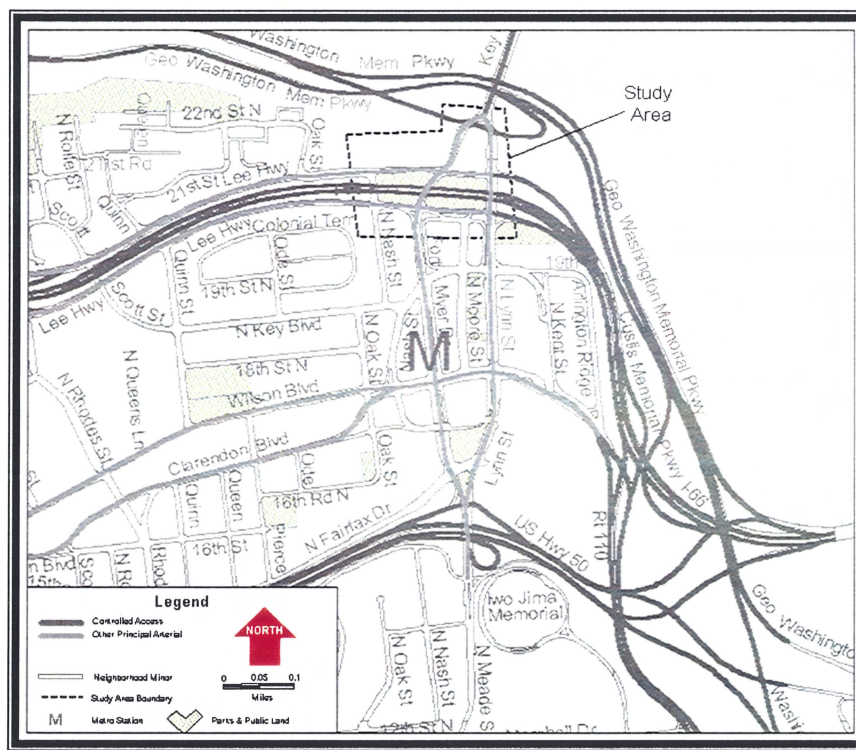


## 1. INTRODUCTION

This Phase II report is a continuation of the study being performed by BMI for Arlington County, Department of Public Works (DPW). The purpose of the study is to identify and evaluate a broad range of measures to improve pedestrian, bicycle, and vehicle safety in the Rosslyn Circle area. The study area is shown in Figure 1.1.

The Rosslyn Circle Crossing Study, Phase I Report, dated May 3, 2002, included crash histories, bicycle and pedestrian counts, input from public involvement and general observations. The crash history for motor vehicles was for the period January 1, 1998 to March 3, 2001 (3 years), while the pedestrian and bicycle crash history was for the period January 1, 1995 to March 3, 2001 (5 years). The Phase I report provided overall and intersection specific information and helped in determining high use locations, high accident locations, types of accidents and conflicts, citizens' concerns and recommendations. Phase I included some potential solutions or topics to be explored during Phase II of the study.

Phase II of the study examines various alternatives in different categories. Long range and immediate improvements, physical and operational improvements, and intersection specific and broad scope projects were all considered. Citizen input was solicited by presenting information at the Bike to Work Day, group meetings and through the DPW web page. This report is formatted to provide the reader with information leading to specific recommendations as well as suggestions for larger projects which require a much more detailed analysis than is provided in the scope of this report. Many of the recommendations contained in this report can be implemented separately or in conjunction with others.



**Figure 1.1. Study Area.**

This report is organized to first discuss some of the major considerations of the study that will either encompass more than one intersection or require a substantive change to the existing geometric conditions of the roadway. Design standards, which can be applied throughout the study area, are provided. General comments are provided in sections, which address traffic signal timing and operation as well as maintenance and operations. Information regarding known developer activities is provided. A detailed intersection specific evaluation and recommendation is provided. Throughout this report, where specific recommendations are provided, they are made bold to attract the readers' attention.

