities on streets or at intersections where traffic impacts of the development are being mitigated.
- Bicycle and pedestrian detours must be provided adjacent to and around all land development projects.
- Fairfax County should explore how it can share the burden with private property owners (multifamily and commercial) to provide bicycle access through parking lots

and driveways that can be used for motorized public access independent of use related to the business. Options to consider include:

  - Providing public bicycle accommodations through select private parking lots is critical to improving bicycle access along high-speed, multilane, congested arterials where private streets and parking lots provide alternative circulation routes for motorists; and
  - Fairfax County should determine if bicycle accommodations can be required of private commercial property owners who provide private roads that serve public access purposes.

- Fairfax County should negotiate easements with private property owners in Tysons Corner for public access, trails, public bicycle parking or other bicycle facilities as is needed to maximize the connectivity and continuity of the bicycle network.
- Fairfax County should develop a plan for managing a select set of trails for transportation use; which would mean a higher level of maintenance and permission of nighttime use. Development of this plan should involve representatives of the Tysons Partnership, Fairfax County Department of Transportation, the Fairfax County Park Authority, the Northern Virginia Regional Park Authority, the Town of Vienna and the Virginia Department of Transportation.
  - The Tysons Corner area should be used as a test case where a select set of transportation trails and trail sections can be identified for application of maintenance and management practices that will offer a higher level of service for cyclists and other trail users.
  - A higher level of service should include the following:
    - » Providing lighting to enable trails to be open and safely used before dawn and after dusk, especially in fall, winter, and spring months;
    - » Providing snow removal to enable trails to be safe and passable within a few days after a winter storm;
    - » Providing reflective edge striping and ensuring that all potential obstructions (such as bollards) have reflective material on them;
    - » Requiring cyclists to use head- and taillights when using the trail after dark; as well as appropriate reflective clothing; and
    - » After two years of operation, an evaluation of the effort should be conducted. It would look at use, user satisfaction, costs, etc.

F. Policy Recommendations for Virginia Department of Transportation (VDOT) Roadway Design and Operations

In addition to the Comprehensive Plan's policies regarding modal priorities, in 2004, the Commonwealth Transportation Board (CTB) adopted the *Policy for Integrating Bicycle and Pedestrian Accommodations*. The policy provides the framework through which VDOT accommodates bicyclists and pedestrians in the funding, planning, design, construction, operation, and maintenance of Virginia's transportation network.

To provide more detail for the agency in implementing this policy VDOT developed a State Bicycle Policy Plan, which is currently under agency review. This bicycle-specific policy implementation plan identifies strategies for more fully integrating bicyclists into VDOT's daily business. It provides recommendations to ensure that the bicycle element of the policy is applied consistently, appropriately, and cost-effectively. The recommendations below are consistent with the recommendations included in the State Bicycle Policy Plan. In Phase 1, VDOT roadway design policies and guidance should be clarified to achieve the following design objectives in Tysons Corner:

- Where necessary to enable the installation of bicycle lanes, 10-foot travel lane widths should be allowed on street classifications below Boulevard (e.g., Major Arterials).[29] Many of the bicycle lanes recommended in this plan may require the use of 10-foot travel lane widths. (Roadways with significant volumes of buses and trucks may need to retain minimum 11-foot travel lanes.) Use and safety of 10-foot travel lanes are discussed in detail in Appendix C of the State Bicycle Policy Plan.
- A few segments of roadway in the Tysons area have hills and curves that impact bicycle safety, such as Clark Crossing Road and the western portions of Old Courthouse Road. These roads typically do not have paved shoulders or if shoulders are present they are narrow and/or discontinuous. Roads where slow moving cyclists, who are out of view of the motorist due to minimal sight distances, should have motorist warning signs posted to alert them of the potential to come up behind a cyclist in the travel lane with minimal time to react. Standard motorist warning signs of sharp curves and reduced speed limits can be used. Also the

[29] In 2010 VDOT is reviewing a draft statewide bicycle accommodation policy which recommends that VDOT adopt such a policy.

bicycle warning diamond with a custom subplate such as "Cyclists in Lane" could be used.

- The "Bikes May Use Full Lane" may also be used to alert all road users that for safety, the cyclist may be in the center of the travel lane.
- VDOT's two-foot paved shoulder program should be applied to roads that are important in the Tysons (and countywide) bicycle network. Where this is done, 11-foot travel lanes should be reduced to 10 feet, to allow for a three-foot striped shoulder.
- Posted speed limits should be reviewed and adjustments considered. The rural roads just outside the core of Tysons have become well populated residential streets. To improve bicycle safety in providing access to Tysons, 35 mile per hour (or higher) speed limits should be re-evaluated. Where roadways are only 20-24 feet wide with no paved shoulders, hills are present, and sight distances are poor, consideration should be given to dropping speed limits to levels that are compatible with bicyclists and motorists sharing the same travel lanes. Special attention should be paid to areas around schools.
- Where shared lane markings are placed in 10-foot travel lanes, they should be placed in the middle of the travel lane and the "Bikes May Use Full Lane" sign
- Intersection design is a major concern regarding cyclists' safety. By policy, as intersections in Tysons are reconstructed along with developments, channelized right turn lanes will be eliminated. Prior to these actions, if bicycle facilities are installed on existing roadways, existing intersections will need to be addressed short of reconstruction. The specific design guidelines described below should be useful. These and other intersection improvements are discussed in detail in Appendix A of the State Bicycle Policy Plan.
- Free-flow right turn slip lanes can be dangerous to cyclists. However, right turn slip lanes can be made safer and even helpful for cyclists if the following design criteria are used:
  - Where bike lanes lead up to the intersection, provide a generous crossover area by using the dashed bike lane markings that allow cyclists to merge left to continue straight through at the intersection. Cities such as Cambridge, Massachusetts have used colored bicycle lanes in these situations, to make it clear that right turning motorists need to yield to cyclists who desire to go straight.
  - Reduce the angle of the right turn lane's approach to the crossing road, so that motorists must take the turn at a lower speed.
  - Do not provide a dedicated receiving lane; turning motorists will use more caution if they are required to merge into a lane that may have traffic in it.
  - Provide dedicated right turn lanes where possible, and through bicycle lanes on the left of the right-turn lane.

  - Minimize or eliminate the use of combined through and turn lanes. These lanes give motorists the option of turning or staying straight, which makes it impossible for the cyclist to predict what the motorist may do, and thus they cannot position themselves safely in the lane. Where these types of lanes must be used, provide the "Bikes May Use Full Lane" sign.

- Provide in-pavement or video bicycle detection at critical signalized crossings that are actuated only when cross traffic is present.
- Provide countdown pedestrian signal heads at all intersections. Where approach streets include bicycle facilities, retrofit intersection crossings to include pedestrian crosswalks on all legs of the intersection. Consider using special crosswalk striping patterns for shared use path crossings of roadways.
- Use special bicycle signals and leading bicycle intervals where the safest and most efficient way to move bicyclists through an intersection is to provide them their own dedicated phase. Washington, D.C. installed such signals in 2010 and they are common throughout Europe.
- Install median refuge islands where possible.
- Adopt design standards for sidepaths adjacent to commercial and multifamily land uses that require the following:
  - A 5-foot vegetated buffer between the path and the road
  - 10-12 foot wide paths in the Tysons Corner area
  - Paths on both sides of a roadway (unless adjacent land uses make it unnecessary
  - Upgraded design of crossings at intersections
  - Use the trail pavement surface across driveways and stop or yield controls for motor traffic. Safety signs should alert drivers approaching from both the driveway and street to look both ways for bicyclists.
- VDOT should make provisions to improve maintenance of on-street and off-street bicycle facilities.
- In conjunction with the Tysons Partnership, provisions for sweeping of roadways with bicycle lanes and sharrows should be made. Regular sweeping should begin in 2014 or 2015.
- Beginning sooner, VDOT should regularly mow lawns and trim vegetation along sidepaths in Tysons Corner to ensure longer pavement life and safe use by cyclists. Sidepaths should also be swept after mowing, and in the spring after the snow season ends.
- Snow clearing is also an issue. Snow should not be plowed and piled on sidewalks and sidepaths, nor in bicycle lanes. A set of priority paths and sidewalks that provide access to the Silver Line station should be cleared of snow along with the arterial street system. To address responsibilities, resources and practices FCDOT,

VDOT and the Tysons Partnership will need to coordinate and perhaps enter into special maintenance agreements.

- VDOT should require all roadway improvement projects, and utility projects on VDOT-owned facilities to provide appropriate and safe detours throughout the entire project period. This is extremely important given the level of roadway investment that is planned in Tysons Corner and the long timeframe for implementation. Utility patches and other pavement repairs should be to standards that will be safe and comfortable for bicyclists.

