

APPENDIX F - Multimodal Analysis Report

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Multi Modal Analysis



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I. INTRODUCTION

In January of 2016, Sabra, Wang & Associates, Inc. performed a field visit to Shirlington in Arlington, Virginia, to conduct a multi-modal analysis, including gathering information on pedestrian, bicycle, and transit facilities. A summary of existing conditions is included in this report along with identified deficiencies and proposed recommendations. The study intersections included are those that are impacted by one of the proposed alternatives from September 8, 2017, which are included in Appendix A. The intersections with pedestrian and bicycle impacts are as follows. Ramp merges and diverges were excluded from this list.

- A. Arlington Mill Dr and Give and Shirlington Road,
- B. Campbell Avenue and South Quincy Street,
- C. Campbell Avenue and South Shirlington Road,
- D. Gunston Road and North Quaker Lane, and
- E. Gunston Road and Martha Custis Drive.

II. NEIGHBORHOOD BACKGROUND

Shirlington is an “urban village” located in southern Arlington County, Virginia, directly west of I-395 and south of Four Mile Run Trail. The Arlington Economic Development labels Shirlington as the County’s “arts and entertainment center.” Development in Shirlington is predominantly mixed-use residential and commercial, with apartments, restaurants, and other ground-level retail.

III. MULTI-MODAL OVERVIEW

Personal vehicles, buses, bicycles, and pedestrians can be found in the Shirlington area. The Shirlington Station serves many transit routes and Capital Bikeshare is represented in the area with multiple stations. There are no Metro stations in the vicinity. The following photographs (Figures 1, 2, and 3) show each of the modes of transportation represented in the Shirlington area.



Figure 1: Typical Shirlington Streetscape with Personal Vehicles, Bicycles, and Pedestrians



Figure 2: Four Mile Run Trail with Capital Bikeshare Station on South Arlington Mill Drive at Campbell Avenue



Figure 3: Buses, Cars, Bicycles, and Pedestrians at Shirlington Station Transit Center on South Quincy Street

IV. CRASH DATA ANALYSIS

Three years of crash data provided by the Virginia Department of Transportation were available for review. Table 1 summarizes the crashes that occurred at each study intersection.

Table 1: Summary of Crash Data (November 1, 2012 to October 31, 2015)

Intersection	Total Crashes	Crash Type
Arlington Mill Dr and Shirlington Rd	5	2 rear end, 1 angle, 1 sideswipe, 1 off-road fixed-object
Campbell Ave and South Quincy St	7	2 rear end, 2 angle, 2 sideswipe, 1 pedestrian-related
Campbell Ave and South Shirlington Rd	5	5 rear end
Gunston Rd and North Quaker Ln	8	5 rear end, 2 angle, 1 off-road fixed-object
Gunston Rd and Martha Custis Dr	0	0

V. PEDESTRIAN & BICYCLE ANALYSIS

Sabra, Wang & Associates, Inc. reviewed the pedestrian and bicycle operations within the study area for general usage and safety. Areas of review included geometric deficiencies, ADA compliance, pedestrian and bicycle accommodations, queues, signing, signal phasing, and other safety issues related to pedestrians and bicyclists. The Virginia Department of Transportation (VDOT) has recently updated signal timings in the area; however, these were not immediately available. Signal timings should be reviewed to ensure minimum pedestrian crossing times are provided.

Existing pedestrian and bicycle amenities are shown in Figures 4 and 5, respectively, and a discussion of each study intersection is included in the following paragraphs. **Appendix B** provides existing conditions diagrams and **Appendix C** provides the proposed concept diagrams, as discussed in the following paragraphs.

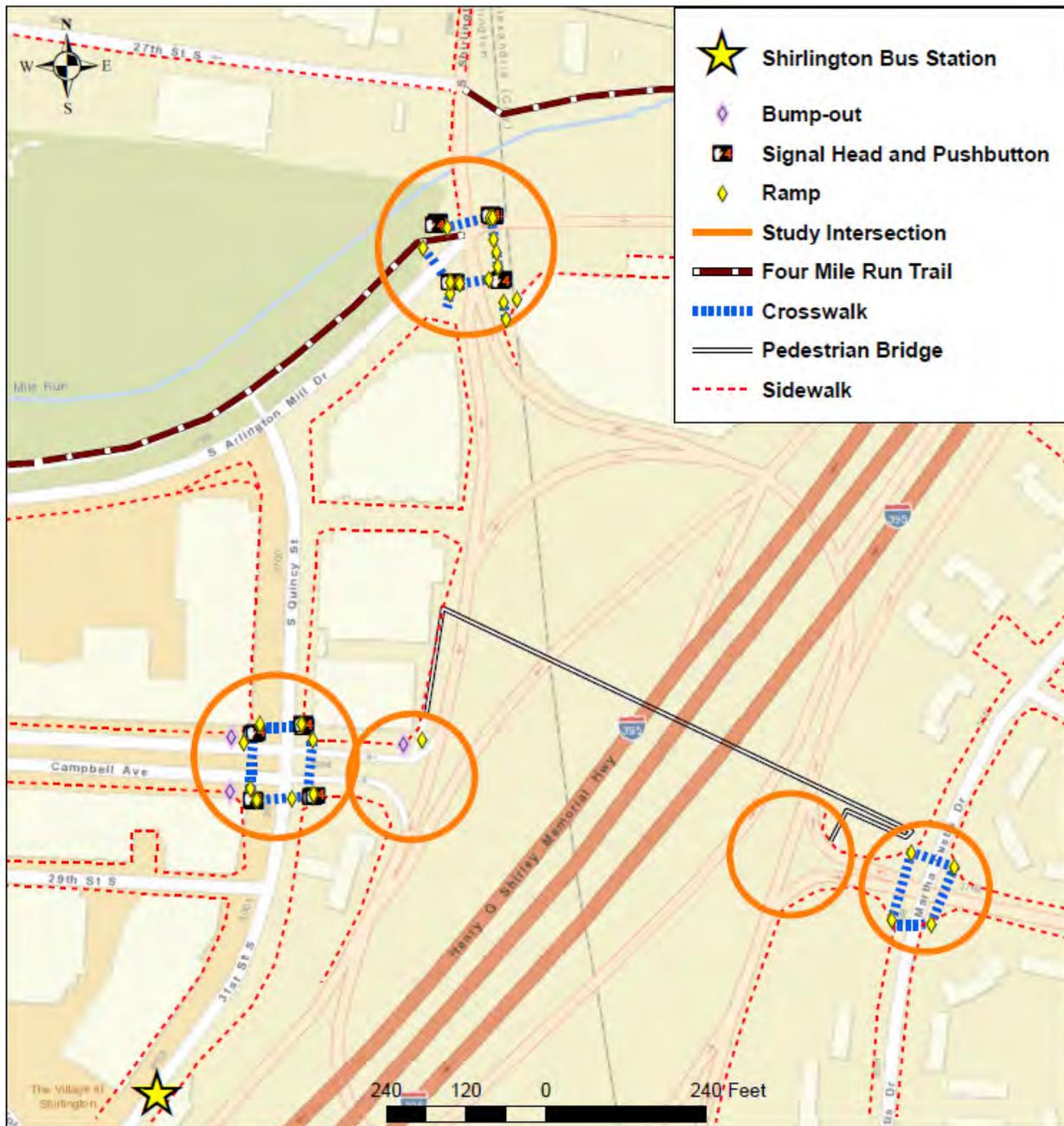


Figure 4: Pedestrian Amenities

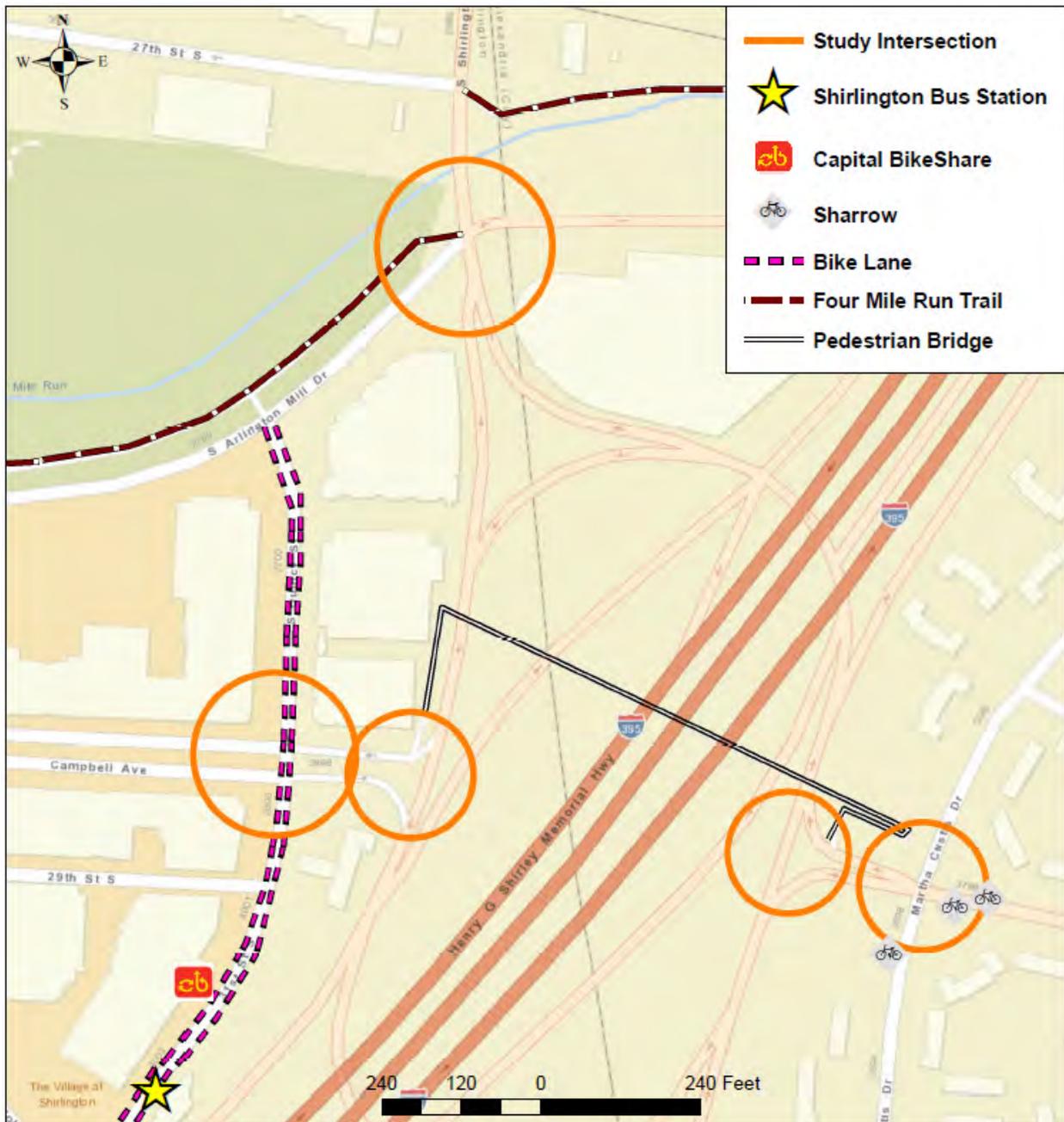


Figure 5: Bicycle Amenities

A. ARLINGTON MILL DRIVE AND SHIRLINGTON ROAD

Description:

Arlington Mill Drive and Shirlington Road are both four-lane arterials. The intersection of Shirlington Road and Arlington Mill Drive is a five-legged signalized intersection north of Shirlington. There are two parallel westbound approaches, each with two lanes: one for traffic exiting southbound I-395 and one for the Shirlington Gateway office building. Four Mile Trail runs parallel to Arlington Mill Drive and crosses Shirlington Road 165 feet north of the intersection. Residential apartment buildings and offices are located on the south side of the intersection. Shirlington Road crosses Four Mile Run north of the intersection via a 115-foot bridge. Existing conditions are shown as Figure B1 in Appendix B.