## **2. MAJOR CONSIDERATIONS**

Figure 2.1 illustrates recommended geometric changes to the existing roadway and lane usage. Most noteworthy is the elimination of the third through lane on westbound Lee Highway, Route 29, from Ft. Myer Drive to Oak Street.

Certain modifications on Lee Highway may require Virginia Department of Transportation (VDOT) approval and additional study to clearly demonstrate that the proposed modifications will not degrade the existing roadway network.

### **2.1 Delete Lane from Westbound Lee Highway**

Currently, there are three westbound lanes of travel on Lee Highway west of the intersection with Ft. Myer Drive. The primary benefit from deleting the northernmost through lane adjacent to the Marriott site is that it will improve the safety of the trail users. This results, from providing more space for this frequently congested portion of the trail by widening the trail from 10 to 14 feet, adding greater separation between the trail and the road, and improving sight distance for the trail users of motorists exiting the Marriott. Underground waterlines, phone and electrical utilities run within or along westbound Lee Highway in this area. It is anticipated that these utilities are sufficiently deep so as not to cause significant construction issues. Manholes and water valve covers will need to be raised to match the new grade. New Drainage inlets will be necessary along with connections to the existing storm sewer system. Final engineering plans will be required to address these issues.

Preliminary analysis of the traffic operations impact using the Highway Capacity Software (HCS) 2000 suggests that the portion of Lee Highway within the study area could function adequately with two westbound lanes. The HCS analysis indicated that the AM and PM Level of Service (LOS) remains at A. Detailed results from the analysis are shown in Appendix A.

The cost for the design and construction to remove the lane and reinstall a new sidewalk and landscaping is estimated to be \$115,000. Streetlights for nighttime illumination were not included in this estimate.