G. Encouragement and Safety Education Program Recommendations

ORGANIZATION AND LEADERSHIP

It is critical that the lead Transportation Management Association (TMA) for Tysons Corner is also the lead entity for the management and coordination of most bicycle transportation encouragement and safety education programs. This will ensure that bicycle-related Transportation Demand Management (TDM) activities are effectively integrated with other TDM initiatives and the TDM-related proffers made by developers.

As this Plan was being developed (fall 2010 to winter 2011) it appeared that the Tysons Partnership was going to become the TMA for Tysons Corner. It is highly recommended that the Partnership take a leadership role regarding bicycle encouragement and education programming and bicycle parking. It is further recommended that they seek funding for bicycle transportation initiatives, hire staff and consider partnering/contracting with experienced local or regional bicycling organizations and businesses for services.

Ongoing Tysons Corner Bicycle Advisory Committee

To provide ongoing guidance regarding plan implementation and program development it is recommended that a bicycle or bicycle and pedestrian advisory committee be established in association with the Tysons Partnership or other organization empowered to be the TMA.

MULTILINGUAL MATERIALS FOR ENCOURAGEMENT AND SAFETY EDUCATION PROGRAMS (*PHASE 1-4*)

Because of the increasing numbers of Spanish speaking people in the Tysons area (especially among service and construction workers) every effort should be made to provide communications about encouragement and safety education programs in Spanish. Due to fast changing demographic characteristics, translations into other languages may be needed for some programs. Perhaps there is a local company who could donate their services, or a foreign language teacher/class at Marshall High School could contribute as volunteers.

ENCOURAGEMENT

Program initiatives suggested for Phase 1 and Phase 2 include the following:

Bicycle-Friendly Employer Program (Phase 1 and ongoing)

Use the League of American Bicyclists *Bicycle-Friendly Employer Program* to encourage employers and property managers to provide employees secure bike parking, availability of showers and changing facilities, incentives to commute by bicycle, etc.[30]

Bicycle-to-Transit Ambassadors (Phase 1 and 2)

In partnership with FABB and WABA, create a volunteer *Bicycle-to-Transit Ambassadors program* at Metrorail stations on select weekdays during the first spring the Silver Line is open. Such a program would entail volunteer cyclists staffing information tables at the Silver Line stations once a week during the first spring the system is open. Face to face contact with another cyclist who commutes can be the most influential factor in a person's decision to bicycle. Information about routes, safety, time savings and health benefits can be provided, as well as how to use the bicycle parking at the station, how to put your bicycle on a bus, and how to rent a bike locker. Arranging commuter companions or mentors is another service that can be provided to help new cyclists.[31]

It's About Time Commuter Campaign (Phase 1 and ongoing)

Launch a bicycle commuting encouragement program called "*It's About Time!*" Over the course of this planning process, many of the cyclists who commute to Tysons in 2010 stated that time savings (and reliability of the daily commute time expenditure) is the reason they choose bicycling over driving or taking transit. Congestion on routes to Tysons from both the east and west is common. Using the W&OD trail, and other connecting trails, bicycle commuters from as far away as the District of Columbia and Ashburn, Virginia described their time shavings over other travel alternatives available to them. This is a little known fact which if publicized might make biking more appealing to many other Tysons commuters.

To support the *It's About Time!* campaign, create a map of the greater Tysons area with "bicycle commuting times for the most time-efficient bicycle commuter routes to Tysons Corner offices. The map could be produced in various forms (paper, a printable map on the Internet, on signs at key gateways to Tysons, or on a bandana as a promotional giveaway).

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[30]http://www.bikeleague.org/programs/bicyclefriendlyamerica/bicyclefriendlybusiness/.

[31] http://alexandriava.gov/localmotion/info/default.aspx?id=11992 and http://bicyclingambassadors.org/.

Social Networking (Phase 1 and ongoing)

Create an Internet-based "social" network among employee-based bicycle clubs, bicycle commuting support groups, and individual bicycle commuters to publicize commuting testimonials; share information and tips, provide bicycle travel advisories, advertise programs and events and publicize progress made to increase the numbers of people bicycling in Tysons. A number of employers in Tysons Corner already have active groups with in-house leadership.

Bike to Work Day Activities (Phase 1 and ongoing)

Continue the *Bike-to-Work Day Pit Stop* in Tysons Corner, which is currently sponsored by Booz Allen Hamilton. Consider new advertising strategies that might increase the numbers of registered participants. It may be useful to consider moving the event location to a location that is more central to or accessible to Tysons area cyclists, or trying to involve more stakeholders and hosting multiple "Pit Stop" locations and "Convoys".

Shared Bicycle Program (Phase 2 and ongoing)

The District of Columbia and Arlington, Virginia have launched an extensive shared bicycle service. These are bicycles that are parked on the street and available free to the public for short trips (30 minutes or about 4-5 miles); a small annual membership fee is charged upon first-time use. This service is most successful in a downtown or downtown-like environment that is too large for walk trips to meet all travel needs among a well distributed mix of land uses. While Tysons Corner has a suburban transportation and development structure, it does have a diverse mix of uses across commercial and office employment, residential areas, places to eat, shop, exercise and run errands. However, the pedestrian environment is not consistently friendly and the suburban layout means that many origins and destinations are separated by distances longer than can be reached in an easy walk.

The shared bicycle is perfect for these types of trips within and to and from Tysons Corner. It may also be very useful for trips to and from the new Silver Line stations. However, it will not be successful until a set of bicycle facilities are implemented, so for this reason it should be scheduled for implementation in the later years of Phase 2.

Bike-to-Lunch Initiative (Phase 2)

This is an encouragement program that can be undertaken when shared bicycle services are in place. The idea is that restaurants in Tysons Corner offer a lunchtime discount (or free item) for bicycling to the lunch spot. They will be encouraging "green" travel and may attract more customers. This promotion will directly encourage lunchtime use of the shared bicycle system, which might otherwise be a low-use period. It will also expose many people to bicycling without requiring them to begin by making a major commitment to biking to work. It should also help the thousands of office employees in Tysons Corner associate bicycling with having fun, getting some exercise, and enjoying their free time during the work week.

Student Commuter Benefit

Transit and bicycling commuter benefits can be provided through employers to employees, at the employers' choice to participate in the program. Perhaps a source of funding could be identified to provide 16-18 year old high school students a monthly $20 benefit if they ride their bicycle to school 50 percent of the time. Experimenting with such a program at one school would enable the idea to be tested. While increasing student fitness, it might also ease congestion around schools and pressure on school parking lots.

Bicycle Parking Programs

Bicycle Parking At Metrorail Stations (Phases 1-4)

The following bicycle parking guidelines should be used to complete a more detailed analysis of the current Silver Line station site plans with regard to rack and locker locations.

- All racks should be covered, either by location under the overhead rail superstructure, by stand-alone canopies (such as modified bus shelters), or by locating them within the mezzanine or other indoor lobby areas.
- Consider locating racks in mezzanine areas, which will provide high-security parking at the lowest possible cost.
- In the early years of Metrorail service in Tysons, residential population in the core of Tysons will remain lower than that in the surrounding communities. If racks are not located in the mezzanines, which are equally convenient to customers regardless of which station entrance they use, the quantity of racks per station should not be split 50/50 among the two station entrances. They should be split two-thirds/one-third with the larger number located at the south entrances, which are generally the entrances that will be closest to the approach route of most cyclists, who will be coming from the surrounding communities.
- Lockers, on the other hand, probably should be split 50/50, as they will be used by cyclists for both bicycle access trips to the station and egress trips from the station to Tysons area destinations.

The provision of bicycle parking at the Tysons Central 123 station is of particular concern. A small number of racks are provided at the north entrance. The south entrance is going to have a small footprint and be isolated by busy roads on all sides. Coordination with the Tysons Corner Mall should continue to explore the optimum location for bicycle parking at this station, which if not located in the station mezzanine, maybe on outdoor Mall property that functions as "public space" for its existing and new developments.

One-Stop-Shop Bicycle Parking Installation Program (Phase 3 and ongoing)

Also, in this timeframe the overall increase in bicycle-friendly infrastructure combined with new trail access to two of the Silver Line stations, is likely to increase the need for

bicycle parking capacity at the Tysons East and Tysons Central 7 stations. Moreover, the increase in residential population within the core and ease of access from the surrounding communities will increase demand for bicycle parking at shopping centers and job sites. A timely and highly responsive program for increasing the overall supply of bike parking as well as the diversity of equipment will be needed. Short-term, weather protected parking will be needed in many locations, on-demand high-security parking will also be need for people who use a bicycle in Tysons frequently, but not necessarily every day. A web-based program may be the most efficient way for bicyclists, property owners and managers, and retail establishments to identify capacity expansion needs and proposed locations. Having a single, centralized procurement and installation administration will ensure that new equipment is installed in a timely manner and sited properly in public or semipublic space.