Geometry:

Sidewalk or trail is present on both sides of Arlington Mill Road, on the west side of southbound Shirlington Road, and on the islands on the east side of the intersection. Ramp detectable warning surfaces are missing on the southeast island and the east leg median, and the slopes are too steep to meet ADA compliance. The other ramps have acceptable slopes. Figure 7 shows two photographs of the study intersection from the southwest corner.



Figure 7: View of Shirlington Road and Arlington Mill Drive Intersection from Southwest Corner

The northbound channelized right turn into Shirlington Gateway increases the number of conflict points with pedestrians, and the sidewalk has no destination. If the channelized right turn is closed, pedestrians walking between the garage and the crosswalk can use the closed area while access to the garage is maintained for drivers via the main driveway.

Signs:

Pedestrian warning signs (MUTCD W11-2) are present on the northeast signal pole. These signs are improperly installed; no downward arrow plaque is posted. Additionally, pedestrian crossings in a marked

crosswalk at a signalized intersection are not expected and are typically installed where there are no pedestrian indications such as for channelized turn lanes with pedestrian crossings, mid-block crossings, etc.

Signalization:

Loop detectors are located along Arlington Mill Drive, the I-395 exit, and the Shirlington Gateway office building exit. Pedestrian signals are present for all crossings. Pushbuttons are provided only to cross Shirlington Road in all four corners and work. Pedestrian signals for Four-Mile Run Road are on recall. Pushbutton signs for Shirlington Road does not indicate the crossing direction, as shown in the following photographs (Figures 8 and 9).



Figure 8 (Left): Pushbutton on Southwest Corner

Figure 9 (Right): Pushbutton on Southeast Corner

Pavement Markings:

Continental pavement markings are striped for each crosswalk. Skip lines and double yellow lines along Shirlington Road northbound and southbound were recently repainted. Crosswalks and stop bars for the north, south, and I-395 exit ramp legs were also recently repainted. The west leg crosswalks remain in good condition while the crosswalk at the Shirlington Gateway office building exit is in poor condition, as shown in the following photograph.



Figure 10: Northbound View of Crosswalk across Shirlington Gateway Office Building Driveway

Bicycles:

There are no designated bicycle lanes at the intersection. Four Mile Run Trail is adjacent to the intersection and permits bicycles. Several bicyclists and pedestrians were observed on this trail during the field visit.

Lighting:

Street lighting is present at all intersection crossings.

Proposed Improvements:

Alternative S7 affects the pavement to the south of this intersection. The following improvements to pedestrian and bicycle facilities are proposed and are shown in Figure C1 in Appendix C.

- Eliminate the northbound channelized right turn into Shirlington Gateway.
- Install ADA-compliant curb ramps on the east leg on the median and the southern island.
- Restripe the eastern crosswalk with continental crosswalk pavement markings.
- Remove the existing pedestrian warning signs on the northeast mast arm signal pole.
- Upgrade Pushbutton signs to show the crossing direction.

B. CAMPBELL AVENUE AND SOUTH QUINCY STREET*Description:*

The signalized intersection of Campbell Avenue and South Quincy Street is located in Shirlington directly north of the Shirlington Transit Center. Quincy Road is a four-lane road oriented north to south that runs parallel to I-395. The west leg of Campbell Avenue is a two-lane, divided roadway that passes through downtown Shirlington. The east leg has two eastbound lanes that access I-395 and three westbound lanes (one right turn, one thru, one left turn) at the intersection. There are offices, restaurants, ground-level retail, and apartments in the immediate vicinity. The Shirlington Transit Center is located approximately 300 feet south of the intersection along South Quincy Street. Existing conditions are shown as Figure B2 in Appendix B.

Geometry:

Wide brick and concrete sidewalks are present on each corner of the intersection, except the southeast corner that is approximately five feet wide. The two ramps on the northeast corner and the ramp for the west side of the northern crosswalk are ADA compliant. All others lack detectable warning surfaces. The northern median cut-through has a detectable warning surface but is only four feet wide. All ramp slopes are acceptable.

The ramps on the southwest corner are not ADA-compliant for multiple reasons. To bring this corner into compliance would require a significant rebuild to address the existing junction box, signal pole, manhole, landing area between ramps, and detectable warning surfaces.

Signalization:

Traffic signals are loop activated along Campbell Avenue. Pedestrian signals are located on all four approaches. Pedestrian signals are activated automatically to cross Campbell Avenue and pushbuttons are used to cross South Quincy Street. Audible pedestrian equipment is located on both corners to cross the north side of South Quincy Avenue.

Bicycles:

Exclusive bicycle lanes are striped along Quincy Avenue, as shown in Figure 14. Bicycle pavement markings along northbound and southbound Quincy Street do not meet VA MUTCD, Section 9C.04 standards. The Helmeted Bicyclist Symbol should be used, and the bike lane arrow markings are missing. The skip lines currently installed are at an incorrect spacing of 3-foot line, 9-foot skip instead of the required 2-foot line, 4-foot skip per figure 9C-6(VA).

Vehicles including buses were observed queueing along northbound South Quincy Street to turn right. The queue extended across the bicycle lane, thereby blocking it. No impeded bicyclists were observed. Only 75 feet are available for the right-turn lane before a 36-foot parking strip is present. The bike lane and right-turn lane are shown in Figure 14. While there are no pavement markings or signs that clearly identify bicycle routes along Campbell Avenue, there are several bicycle racks on both sides of the street.



Figure 14: Northbound South Quincy Street Approach

The Shirlington Transit Center/S Quincy & Randolph St Capital Bikeshare station is located approximately 300 feet south of Campbell Avenue along South Quincy Avenue across from Shirlington Station and is shown in Figure 15.



Figure 15: Shirlington Transit Center Capital Bikeshare Station

Pavement Markings:

Pavement markings are in fair condition. Continental pedestrian pavement markings are used across all crossings except the west leg of Campbell Avenue where decorative red brick is used to delineate the pedestrian crossing, as shown Figure 13.



Figure 13: View from Southeast Corner of Campbell Avenue and South Quincy Street

Lighting:

All four traffic signal poles provide overhead lighting at the intersection.

Proposed Improvements:

Alternative S14 affects the pavement to the east of this intersection. The following improvements to pedestrian and bicycle facilities are proposed and are shown in Figure C2 in Appendix C.

- Replace the overhead “Turning Vehicles Yield to Pedestrians in Crosswalk” signs with MUTCD R10-15 image signs.
- Install MUTCD R4-4 “Begin Right Turn Lane Yield to Bikes” sign on northbound approach
- Install new Bike Route sign on northbound Quincy Street.
- Remove existing left arrow under the southbound bike route sign since the sign below shows through and left-turn options.
- Install ADA-compliant curb ramps on southwest, southeast, and northwest corners.
- Remove detectible warning surface on north median since it is too narrow.
- Restripe bike lanes and pavement markings to match VA MUTCD requirements.
- Extend northbound right-turn lane to provide additional storage.

C. CAMPBELL AVENUE AND SOUTH SHIRLINGTON ROAD

Description:

The intersection of Campbell Avenue and South Shirlington Road is located east of Shirlington immediately west of I-395. It is partially signalized with a free southbound right-turn movement towards Shirlington. The signal controls southbound South Shirlington Road and eastbound Campbell Avenue. The southbound I-395 off-ramp is stop-controlled and merges with South Shirlington Road immediately south of the signal. The land use consists of a gas station on the southwest corner and WETA on the northwest corner. No bus stops are present at this intersection. Existing conditions are shown as Figure B3 in Appendix B.

Geometry:

Sidewalk is present on the southwest corner, but there are no destinations for pedestrians east of South Quincy Street. Access to the pedestrian bridge overpass crossing I-395 (shown in Figure 13) is present on the northwest corner. No crosswalks are present, but a ramp is located on the northwest corner.



Figure 18: Pedestrian Bridge Connecting Fairlington and Shirlington

Signalization:

The traffic signal controls two southbound through lanes and two eastbound right-turn lanes. A sign is posted prohibiting turns on red from the left lane. Loop detectors are present on Campbell Avenue.

Pavement Markings:

Pavement markings are in fair condition.

Bicycles:

No bicycle signs or pavement markings are present at the intersection.

Lighting:

Street lighting is present at the intersection. While no lights are located directly on the northwest corner near the pedestrian overpass, there is lighting on the overpass and street lighting on both roadways.

Proposed Improvements:

Alternative 14 affects this study intersection. The only existing pedestrian or bicycle facility is the sidewalk on the northwest corner and the southwest corner. Currently, no crosswalk exists to connect these two. With the realignment of the eastern leg and updated signalization, pedestrian and bicycle access should be considered. Due to the nature of this intersection, pedestrians are not expected nor encouraged to use the southwest sidewalk; therefore, no crosswalks are necessary at this study intersection. The following improvements are proposed and are shown in Figure C3 in Appendix C.

- Eliminate the ramp on the northwest corner and rebuild the curb and sidewalk.
- Install signs indicating pedestrians should use the crosswalk at Quincy Street (R9-3 and R9-3bP assembly.)
- Install pedestrian lighting in the northwest corner at the start of the pedestrian overpass entrance.

D. GUNSTON ROAD AND NORTH QUAKER LANE

Description:

The intersection of Gunston Road and North Quaker Lane is located immediately east of I-395. North Quaker Lane is uncontrolled with three northbound lanes; the right turn onto Gunston Road is channelized. A stop sign controls the westbound movement from Gunston Road onto northbound North Quaker Lane. Gunston Road is a two-lane, residential street. The pedestrian bridge overpass crossing I-395 connects the intersection with Shirlington. The land use is residential to the east. No bus stops are present at this intersection. Existing conditions are shown as Figure B4 in Appendix B.

