

ALTERNATIVES TECHNICAL MEMORANDUM

for

**Soapstone Connector
Environmental Assessment**

Fairfax County Project No. 2G40-078

March 31, 2017

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SECTION 1

INTRODUCTION AND BACKGROUND

1.1 INTRODUCTION

The Fairfax County Department of Transportation (FCDOT), in cooperation with the Virginia Department of Transportation (VDOT) and the Federal Highway Administration (FHWA), is preparing an Environmental Assessment (EA) for the Soapstone Connector. The Soapstone Connector is a new roadway, approximately one-half mile long between Sunrise Valley Drive and Sunset Hills Road, in Fairfax County (Reston), Virginia.

The Council on Environmental Quality's (CEQ) implementing regulations for the National Environmental Policy Act (NEPA) require that a reasonable range of alternatives be explored and evaluated. According to FHWA Technical Advisory T 6640.8A, an EA may be prepared for one or more build alternatives, in comparison to a no action alternative. This *Alternatives Technical Memorandum* documents the process and describes the criteria that were used to develop and screen alternatives for the Soapstone Connector. The memorandum includes discussion of alternatives that were dropped from consideration, as well as a description of potential alternatives to be carried forward for detailed evaluation. Previous studies are also summarized.

As a result of the screening process, two build alternatives are being carried forward for detailed evaluation in the EA. These alternatives represent a set of improvements that form a stand-alone solution to the identified needs within the study limits. The two build alternatives vary only in the portion north of the Dulles Toll Road, as described further in Section 4.

The no action or No Build Alternative is also retained for detailed study in accordance with NEPA to serve as a baseline for comparison to the build alternatives.

1.2 STUDY AREA

The project is located just west of the new Wiehle-Reston East Metrorail Station and would include a new crossing over the Dulles Corridor, which includes VA Route 267 (Dulles Toll Road), the Dulles International Airport Access Highway (DIAAH), and the Silver Line of the Metrorail system, as shown in **Figure 1-1**.

The current roadway network in the study area includes two crossings of the Dulles Corridor on either side of the Wiehle-Reston East Metrorail Station, at Reston Parkway (Route 602) to the west and Wiehle Avenue (Route 828) to the east. Direct access to the rail station, which opened in July 2014, is provided by way of Wiehle Avenue. Sunrise Valley Drive and Sunset Hills Road serve east-west travel to the south and north of the Dulles Corridor, respectively. The traffic analysis area for the study encompasses Reston Parkway, Wiehle Avenue, Sunrise Valley Drive, and Sunset Hills Road.