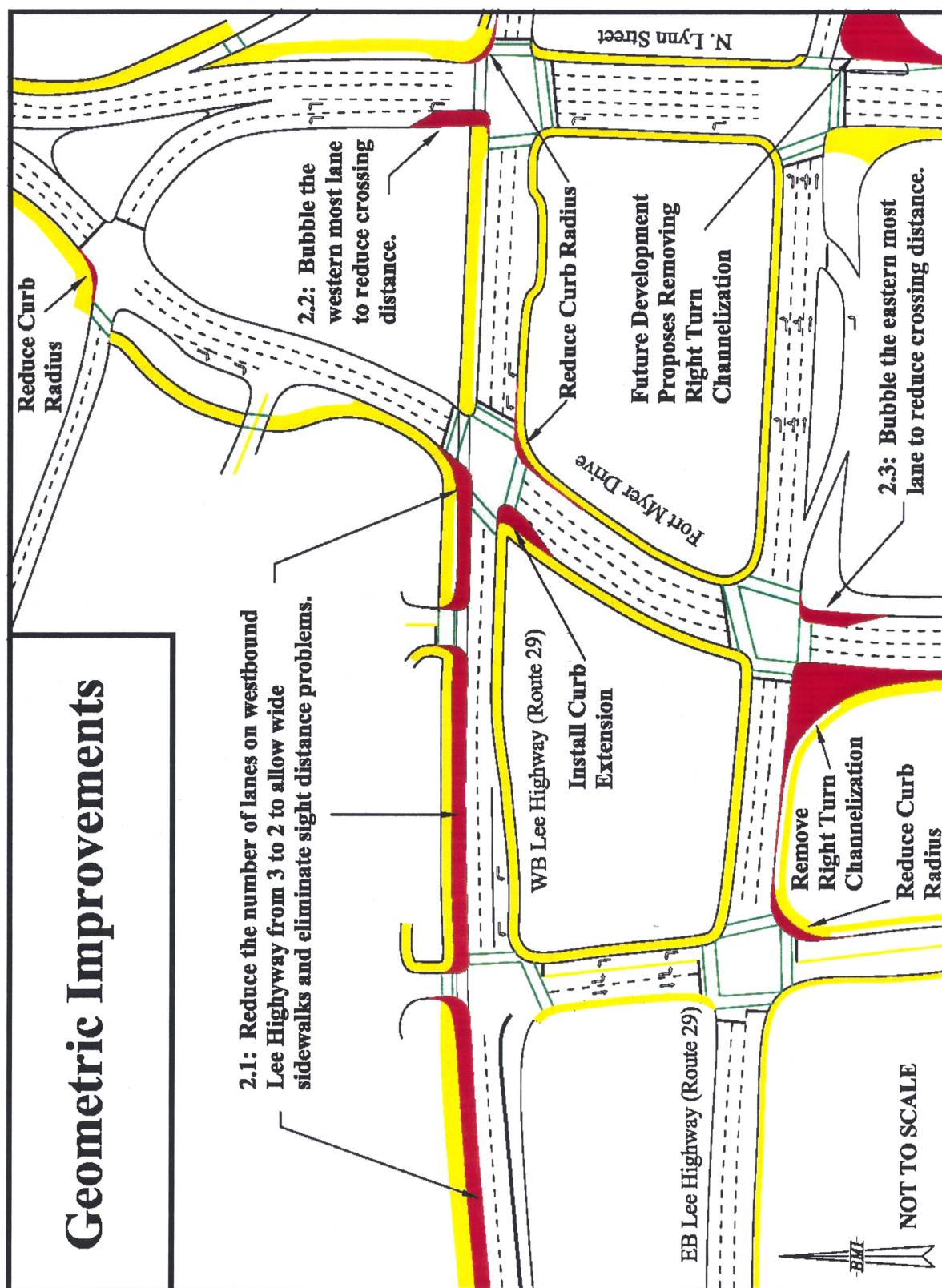


Figure 2.1. Geometric Changes to Existing Roadway Lane Usage.

## **2.2 Install Curb Extension on N. Lynn Street/Westbound Lee Highway**

A curb extension can be created in the northwest corner extending the curb to reduce N. Lynn Street by one lane. This would reduce the distance between curbs on N. Lynn Street and, subsequently, reduce the time that trail users are exposed to traffic. The impact to vehicles should be negligible since the lane approaching this location is a left turn only lane. Underground waterlines, phone and electrical utilities run within westbound Lee Highway in this area and are not impacted by this change. Storm sewer and underground utilities in N. Lynn Street are anticipated to be sufficiently deep so as not to cause significant construction issues. Manholes and water valve covers will need to be raised to match the new grade. New drainage inlets will be necessary along with connections to the existing storm sewer system. Final engineering plans will be required to address these issues. The design and construction cost to provide this curb extension is estimated to be \$30,000.