Geometry:

Sidewalk is present on the southeast corner. There is no direct connection from this sidewalk to the pedestrian bridge on the northeast corner at this intersection without crossing Gunston Road at Martha Custis Road. No ramps or crosswalks are present.

Signalization:

This intersection is unsignalized.

Pavement Markings:

Pavement markings are in good condition.

Bicycles:

No bicycle signs or pavement markings are present at the intersection.

Lighting:

Street lighting is present at the intersection; however, no lights are located on the northeast corner near the pedestrian overpass.

Proposed Improvements:

Alternative 13 affects this study intersection. The only existing pedestrian or bicycle facility is the sidewalk on the southeast corner and the northeast corner. Currently, no crosswalk exists to connect these two. With the addition of a traffic signal, pedestrian and bicycle access should be considered. Due to the nature of the proposed signal and the expected low traffic volumes, no additional access is recommended. The following improvements are proposed and are shown in Figure C4 in Appendix C.

- Install signs indicating pedestrians should use the crosswalk at Martha Custis Drive (R9-3 and R9-3bP assembly) for pedestrians coming off the pedestrian bridge.
- Install new sidewalk to pave the footpath to provide more direct access to the pedestrian bridge.
- Provide pedestrian-level lighting for the new footpath.

E. GUNSTON ROAD AND MARTHA CUSTIS DRIVE

Description:

The stop-controlled intersection of Gunston Road and Martha Custis Drive is located east of Shirlington in Fairlington. It is separated from Shirlington by I-395. Both Gunston Road and Martha Custis Drive are two-lane, residential streets. The pedestrian bridge overpass crossing I-395 connects the intersection with Shirlington. The land use is mainly multifamily residential. There are WMATA, ART, and DASH bus stops along Martha Custis Drive in both directions. Existing conditions are shown as Figure B5 in Appendix B.

Geometry:

Sidewalk is present on all four corners. All four ramps were recently rebuilt and are ADA compliant with the correct slopes and detectable warning surfaces.

Pavement Markings:

The crosswalks and stop bars for all four approaches were recently repainted. Standard parallel line pedestrian crossing markings were clearly striped on each approach. The southern crosswalk is striped at an angle as is shown in Figure 21. Low volume pedestrian activity was observed.



Figure 21: Intersection of Gunston Road and Martha Custis Drive

Bicycles

There are sharrow pavement markings south of the intersection along Martha Custis Drive and east on Gunston Drive and in new condition. Bicycle signs are present at the intersection, such as the ones shown in Figure 23. No bicyclists were observed during the field visit.



Figure 23: Bicycle Signs on Northbound Martha Custis Drive at Gunston Road

Lighting:

Overhead lighting was provided at every corner except the southeast corner.

Proposed Improvements:

Alternative S13 affects the pavement to the west of this intersection. The intersection was recently resurfaced and repainted; however, a few improvements are still recommended. The following improvements to pedestrian and bicycle facilities are proposed and are shown in Figure C5 in Appendix C.

- Realign the southern crosswalk and stop bar on Martha Custis Drive to shorten the crossing distance, and rebuild the southeast ramp to match.
- Restrict northbound parking and install/relocate bus signs for the northbound Martha Custis Drive near side bus stop.
- Relocate stop signs to be closer to the stop lines.

- Install sharrows on north leg for consistency.
- Install new sidewalk to pave the footpath to provide more direct access to the pedestrian bridge.
- Remove the curb abutted sidewalk in the northwest corner.

VI. TRANSIT ACCESS

Three different agencies have multiple bus routes traversing the Shirlington area, including Washington Metropolitan Area Transit Authority (WMATA), Arlington Transit (ART), and Alexandria Transit Company’s DASH. Shirlington Station is located south of downtown Shirlington along South Quincy Street with five bus bays, an indoor waiting area, a staffed commuter store offering transit information, and audible schedule devices. The station, shown in Figure 25, serves over 2,000 commuters daily.



Figure 25: Capital BikeShare Station and Buses Departing Shirlington Station Transit Center

The WMATA bus routes stopping at Shirlington Station are 7A/7F/7Y (Lincolnia-North Fairlington Line), 7C (Lincolnia-Park Center-Pentagon Line), 10B (Hunting Towers-Ballston Line), 22A (Barcroft-S Fairlington line), and 23A/23B/23T (McLean-Crystal City Line). The WMATA average ridership data is shown in Table 2.

Table 2: WMATA Ridership Summary by Route

WMATA Bus Route	Description	Average Weekday Ridership	Average Monthly Ridership
7A/7F/7Y	Lincolnia-North Fairlington	3,387	83,637
7C**	Lincolnia-Park Center-Pentagon	1,583	33,239
10B	Hunting Point-Ballston	2,025	57,689
22A*	Barcroft-South Fairlington	1,497	33,951
23A/23B/23T	McLean-Crystal City	3,936	102,828

* indicates route without Sunday service
 ** indicates route without Saturday or Sunday service

ART bus routes stopping at Shirlington Station are 75 (Shirlington-Ballston-Virginia Square line), 77 (Shirlington-Lyon Park-Court House), and 87 (Pentagon-Shirlington line). Ridership data was not available for these routes.

Alexandria DASH bus route AT9 (Mark Center-Potomac Yard line) has a stop beside Shirlington Station. The intersection of Gunston Road and Martha Custis Drive, southeast of I-395, is also serviced by DASH bus routes AT3, AT4, and AT3-4 Loop. Table 3 summarizes Dash ridership.

DASH and WMATA buses are shown in Figure 26 at the intersection of Gunston Road and Martha Custis Drive.

Table 3: DASH Ridership Summary by Route

DASH Bus Route	Description	Average Monthly Ridership*
AT3	Hunting Point-Pentagon Metro	14,529
AT4	Old Town-Pentagon Metro	14,402
AT3-4	Loop	1,878
AT9	Mark Center Transit Station-Potomac Yard Shopping Center	7,173

*average of 2015 January-June data



Figure 26: DASH and WMATA Buses at Intersection of Gunston Road and Martha Custis Drive

VII. TRANSIT ACCESSIBILITY AND SAFETY

Shirlington Station is Arlington County's only enclosed public bus station; it is located at 2975 South Quincy Street, adjacent to I-395. Over 2,000 commuters use the station daily. The building is staffed with employees providing route and travel information for all transit options. There are five bus bays for WMATA and ART public buses. Each bus bay is equipped with route information, electronic signing with next bus arrival time, and audible scheduling devices, as shown Figure 27. There is an additional bus stop for Alexandria's DASH route AT9 located 100 feet north of the station along South Quincy Street. Aside from Shirlington Transit Center, bus stops are located throughout the area. While not all have bus shelters, all are well marked and clearly visible. There are no Park & Ride facilities in the immediate vicinity. A covered bicycle rack shelter is located directly north of the station and is shown in Figure 28.

The only issue noted during the field visit was potential lighting concerns for the bus stops along Martha Custis Drive. While street lighting is provided, it is not in the immediate vicinity of the WMATA and DASH bus stops.



Figure 27 (Left): Bus Bay Featuring Route Information and Audible Schedule Devices

Figure 28 (Right): Covered Bicycle Parking at Shirlington Transit Center

VIII. DESCRIPTION OF TRANSIT ROUTES

Eight bus routes, plus variations on some of the routes, traverse the study area. Figure 29 maps the roadways within the study area that each of these routes travel. Figure 30 depicts the amenities at each bus stop including the presence of a shelter, bus pad, landing pad, and lighting. The paragraphs following these figures describe the transit routes that cross the study area.

Recommended changes related to transit include relocating the bus stop sign and restricting parking on northbound Martha Custis Drive and extending the northbound right-turn lane on South Quincy Street at Campbell Avenue to provide additional space for queues; these are included in the previous recommended diagrams.

