

# Memorandum

To: Dan Iglhaut (NVRPA)  
From: Tina Fink, P.E. (TDG)  
CC: Melany Alliston-Brick, P.E. (TDG), Bill Schultheiss, P.E. (TDG)  
Date: January 19, 2015  
Re: W&OD Trail - Parallel Trail Feasibility Study (Phase II)  
TDG Project No. 5387  
**Draft Trail Concept Plan Submittal – Task 3**



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The Northern Virginia Regional Park Authority's (NVRPA) Washington & Old Dominion (W&OD) Trail serves a wide range of users, including bicyclists, walkers, joggers, skaters and equestrians that use the trail for both transportation and recreational purposes. During times of peak activity, the trail can become busy with various users competing for space. NVRPA is interested in proactively establishing a plan for future trail widening to meet the current and projected demands of the W&OD Trail. NVRPA asked Toole Design Group to evaluate the feasibility of widening and/or adding a parallel trail facility along particular trail segments with high volumes of bicyclists and pedestrians.

The memorandum includes: a summary of the overall W&OD Trail including trail users volumes and trail operations (i.e. W&OD Parallel Trail Feasibility Study – Phase I); a preliminary evaluation of the physical feasibility for trail widening and a preliminary assessment of existing and future trail operations with the potential typical sections (i.e. a widened shared trail and a parallel trail) between Columbia Pike in Arlington, VA and Broad Street in Falls Church, VA; and recommendations for possible next steps.

## **Overall W&OD Parallel Trail: Trail User Volumes and Shared Use Path Level-of-Service (Phase I)**

As a part of Phase I of W&OD Trail – Parallel Trail Feasibility Study, Toole Design Group gathered available trail user counts at ten (10) locations and summarized counts for the weekday morning, weekday afternoon, weekend morning and weekend afternoon PM peak hours. Using the Federal Highway Administration's Shared-Use Path Level-of-Service (SUP LOS), TDG calculated SUP LOS for each peak hour.

The SUP LOS provides a measure of quality of service for bicyclists on paved shared-use paths. Quality of service for bicyclists measures the ability of a bicyclist to maintain an optimum speed with freedom to maneuver around other users (i.e. type of meetings and ability to pass). The SUP LOS is a link-based analysis, meaning that it evaluates a segment of a trail only, not intersections, rest areas or trail heads. The score received is affected by several factors concerning the trail's use, including the mode split, trail width, and presence of a centerline. Generally, a trail used by fewer pedestrians will result in a more desirable LOS score. Using these variables, the method outlined by the FHWA estimates the number of conflicts between users along the trail and uses this number to determine the LOS score. SUP LOS scores

range from A to F, with A being the most desirable score and F being the least desirable, described in more detail below:

- A LOS of A (excellent) is received when a trail provides optimum conditions for bicyclists with space to move around other modes.
- A good trail (LOS B) has good bicycling conditions and retains some room for bicyclists to move around other modes.
- A trail in fair condition (LOS C) has at least the minimum width to accommodate the current demand and provides basic service to bicyclists; however, this service will worsen if the number of slow-moving users such as pedestrians increases.
- A poor trail (LOS D) is reaching its functional capacity, and the addition of more users of any mode will significantly degrade the quality of service. Some users of such a trail may adjust their experience expectations or avoid peak-period use.
- A LOS of E signifies a trail which has reached its functional capacity, and, like a poor trail (LOS D), users may adjust their expectations or avoid peak-period use.
- An LOS of F is a failing score and signifies that the trail does not effectively serve most bicyclists and that conflicts between trail users should be expected.