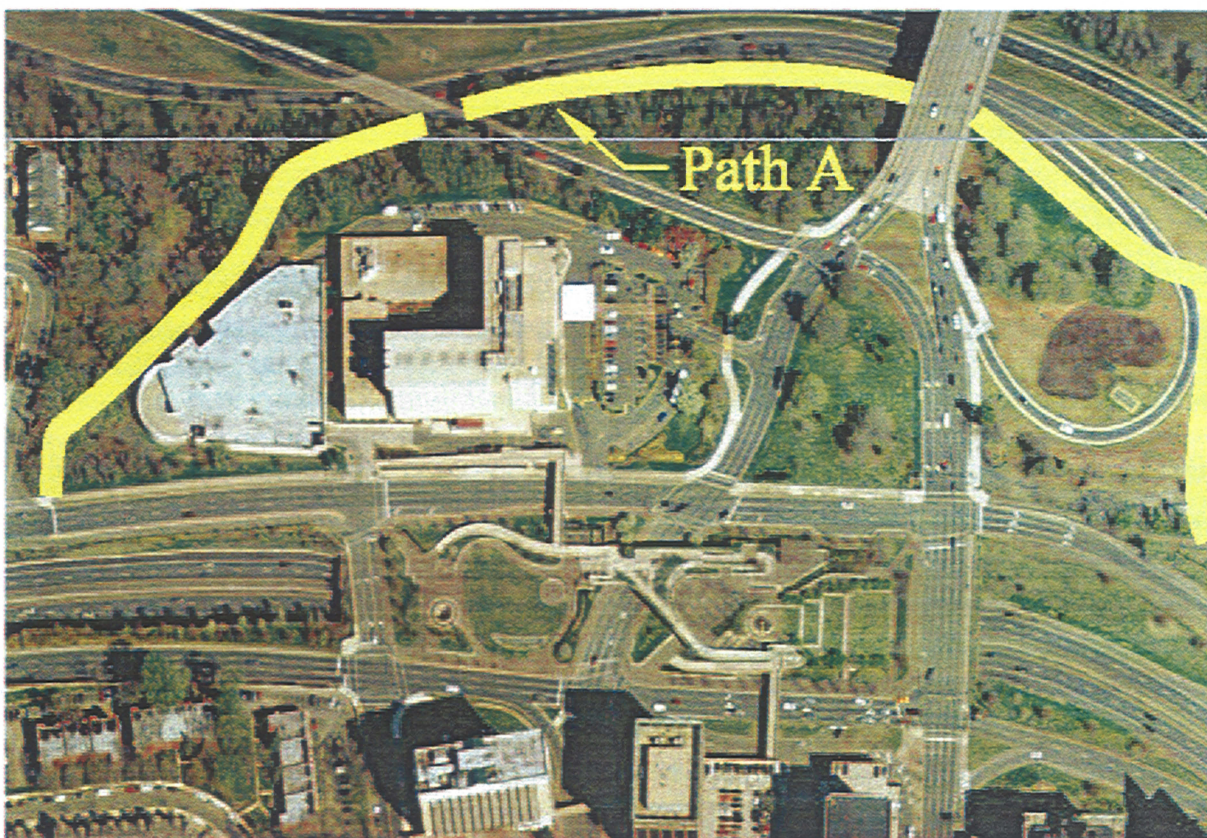
## **2.3 Install Curb Extension on Ft. Myer Drive/Eastbound Lee Highway**

A curb extension can be created in the southeast corner extending the curb to reduce Ft. Myer Drive by one lane. This modification will reduce the distance between curbs and reduce the time that trail users are exposed to traffic. Currently, the southbound left lane is a through/left. The proposed modification will require that the left lane become an exclusive left lane. This also provides for the option of using the adjacent lane as a through/left, which would improve the capacity of the intersections but may be less desirable to the crosswalk trail users because there may be the potential for additional conflicts from two turning lanes rather than one turning lane. Modifications to the existing storm sewer and inlet will be required. All other underground utilities should be sufficiently deep and not cause a conflict with construction. Final engineering plans will be required to address these items. The design and construction cost to provide this curb extension is estimated to be \$32,000.

## **2.4 Trail Relocation**

One way to improve safety for pedestrians and bicyclists is to provide alternate trails that avoid vehicle-crossing conflicts. In this regard several options were investigated and are discussed below. A major consideration was given to the possibility of isolating pedestrian and bicycle traffic from vehicular traffic. Appendix B reviews eight trail alternatives and their relative merits. Most options were dropped from further consideration due to high costs, excessive land disturbance, their longer travel distance and their circuitous route. In general, the relocated trail can be broken into three alternatives: (1) relocation behind the Marriott, (2) modification to the existing skywalk and (3) a tunnel under N. Lynn Street.

One of the options evaluated was to install a trail in the undeveloped area behind the Marriott, as illustrated as Path A in Figure 2.2. However, because the terrain in that area has steep slopes, it was determined to not be feasible to develop a design that exceeded acceptable grades and minimum horizontal curvature. Even the best design would result in excessive land disturbance and high construction costs. Also, it would require using right of way controlled by the National Park Service. Finally, it is doubtful all trail users would divert to this new trail since it would be a longer distance to navigate.



**Figure 2.2. Potential Trail behind Marriott.**

Another option considered was an extension of the existing skywalk system that would cross above the intersection of Lee Highway and N. Lynn Street, as illustrated in Figures 2.3 and 2.4.