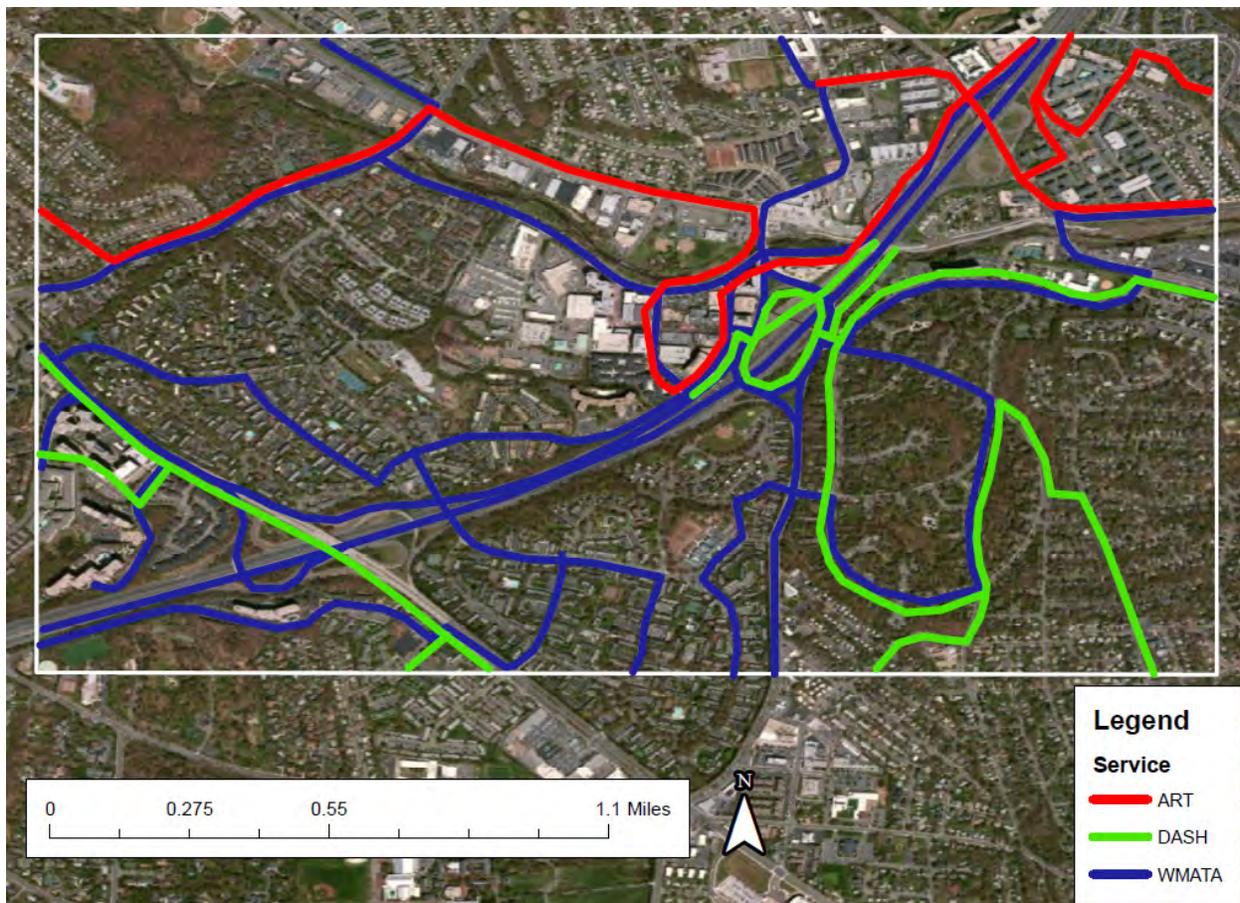


Figure 29: Study Area Roadways with Transit Routes

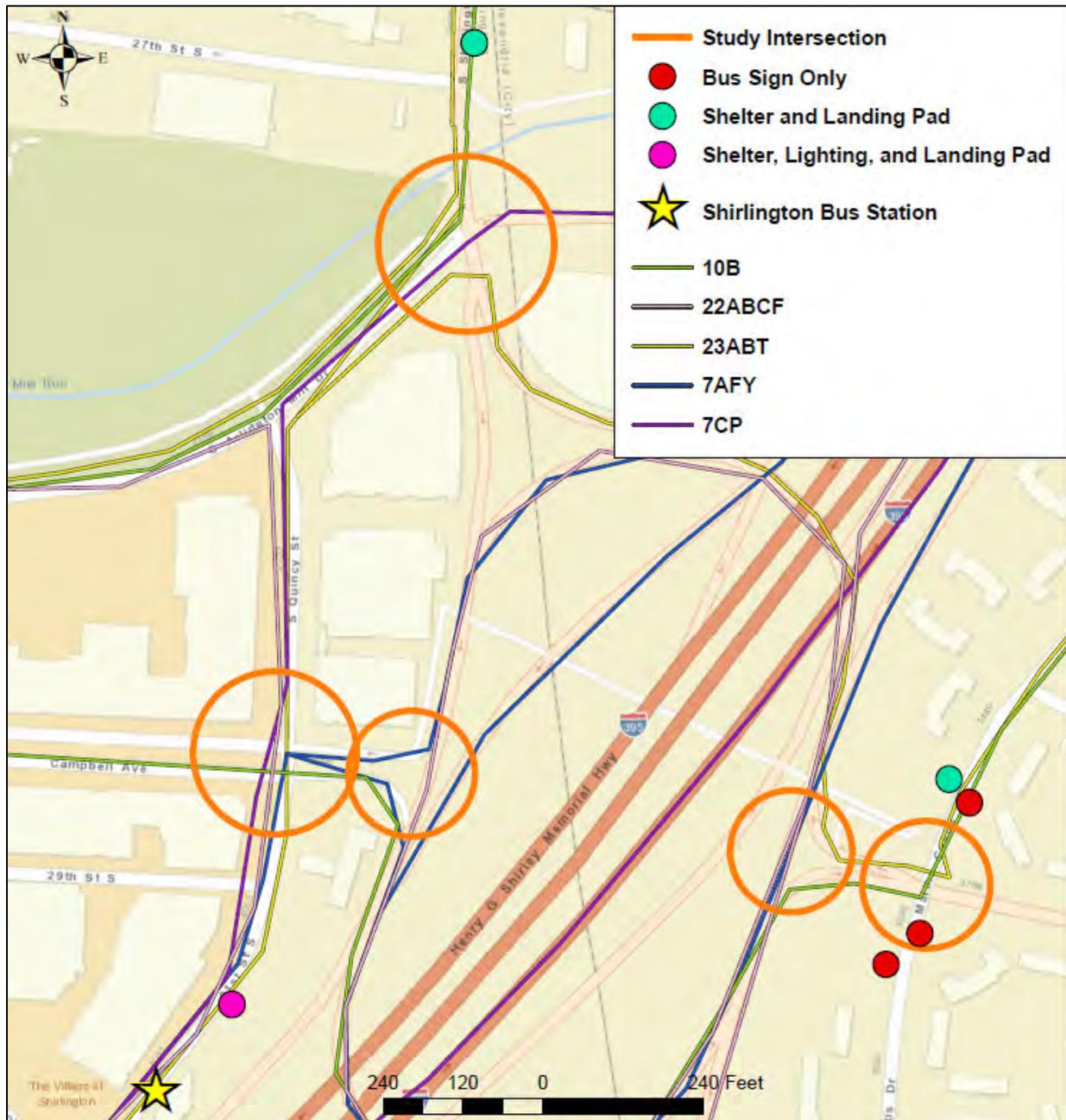


Figure 30: Transit Amenities

ART 75, 77, 87 ROUTES (ARLINGTON RAPID TRANSIT BUS ROUTES)

Three Arlington Rapid Transit (ART) bus routes provide service to Shirlington. Route 75 operates from Shirlington to Virginia Square Metro via Wakefield High School and the Ballston Metro. It runs weekdays with 30-minute headways. Route 77 operates from Shirlington to Court House Metro via Lyon Park and operates weekdays and Saturdays with 30-minute headways; it does not run on Sundays. Route 87 operates from Pentagon Metro to Shirlington via Army-Navy Drive. Operating daily, weekday headways range from 15 minutes during peak hours to 30 minutes during off-peak hours. Saturday and Sunday operations have 30-minute headways.

DASH AT3, AT4, AT3-4, & AT9

Alexandria's DASH bus system has four routes that pass through Shirlington or Fairlington. Of these routes, the AT9 is the only bus that stops at Shirlington Station. The AT3 and AT4 operate along I-395, exiting at the Shirlington interchange into Fairlington via the Martha Custis Drive and Gunston Road intersection. The AT3 route runs from Pentagon Metro to Hunting Point via Fairlington and Old Town Alexandria. The AT4 route operates from Pentagon Metro to Alexandria City Hall via I-395 and Fairlington. Both the AT3 and AT4 operate weekdays during AM and PM peak hours with 20-minute headways. The AT3-4 is a hybrid of the two routes that operates during off-peak hours between Fairlington and Old Town Alexandria. It operates on one-hour headways during weekday off-peak hours and weekends. The AT9 operates between the Mark Center and Potomac Yard Shopping Center on weekdays and Saturdays. It operates on 30-minute headways on weekdays and 60-minute headways on Saturdays.

WMATA 7A/F/Y – LINCOLNIA – NORTH FAIRLINGTON LINE

The 7A/F/Y WMATA bus route spans from Lincolnia Road and Quantrell Avenue at its southern terminus northbound to the Washington Convention Center via Mark Center Transit Station, Shirlington Transit Center, Pentagon Metro, and Farragut North and West Metro stations in Washington, DC. The A and F routes run from Lincolnia to Pentagon Metro via Shirlington Transit Center via slightly different routes. The 7Y originates at Southern Towers and utilizes the same route as the 7A to Pentagon Metro. Then, it crosses into downtown Washington, DC, to its north terminus at the Washington Convention Center. The 7Y route operates on a limited schedule, Monday through Friday, running northbound during the AM peak and southbound during the PM peak. The 7A and F generally operate 15- to 25-minute headways from 4:45 AM until after midnight Monday through Friday. They run a similar schedule on weekends but generally operate with 30- to 35-minute headways.

WMATA 7C – LINCOLNIA – PARK CENTER – PENTAGON LINE

The 7C WMATA bus route runs from Park Center Drive to Pentagon Metro via Shirlington Transit Center. The route utilizes I-395 between Pentagon Metro and Shirlington, and then travels along Arlington Mill Drive, Walter Reed Drive, and King Street en route to Park Center. It operates nine northbound trips during the AM peak and eight southbound trips during the PM peak from Monday through Friday. Headways vary from 15 to 20 minutes, with buses departing Park Center from 6:05 AM to 8:47 AM in the morning and Pentagon Metro from 4:15 PM to 7:05 PM in the evening.

WMATA 8S – FOXCHASE – SEMINARY VALLEY LINE

The 8S WMATA bus route runs a direct route between Pentagon Metro Station and Radford Street and Quaker Lane, utilizing the Shirlington interchange for access to I-395. There is a southbound bus stop at 32nd Street and South Quaker Street before its terminal bus stop at Radford Street. There is no northbound bus stop at this intersection. The 8S operates five morning and five afternoon trips, all with under approximate 25-minute headways. The AM trips exclusively run southbound while PM trips run northbound.

WMATA 10B – HUNTING POINT – PENTAGON LINE

The 10B WMATA bus route runs from Ballston Metro to Hunting Point in Alexandria, VA, via Shirlington Transit Center and Braddock Road Metro. It operates seven days a week, with a limited weekend schedule. The route begins operations in both directions after 5:00 AM, operating on 30-minute headways. It has a similar Saturday schedule. On Sundays, it operates on 60-minute headways.

WMATA 22A/C – BARCROFT – SOUTH FAIRLINGTON LINE

The 22A and 22C WMATA bus routes run from Ballston Metro to Pentagon Metro, via Shirlington and Fairlington. Traveling along George Mason Drive, Four Mile Drive, and Arlington Mill Drive, the routes utilize many smaller residential streets through the Shirlington and Fairlington neighborhoods. They use the I-395 Shirlington interchange to access I-395 en route to Pentagon Metro. The routes are identical except in Fairlington, where they travel along different streets. The 22C generally operates during AM and PM peak hours, while the 22A operates during off-peak hours. The routes operate at 20- to 30-minute headways daily. The 22A operates a limited weekend schedule, while the 22C does not run. On Saturdays, the 22A operates on 45-minute headways; on Sundays, headways are one hour.

WMATA 23A/B/T – MCLEAN – CRYSTAL CITY LINE

The 23A WMATA bus route runs from McLean Metro to Crystal City Metro via Ballston Station and the Shirlington Transit Center. The route follows extensive portions of Dolley Madison Boulevard, Old Dominion Drive, and Glebe Road. The 23B route uses the same route as 23A, but only operates between Ballston Metro and Crystal City Metro. The 23T route uses the same route as 23A, but only operates between the McLean Metro and Shirlington. During AM and PM peak periods, the 23B and 23T operate their respective routes. During off-peak hours and weekends, the 23A operates along the route in its entirety. The 23B and 23T routes operate under approximate 25-minute headways during weekday peak operations and 30-minute headways at other times. The 23A operates on 30-minute headways on Saturdays and 60-minute headways on Sundays.