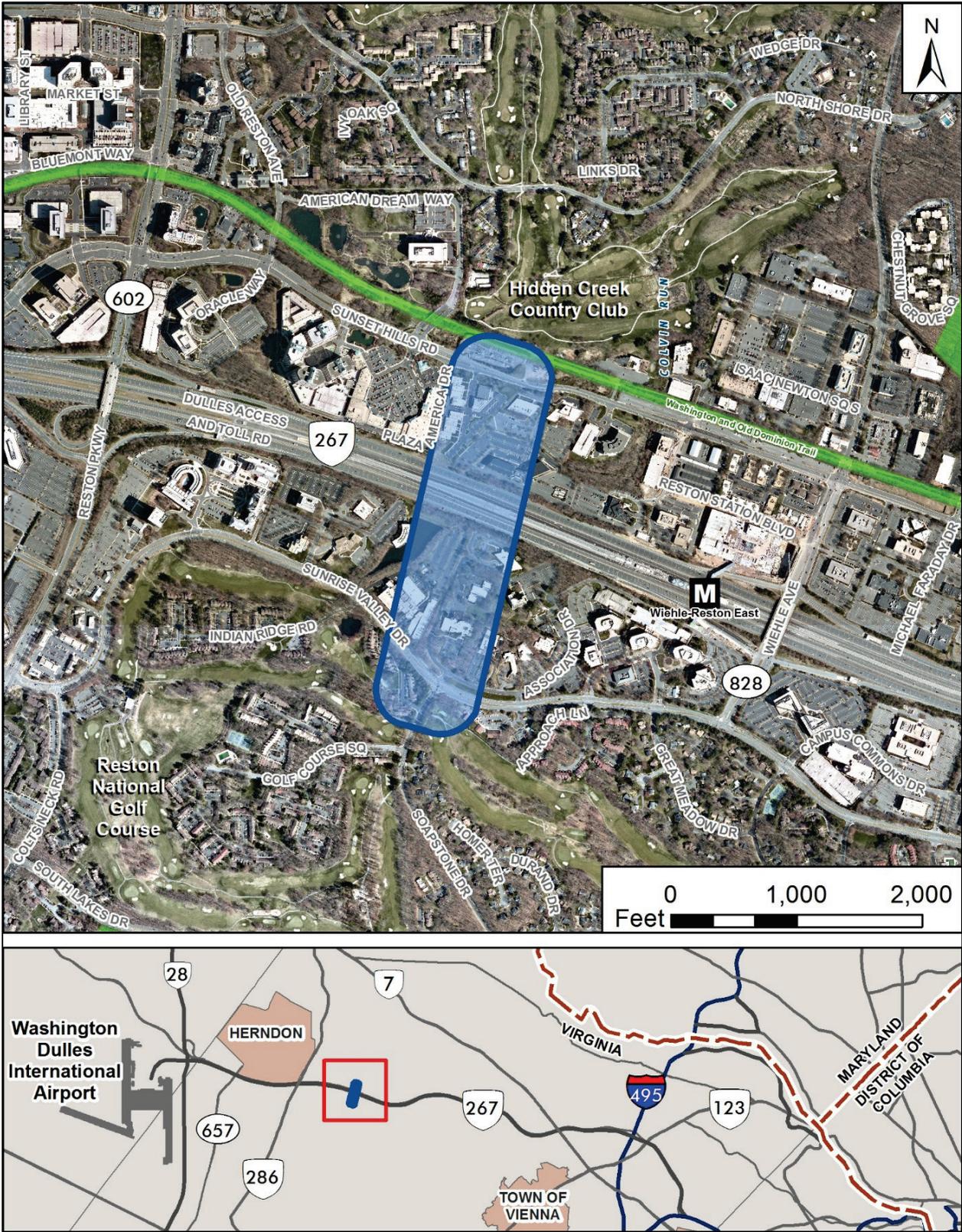


Figure 1-1. Project Location Map

1.3 PROJECT HISTORY

The process of developing alternatives to address the transportation needs in the vicinity of the Wiehle-Reston East Metrorail Station has been ongoing for several years and has been documented in two studies: the *Wiehle Avenue/Reston Parkway Station Access Management Plans* (April 2008) and the *Soapstone Connector Feasibility Study* (November 2013). The planning efforts and the resulting recommendations from the two previous studies are described below (note that all figures referenced in the descriptions are contained in **Appendix A**).

1.3.1 Wiehle Avenue/Reston Parkway Station Access Management Plans (2008)¹

The Dulles Corridor Metrorail Project is a 23-mile extension of Washington's existing Metrorail system in Virginia, which is being built in two phases by the Metropolitan Washington Airports Authority (MWAA). Known as the Silver Line, the new line would extend from the East Falls Church Metrorail Station through Tysons Corner and Reston in Fairfax County, west to Washington Dulles International Airport and Ashburn in eastern Loudoun County. Fairfax County recognized the need for detailed analyses to determine the necessary improvements to support access to and from the rail stations proposed for the Reston area at Reston Parkway and Wiehle Avenue. Accordingly, the County, with the help of the Reston Metrorail Access Group (RMAG) appointed by Supervisor Cathy Hudgins of the Fairfax County Hunter Mill District, initiated the *Wiehle Avenue/Reston Parkway Station Access Management Plans*. The intent of the study was to consider the current status and future needs in the vicinity of the two stations to provide pedestrian and bicycle access, to provide effective bus feeder service, and to manage the traffic projected in the area of the stations. The Soapstone Connector, which would extend between Sunrise Valley Drive and Sunset Hills Road, was identified as a recommended roadway project and incorporated into the management plans. At the conclusion of the study, recommendations were divided into three groups based on date of implementation; the Soapstone Connector was included in the first group that would be required at the opening of the Wiehle Avenue station.

The report stated that the Soapstone Connector would improve traffic operations on Wiehle Avenue and enhance multimodal access to the Wiehle-Reston East Metrorail Station. Although this planning study did not include any detailed engineering analyses, an alignment for the Soapstone Connector from Sunrise Valley Drive to Sunset Hills Road was developed for consideration. The study area and alignment are shown in **Figure A-1**, with a close-up provided in **Figure A-2**.

