



**DEPARTMENT OF TRANSPORTATION  
AND ENVIRONMENTAL SERVICES**

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June 18, 2010

Bruce Friedman, PE, PTOE  
Federal Highway Administration  
Office of Transportation Operations  
400 Seventh Street, SW, HOTO  
Washington, DC 20590

RE: Request for Permission to Experiment with a Bicycle Signal

Dear Mr. Friedman:

The City of Alexandria is submitting the attached request for permission to experiment with a bicycle signal to evaluate its potential effectiveness modifying bicyclist and motorist behavior at an intersection of the Mount Vernon Trail with a driveway and street crossing. It is the City of Alexandria's goal to increase bicyclist compliance at the crossing and to improve safety for trail users and motorists.

The Mount Vernon Trail crosses the Porto Vecchio Condominiums driveway at the intersection of South Alfred Street and South Washington Street in Alexandria. The driveway is essentially the fourth leg of the intersection acting as an extension of South Alfred Street. The Mount Vernon Trail is a sidepath crossing of the Porto Vecchio Condominium driveway parallel to South Washington Street. The intersection is fully signalized for motorists and pedestrians with stop control for the Mount Vernon Trail.

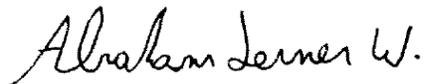
The current posting of a stop sign for the trail crossing at an otherwise signalized intersection is routinely disregarded by bicyclists and trail users and is in contradiction to AASHTO and MUTCD guidelines. The experiment proposes a phased approach to assess the removal of the

stop signs, use of the pedestrian signal for the trail crossing, and the addition of bicycle signal heads mounted to the existing signal poles adjacent to the existing pedestrian signals to determine the optimum sidepath crossing traffic control strategy that results in compliance and safety. The City would also like to experiment with variations in the bicycle signal operation.

The following application includes a statement of the problem, summary of proposed improvements and other information requested under Section 1A.10 (Interpretations, Experimentations, Changes, and Interim Approvals) of the *Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD)*. The City of Alexandria is assisted by Toole Design Group and Kittelson & Associates, Inc. to conduct a detailed evaluation of before and after conditions to evaluate their effectiveness.

Thank you for considering this request to experiment with an innovative treatment to improve bicycle safety in Alexandria, Virginia. If you have any questions or need additional information, please contact Yon Lambert with the City of Alexandria Bicycle and Pedestrian Program at 703-746-4081 or by emailing [yon.lambert@alexandriava.gov](mailto:yon.lambert@alexandriava.gov)

Sincerely,

A handwritten signature in black ink that reads "Abraham Lerner W." The signature is written in a cursive, flowing style.

Abraham Lerner, P.E.  
Deputy Director

# **Federal Highway Administration**

## **Application**

### **REQUEST FOR PERMISSION TO EXPERIMENT WITH A BICYCLE SIGNAL**

**Submitted by:**

City of Alexandria Transportation and Environmental Services

**Date:**

June 6, 2010

# Request for Permission to Experiment

## Background

With over one million visitors every year, the Mount Vernon Trail is one of the Washington, D.C. region's most popular multi-use trails. The trail follows the Potomac's Virginia shoreline and transitions to on-street facilities approximately 0.5 miles north of the experiment's location. The location is less than one mile from the Woodrow Wilson Memorial Bridge, which connects trail users to park spaces and trails on the east bank of the Potomac River, as well as cultural destinations such as the National Harbor.

The experiment's location is at the Mount Vernon Trail crossing of the Porto Vecchio Condominium driveway, adjacent to the intersection of South Washington Street and South Alfred Street, shown in Figure 1.



Figure 1 - Intersection of South Washington Street/ South Alfred Street/Porto Vecchio Driveway

## A. Nature of the Problem

The roadway and driveway are controlled by a traffic signal. Southbound left turns off from South Washington Street into the Porto Vecchio Condominium driveway are controlled by an actuated left turn signal which calls a protected/permitted phase. The Mount Vernon Trail crossing of the Porto Vecchio Condominium driveway is posted with a stop sign and a pedestrian signal. Pedestrians and trail users are required to actuate the pedestrian signal to call a walk phase with a pedestrian pushbutton as the signal presently is set to reside with “Don’t Walk” message.

The present locations of the pushbuttons do not meet current MUTCD guidance. The traffic signal poles are located on the left side of the trail (relative to the through moving bicyclist who is riding on the right), requiring bicyclists to obstruct the opposite flow of trail traffic in order to and to potentially have to dismount to actuate the signal. Observations indicate neither bicyclists nor pedestrians actuate the signal. Crashes of bicyclists into vehicles entering and exiting the Porto Vecchio Condominium driveway have been reported.