IX. CONCLUSION

A multi-modal analysis was performed for five intersections in the Shirlington area of Arlington, Virginia. Pedestrian, bicycle, and transit data was collected and recorded in this document. Deficiencies were determined and proposed improvements to each intersection, based on the concept diagrams in Appendix A, are provided in Appendix C.

Appendix D includes a table summary of the pedestrian, bicycle, and transit amenities. Appendix E shows the Matrix of Impacts to Pedestrians, Bicycles, Transit, and Access Management for each of the eight alternatives.

Signal timings should be reviewed to ensure minimum pedestrian crossing times are provided.

APPENDICES

APPENDIX A: SEPTEMBER 8, 2017, INTERCHANGE IMPROVEMENTS

I-395 & Shirlington Rd Interchange Safety & Operations Phase II Study

Project Location



North Arrow & Scale



Legend

- Proposed Pavement
- Resurfaced Pavement
- Proposed Median
- Demolition of Pavement
- Existing Right of Way and Property Lines
- Proposed Limits of Construction
- Proposed Retaining Walls
- Proposed Signal

S1: Reduce Required Weaves; Reduce and Repurpose Existing Lanes

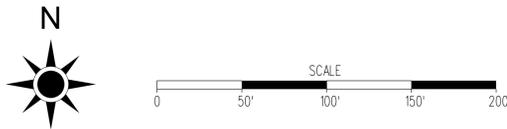
DRAFT
September 8, 2017



Project Location



North Arrow & Scale



Legend

- Proposed Pavement
- Resurfaced Pavement
- Proposed Median
- Demolition of Pavement
- Existing Right of Way and Property Lines
- Proposed Limits of Construction
- Proposed Retaining Walls
- Proposed Signal

S7: Add Full Lane to Arlington Mill Road On-Ramp

DRAFT
September 8, 2017

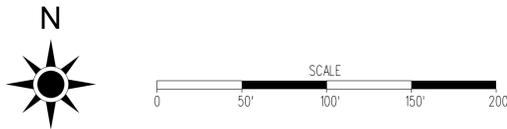


I-395 & Shirlington Rd Interchange Safety & Operations Phase II Study

Project Location



North Arrow & Scale

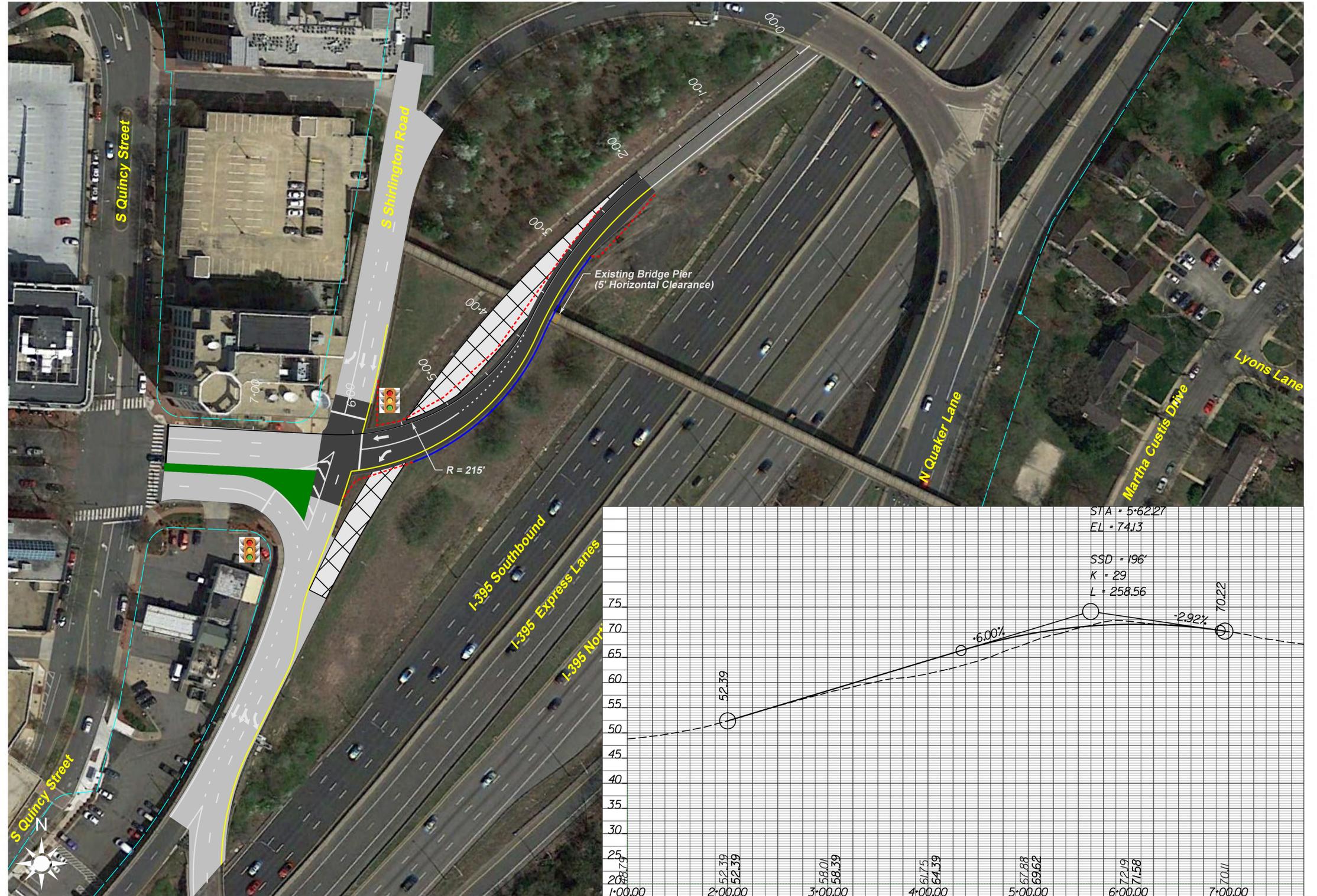


Legend

- Proposed Pavement
- Resurfaced Pavement
- Proposed Median
- Demolition of Pavement
- Existing Right of Way and Property Lines
- Proposed Limits of Construction
- Proposed Retaining Walls
- Proposed Signal

S14: Convert I-395 Off-Ramp to Signalized Intersection With Campbell Ave

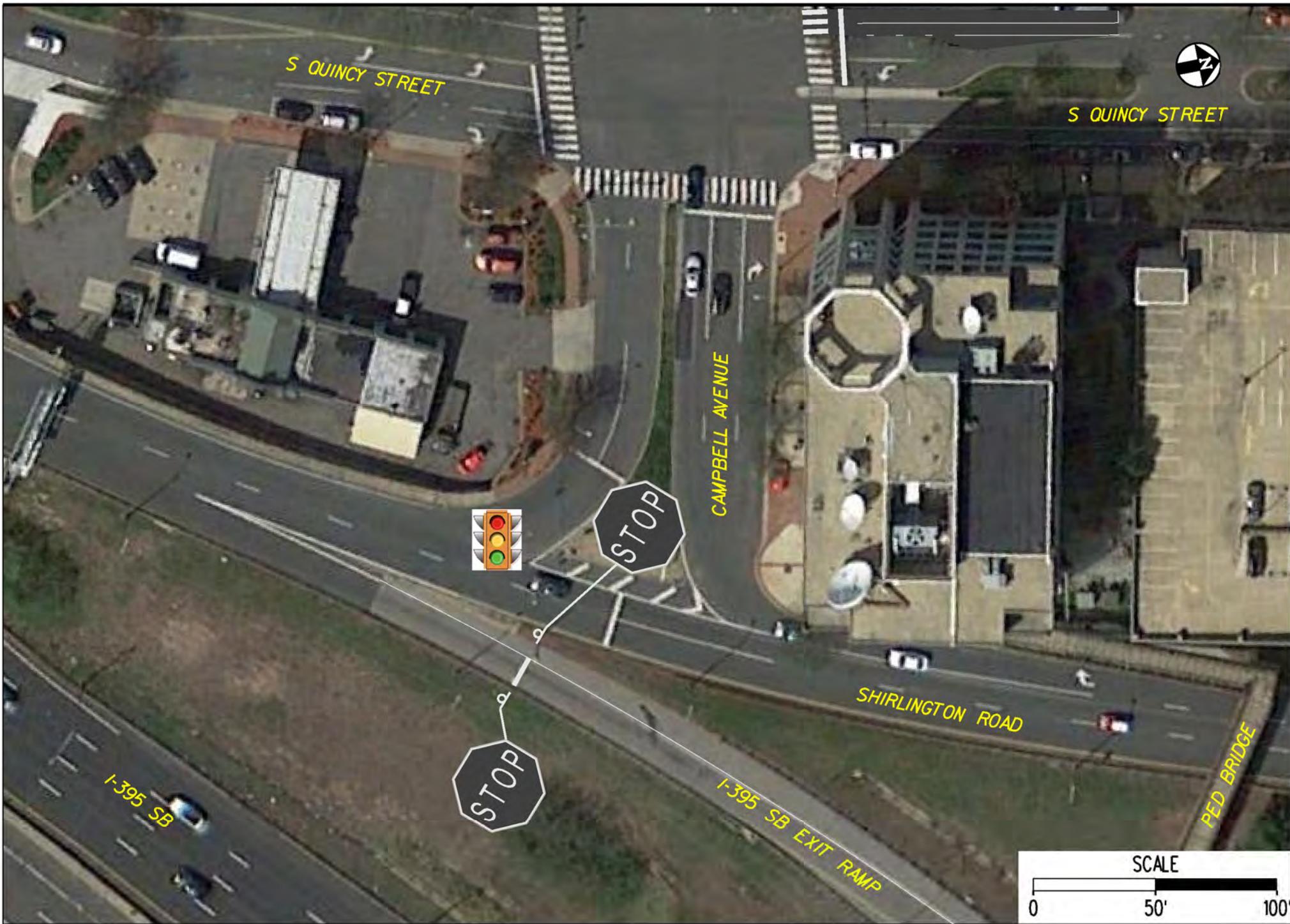
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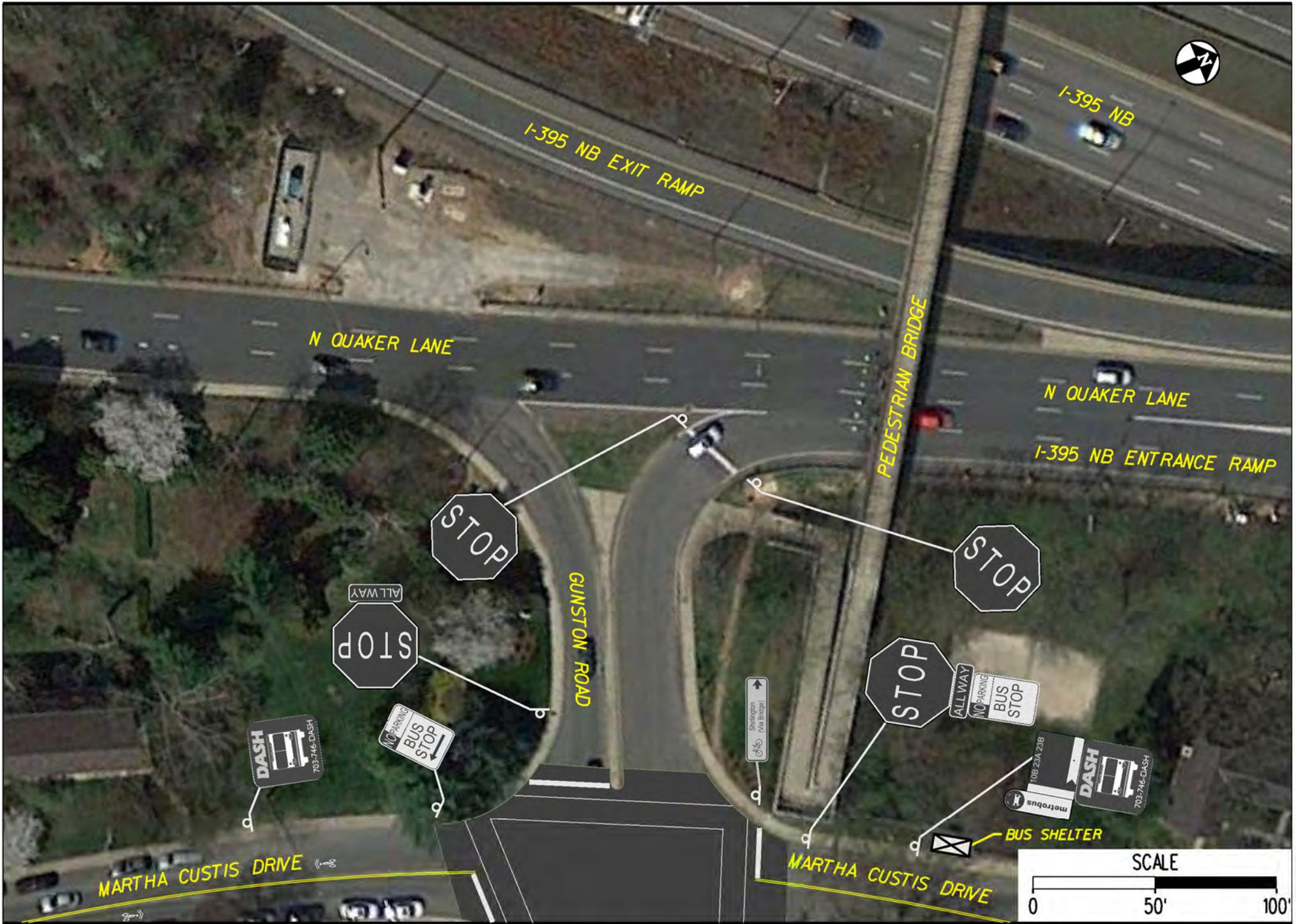