1.3.2 Soapstone Connector Feasibility Study (2013)²

Fairfax County sponsored this follow-on study to assess the engineering feasibility of the Soapstone Connector, a multimodal roadway that would provide a connection for motorists, pedestrians and bicyclists, and transit vehicles between Sunrise Valley Drive and Sunset Hills Road. The following objectives were established for the study: identify multiple alternative alignments, conduct a high-level screening of those alignments, and identify the most promising alignment(s) for the Soapstone Connector. In total, 30 alternatives were identified and screened.

¹ The 2008 study can be found here: http://www.fairfaxcounty.gov/fcdot/pdf/wr_sam/sam_report.pdf.

² The 2013 study can be found here: http://www.fairfaxcounty.gov/fcdot/pdf/soapstone_connector_study.pdf.

From these alternatives, five were selected to be advanced as they represented the most promising alignments:

- **Alternative 1C.** Among the five alternatives evaluated, the southern terminus of this alternative is closest to the Sunrise Valley Drive / Wiehle Avenue intersection (see **Figure A-3**). The alignment runs along portions of Commerce Park Drive and Association Drive. North of the Dulles Toll Road, the alignment runs roughly along the property boundary between the Kaiser Permanente property (1890 Metro Center Drive) and the property with the large office building at 11493 Sunset Hills Road. After bridging a floodplain, this alignment goes through the existing multi-level parking structure for the building at 11487 Sunset Hills Road. From a connectivity perspective, the extension of Reston Station Boulevard would provide a direct connection to the kiss-and-ride area, the parking garage for the Metrorail station, and future development in the vicinity of the station.
- **Alternative 3D.** This alternative features a fairly straight connection between Sunset Hills Road north of the Dulles Toll Road and Sunrise Valley Drive at Soapstone Drive, south of the Dulles Toll Road (see **Figure A-4**). This alternative aligns directly with Soapstone Drive at Sunrise Valley Drive. To minimize the impact on existing structures, it would take a curvilinear path through the parcels fronting Association Drive. North of the Dulles Toll Road, the alignment runs roughly along the property boundary between the Kaiser Permanente property (1890 Metro Center Drive) and the property with the large office building at 11493 Sunset Hills Road. After bridging a floodplain, this alignment goes through the existing multi-level parking structure for the building at 11487 Sunset Hills Road.
- **Alternative 4D.** This alignment connects directly with Soapstone Drive at its southern terminus on Sunrise Valley Drive (see **Figure A-5**). The alternative is shown to go through the building and traverse a good portion of the property owned by the National Association of Secondary School Principals (1904 Association Drive). The alignment traverses a short section of Association Drive and then a larger portion of the surface parking and the property owned by BDC Sunrise Valley LLC (11600 Sunrise Valley Drive). North of the Dulles Toll Road, the alignment traverses surface parking areas for the property currently owned by iSTAR CTL Sunset Hills – Reston, LLC (11493 Sunset Hills Road), the Spectra 4 LLC property (11495 Sunset Hills Road), the property owned by Musica LLC (11501 Sunset Hills Road), and the property owned by Solus LLC (11505 Sunset Hills Road). This alternative is in close proximity to a “gas valve pad” for the Transcontinental Gas Pipeline Corporation. It would be costly to relocate the valve pad; therefore, the alignment shifts to the west to avoid it. Unlike the two previous alternatives, Alternative 4D would not traverse the floodplain or the resource protection area north of the Dulles Toll Road.
- **Alternative 5C.** This alternative features a southern terminus that is approximately 350 feet west of the intersection of Sunrise Valley Drive and Soapstone Drive (see **Figure A-6**). South of the Dulles Toll Road, the alignment generally runs along the boundary between the property owned by BDC Sunrise Valley LLC (11600 Sunrise Valley Drive) and the western segment of Association Drive. The alignment is shown to run adjacent to the existing parking garage for 11600 Sunrise Valley Drive and then run through the northern portion of the BDC Sunrise Valley LLC property. North of the Dulles Toll Road, the alignment would cross the paved surface parking area in the southwest corner of the property owned by iSTAR CTL Sunset Hills – Reston LLC. The alignment through this parcel would avoid the existing office building at 11493 Sunset Hills Road. Continuing north, the alignment then traverses a portion of the paved parking area for the property owned by Solus, LLC (11505 Sunset Hills Road). The alignment

is shown going through the building owned by Musica, LLC (11501 Sunset Hills Road). The alignment also traverses the easement of the Transcontinental Gas Pipeline Corporation.