The placement of a stop sign for trail users at a signalized intersection is not compliant with MUTCD practice or AASHTO Guidelines. Bicyclists frequently

disregard the pedestrian signal and stop sign, preferring to continue across when traffic appears clear, as opposed to pushing the button and waiting for the walk signal to activate or stopping at the stop sign and proceeding when clear. This creates a safety problem when bicyclists ride through the intersection in conflict with the Alfred Street/Driveway green signal phase. It also has created a perception problem whereupon residents of the Porto Vecchio complex frequently register complaints to the City that the trail users are ignoring the traffic control devices. Cyclists are also exposed to potential conflicts when vehicles exit the driveway, turning right on red and when vehicles are turning off from South Washington Street into the driveway. The crossing also has a sight distance restrictions due to decorative walls and vegetation on either side of the driveway.



Figure 2 - Mt Vernon Trail Crossing

## **B. Proposed Changes not in Conformance with Existing MUTCD**

The City of Alexandria is proposing to install a bicycle signal to control bicycle traffic on the trail. The engineering solution identified will provide bicyclists on the trail a visual indication of when they may proceed across the driveway without conflicting with traffic. Bicycle signals are presently not included in the MUTCD.

Additionally it is proposed to experiment with the bicycle signal operation and potentially Washington Street left turn operation. Traditional concurrent timing of the bicycle signal with the parallel South Washington Street traffic will be initially assessed. It is anticipated that a flashing yellow bicycle signal indication will be evaluated as well in lieu of a solid green indication to determine if the signal timing promotes further awareness of bicyclists to look for turning traffic. An intercept survey will determine bicyclists interpretation of the flashing yellow operation (i.e. is message indicating watch for traffic or yield to traffic).

The Washington Street left turn may be converted to a flashing yellow timing from the current protected/permissive phasing. This timing may be implemented with the walk signal change or the bike signal change depending upon results of the initial existing conditions analysis and conflict analysis.

## **C. Illustration of Proposed Devices**

Proposed improvements include bicycle signals, intersection striping, and regulatory and warning signage. Motor vehicles exiting the Porto Vecchio Condominiums driveway will no longer be permitted to “turn on red” at the intersection. A wider stop line may be striped across the Porto Vecchio Driveway set back from the trail edge (the existing stop line is at the trail edge).

It is anticipated that advanced intersection signal warning signs may be placed on the trail in advance of the crossing to notify bicyclists of the traffic signal. If it is determined that additional signs and/or pavement markings may be necessary, FHWA will be notified of the proposed change to the experiment.

To improve the safety and operations of the existing intersection, the city proposes the following phased approach to the bicycle signal installation:

1. Observe and document existing conditions and behaviors
2. Remove stop sign, retime pedestrian signal to rest in “Walk” each cycle, remove pedestrian push buttons, direct cyclists to follow pedestrian signal
3. Add bicycle signal heads and remove sign directing cyclists to follow pedestrian signal

Below is an illustration of the bicycle signal anticipated to be used during the experiment.



**Figure 3 – Proposed Bicycle Signal**

#### **D. Supporting Data for Use of Devices**

The no turn on red is a standard treatment within the existing MUTCD. Engineers currently have great flexibility in signal timing and the MUTCD only proscribes minimum requirements for signal visibility and timing sequencing which this experiment will conform to.

Bicycle signals are prevalent on streets in the UK, the Netherlands, Germany and Denmark. They have also been utilized in the United States in Tucson, AZ, New York City, NY, and have recently been experimented with in Denver, CO.

The proposed devices deviates from standards contained in the MUTCD, principally through the use of a bicycle-specific signal head mounted in addition to the existing pedestrian signals regulating trail traffic.

#### **E. Patent or Copyright Protection**

The devices proposed for use are not protected by patent or copyright.