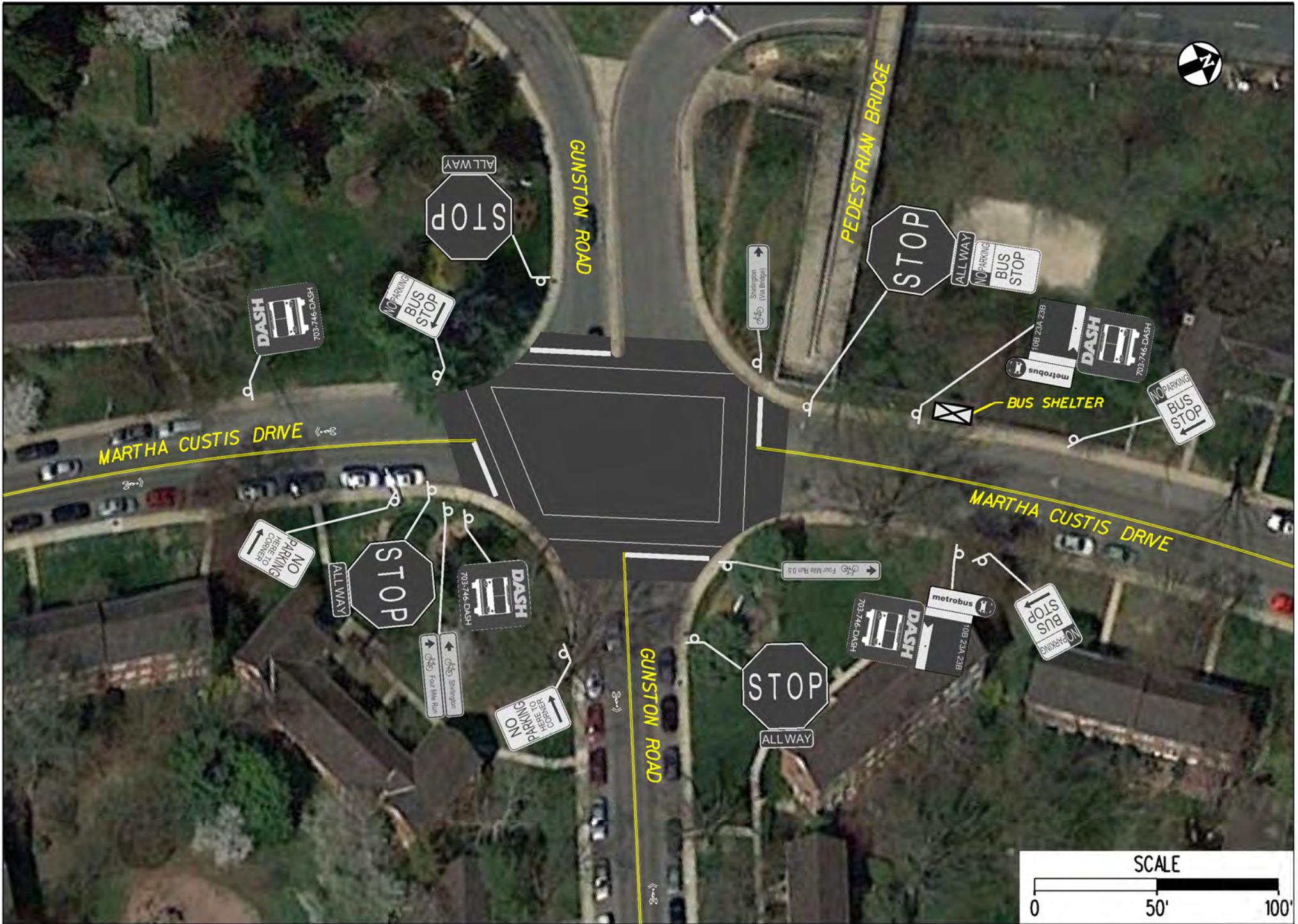
APPENDIX B: EXISTING CONDITION DIAGRAMS







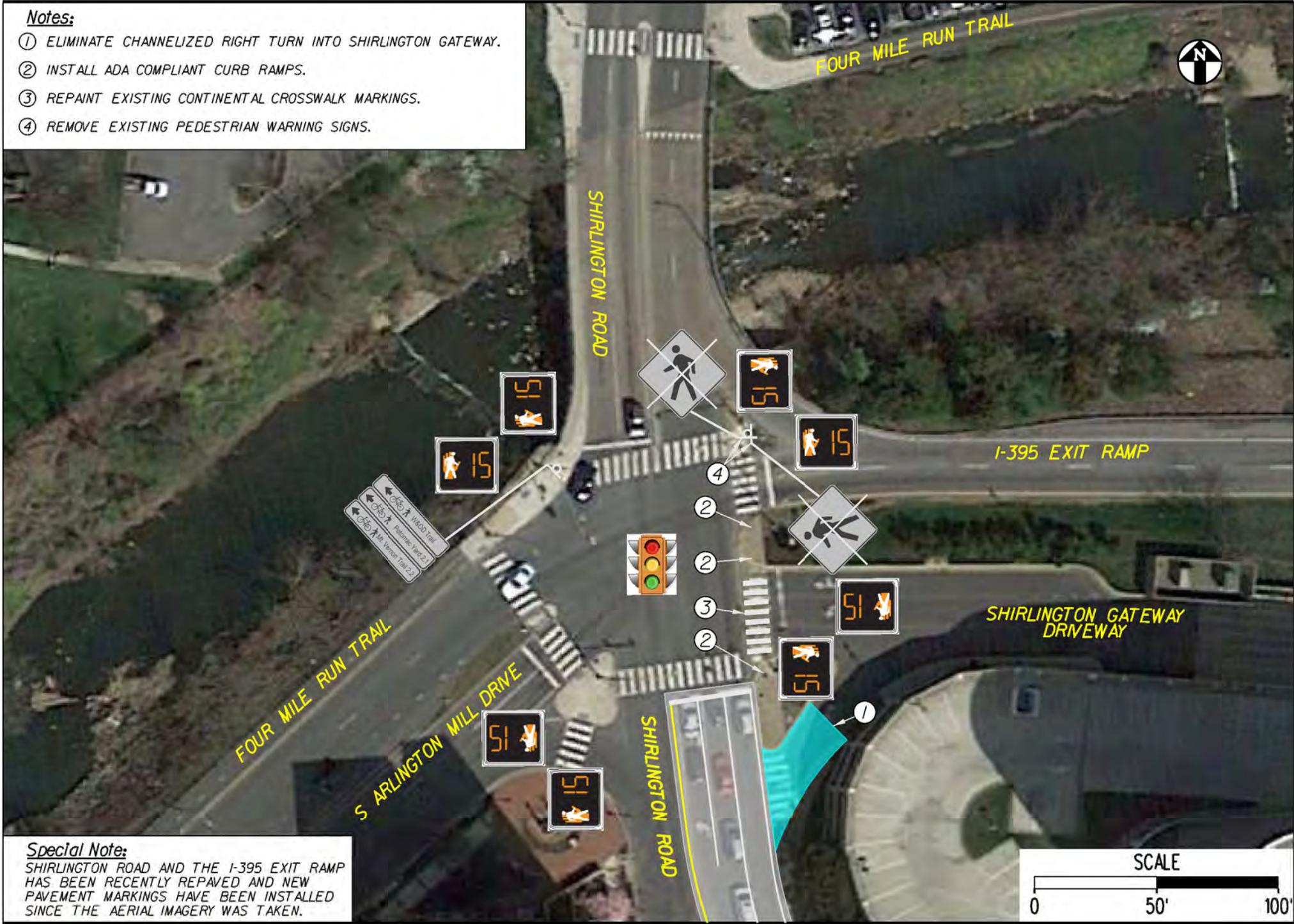




APPENDIX C: PROPOSED CONCEPT DIAGRAMS

Notes:

- ① ELIMINATE CHANNELIZED RIGHT TURN INTO SHIRLINGTON GATEWAY.
- ② INSTALL ADA COMPLIANT CURB RAMP.
- ③ REPAINT EXISTING CONTINENTAL CROSSWALK MARKINGS.
- ④ REMOVE EXISTING PEDESTRIAN WARNING SIGNS.