- **Alternative 6E.** The southern terminus of this alternative is the farthest west of the five evaluated alternatives (see **Figure A-7**). This terminus, located on Sunrise Valley Drive, is also the furthest from Wiehle Avenue and the Wiehle-Reston East Metrorail Station. From the southern end, the alignment proceeds through the property owned by BDC Sunrise Valley LLC (11600 Sunrise Valley Drive), west of the existing office building along the circulation road. It runs parallel and adjacent to the existing stormwater management pond along the western side of this property. North of the Dulles Toll Road, the alignment traverses a portion of the existing paved surface parking area for the property owned by iSTAR CTL Sunset Hills – Reston LLC (11493 Sunset Hills Road), just east of the easement for the Transcontinental Gas Pipeline Corporation. This alignment then runs east of the existing building through the property owned by Musica LLC (11501 Sunset Hills Road) and just west of the valve field for the pipeline. The alignment traverses a small portion of the northern area of the parcel owned by Solus LLC (11505 Sunset Hills Road).

From these alternatives, a “hybrid” alternative was identified and recommended for further study. The alternative featured an alignment that combined Alternative 5C north of the Dulles Corridor with Alternative 4D south of the Dulles Corridor (see **Figure A-8**).

1.3.3 Amendment to the Fairfax County Comprehensive Plan (2014)

Following the completion of the 2013 Feasibility Study, on February 11, 2014, the Soapstone Connector was included as a recommended roadway network improvement in the Reston Transit Station Areas Comprehensive Plan Amendment to the Fairfax County Comprehensive Plan.³

³ Amendment No. 2013-05, adopted February 11, 2014 by the Fairfax County Board of Supervisors, replaced the following: Fairfax County Comprehensive Plan, 2013 Edition, Area III, Upper Potomac Planning District as amended through 12-3-2013, Reston-Herndon Suburban Center and Transit Station Areas, pages 28-80.

SECTION 2

ALTERNATIVES DEVELOPMENT AND SCREENING PROCESS

2.1 ALTERNATIVES DEVELOPMENT AND SCREENING PROCESS

The alternatives development process began with the identification of the preliminary purpose and need established in the previous studies described in Section 1.3. Additionally, agency and public scoping was initiated early to solicit input in the development of alternatives, which included consultation with VDOT and FHWA. Based on the identified purpose and need, input received during scoping, and data obtained from the aforementioned reference documents, a reasonable range of alternatives for study were identified. **Figure 2-1** illustrates the step-by-step process that was used to identify, develop, and screen alternatives. Each of these steps is detailed in the remainder of this section.

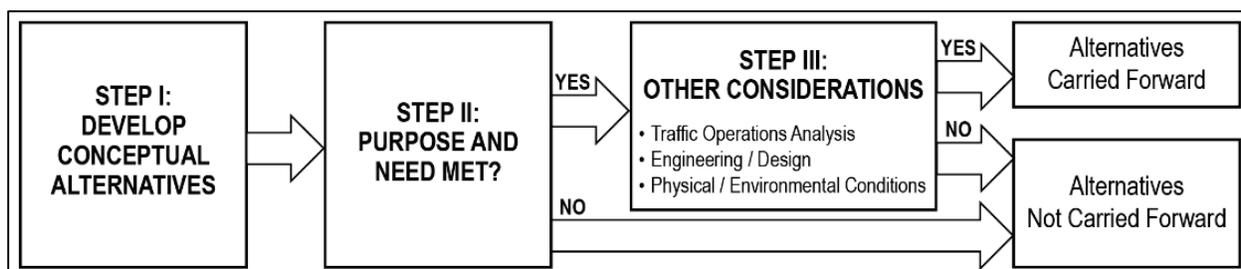


Figure 2-1. Alternatives Screening Process

Alternatives that would not address the stated purpose and need or were dismissed due to other considerations during the screening process are described in Section 2.5. The No Build Alternative is described in Section 3, and the Build Alternatives that emerged from the screening process and were carried forward for further consideration in the EA are described in Section 4.