Advanced Bicycle Parking Systems (Phase 4 and ongoing)

Bicycle parking needs are expected to grow steadily throughout all phases of plan implementation. By 2020 it is likely that another generation of new bicycle parking technologies will be available which will increase convenience, weather protection, and security. The one-stop bicycle parking program recommended in Phase 3 will continue to be important to ensure that Tysons remains current with changing parking needs and changing equipment trends.

If a full-service bicycle station has not already been created, it will likely be needed by 2020. Bike stations are essentially "retail" outlets for bicycle transportation. They offer high-security bicycle storage, bicycle rental, sale of equipment and accessories, food and drink sales, bicycle repair, information, and advice, an office for bicycle mounted police, and any other services that cyclists may need. Bike stations are typically located at rail stations, where provision of bike parking for egress trips is a major service need.

In Tysons Corner, the first bicycle station is recommended for the Tysons West Silver Line station, and could be located in ground-level space in the new development already planned for this station. Bike stations are best if operated by an experienced bicycle retailer, however due to their need for a portion of the most valuable street-level retail space, they likely need public subsidy to get started. If additional storage or bicycle repair space is needed it should be provided at a second but nearby location that has less expensive rent.

Safety Education

Safe Routes to School (Phase 1)

As of January 2011, dialogue has begun between various safe routes to school advocates and the Fairfax County Public Schools. Like school districts around the U.S., Fairfax schools are eligible to apply for Federal safe routes to school funding through the state department of transportation (VDOT). This funding can be used for bicycle or pedestrian infrastructure improvements, operational improvements, safety education and/or encouragement programs at elementary or middle schools, including private schools.

Local schools (administrators, teachers and parents) in the Tysons Corner area can initiate local Safe Routes To School (SRTS) programs based on their own sense of need to improve bicycle and pedestrian safety for students or to encourage more kids to bicycle or walk to school. The planning process for this Plan did not systematically identify and evaluate safe routes to school needs in the study area. None-the-less, various needs were identified in the analysis process or pointed out by Bicycle Advisory Committee members or members of the public. Schools with safety and access issues include, but are not limited to the following: Wolftrap Elementary, Spring Hill Road Elementary and Joyce Kilmer Middle School.

Near-term initiation of SRTS programs in Tysons area schools will contribute significantly to a more bicycle and pedestrian safety savvy citizenry in Tysons in the long-term.

Bicycle Safety Education Program (Phase 2 and ongoing)

Cyclist and pedestrian safety education is recommended in Phase 2 given the potential for conflict between motorists and cyclists. Higher levels of cycling in Tysons Corner will be seen by motorists as a change in the transportation environment. Many may not be familiar with bicycle lanes or understand the shared lane marking.

Due to the location of affordable housing near Tysons Corner, many of the service workers with jobs in the Core, walk and bicycle along Route 7 from Pimmit Hills and Idylwood to various locations in Tysons. In recent years, a number of pedestrian and bicycle crashes along Leesburg Pike at the Beltway interchange, illustrate the safety issues related to the needs of this constituency and its only travel path between work and home. Additionally, the expanded opportunities for bicycling resulting from implementing this plan will bring out new cyclists; some of whom may not have had much education in the area of bicycle safety.

To address these safety education needs pedestrian and bicyclist safety along the sidepaths, service road bikeways and ramp crossings proposed for Route 7 and portions of Route 123 is paramount. While necessary as interim facilities, these types of accommodations are less than ideal for cyclists. They require crossing driveways, two-way cycling through intersections and crosswalks, and crossing free-flow motor vehicle traffic merging off and on expressway ramps—all of which are a challenge. Nighttime use makes it that much more challenging.

Inexperienced and new cyclists can easily assume that because a sidepath keeps them away from moving traffic that these facilities are inherently safer than bicycling in the street. However, because of the dynamics of sidepath crossings, and mixing with pedestrians, they actually demand more attention to safety and a greater degree of scanning for potential traffic conflicts.

Education of cyclists who will regularly use these sidepaths should be focused as follows: 1) through bicycle safety education in select middle and high schools in the area, and 2) through employee and neighborhood-based education and outreach, such as door hangers and flyers passed out at grocery stores, information distributed through homeowner associations, civic groups, and neighborhood listservs; and information

provided to service workers by their employers.[32] This education effort should also target motorists with messages delivered in the roadway environment, using special banners, variable message signs, and alerts to new bicycle facilities when they are installed on particular roadways.

Safe Routes to School Programs at the Elementary Level *(Phase 3 and ongoing)*

Phase 3 may be the most appropriate time to initiate a comprehensive Safe Routes to School program in the elementary schools. During this timeframe, safety education and encouragement programs can be combined with infrastructure improvements that will facilitate access to the schools, for example trails near Westbriar and Westgate Elementary Schools.

Law Enforcement *(Phase 1 and 2)*

As cycling increases during Phase 1 and 2 years, enforcement of bicycling laws will become increasingly important. During Phase 1, the FCDOT Bicycle Program staff and other bicycling interest groups should engage the Fairfax County and Town of Vienna police departments in a dialogue about bicycle law enforcement. As redevelopment of Tysons progresses, and more cyclists and pedestrians are using the public realm, bicycle mounted police patrols may be an effective approach to general law enforcement.

Evaluation

Bicycle Counts (Phase 1 and ongoing)

It is recommended that the Fairfax County DOT Bicycle Program in conjunction with FABB and WABA establish an annual bicycle counting program. This will serve to establish baseline usage levels from which progress can be measured over time. Because Tysons Corner is two-thirds enclosed by limited access highways, it is likely that 90 percent or more of existing bicyclists traveling in and out of Tysons Corner can be counted at eight points of entry/exit, including:

1. Spring Hill Road and VARoute 267
2. Dolley Madison Boulevard and Lewinsville Road
3. Chain Bridge Road and Anderson Road
4. VA Route 7 and the Beltway
5. Gallows Road at Old Gallows Road
6. Chain Bridge Road at Gosnell Road

[32] Kilmer, Longfellow and Thoreau Middle Schools; Marshall, McLean and Madison High Schools. In time, education efforts can be shifted from the High Schools to the Elementary Schools.

7. Old Courthouse Road at Gallows Road
8. Ashgrove Lane

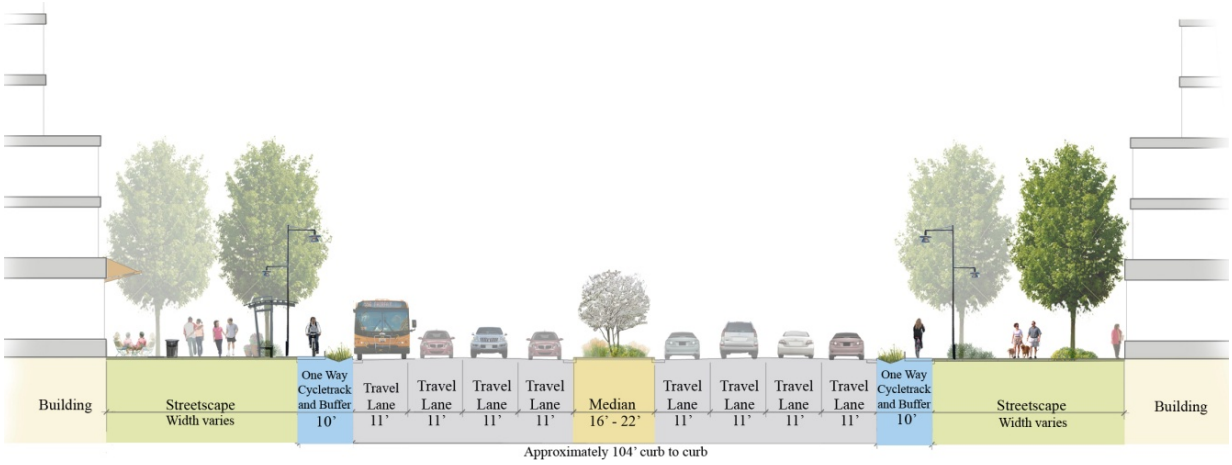
Annual bicycle counts should be continued. Expansion of the counting locations or expansion of the hours may be considered, depending upon available resources. Another option would be to conduct counts twice yearly by selecting an additional data gathering period.

H. Specific Recommendations Related to the Tysons Corner Comprehensive Plan Amendment (June 2010)

Updates to the Tysons Corner Urban Center Comprehensive Plan Amendment

The following recommendations fill gaps, clarify and elaborate on the bicycle transportation provisions identified in the Tysons Corner Urban Center Comprehensive Plan Amendment. Six key areas that need updated recommendations are listed below:

Updated Boulevard cross-sections that include bicycle facilities: Near-term and long-term bicycle facility recommendations are provided (see section below).