#### **F. Time Period and Location of Experiment**

- June 2010 – Collect video and intercept survey data to establish “before” conditions. This period will be an assessment of operational conditions as they exist without changes. It is expected that up to 4 hours of video data will be collected during the following periods:
  - Midweek - (Tues, Wed, or Thur) between 5- 7 pm
  - Saturday or Sunday between 10 am and 2 pm
- Perform community outreach of experiment and changes
- July 2010 – Remove stop signs, set pedestrian signal to rest in walk each cycle, remove push buttons for trail, and add sign directing cyclist to follow pedestrian signal.
- July/August 2010 (within 30 days of installation) Collect video and intercept survey data to establish “after” baseline conditions. It is expected that up to 4 hours of video data will be collected during the following periods:
  - Midweek - (Tues, Wed, or Thur) between 5- 7 pm

- Saturday or Sunday between 10 am and 2 pm
- August 2010 – Install bicycle signals, remove the WHEN PEDESTRIANS PRESENT sign from the NO RIGHT TURN ON RED sign for Porto Vecchio Driveway, and modify the signal timing as necessary to incorporate the bicycle signals.
- August/ September 2010 (within 30 days of bicycle signal installation) – Collect video and intercept survey data to establish “after” conditions. It is expected that up to 4 hours of video data will be collected during the following periods:
  - Midweek - (Tues, Wed, or Thur) between 5- 7 pm
  - Saturday or Sunday between 10 am and 2 pm
- November 2010 (3-months subsequent to installation) – Collect video and intercept survey data to establish “after” conditions. It is expected that up to 4 hours of video data will be collected during the following periods:
  - Midweek - (Tues, Wed, or Thur) between 5- 7 pm
  - Saturday or Sunday between 10 am and 2 pm
- August 2011 (12-months subsequent to installation) – Collect video and intercept survey data to establish “after” conditions. It is expected that up to 4 hours of video data will be collected during the following periods:
  - Midweek - (Tues, Wed, or Thur) between 5- 7 pm
  - Saturday or Sunday between 10 am and 2 pm
- Fall 2011 – The T&ES Transportation Planning Division submits final report to FHWA.

## **G. Research and Evaluation Plan**

The City of Alexandria is collaborating with Toole Design Group and Kittelson & Associates, Inc. to study the effectiveness of the proposed intersection treatments. The project will involve “before” and “after” studies tracking progress of the experiment and evaluate the performance of the new facilities.

### **Data Collection Strategy for All Phases**

All vehicles, pedestrians, and bicyclists that enter or cross the intersection will be counted during data collection efforts. Traffic control compliance will be tracked as will crossing behaviors at the intersection. Approach speeds of northbound right turning vehicular traffic, north and southbound bicyclists will be collected with laser detection. A combination of tube and manual counts is expected as is follow up review/count adjustment based on video tape.

### **Before Data Collection**

The following “before” data will be collected at the intersection:

- Vehicular volumes crossing the Mt. Vernon Trail at the South Alfred Street/driveway
- Bicycle and pedestrian volumes on the Mt. Vernon Trail

- Bicycle compliance with traffic controls
- Vehicle compliance with traffic controls
- Observations of conflicts

Additionally, a spot speed study of approaching bicyclists and turning motorists will be conducted during the video observation period by a field observer.

Motorists and trail users (pedestrians and bicyclists) will be interviewed to determine a pre-improvement attitude on the following:

- Ask trail users how they determine when it is “safe” to cross the Porto Vecchio driveway
- Opinion on the installation of the stop sign at the trail intersection
- Opinion of safety crossing at the location
- Opinion of behavior of other modes at the location
- Opinion of what improvements should be considered

### **After Data Collection**

After installation TDG will collect the same data collected during the “before” evaluation periods at 30, 90, and 360 day intervals.

### **H. Agreement to Restore Site to Conform to the MUTCD**

If it is determined the devices do not achieve the goals outlined herein, they will be removed at the conclusion of the experiment process.

Should at any time during the experiment the safety of users of the intersection become a concern due to treatments associated with this experiment, the City of Alexandria is willing to terminate the experiment and restore the site to its original condition.

### **I. Progress Reports**

The TDG Team will produce a report that documents the “before” and “after” study for submittal to FHWA. TDG will produce report amendments in conjunction with the follow up intervals (30, 90, and final), for submittal to FHWA.

### **J. Conclusion**

The use of bicycle signals is a potentially important tool to enhance safety conditions for the large volume of bicyclists who travel along the Mt. Vernon Trail. The present MUTCD does not provide a traffic control devices for bicyclists operation at signalized trail crossings of roadways

which has resulted in a variety of non-standard and non-conforming treatments at trail/roadway intersections (of which posting stop signs as signalized intersections is common). The bicycle signal has the potential to improve bicyclist compliance with all traffic control devices and to reduce the perception that bicyclists are ignoring traffic control devices (such as stop signs at signalized intersections) Should the results of this experiment conclude that some or all of the treatments contained in this proposal are effective and successful in improving bicyclist safety, the FHWA should consider a guideline for the traffic control devices in a future update of the MUTCD.