The attached *Figure 1. Overall Trail User Volumes and Shared-Use Path Level-of-Service* illustrates a total number of users, the percentage of bicycles and pedestrians, and the SUP LOS for each direction at each of the ten (10) locations during each hour. As shown in the summary table, locations on the eastern end of the trail (i.e. near the intersections with Columbia Pike, Custis Trail, Lee Highway) have relatively high trail user volumes and higher proportion of pedestrians, which both contribute to a less favorable level of service grade. This is not unexpected as the eastern portion of the trail is located in more densely populated urban areas. The trail also provides a direct and comfortable connection to WMATA Metro Stations which contribute to the increased pedestrian and bicyclist volumes. As such, these segments were identified as 'critical segments' for additional study of trail widening as Phase II of this project, which is described in more detail below.

### **Eastern W&OD Trail: Columbia Pike to Broad Street (Phase II)**

TDG completed a preliminary assessment of the physical feasibility of and limiting constraints associated with potential trail widening. The focus of this assessment is from Columbia Pike (Arlington, VA) to Broad Street (Fall Church, VA), which encompasses the three critical segments identified in Phase I.

#### **Trail Widening Feasibility and Constraints**

TDG assessed the physical feasibility of trail widening using available Geographic Information System (GIS) data (e.g. roads, buildings, right-of-way, flood plain, trail alignments, contours), aerial photographs, resource protection areas, utility information and location of bridges. The attached *Figure 2, Trail Widening Feasibility and Constraints*, illustrates locations where widening is feasible with orange lines. The following discussion summarizes the investigative findings:

- between Columbia Pike and Patrick Henry Drive, there are opportunities for widening along the trail; however, the trail crosses the Four Mile Run stream in several locations, which will require bridges be replaced or widened. The Four Mile Run trail runs parallel to the W&OD trail for much of this stretch, which could provide an alternate route for some trail users;

- between Patrick Henry Drive and halfway between the East Falls Church Metro Station and Lee Highway, opportunities for widening are limited by the I-66 sound wall north of the trail, a stream valley south of the trail and an electrical power substation south of the trail just west of the East Falls Metro Station. Similar to the previous stretch, the Four Mile Run trail runs parallel to the W&OD trail for much of this stretch, which could provide an alternate route for some trail users;
- from just east of Lee Highway to Broad Street in Falls Church there appears to be ample space for trail widening.

### **Planning for Future Widening**

In support of NVPRPA's efforts to prioritize locations for trail widening, TDG completed a preliminary assessment of two potential cross-section scenarios for the three critical segments, identified during Phase I of this project. The two potential trail typical cross-sections, shown on Figure 2, are described below:

- *16' wide shared trail*, provides 8' lanes on either side of a centerline wide enough for a bicyclist to pass another user without entering the lane of an oncoming bicyclist or pedestrian.
- *19' wide parallel trail* creates separate lanes for bicyclists and pedestrians resulting in an 8' two-way path for pedestrians and an 11' trail for bicyclists divided into two 5.5' lanes.

Quality of service measures for bicyclists and pedestrians on shared-use paths (i.e. SUP LOS) were used to provide guidance on where a 16' wide shared trail or a 19' wide parallel trail may be appropriate. TDG recommends that NVPRPA strive to achieve a LOS C for bicyclists on the W&OD trail.

TDG used the FHWA SUP LOS for bicyclists to assess the various trail section options. Table 1 shows the SUP LOS for the 10-foot wide existing trail and a 16-foot wide shared trail using current trail volumes. The 16-foot trail results in a LOS C or better at each location for each peak studied with the exception of eastbound bicyclists near Columbia Pike during the weekday PM. The 19-foot trail with a separate 11-foot trail for bicyclists would provide LOS A or B for all segments since there would be no pedestrians impeding the bicyclists movement.

In addition to the FHWA SUP LOS for bicyclists, TDG utilized the Highway Capacity Manual's (HCM) Shared-Used Path Level of Service for Pedestrians (found in Chapter 23 of the HCM). This quality of service measure focuses on the frequency that a pedestrian meets or is overtaken by a bicyclist. The methodology does not take into account pedestrian volume, trail width or interactions between pedestrians. For SUP LOS for pedestrians, LOS A represents optimum conditions where conflicts with bicycles are rare, at LOS D there are frequent conflicts with bicyclist and at LOS F there are significant conflicts with a diminished experience for pedestrians. As shown in Table 1, SUP LOS for pedestrian is LOS F near the Custis Trail segment during both hours studied and on the Lee Highway segment during the weekday PM hour. This analysis suggests that a separated trail may benefit pedestrians in the Custis Trail and Lee Highway segments.