Updating the network of roadways that will have bicycle lanes due to their functional classification as Avenues or Collectors (see Figure 7.2)

Recommendations to consider in the Grid of Streets study to improve functionality of a southern section of the grid for bicycle access to and from Tysons Corner.

- At the north end, Woodford Road should be continued north to Leesburg Pike and cross to link with a service road along side VA Route 123. It would replace a part of Howard Road.
- At the north end, Lord Fairfax Road should be continued across Old Courthouse Road to Boone Boulevard.

- Address the need for Aline Avenue to line up with Fashion Boulevard at the crossing of Leesburg Pike. This is a critical disruption of the proposed grid that needs to be fixed.
- Even though it is diagonal to the proposed grid, include the proposed trail along the powerline corridor as a street in the grid. Use this corridor to create natural boundaries to development blocks. Other non-motorized streets will need to be considered as well, for example from the end of Raglan Road at Gosnell Road, directly to the Tysons Corner Central 7 Metrorail station.
- Modify the VA Route 123 intersection with Tysons Boulevard to allow bicycles to pass straight across VA Route 123 in both directions as pedestrians. Provide pedestrian crosswalks on both sides of Tysons Boulevard.
- Fully integrate the Ring Road around the Tysons Center Mall into the grid and set of public travel ways. Consider some re-alignments on the west side of the mall.
- Rename many of the roadways in Tysons Corner. The terms Drive and Road should be eliminated from the lexicon, as they are not street types that appear in downtown areas. The streets should be called for their new functional classification, i.e., Boulevards should be Boulevards, Avenues…Avenues, etc. Street names should not carry through major intersections on legs that are perpendicular of each other, i.e., Spring Hill Road at International Drive turns to the west. This in counter intuitive and makes wayfinding very difficult.
- There will be a need to have the grid of streets integrate with the surrounding community on the south side of Tysons. Where residential communities need to be protected from increased traffic and cut-through traffic, use landscaping islands to limit entry for motor vehicles and retain bicycle and pedestrian access. Do not offset the minor streets at the arterial, as this makes it extremely difficult for bicyclists and pedestrians to cross.
- Expanded recommendations for the trail network, refined trail alignments and inclusion of key trails as components of the "grid of streets" (see Map F available on line, and Figure 7.2 in this document).
- Recommendations for consideration of alternate and additional grade separated crossings of the Beltway and Dulles Toll Road (See Figure 7.1).

For bicycle parking requirements-adopt the *Fairfax County Policy and Guidelines for Bicycle Parking*, which currently is under development by FCDOT staff. In the interim, the bicycle parking provisions provided in *Comprehensive Plan Amendment* should be followed. They are restated here:

- **Short-Term Bicycle Parking**: Emphasizes convenience and accessibility, providing parking for visitors, shoppers, and guests. Short-term parking typically constitutes bicycle racks that are adjacent to primary entrances at libraries, municipal buildings, schools, and retail centers and are intended for site users. Racks should preferably be protected by the elements, and be highly visible.

- **Long-Term Bicycle Parking:** Provides not only convenience but security. This type of bicycle parking accommodates employees and residents where parking duration is typically longer than a few hours. Parking amenities include bike lockers, bike cages, and bike rooms. These facilities should be conveniently located and offer fully enclosed and locked storage.
- Bicycle Parking Ratios for Urban Mixed Use Centers
- **Multifamily:** One space for every 5 residential units and 1 visitor space for every 25 residential units or to the satisfaction of the Director of Transportation. Minimum is 2 spaces.
- **Commercial-Retail:** One employee space per 10,000 sq. ft. and 1 visitor space per 5,000 sq. ft. or to the satisfaction of the Director of Transportation. Minimum is 2 spaces.
- **Office:** One employee space per 7,500 sq. ft. and 1 visitor space per 20,000 sq. ft., or to the satisfaction of the Director of Transportation. Minimum is 2 spaces.
- In addition to this guidance, it should be noted that inverted-U standard bicycle parking racks are highly recommended. Artistic racks may also be used. Racks should be powder-or plastic-coated so they do not scratch the bicycle. Racks should support the bicycle in two locations along the frame (providing wheel support is not sufficient), and allow for a standard U-lock to be used to secure the bicycle. What are known as "school racks," "wave racks," and other types of racks that do not meet these guidelines should not be used.

Racks should be located as close as possible to the building entrance, without causing blockage of pedestrian space or making a pedestrian travel way impassible for a person with a physical disability. Racks or lockers provided for employee use should be located near an entrance that is both convenient and secure. It may be best to consult with employees who bicycle to work to determine which entrance is preferred.

I. Project Lists and Cost Estimates by Phase

Phase 1: On Road Projects

Street Name	Bike Lane	Climbing Lane	Paved Shoulder	Sharrow	Total Miles (Rounded)	Total Cost
ASHGROVE HOUSE LN				0.03	0.03	$60
ASHGROVE LN				0.07	0.07	$140
BEULAH RD			0.27		0.27	$1,215,000
CHAIN BRIDGE RD SERVICE RD				0.24	0.24	$480
COLSHIRE DR		0.1		0.14	0.24	$2,555
COLSHIRE MEADOW DR				0.2	0.2	$400
DARTFORD DR				0.08	0.08	$160
DOLLEY MADISON BLVD			1.09		1.09	$0
GALLOWS RD	2.73			2.38	5.11	$4,760
HELENA DR				0.1	0.1	$200
HURST ST				0.22	0.22	$440
IDYLWOOD RD				0.09	0.09	$180
KIDWELL DR				0.16	0.16	$320
LEESBURG PIKE SERVICE RD				0.14	0.14	$280
LEWINSVILLE RD	0.47				0.47	$24,360
MERRY OAKS LN				0.27	0.27	$540
MERVIS WAY	0.08				0.08	$1,392
OAK ST				0.33	0.33	$660
PROVIDENCE ST				0.13	0.13	$260
SHERATON TYSONS DR				0.1	0.1	$200
TRAP RD				1.42	1.42	$2,840
VIRGINIA LN				0.08	0.08	$160
WESTPARK DR	0.26				0.26	$0
WESTWOOD CENTER DR				0.17	0.17	$340
(blank)				0.3	0.3	$600
Grand Total	3.54	0.1	1.36	6.65	11.65	$1,256,327

Phase 1: Off Road Projects

Facility	Construct	Rehab Existing	Under Construction	Widen Sidewalk	Total Miles (Rounded)	Total Cost
Dolly Madison Blvd Sidepath				0.25	0.25	$500,000
Underway				0.25	0.25	$500,000
Gallows Rd Sidepath		0.53			0.53	$26,500
Existing		0.53			0.53	$26,500
Mervis Way Connector	0.04				0.04	$80,000
Planned	0.04				0.04	$80,000
Route 7 Sidepath	0.3		2.84	0.03	3.17	$660,000
Underway	0.3		2.84	0.03	3.17	$660,000
Tysons East Metro Connector				0.26	0.26	$520,000
Existing				0.26	0.26	$520,000
Grand Total	1.22	0.53	2.84	0.54	5.0	$3,366,500

Phase 1: Intersection Improvements

Description	Status
Old Courthouse Rd and Westwood Dr	Proposed
Lewinsville Rd and Balls Hill Rd	Planned
Dolley Madison Blvd and Lewinsville Rd	Planned
Dolley Madison Blvd and Ingleside Ave	Planned
Clarks Crossing Rd and Percussion Way	Proposed
Old Courthouse Rd and Creek Crossing Rd	Proposed
Towers Crescent Dr and Shoptysons Blvd	Proposed

Phase 1: Interchange Improvements

Description	Status
VA Route 7 and I-495 (West)	Underway
VA Route 7 and I-495 (East)	Underway

Phase 1 Access Improvements

Name	Status	Action
G.C. Marshall Dr Access	Proposed	Remove fence; replace with new access control.
Kidwell Dr Link	Proposed	Curb ramp and short path section.
Madron Lane Passage	Proposed	New access control.

Phase 1 Bicycle/Pedestrian Overpass

Name	Status	Facility Type
Wolf Trap Road Trail Overpass of Dulles Toll Road	Underway	Off Road

Note: Due to significant variation in potential bridge costs, and considerable differences in the potential bridge locations, cost estimates for the bridge options are not provided. Additionally, most of the potential bridge locations require a significant length of grade-level trail or on-street facilities leading to the approaches at each end. Because these costs would not be incurred unless the bridge option was selected, they too have not been included in the off-road or on-road cost estimates.