**Figure 2.3. Extension of Existing Skywalk above Lee Highway.**



**Figure 2.4. Extension of Existing Crosswalk above N. Lynn Street.**

This improvement would provide a safe crossing for the trail users. Any design of the skywalk would place the trail 20 feet above the existing intersection grade. A ramp of 200 feet with a 10% grade would be required. While this ramp could be circular in shape, the extra distance would cause many trail users to cross at the existing street level. In addition, the skywalk structure would significantly impact the view of the Washington D.C. monuments and would itself be aesthetically unappealing.

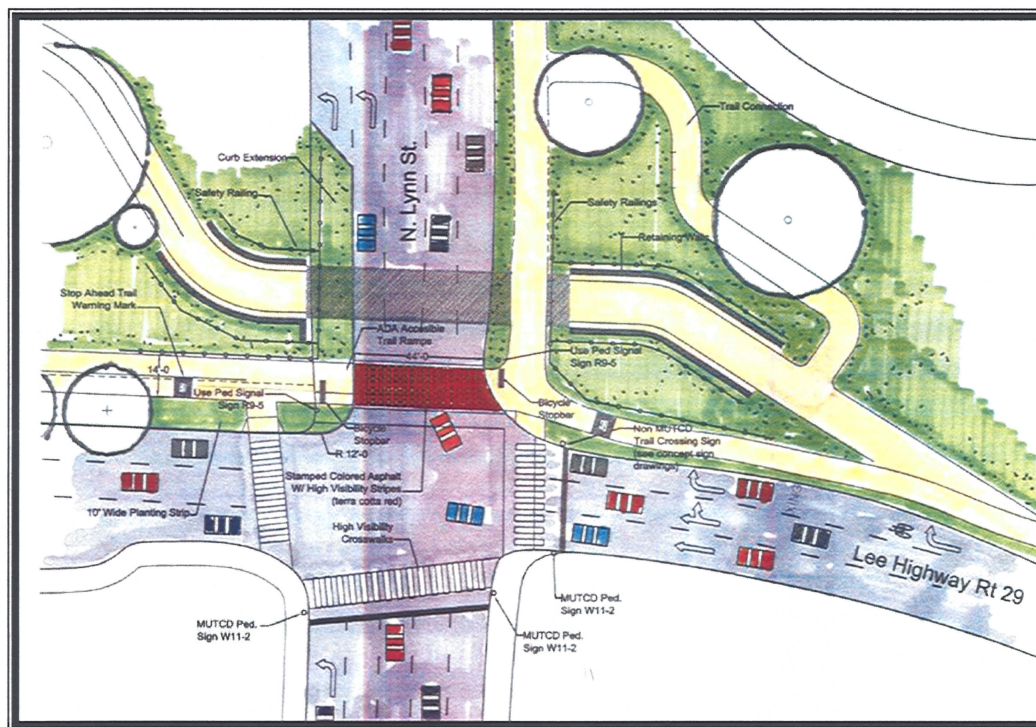
The third option considered is a pedestrian/bicycle tunnel crossing under N. Lynn Street. The existing grades make for a reasonable connection on both sides of the tunnel. The alignment of a tunnel option is marked Path E and illustrated in Figure 2.5. The tunnel would be at approximately a 5% grade and have significant impact on the area controlled by the Park Service, which is designated for a future memorial site. A more direct path with less impact on the Park Service property could be established adjacent to the existing sidewalk, but it would require a steeper grade of approximately 10%.



**Figure 2.5. Pedestrian/Bicycle Tunnel under N. Lynn Street.**

There are potential personal safety issues associated with tunnels that will need to be considered. The existing at-grade crossings will still exist, allowing people the choice to use or avoid using the tunnel should they so desire. The tunnel is needed most during peak morning and afternoon periods. These periods also have a high number of trail users, which should by virtue of numbers provide safer conditions. In addition, video cameras may need to be installed to provide additional security. Lighting, “panic buttons”, landscaping and even the shape of the tunnel can be coordinated to promote a safer environment.