		Weekday PM						Weekend AM					
		Volume			SUP LOS (Bicycle) <sup>1</sup>		SUP LOS (Ped) <sup>2</sup>	Volume			SUP LOS (Bicycle) <sup>1</sup>		SUP LOS (Ped) <sup>2</sup>
		Total	%Ped	%Bike	10' Shared Trail	16' Shared Trail	10' or 16' Shared Trail	Total	%Ped	%Bike	10' Shared Trail	16' Shared Trail	10' or 16' Shared Trail
Columbia Pike	EB	144	54%	46%	F	D	D	110	36%	64%	D	B	D
	WB	114	47%	53%	E	C	D	90	54%	46%	E	B	D
Custis Trail	EB	93	22%	78%	C	B	F	162	41%	59%	F	C	F
	WB	166	11%	89%	D	B	F	170	41%	59%	F	C	F
Lee Highway	EB	199	6%	94%	C	B	F	127	61%	39%	E	C	D
	WB	218	3%	97%	C	B	F	110	32%	68%	D	B	D

1- Based on FHWA SUP LOS for bicyclists

2- Based on HCM SUP LOS for pedestrians

**Table 1. Existing Trail User Volume and Mode Split, SUP LOS for bicyclist and SUP LOS for pedestrians for Weekday PM and Weekend AM**

Table 2 shows the number of years that SUP LOS C and LOS D for bicyclists can be maintained assuming a growth rate of 2.7% per year, which is based on Arlington County population growth from 2010 to 2013 and a steady mode split between pedestrians and bicyclists. This analysis suggests that a parallel trail that separates pedestrians and bicyclists may be beneficial near Columbia Pike and Custis Trail.

		Weekday PM						Weekend AM									
		Max Volume to maintain LOS C	Years			Max Volume to maintain LOS D	Years			Max Volume to maintain LOS C	Years			Max Volume to maintain LOS D	Years		
			0-10	11-20	20+		0-10	11-20	20+		0-10	11-20	20+		0-10	11-20	20+
Columbia Pike	EB	n/a				183				203				261			
	WB	161				207				142				183			
Custis Trail	EB	305				392				181				233			
	WB	508				659				181				233			
Lee Highway	EB	738				967				127				967			
	WB	1028				1366				224				288			

**Table 2. Volumes to maintain SUP LOS C and D for bicyclists and associated estimate year, Weekday AM and Weekend PM**

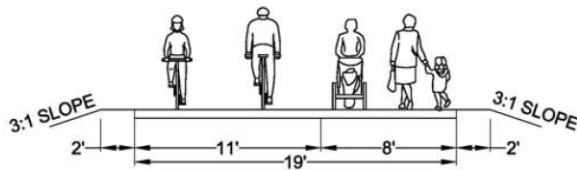
In summary, based on current and estimated future demand, there may be benefits of providing a parallel trail on each of the three segments:

- Columbia Pike segment- given the relatively high pedestrian volumes, bicyclists in particular may benefit from a trail without pedestrian impeding their travel.
- Custis Trail segment – given the relatively high bicycle volumes, pedestrians may have an improved experience on a separate trail. Additionally, bicyclists, particularly on the weekend may benefit from a parallel trail.

- Lee Highway segment – given the relatively high bicycle volumes, especially during the weekday PM, pedestrians may have an improved experience on a separate trail. Also, given the relatively high pedestrian volumes, particularly in the weekend, bicyclists may benefit from a parallel trail.