Phase 2: On Road Projects

Street Name	Add Safety Signage	Bike Lane	Buffered Bike Lane	Climbing Lane	Paved Shoulder	Sharrow	Total \ Miles (Rounded)	Total Cost
ALINE AVE		0.23					0.23	$20,010
ANDERSON RD		0.43				0.09	0.52	$37,590
BESLEY RD						0.32	0.32	$640
BOONE BLVD						0.06	0.06	$120
CHAIN BRIDGE RD		0.62					0.62	$976,494
CHURCHILL RD		0.57				0.53	1.1	$22,948
CLARKS CROSSING RD	0.87						0.87	$1,740
COLSHIRE DR				0.05			0.05	$1,138
DOLLEY MADISON BLVD		0.25	1.67		1.62		3.54	$1,402,815
FASHION BLVD		0.09					0.09	$1,566
GALLOWS BRANCH RD		0.07					0.07	$6,090
GREAT FALLS ST						0.21	0.21	$420
HOWARD AVE		0.08					0.08	$1,392
IDYL LN				0.09			0.09	$2,048
IDYLWOOD RD		0.34					0.34	$1,530,000
JONES BRANCH DR		1.41					1.41	$122,670
KIDWELL DR		0.28					0.28	$24,360
LEESBURG PIKE		0.06					0.06	$5,220
LEESBURG PIKE SERVICE RD						1.29	1.29	$2,580
LEWINSVILLE RD		1.11					1.11	$96,570
MADRILLON RD						0.42	0.42	$840

Street Name	Add Safety Signage	Bike Lane	Buffered Bike Lane	Climbing Lane	Paved Shoulder	Sharrow	Total \ Miles (Rounded)	Total Cost
MAGARITY RD		0.34				0.3	0.64	$634,080
NIBLICK DR SE						0.01	0.01	$20
OAK ST		0.3					0.3	$50,616
OLD COURTHOUSE RD	0.91	1.62					2.53	$623,618
OLD COURTHOUSE RD NB RAMP TO TRAP RD EB		0.03					0.03	$2,610
OLD GALLOWS RD		0.08					0.08	$6,960
OLD MEADOW RD		0.47					0.47	$90,240
PARKING LOT						0.01	0.01	$20
PATTERSON RD						0.14	0.14	$280
PEACH ORCHARD DR						0.13	0.13	$260
PIMMIT DR				0.43			0.43	$9,783
RAMADA RD						0.02	0.02	$40
RING RD				0.05			0.05	$1,138
SPRING HILL RD		0.74				0.67	1.41	$65,720
STANBRIDGE PL						0.05	0.05	$100
TRAP RD				0.28			0.28	$6,370
TYCO RD						0.46	0.46	$10,370
TYSONS BLVD		0.22					0.22	$3,828
TYSONS CORNER CTR		0.2		0.26		0.28	0.74	$19,003
WESTMORELAND ST				0.4			0.4	$9,100
WESTPARK DR		0.31					0.31	$26,970
WESTWOOD CENTER DR						0.01	0.01	$20
WOLFTRAP RD		0.36				0.79	1.15	$7,844
WOLFTRAP RD SE						0.3	0.3	$600
WOODFORD RD		0.25				0.25	0.5	$4,850
(blank)						1.33	1.33	$2,660
Grand Total	1.78	10.46	1.67	1.56	1.62	7.67	24.76	$5,834,349

Phase 2: Off Road Projects

Facility	Construct	Easement	Pave	Realign	Rehab Existing	Widen Sidewalk	Total Miles (Rounded)	Total Cost
Aline Connector	0.04						0.04	$80,000
Proposed	0.04						0.04	$80,000
Ambergate and Choleshire Connector	0.01						0.01	$20,000
Proposed	0.01						0.01	$20,000
Ashgrove Connector					0.24		0.24	$12,000
Existing					0.24		0.24	$12,000
Davis Ct Connector					0.03		0.03	$1,500
Existing					0.03		0.03	$1,500
Dolly Madison Blvd Sidepath	1.14				0.79		1.93	$2,319,500
Existing					0.79		0.79	$39,500
Planned	1.14						1.14	$2,280,000
Idylwood Connector	0.41						0.41	$820,000
Proposed	0.41						0.41	$820,000
Jones Branch Trail	0.73						0.73	$1,460,000
Planned	0.51						0.51	$1,020,000
Proposed	0.22						0.22	$440,000
Leesburg Pike and Chain Bridge Rd Connector						0.44	0.44	$880,000
Existing						0.44	0.44	$880,000
Leesburg Pike Service Rd	0.01						0.01	$20,000
Proposed	0.01						0.01	$20,000
Leesburg Pike Sidepath	2.48						2.48	$4,960,000
Planned	2.48						2.48	$4,960,000
Madrillon Rd Connector			0.06				0.06	$3,000
Existing			0.06				0.06	$3,000
McLean High						0.13	0.13	$260,000

Facility	Construct	Easement	Pave	Realign	Rehab Existing	Widen Sidewalk	Total Miles (Rounded)	Total Cost
School Connector								
Existing						0.13	0.13	$260,000
Old Courthouse Rd Sidepath						0.65	0.65	$1,300,000
Existing						0.65	0.65	$1,300,000
Pimmit Drive Connector						0.06	0.06	$120,000
Proposed						0.06	0.06	$120,000
Power Line Trail	0.62						0.62	$1,240,000
Planned	0.62						0.62	$1,240,000
Route 7 Sidepath						1.35	1.35	$2,700,000
Existing						0.85	0.85	$1,700,000
Proposed						0.5	0.5	$1,000,000
Service Road Sidepath						0.19	0.19	$380,000
Existing						0.19	0.19	$380,000
Tysons Central 123 Trail System	1.06						1.06	$2,120,000
Planned	0.39						0.39	$780,000
Proposed	0.67						0.67	$1,340,000
Wolf Trap Stream Valley Park Trail System		0.18			0.03		0.21	$1,500
Existing		0.18			0.03		0.21	$1,500
Wolf Trap Trail Extension				0.06			0.06	$120,000
Proposed				0.06			0.06	$120,000
Grand Total	6.5	0.18	0.06	0.06	1.09	2.82	10.71	$18,817,500

Phase 2: Intersection Improvements

Description	Status
Rt 7 and Tyco Rd	Proposed
Rt 7 and Spring Hill Rd	Proposed
Old Courthouse Rd and Besley Rd	Proposed
Chain Bridge Rd Just East of Old Courthouse Rd	Proposed
International Dr and Westpark Dr	Proposed
International Dr and Jones Branch Dr	Proposed
Spring Hill Rd and Lewinsville Rd	Proposed
Old Courthouse Rd and Woodford Rd	Proposed
Old Courthouse Rd and Aline Road	Proposed
Gallows Rd and Madrillon Rd	Proposed
Rt 7 and Fashion Blvd	Proposed
Rt 7 and Ramada Rd	Planned
Anderson Rd just South of Chain Bridge Rd	Proposed
Westpark Dr and Greensboro Dr	Proposed
Chain Bridge Rd and Old Courthouse Rd	Proposed
Beulah Rd and Old Courthouse Rd	Proposed
Rt 7 and Rt 267 (North)	Planned
Rt 7 and Rt 267 (South)	Planned
Beulah Rd NE and Creek Crossing Rd	Proposed

Phase 2: Interchange Improvements

Description	Status
Dolly Madison Blvd and Dulles Toll Rd (North)	Planned
Dolly Madison Blvd and Dulles Toll Rd (South)	Planned
Rt 7 and I-66 (West)	Proposed
Rt 7 and I-66 (East)	Proposed
Spring Hill Rd and Dulles Toll Rd	Proposed
Dolly Madison Blvd and I-495	Proposed

Phase 2: Access Improvements

Name	Status	Action
Colshire Dr Link	Proposed	Construct trail link and curb ramps.
Tysons Corner Center Mall	Proposed	Work w/ Developer – install crosswalk and safety sign.
Leesburg Pike Service Rd Deadend	Proposed	Short section of path; modify landscaping.
Ashgrove Lane Connector	Proposed	Shore up trail treadway from erosion; modify gate.

Phase 2: Bicycle/Pedestrian Overpass Options

Name	Status	Facility Type
Toll Road Overpass at Leesburg Pike – Median Trail	Planned/Proposed	Off Road

Note: Due to significant variation in potential bridge costs, and considerable differences in the potential bridge locations, cost estimates for the bridge options are not provided. Additionally, most of the potential bridge locations require a significant length of grade-level trail or on-street facilities leading to the approaches at each end. Because these costs would not be incurred unless the bridge option was selected, they too have not been included in the off-road or on-road cost estimates.