Figure 2.6 shows a rendering that incorporates the tunnel concept as well as a curb extension on N. Lynn Street. The connections between the Mount Vernon Trail and the Custis Trail are fairly direct while the connections to the Key Bridge and southbound N. Lynn Street have a relatively short distance added to the route.



**Figure 2.6. Drawing of Tunnel Concept and Curb Extension on N. Lynn Street.**

This facility would be very expensive to construct at approximately \$1,000,000. The estimate is based on a conservative comparison of similar projects, specifically the tunnel constructed for the Washington and Old Dominion Trail (W&OD) under Reston Parkway, as shown in



**Figure 2.7. Photograph of W&OD Tunnel Used for Comparison Cost Estimates**

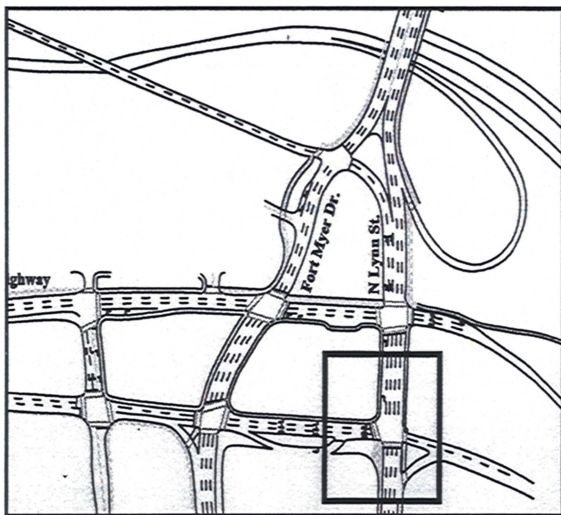
Figure 2.7. The W&OD tunnel is wider than the proposed pedestrian tunnel because it includes a horse trail. In addition, to providing a wider opening the tunnel is a longer crossing under more lanes. Construction constraints for this proposed tunnel consist of utility lines such as water, electrical, and phone, storm sewer, etc. Traffic would be impacted during construction. It is anticipated that the existing Metro rail is sufficiently deep in this area so as not to provide a construction problem. Construction of a tunnel does affect the access currently being considered for the Schlafman property in the NE

quadrant. Specifically, the tunnel as shown in Figure 2.6 is within the area of the existing driveway entrance that concept plans show to be the entrance for the Schlafman Property.

The benefits that would be derived from a tunnel are not quantifiable, and therefore, make specific recommendations difficult. Of the scenarios studied to separate pedestrians and bicyclists from vehicular traffic, the tunnel appears to be the most desirable with respect to directness of route and hence attract users. While the construction and maintenance cost is high, the improvement is long term and will be in use for many years. The number of bicyclists and pedestrians that could use the tunnel and avoid potential conflicts with vehicles is significant, especially over time. The current accident history suggests that this separation of bicyclists and pedestrians from vehicles would have significant benefit especially over the life of the tunnel. A more detailed preliminary design and cost/benefit analysis is needed to determine feasibility.

## **2.5 Bicycle Lane (N. Lynn Street)**

At the southern portion of the study area on N. Lynn Street (see Figure 2.8), bicyclists were often observed traveling northbound in the road in lieu of riding on the sidewalk, as shown in Figure 2.9. Because there is sufficient roadway width, these bicyclists could easily travel on the bridge over I-66 and would typically return to the sidewalk either at the intersection with the ramp from westbound I-66 or just to the north by using the existing driveway.