### Recommendations and Next Steps

Based on the analysis presented above in Planning for Future Widening, there may be benefits for a parallel trail on each of the segments studied. **It is therefore recommended as a primary recommendation to move forward with widening and construction of the parallel trail concept as shown in the figures below.**



**Parallel Trail Concept**

### Design of Parallel Trail Concept

- It is recommended the pedestrian portion of the trail be separated from the bicycle portion of the trail with a 4-inch solid white line.
- Pedestrian symbols should be placed periodically within the pedestrian lanes to indicate the desired preferential use for pedestrians.
- Bicycle symbols should be placed periodically within the bicycle lanes to indicate the desired preferential use for bicyclists. The opposing lanes should be separated by a 4-inch dashed yellow centerline.
- Signs denoting the intended use may be desirable if users are not traveling within the designated lane as intended. Signs are not required per the MUTCD or other guidelines, nor are they in use at many other parallel type trails around the U.S.

Recognizing that it may take time to widen the trail as proposed, the following additional recommendations and next steps should be considered in the interim:

- During routine repaving, where space is constrained, consider widening the trail to a minimum of 11-feet during routing repaving or resurfacing projects. An 11-foot width trail provides essentially three travel lanes, allowing a bicyclist to comfortably pass another trail user in the same direction while a trail user is present in the opposite direction.
- Coordinate with Arlington County to provide improved wayfinding and marketing (e.g. signage, kiosks) for the Four Mile Run rail. As mentioned above, the Four Mile Run trail runs parallel to the W&OD trail between Columbia Pike and the East Falls Church metro and provides an opportunity for balancing use between the two trails, especially recreational walkers and runners. It may be advantageous for Arlington County and NVRPA to facilitate a public process with an advisory group to gain a better understanding of how the trails are used, public perception of the benefits and concerns with the trails and possible areas for improvements.

- Consider additional spot improvements to improve the intuitiveness of the trail gap between the East Falls Church metro station and Roosevelt Street. The existing trail ends approaching the metro station and I-66. This requires a workaround route through Banneker Park and Falls Church Streets. The route is not intuitive and requires out-of-the way travel for some bicyclists. In coordination with Arlington County NVRPA should consider:
  - Providing wayfinding for routes along the trail, N. Westmoreland, N. Van Buren, and 19<sup>th</sup> Street, Tuckahoe Street, and Banneker Park.
  - Consider widening the eastern sidewalk along North Sycamore Street to connect an 11 foot trail to the intersection with 19<sup>th</sup> Street North. Include bike boxes or queue boxes and bicycle crosswalks as appropriate to transition bicyclists from the street to the trail and vice-versa. Provide a gateway treatment at the corner of 19<sup>th</sup> Street and Sycamore Street to the W&OD.
  - Consider providing shared lane markings, bicycle lanes, or climbing lanes on N. Westmoreland, N. Van Buren, and 19<sup>th</sup> Street, or Tuckahoe Street as space allows supplementing signed routes.
  - Develop clear gateways to the trail at trail intersections at 18<sup>th</sup> Street N and N Tuckahoe Street and at 19<sup>th</sup> Road N and N Tuckahoe Street.
- Coordinate with Arlington County and their existing counting program and implement a counting program for the W&OD Trail. Arlington County has counters in three locations on the W&OD Trail: near Columbia Pike, in Bon Air Park (near the Custis Trail intersection) and near the East Falls Church metro station. The additional information from the counting program could be used to help inform NVRPA's strategic planning for prioritizing locations for trail widening and other efforts. The data can be used to gain a more complete picture of how trail use varies by time of day, day of week and time of year.
- The potential widening of the W&OD Trail adjacent to the Vienna Community Center presents an opportunity to evaluate the effectiveness of the parallel trail concept prior to widespread implementation. It is recommended the NVRPA consider surveying trail users and observing behaviors once the project is completed.

We are available to meet to review our analysis and recommendations. Once you have reviewed the analysis, we are available for an in-person meeting to discuss your comments and additional ways that Toole Design Group can support NVRPA.