Phase 3: On Road Projects

Street Name	Bike Lane	Buffered Bike Lane	Climbing Lane	Paved Shoulder	Shared Road	Sharrow	Total Miles (Rounded)	Total Cost
BALLS HILL RD					0.01	1.33	1.34	$2,660
BEULAH RD	0.43						0.43	$7,482
BEULAH RD NE	0.03						0.03	$522
BOONE BLVD	0.27					0.35	0.62	$5,398
CHAIN BRIDGE RD	3.75					0.29	4.04	$270,976
CHAIN BRIDGE RD SERVICE RD						0.08	0.08	$160
CHURCHILL RD						0.08	0.08	$160
CREEK CROSSING RD	0.26		0.29				0.55	$25,433
CREEK CROSSING RD NE	0.09						0.09	$7,830
DOLLEY MADISON BLVD	1.35			1.61			2.96	$262,836
DOMINION HEIGHTS CT						0.02	0.02	$40
ELECTRIC AVE	0.75					0.31	1.06	$65,870
FASHION BLVD	0.27						0.27	$4,698

Street Name	Bike Lane	Buffered Bike Lane	Climbing Lane	Paved Shoulder	Shared Road	Sharrow	Total Miles (Rounded)	Total Cost
FLETCHER ST						0.05	0.05	$100
GALLERIA DR	0.82						0.82	$71,340
GALLOWS RD						0.5	0.5	$1,000
GOSNELL RD	1.01						1.01	$74,646
GREAT FALLS ST	1.69	0.55	0.31				2.55	$217,794
GREENSBORO DR	0.48		0.29				0.77	$48,358
HOWARD AVE	0.32						0.32	$5,568
IDYLWOOD RD			0.45				0.45	$10,238
INTERNATIONAL DR			0.36			1.12	1.48	$10,430
LEESBURG PIKE SERVICE RD						0.3	0.3	$600
LEWINSVILLE RD	0.45						0.45	$2,025,000
MAPLE AVE E	0.2						0.2	$17,400
OLD CHAIN BRIDGE RD	0.01					0.38	0.39	$1,630
OLD COURTHOUSE RD	0.15					0.12	0.27	$4,242
OLD DOMINION DR	2.17						2.17	$188,790
PIMMIT DR						0.51	0.51	$11,730
SOLUTIONS DR						0.1	0.1	$200
Solutions Drive Extended			0.16				0.16	$1,552
SPRING HILL RD	0.34					0.7	1.04	$66,680
SWINKS MILL RD			0.48				0.48	$10,920
TOWLSTON RD						1.14	1.14	$2,280
TYSONS BLVD	1.26						1.26	$109,620
WATSON ST						0.18	0.18	$360
WESTBRANCH DR	0.31		0.21				0.52	$31,748
WESTMORELAND ST	0.24						0.24	$20,880
WESTPARK DR	1.14					0.46	1.6	$100,100
WOODFORD RD	0.22					0.25	0.47	$4,328
Grand Total	18.58	0.55	2.55	1.61	0.01	8.27	31.3	$5,176,597

Phase 3: Off Road Projects

Facility	Construct	Easement	Pave	Rehab Existing	Widen Sidewalk	Total Miles (Rounded)	Total Cost
Chain Bridge Road Sidepath	0.89					0.89	$1,780,000
Planned	0.38					0.38	$760,000
Proposed	0.51					0.51	$1,020,000
Gallows Rd Sidepath					0.21	0.21	$420,000
Existing					0.21	0.21	$420,000
Georgetown Pike Connector	0.48					0.48	$960,000
Planned	0.48					0.48	$960,000
Idylwood Connector		0.06				0.06	$0
Existing		0.06				0.06	$0
Jones Branch Trail	0.46					0.46	$920,000
Planned	0.46					0.46	$920,000
Leesburg Pike Service Rd	0.34					0.34	$680,000
Proposed	0.34					0.34	$680,000
McLean Community Park Connector			0.21			0.21	$10,500
Existing			0.21			0.21	$10,500
Meadowlark Rd Trail			0.65			0.65	$32,500
(blank)			0.65			0.65	$32,500
Old Courthouse Sidepath	0.08					0.08	$160,000
Proposed	0.08					0.08	$160,000
Pimmit Library Trail System				0.51		0.51	$25,500
Existing				0.51		0.51	$25,500
Sandburg St Connector	0.08					0.08	$160,000
Proposed	0.08					0.08	$160,000
Scotts Run Trail System	0.4					0.4	$800,000
Planned	0.4					0.4	$800,000
Westbriar Elementary School Connector	0.51			0.1		0.61	$1,025,000
Existing				0.1		0.1	$5,000
Proposed	0.51					0.51	$1,020,000
Tysons Central at 7 Metro Connector	0.56					0.56	$1,120,000
Proposed	0.56					0.56	$1,120,000
Grand Total	3.8	0.06	0.86	0.61	0.21	5.54	$8,093,500

Phase 3: Intersection Improvements

Description	Status
Beulah Rd and Abbotsford Dr	Proposed
Rt 7 and Westpark Dr	Proposed
Rt 7 and International Dr	Proposed
Dolley Madison Blvd and Beverly Rd	Proposed
Chain Bridge Rd and International Dr	Proposed
Chain Bridge Rd and Niblick Dr	Proposed
Beulah Rd and Cinnamon Creek Dr	Proposed
Beulah Rd and Lozano Dr	Proposed
Beulah Rd and John Marshall Dr	Proposed

Phase 3: Interchange Improvements

(none)

Phase 3: Access Improvements

Name	Status	Action
Davis Ct Link	Existing	Add new curb ramps, adjust storm drainage inlet.
Spring Hill Rd Sidepath	Planned	Eliminate property owner's blockage of existing sidepath.

Phase 3: Bicycle/Pedestrian Overpass Options

Name	Status	Facility Type
Scotts Crossing Rd	Proposed	On Road

Note: Due to significant variation in potential bridge costs, and considerable differences in the potential bridge locations, cost estimates for the bridge options are not provided. Additionally, most of the potential bridge locations require a significant length of grade-level trail or on-street facilities leading to the approaches at each end. Because these costs would not be incurred unless the bridge option was selected, they too have not been included in the off-road or on-road cost estimates.

Phase 4: On Road Projects

Street Name	Bike Lane	Climbing Lane	Cycletrack	Paved Shoulder	Sharrow	Total Miles (Rounded)	Total Cost
BEULAH RD	0.13			1.2		1.33	$5,985,000
CEDAR LN					0.79	0.79	$1,580
CHAIN BRIDGE RD SERVICE RD	0.14					0.14	$5,376

Street Name	Bike Lane	Climbing Lane	Cycletrack	Paved Shoulder	Sharrow	Total Miles (Rounded)	Total Cost
COTTAGE ST	1.08					1.08	$18,792
IDYLWOOD RD					0.37	0.37	$2,840
INTERNATIONAL DR			1.08			1.08	$2,160,000
KIRBY RD	0.42				0.18	0.6	$36,900
LEESBURG PIKE SERVICE RD	0.09					0.09	$3,456
LEWINSVILLE RD	1.43					1.43	$6,435,000
LISLE AVE		0.25			0.96	1.21	$9,595
OLD MEADOW RD		0.19				0.19	$1,843
WILSON LN	0.07					0.07	$6,090
WILSON LN BRIDGE	0.14					0.14	$630,000
(Unknown name)		0.14				0.14	$4,298
Grand Total	3.5	0.58	1.08	1.2	2.3	8.46	$14,085,770

Phase 4: Off Road Projects

Facility	Construct	Construct w/ Road Project	Realign	Rehab Existing	Widen Sidewalk	Total Miles (Rounded)	Total Cost
Courthouse Spring Branch Trail System			2.05			2.05	$4,100,000
Planned			2.05			2.05	$4,100,000
Jones Branch Trail	0.24					0.24	$480,000
Planned	0.24					0.24	$480,000
Kirby Rd Sidepath					0.15	0.15	$300,000
Proposed					0.15	0.15	$300,000
Leesburg Pike Sidepath	2.75					2.75	$5,500,000
Planned	2.75					2.75	$5,500,000
Macbeth St Connector	0.33					0.33	$660,000
Proposed	0.33					0.33	$660,000
Scotts Run Trail System	0.29					0.29	$580,000
Planned	0.29					0.29	$580,000
Spring Hill Rd Sidepath	0.15					0.15	$300,000
Proposed	0.15					0.15	$300,000
Wolf Trap Creek Trail	0.29					0.29	$580,000

Proposed	0.29					0.29	$580,000
Wolf Trap Stream Valley Park Trail System				1.36		1.36	$68,000
Existing				1.36		1.36	$68,000
Grand Total	5.1	1.1	2.05	1.36	0.15	8.4	$14,868,000

Phase 4: Intersection Improvements

Description	Status
International Dr and Galleria Dr	Proposed
International Dr and Tysons Blvd	Proposed
Westpark Dr midblock trail crossing	Proposed

Phase 4: Interchange Improvements

(none)

Phase 4: Access Improvements

Name	Status	Action
Redd Road Trail Bridge	Proposed	Install trail bridge over stream to connect two cul-de-sacs

Phase 4: Bicycle/Pedestrian Overpass Options

Name	Status	Facility Type
Beulah Rd	Proposed	On Road or Off Road
Wilson Lane – Tysons Corner Mall Connector	Proposed	On Road
Toll Road Overpass at Greensboro Extended (w/potential entrance ramp)	Proposed	Off Road
Toll Road Overpass at McLean Hamlet Park (w/potential entrance ramp)	Proposed	Off Road
Marshall High School Overpass	Proposed	Off Road
Old Meadow Lane – Tysons Corner Mall Connector	Proposed	Off Road

Note: Due to significant variation in potential bridge costs, and considerable differences in the potential bridge locations, cost estimates for the bridge options are not provided. Additionally, most of the potential bridge locations require a significant length of grade-level trail or on-street facilities leading to the approaches at each end. Because these costs would not be incurred unless the bridge option was selected, they too have not been included in the off-road or on-road cost estimates.