Special Note:

SHIRLINGTON ROAD AND THE I-395 EXIT RAMP HAS BEEN RECENTLY REPAVED AND NEW PAVEMENT MARKINGS HAVE BEEN INSTALLED SINCE THE AERIAL IMAGERY WAS TAKEN.

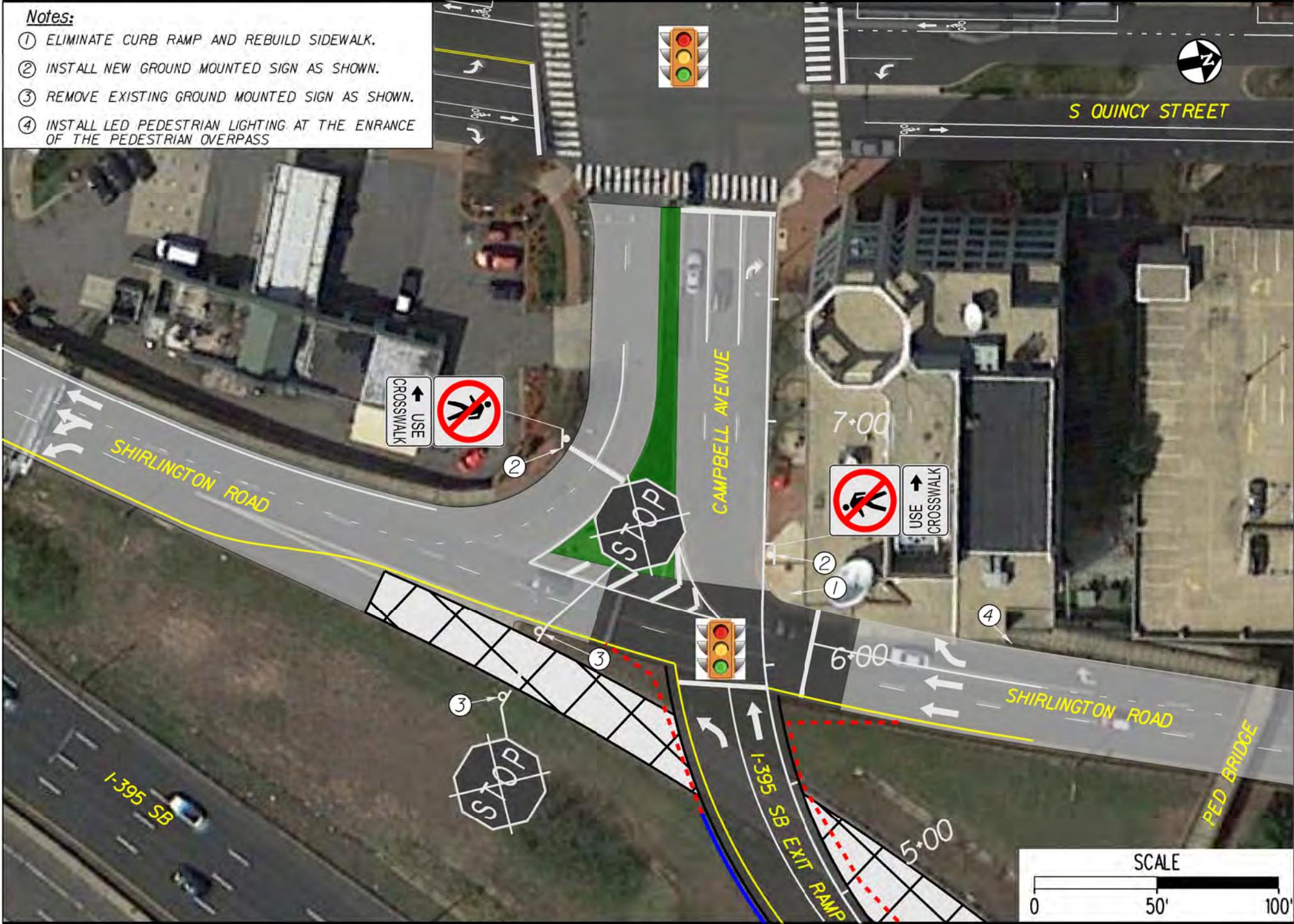
Notes:

- ① REPLACE OVERHEAD 'YIELD TO PEDESTIANS' SIGNS WITH RIO-15 AS SHOWN.
- ② INSTALL NEW GROUND MOUNTED SIGN AS SHOWN.
- ③ REMOVE EXISTING GROUND MOUNTED SIGN AS SHOWN.
- ④ INSTALL ADA COMPLIANT CURB RAMP.
- ⑤ ELIMINATE TWO (2) PARKING SPACES AND EXTEND RIGHT TURN LANE.
- ⑥ REPAINT BIKE LANE LANE LINES TO BE 6 IN.WIDE
- ⑦ REPAINT BIKE LANE SKIP LINES TO BE 6 IN.WIDE, 2 FT.LONG, 4 FT.SKIP.
- ⑧ INSTALL HELMETED BIKE SYMBOL WITH ARROW PER VA MUTCD.
- ⑨ REMOVE DETECTABLE WARNING SURFACE FROM MEDIAN SINCE THE MEDIAN IS ONLY 4 FT.WIDE.



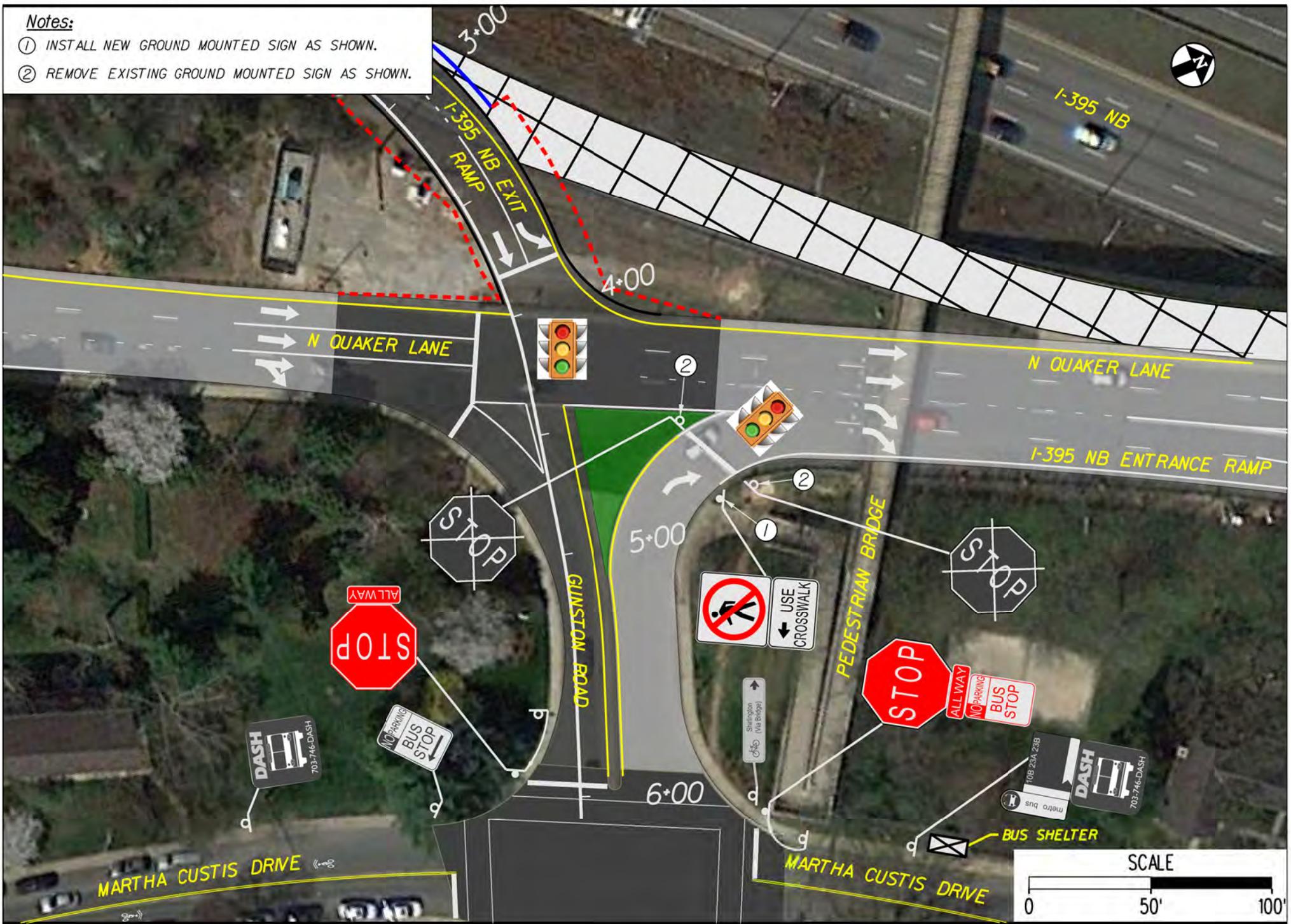
Notes:

- ① ELIMINATE CURB RAMP AND REBUILD SIDEWALK.
- ② INSTALL NEW GROUND MOUNTED SIGN AS SHOWN.
- ③ REMOVE EXISTING GROUND MOUNTED SIGN AS SHOWN.
- ④ INSTALL LED PEDESTRIAN LIGHTING AT THE ENTRANCE OF THE PEDESTRIAN OVERPASS