**Figure 2.8. Sketch of Southern Portion of Study Area**



**Figure 2.9. Example of Bicyclist in Road.**

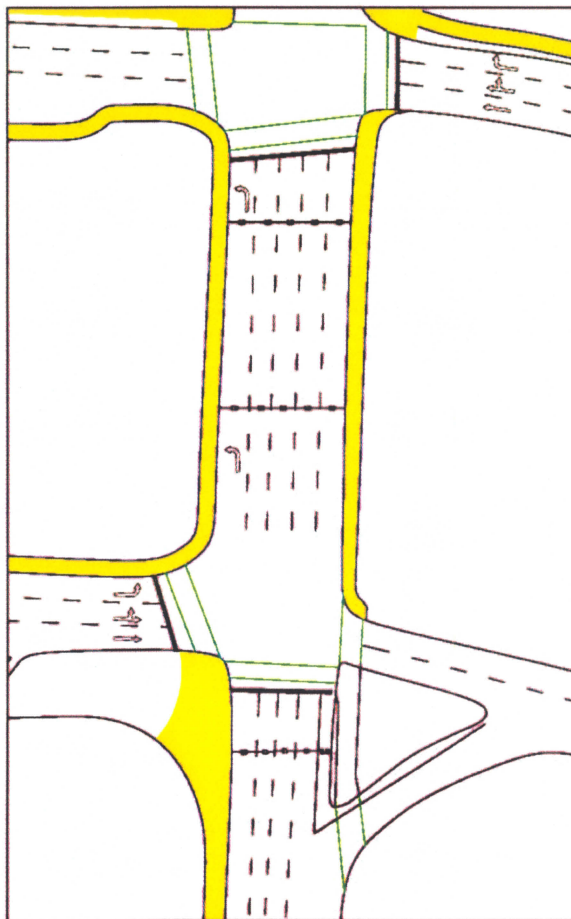
By using the available pavement and reducing the vehicle lane width to 11 feet, 5 feet would remain between the right lane and the face of curb. No gutter pan exists, assuming bicyclists will shy away from the curb by one foot, which leaves 4 feet of usable bike lane on this portion of the road. There is insufficient roadway width on Key Bridge to extend the bike lane onto the bridge. The north side of the westbound I-66 ramp is a logical terminus for this lane and is consistent with bicyclists' current practices, as illustrated in the photographs in Figures 2.10 and 2.11 and the drawings in Figures 2.12 and 2.13.



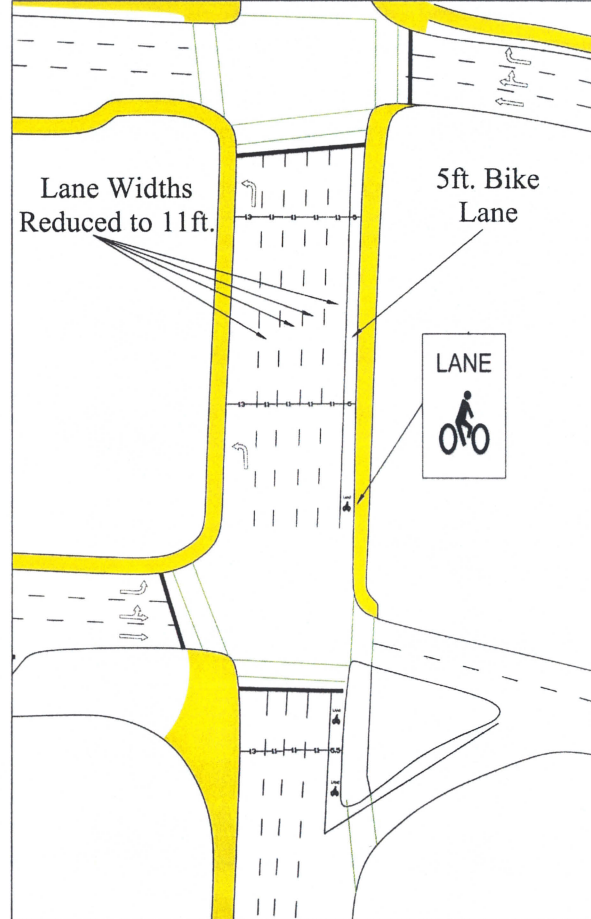
**Figure 2.10. Existing View on N. Lynn Street.**



**Figure 2.11. Proposed Bicycle Lane on N. Lynn Street.**



**Figure 2.12. Drawing of Existing Conditions on N. Lynn Street.**



**Figure 2.13. Drawing of Bicycle Lane on N. Lynn Street.**