Long-Term Facilities

Street Name	Bike Lane	Buffered Bike Lane	Climbing Lane	Cycletrack	Paved Shoulder	Total Miles (Rounded)	Total Cost
AMBERGATE PL	0.09					0.09	$8,029
BALLS HILL RD	1.96					1.96	$5,644,560
BOONE BLVD	0.12					0.12	$10,812
CHAIN BRIDGE RD		1.15		0.18	1.12	2.44	$10,981,579
CHOLESHIRE DR	0.11					0.11	$9,309
CLARKS CROSSING RD			0.87			0.87	$8,445
COLSHIRE DR	0.24					0.24	$20,745
COLSHIRE MEADOW DR	0.20					0.20	$17,776
DARTFORD DR	0.08					0.08	$7,036
DOLLEY MADISON BLVD	0.28			7.63	0.68	8.60	$37,447,061
FLETCHER ST	0.05					0.05	$4,514
GALLOWS RD				0.51		0.51	$1,012,861
GREAT FALLS ST	0.21					0.21	$925,639
HOLLY RIDGE DR	0.21					0.21	$18,374
IDYLWOOD RD	0.53					0.53	$55,651
INTERNATIONAL DR				1.49		1.49	$2,985,665
LEESBURG PIKE				4.14		4.14	$8,281,045
LEESBURG PIKE SERVICE RD				0.15		0.15	$296,912
MAGARITY RD	1.23					1.23	$5,528,535
OLD COURTHOUSE RD	0.39				0.52	0.91	$4,076,856
OLD DOMINION DR	1.07					1.07	$4,819,725
PARK RUN DR			0.36			0.36	$3,478
SPRING HILL RD	0.65					0.65	$56,608
TYCO RD	0.30					0.30	$25,727
TYSONS CORNER CTR	0.28					0.28	$24,676
WATSON ST	0.18					0.18	$15,246

Street Name	Bike Lane	Buffered Bike Lane	Climbing Lane	Cycletrack	Paved Shoulder	Total Miles (Rounded)	Total Cost
WESTPARK DR	0.46					0.46	$40,017
WESTWOOD CENTER DR	0.18					0.18	$15,505
Unknown Name	0.31			0.22		0.53	$470,834
Grand Total	9.13	1.15	1.23	14.32	2.32	28.14	$82,813,220

J. Cost Estimate Methodology

Fairfax County developed planning-cost estimates by identifying pay items and establishing rough per-mile quantities. Cost estimates are based on 2010 dollars and were assigned based on project costs from previous projects in Fairfax County. The costs are intended to be general and used for long-range planning purposes. They do not account for inflation. Construction costs will vary based on the ultimate project scope (i.e., combination with other projects) and economic conditions at the time of construction.

In general, the following assumptions apply, however a table follows, which includes select exceptions and specific cost per-mile multipliers for each facility/action combination:

- The costs shown reflect cost associated with construction of the particular bicycle or pedestrian facility indicated. The costs shown do not reflect other costs that may be associated with a larger project.
- A contingency is applied to the cost for each item of approximately 25 percent of construction cost.
- Preliminary engineering and design costs are approximated at 15 percent of total construction cost.
- Maintenance of Traffic costs are approximated at 5 percent of total construction cost.
- The planning estimates do not include costs for substantial right-of-way acquisition (unless noted), lighting, significant changes in vehicular traffic patterns, or future facility maintenance.
- Eradication cost is assumed to be $4 per linear foot (one mile is $21,000) and paint cost is assumed to be $.50 per linear foot (one mile is $3,000).
- Cost estimates do not include access, interchange, intersection or bridge improvements given the unique character and broad potential range of costs for these improvements.

Detailed Assumptions for Cost Estimates

Facility/Action Combination	Cost Per Mile	Notes
Signage		
Add Signage	$2,000	Includes all sign types
Bike Lane		
Add Bikeway w/ RD Reconstruction	$4,500,000	ROW included. Note that over 50 percent of the new bike lanes will likely only cost Fairfax County the striping amount as VDOT's repaving schedule will likely incorporate the rest of the repaving cost.
Add Striping and Marking	$17,400	
Construct	$4,500,000	See above.
Lane Diet	$87,000	
Pave Shoulder	$105,000	Assumes a 2-foot paved shoulder ($20 a linear foot)
Remove Parking 1 Side	$38,400	
Road Diet	$192,000	
Widen Road	$4,500,000	ROW included.
Buffered Bike Lane		
Lane Diet	$64,500	Assumes the cost of bike lane plus $21,000 per mile ($4 per foot for hash striping)
Climbing Lane		
Add Striping and Marking	$9,700	Assume half of the cost of a bike lane plus half of the cost of shared lane markings.
Lane Diet	$22,750	
Remove Parking 1 Side	$30,700	
Cycletrack		
Construct	$2,000,000	
Paved Shoulder		
Pave Shoulder	$105,000	
Widen Road	$4,500,000	
Sharrow		
Add Striping and Marking	$2,000	Assumes $200 per stencil and 10 stencils per mile.
Lane Diet	$23,000	
Remove Parking 1 Side	$23,000	
Multi-Use Trails		
New, realigned, reconstructed, widened, etc.	$2,000,000	
Simple resurfacing of existing trail	$50,000	

K. Potential Impacts of the Proposed Bicycle Facilities

The four phases of the Tysons Corner Bicycle Master Plan (the Plan) include a broad set of recommendations for physical improvements that will enhance roadways, transit facilities, greenways, or right-of-way in and adjacent to Tysons Corner. When developing recommendations for the Plan, the Fairfax County DOT considered the possible implications or impacts that the recommended improvements and programs may have on areas of concern such as:

- The convenience of travel across multiple modes (defined by measures of accessibility to destinations and overall travel mobility);
- The safety of cyclists, pedestrians, and drivers;
- Public and private property and rights-of-way (ROW); and
- Air quality and the natural environment.

This section addresses how the bicycle network improvements and programs affect these areas of interest.

MOBILITY

Traveling by Bicycle

The Bicycle Plan makes many recommendations for bicycle facilities that will help to increase connectivity, comfort, and safety for people who choose to travel by bicycle. Full deployment of the Plan within the area approximately 3 miles from Tysons Corner will result in an additional 85 miles of on-road facilities by 2030. Of the on-road facilities, bike lanes, buffered lanes, climbing lanes, or cycletracks represent 44 miles. This represents almost a tripling of total on-road bicycle facility mileage in the area and provides multiple direct connections into the W&OD trail and a proposed additional 30 miles of shared use paths/off-road facilities.

Based on 2005 population in Tysons Corner and the surrounding area, there are 0.04 miles of on-road bicycle facilities for every 1,000 people. By 2030, with projected population growth and broad network expansion as identified in this plan, the density increases to 0.9 miles per 1,000 people.

Traveling by Transit

The Plan not only identifies improvements and programs that will provide the opportunity for biking to be a preferred and reliable form of transportation, but it also creates safe and direct links from residential communities to the Metrorail stations, and

from Metrorail stations to prominent destinations throughout Tysons Corner. The Plan encourages integrating bicycle facilities with buses and bus stops, by recommending improvements that would link to bus routes, supporting bicycle racks on buses, and providing quality bicycle parking at bus stops as well as at Metrorail stations.

Traveling on the Roadways

When developing the Plan, impacts to automobile mobility was considered, as many recommended bicycle improvements are on existing Tysons Corner roadways. Actions taken to accommodate bicycle improvements fall into two general categories – those which diminish capacity (reduce the number of vehicles which can travel a roadway over a particular time period) and those that do not. In the Plan, the majority of actions recommended to develop improvements are those that do not typically diminish vehicle throughput on a roadway, these include adding shared lane markings to roadways and implementing lane diets that include restriping the travel lanes to provide bicycle lanes or wide outside lanes that have shared lane markings in them.

Actions that can diminish motor vehicle capacity include road diets, which involve removal of one or two travel lanes in order to add bicycle lanes. In many cases, prior to implementation of a road diet, a study will be conducted to ensure that the action taken is appropriate for traffic operations and safety as well as the safety of the bicyclist.