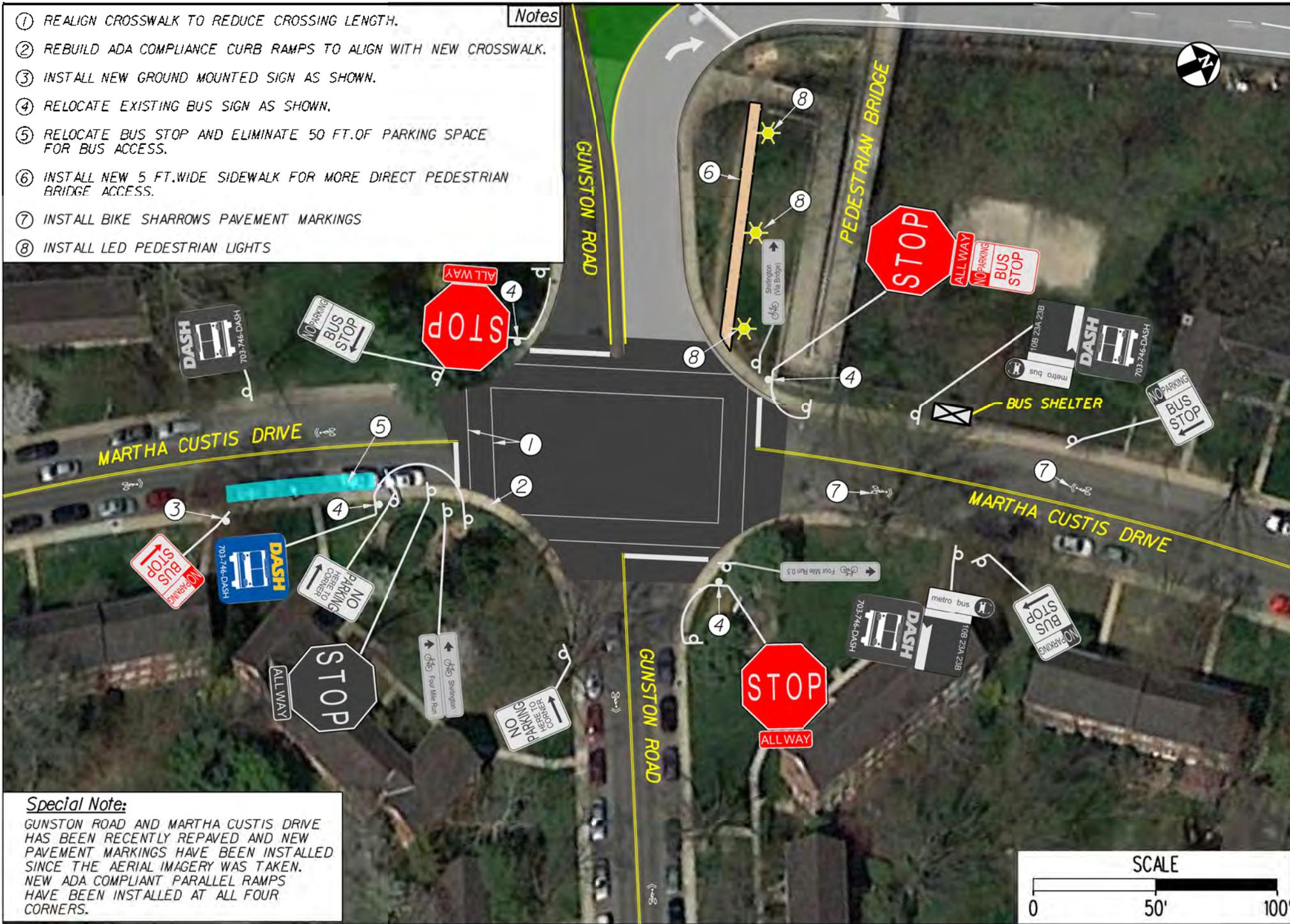


Notes:

- ① INSTALL NEW GROUND MOUNTED SIGN AS SHOWN.
- ② REMOVE EXISTING GROUND MOUNTED SIGN AS SHOWN.



- Notes**
- ① REALIGN CROSSWALK TO REDUCE CROSSING LENGTH.
 - ② REBUILD ADA COMPLIANCE CURB RAMP TO ALIGN WITH NEW CROSSWALK.
 - ③ INSTALL NEW GROUND MOUNTED SIGN AS SHOWN.
 - ④ RELOCATE EXISTING BUS SIGN AS SHOWN.
 - ⑤ RELOCATE BUS STOP AND ELIMINATE 50 FT. OF PARKING SPACE FOR BUS ACCESS.
 - ⑥ INSTALL NEW 5 FT. WIDE SIDEWALK FOR MORE DIRECT PEDESTRIAN BRIDGE ACCESS.
 - ⑦ INSTALL BIKE SHARROWS PAVEMENT MARKINGS
 - ⑧ INSTALL LED PEDESTRIAN LIGHTS



Special Note:

GUNSTON ROAD AND MARTHA CUSTIS DRIVE HAS BEEN RECENTLY REPAVED AND NEW PAVEMENT MARKINGS HAVE BEEN INSTALLED SINCE THE AERIAL IMAGERY WAS TAKEN. NEW ADA COMPLIANT PARALLEL RAMPS HAVE BEEN INSTALLED AT ALL FOUR CORNERS.

APPENDIX D: SUMMARY OF PEDESTRIAN, BICYCLE, AND TRANSIT AMENITIES

Summary of Existing Pedestrian, Bicycle, & Transit Amenities and Deficiencies													
Intersection	Sidewalks?	Marked Crosswalks?	Pedestrian Signals?	Push-buttons?	Signs?	Bike Facilities?	Lighting Provided?	Bus Stops or Routes?	Curb Ramps?	Ramps ADA Complaint?	Pavement Markings in Good Condition?	Signal Equipment Operational?	Bus Access?
	[Legs of Intersection]								[Corner]	[Deficiencies]			
Arlington Mill Drive and Shirlington Road	Yes	Yes	Yes	Yes	Improperly installed W11-2 signs	Four Mile Run Trail north of Arlington Mill Dr	Yes	no bus stops; multiple routes	Yes	Yes, except SE quadrant and east median crossing	Yes, except faded crosswalk on east leg	Yes, except south crossing pushbuttons are not operational	N/A
Cambell Avenue and South Quincy Street	Yes	Yes	Yes	Yes	Yield to Ped signs and bike route signs need updating	Bike lanes Quincy Street	Yes	no bus stops; multiple routes	Yes	Only in NE corner and one ramp in NW corner; SE and SW ramps are not ADA compliant	Yes	Yes	NB RT queues exceed available storage
Campbell Avenue and South Shirlington Road	Yes, on west side of intersection	No	No	No	N/A	No	Yes	no bus stops; multiple routes	One on NW corner to nowhere	No	Yes	N/A for Peds	N/A
Gunston Road and North Quaker Lane	Yes, on east side of Quaker Ln and on Gunston Rd	No	unsignalized	N/A	N/A	No	Yes	no bus stops; multiple routes	No	N/A	Yes	N/A	N/A
Gunston Road and Martha Curtis Drive	Yes	Yes	unsignalized	N/A	stop signs not placed at stop lines	Sharrows on east and south legs	Yes, except SE corner	multiple stops; multiple routes; shelter at SB bus stop	Yes	Yes	Yes	N/A	Parking at NB bus stop

APPENDIX E: MATRIX OF IMPACTS TO PEDESTRIANS, BICYCLES, TRANSIT, AND ACCESS MANAGEMENT

VDOT I-395 & SHIRLINGTON ROAD INTERCHANGE SAFETY & OPERATIONS PHASE II STUDY			
Scenario	Intersection Impacts to Pedestrians	Intersection Impacts to Transit	Access Management
S1: Reduce required weaves; reduce and repurpose existing lanes	<p><u>Gunston Road and N Quaker Lane:</u> -no pedestrian facilities for crossing present or recommended -recommend paving shortcut to pedestrian bridge</p> <p><u>Campbell Avenue and S Shirlington Road:</u> -no pedestrian facilities for crossing present or recommended</p>	-improves merging and weaving for buses accessing I-395 and Shirlington Road	<p><u>N Quaker Lane to Gunston Road</u> - Weaving reduce by one lane change thus reducing the merging movements</p> <p><u>Gunston Road to Northbound I-395</u> - Weaving reduce by one lane change thus reducing the merging movements</p>
S3: Increase Quaker Lane entrance angle	none	-reduces speeds entering N Quaker Lane	none
S7: Add full lane to Arlington Mill Road on-ramp	<p><u>S Arlington Mill Drive and Shirlington Road:</u> -improve ramps on eastern crosswalks to be ADA compliant -restripe eastern crosswalk -close channelized right turn -remove W11-2 pedestrian warning signs</p>	-reduces merging and improves flow	Reduces weaving between I-395 HOV Ramp and exit to Shirlington Road
S12: Signalized T-intersection with North Quaker Lane	<p>NEW <u>Shirlington Road and N Quaker Lane:</u> -no pedestrian facilities for crossing present or recommended -maintain sidewalk on east side of N Quaker Lane</p>	-may increase delays northbound from Shirlington Road to N Quaker Lane and on northbound N Quaker Lane -removes northbound merge	Providing the signal at Rotary and northbound Quaker Lane reduces the merging conflicts and eliminates weaving
S13: Convert I-395 off-ramp to signalized intersection with Gunston Road	<p><u>Gunston Road and Marta Custis Drive:</u> -ideally, provide curb extensions with new ADA-compliant ramps to narrow intersection and reduce crossing distance; however, intersection was recently updated -realign southern crosswalk and rebuild ADA-compliant ramp -relocate stop signs to stop lines on each approach -restrict parking at NB bus stop -install sharrows on north leg for consistency</p> <p><u>Gunston Road and N Quaker Lane:</u> -no pedestrian facilities for crossing present or recommended -recommend paving shortcut to pedestrian bridge</p>	-provides new access point from NB I-395 to Gunston Road -will increase delays at new signal	- Weaving and merging conflicts still exist between the traffic in the rotary and northbound Quaker Lane. - Provides direct access to Ginston Road and Martha Custis Drive
S14: Convert I-395 off-ramp to signalized intersection with Campbell Avenue	<p><u>Campbell Avenue and S Quincy Street:</u> -improve ramps to be ADA compliant -upgrade bicycle pavement markings for NB and SB bike lanes -upgrade bike signage -install R4-4 "Begin Right Turn Lane Yield to Bikes" signs -upgrade existing "Turning Vehicle Yield to Peds" signs -remove detectable warning surface on north median</p> <p><u>Campbell Avenue and S Shirlington Road:</u> -no pedestrian facilities for crossing present or recommended -close existing ramp on NW corner -install signs to direct pedestrians to the crosswal at Quincy St</p>	-provides new access point from SB I-395 to Campbell Avenue -will increase delays at new signal -removes prior merge ont S Shirlington Road	- Provides direct access to Campbell Boulevard and Quinc Street - Weaving and merging conflicts still exist between the traffic in the rotary and southbound Shirlington Road. - installation of a signal will reduce the merging conflicts from Campbell Blvd traffic and southbound rotary traffic.
G1: Reduce I-395 off-ramp to a single lane	none	-improves merge from S Glebe Rd exit -may slow traffic exiting from I-395	- Reduces the merging conflict from Glebe Road to southbound I-395
G2: Shift two-lane I-395 off-ramp and reduce right shoulder width to two feet	none	-little to no impact to transit	- no changes from existing conditions