Developing a bicycle network in Tysons Corner will also have a positive impact on roadway congestion in the area whether the road has a planned bicycle facility or not. Based on a combination of socioeconomic and travel data from the 2000 Census, 2001 National Household Travel Survey, and MWCOG's regional travel demand model, ranges of estimates on the current number of bicycle trips and anticipated future number of bicycle trips can be made. On an average work day, in 2005 there are 400 to 500 bike-to-work trips with a production or attraction in and around Tysons Corner. Based on population and employment growth in Tysons Corner and full build-out of the planned bicycle network this could increase to 5,700 to 6,300 bike-to-work trips per day by 2030. This does not include increased bike-to-transit-to-work trips.

The resulting reduction in vehicle trips from this mode shift may decrease congestion in specific intersection locations in the peakperiods. The potential also exists for reductions in off-peakperiods, although these impacts on congestion are anticipated to be minor.

SAFETY

The recommendations for Tysons Corner bicycle facilities have been made with safety in mind. The safest and best routes have been chosen, matched with the appropriate facilities based on roadway geometry, speeds and traffic volumes to be phased in over time on those routes. Certain routes may not be considered adequately safe for bicycling without the recommended improvements. Despite best efforts to address safety, not all safety concerns for each improvement can be addressed directly in the Bicycle Plan. At the time of implementation, details about engineering/design, enforcement, evaluation, education and encouragement will need to be given full attention. Fairfax County planners and engineers prioritize safety when considering any transportation improvement, this will continue to be true when considering implementation of the recommendations of the Plan.

Challenges to Safety

Highway Interchanges

Safely traveling in and out of Tysons Corner was a prime concern voiced by both the attendees of public meetings and the BAC. As Tysons Corner is bisected by several major, high-speed, high-volume roadways, including I-495, Dulles Toll Road (VA Route 267), Leesburg Pike (VA Route 7), and Dolley Madison Boulevard (VA Route 123); providing safe routes to cross these roadways is especially critical. Highway interchanges are a particular barrier and challenge for cyclists, because the crossings are long, the motor vehicles are traveling at high speeds, and there are typically not stop controls at the ramps. This environment greatly increases the chance for bicyclist/vehicle conflict. Most improvements to create safe passage for cyclists pose challenges by either impacting vehicle flow (by stopping traffic to allow for crossing) or are costly (such as construction of grade separated crossings).

Difficult Intersections

High-volume roadways with difficult intersection crossings need to be addressed for safety. There are numerous best practices for intersection engineering and design which accommodate bicycles. However, there are a limited number of improvements which can be implemented at a given time due to funding, and it may be necessary to impact traffic flow and/or adjust signal timing in order to improve bicycle safety.

A full list of intersections and interchanges recommended for improvement is provided in Appendix I.

Driveways

Corridors where cyclists may choose to use sidewalks or sidepaths typically have frequent driveways and crossings of minor streets. Combined with high-peakperiod traffic volumes and turning movements driveways can be dangerous for cyclists. This potential vehicle/bicyclist conflict is minimized to the extent possible in the Bicycle Plan through recommended yield or stop signage at driveway entrances and exits for motorists.

On Street Parking

While on-street parking supports ground-level retail, promotes pedestrian activity on sidewalks, and contributes to lower motor vehicle speeds, it can present hazards for cyclists. Frequent parking turnover increases the potential for vehicle/bicycle collisions as cars move in and out of parking spaces across the bicycling space. Also, the opening of driver-side car doors presents a danger to cyclists on the right edge of the travel lane. In settings where cyclists are going downhill, bicycling in the door zone is particularly dangerous because a bicyclist cannot stop in time to avoid a suddenly opened door.

Across the U.S., new design guidelines are being implemented for bicycle lane design and shared lane markings placement that ensures sufficient buffer distance from on-street parking. These designs have been included as part of this plan. For example, in situations where roadway space is tight and shared lane markings are the recommended bicycle treatment, the shared lane marking symbol should be located in the middle of

the shared travel lane, so cyclists are encouraged to ride away from the door zone. In addition, this encourages motorists to respect cyclists' rights to the entire lane if needed as allowed by Virginia traffic law.

RIGHT-OF-WAY

The Plan recommends improvements that may occur on public or private right-of-way. Any changes to the public right-of-way will be given careful consideration by the agencies involved in implementing bicycle facilities. Improvements to the private right-of-way are recommendations only, to develop the optimum bicycle network based on predicted land use patterns. These may be altered slightly depending on development design and construction.

Most improvements recommended for public right-of-way will be discussed and negotiated by the Virginia DOT or Fairfax County DOT. In cases where additional right-of-way is required, these negotiations will include developers and/or current property owners. Additionally, there are some recommendations for private right-of-way that may require working together with homeowner associations or private property owners to allow for small but important network connections to be made, such as passage through a church or store parking lot to connect bicycle facilities. In more significant needs for a connection through a private parcel, negotiations regarding a permanent easement may be required.

AIR QUALITY AND THE ENVIRONMENT

Air Quality

Another benefit of investing in the recommended bicycle facilities is that each additional trip made by bicycle likely results in one less vehicle trip, which helps to reduce congestion and road maintenance costs, and improve air quality.

The most significant impact is expected for commute trips, where the mode shift resulting from implementation of the bicycle plan will pull vehicle trips (either existing drive alone or carpool trips) off of the congested a.m. and p.m. peak roadway networks. The primary focus area of the commute mode shift is within 3 miles of Tysons Corner.

Other vehicle trip reductions are likely for home to school trips, home to shopping trips and non-home based work trips (i.e., running errands during lunchtime from work or traveling to work-related meetings). The bicycle plan's proposed network and associated policies also help encourage bicycling as a preferred travel option for these trips.

Table 4 in Section 2 presents the motorized trip mode shares for all trips with a start or end in the three-mile Tysons Corner buffer area. In 2030 with assumed long-range redevelopment and investment in transportation, 52 percent of all trips are drive alone, 45 percent are carpools, and 3 percent is transit. The primary change from 2005 travel characteristics is a shift of 5 percent of drive alone trips to carpools and transit.

When looking only at commute trips, 2005 conditions reflect that 79 percent of trips are drive alone, decreasing to 69 percent by 2030. The 10 percent reduction in drive alone mode share predominantly goes to transit by 2030 as a result of build out of the Silver

Line Metrorail. The critical question is: what additional share of drive-alone trips may shift to biking or biking to transit with implementation of the bicycle plan?

There are two options for estimating a range of total daily bicycle commute trips in 2030. Option 1 is based off of the change in population density and connects this to average weekly bicycle trip rates per capita as reported in the 2001 National Household Travel Survey. Option 2 is based off findings from a 2003 research report "Bicycle Commuting and Facilities in Major U.S. Cities" that surveys 42 cities in the U.S. and uses data on population density and bicycle network density to approximate how changes in network density at different ranges of density impact total bicycle commute trips.[33]

The results of using these two methods estimates that on a daily basis, in 2030 up to 5,700 to 6,300 daily commute trips could be completed solely by a bicycle. Based on the following assumptions:

- An average trip length of three miles;
- 250 work days annually; and
- Frequent users will ride to work at least three days a week,

the total annual Vehicle Miles Traveled (VMT) reduction in 2030 within the three-mile Tysons Corner area ranges from 1.43 to 1.71 million vehicle miles.

When accounting for all trip types, the annual VMT reduction in 2030 could be as high as 3.61 million vehicle miles, equivalent to 7,100 daily bicycle trips. Depending on average speeds and vehicle data, reduction in criteria pollutant emissions resulting from the annual and daily change in VMT can be estimated.

Assuming an average-per-mile emissions rate of 250 grams CO_2 per mile (consistent with the final rule for light-duty vehicle model years 2012-2016 CAFE standard), in 2030 total CO_2 emissions reduced would range from 3,100 to 7,900 lbs (1.6 to 4.0 tons of CO_2).[34]

Watersheds

The recommended improvements in the Plan have a very minimal effect on the amount of impervious surface area in Tysons Corner. Most improvements would simply include restriping or repaving of an existing hard surface. For example, many improvements entail adding marking or striping to existing roadways, or improving shoulders, but do not expand the paved surface of roadways. The most probable contribution the Plan may make to increase the impervious surface area in Tysons Corner would be cycletracks proposed parallel to existing roadway corridors and the proposed paths in several parks, where some grass, dirt, or gravel may be replaced with a hard-surface bicycle path.

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[33] Dill, J., and T. Carr (2003). "Bicycle Commuting and Facilities in Major U.S. Cities: If You Build Them, Commuters Will Use Them – Another Look." *Transportation Research Record* No. 1828, National Academy of Sciences, Washington, D.C.

[34] http://www.nhtsa.gov/Laws+&+Regulations/CAFE+Fuel+Economy/Model+Years+2012-2016:+Final+Rule