2.2 STEP I. DEVELOP CONCEPTUAL ALTERNATIVES

2.2.1 Review Previous Studies

Initially, the *Wiehle Avenue/Reston Parkway Station Access Management Plans* (April 2008) and the *Soapstone Connector Feasibility Study* (November 2013) were reviewed in order to gain an understanding of the range of alternatives that were examined for the Soapstone Connector. Those alternatives that were dropped from consideration during the 2013 study are described in Section 2.5.1 for reference; these concepts were reviewed as part of this study and the reasons for their dismissal reaffirmed. The “hybrid” alternative that was advanced from the 2013 study has been carried forward, and traffic forecasts have been updated to design year 2046⁴ to reaffirm the need for the new roadway, as described in Section 2.4.1.

⁴ The analysis in the 2013 *Soapstone Connector Feasibility Study* was based on traffic volumes forecasted for 2035. For the purposes of the EA, the design year was advanced to 2046 given the time that has elapsed since the previous study and the projected schedule for project completion (note that design year is typically the ad date plus 22 years).

2.2.2 Coordination Following Previous Studies

Subsequent to the completion of the November 2013 *Soapstone Connector Feasibility Study*, an additional alignment north of the Dulles Toll Road was developed. This alignment was presented to FCDOT by Linden Development Partners, LLC, the agent for the land owners of Triangle Park, which includes Musica, LLC and Solus, LLC, located at 11501 and 11505 Sunset Hills Road, respectively. The additional alignment would shift the Soapstone Connector north of the Dulles Toll Road to the east, minimizing the impact of the selected “hybrid” alternative on the structures within Triangle Park. This alignment would add impacts, however, to two additional properties (11493 Sunset Hills Road, identified as iStar CTL Sunset Hills – Reston, LLC in the Feasibility Study, and 11495 Sunset Hills Road, identified as Spectra 4, LLC in the Feasibility Study). Linden Development requested that their alignment be included in the EA, even though the engineering feasibility of such an alignment had not been previously studied by FCDOT.

Ultimately, FCDOT determined that the EA would include both the Board of Supervisors’ approved alignment, identified as the “hybrid” alternative in the Feasibility Study, and Linden Development’s additional alignment north of Dulles Toll Road. The two alignments are being studied separately in the environmental documentation (see Section 4); however, as they are functionally equivalent for the purposes of the traffic analysis, only one build scenario traffic forecast was developed, as described in Section 2.4.1.

2.2.3 Agency and Public Scoping for EA

A Public Scoping Meeting was held for the public and scoping letters were mailed to federal, state, and local agencies to afford an opportunity to provide suggestions on the proposed project and the scope of issues to be addressed in the EA.⁵ Input was solicited on the **purpose and need** (confirming the transportation problem(s) to be solved); **alternatives** (suggestions for additional improvement concepts); and **environment** (reporting natural, cultural, and human environment considerations). During the scoping process, it was made clear that traffic operations is a widespread concern in the study area, especially with respect to congestion along Wiehle Avenue and Reston Parkway. In addition, the potential impact of the Soapstone Connector on traffic volumes on Soapstone Drive south of the study area was also expressed by several citizens as a traffic concern. Numerous comments were also received relating to safety for pedestrians and bicyclists and connectivity to existing sidewalks, trails, and bike facilities, as well as environmental concerns such as impacts to air, noise, and parks/recreation and public facilities in the study area.

2.3 STEP II. PURPOSE AND NEED ADDRESSED?

The 2008 and 2013 studies referenced above formed the basis of the purpose and need for the Soapstone Connector, and additional studies have been completed as part of the EA to reaffirm what was identified in those studies. As described in the next section, traffic studies included the development of 2046 travel demand forecasts and the operational analysis of existing and future no build and build conditions. The updated traffic analyses have confirmed the deficiencies in traffic level of service due to volumes exceeding available capacity on Wiehle Avenue and reaffirmed the need to provide additional north-south capacity in the study area.

⁵ A Public Scoping Meeting was held in Reston on October 26, 2015 (see *Summary of Public Scoping Meeting and Comments* for full details). Scoping letters were also sent to agencies in October 2015 (see *Agency Scoping Summary* for full details).

Based on the existing and future needs that have been identified, the purpose of the proposed project is to:

- **Reduce congestion** and travel delay at intersections along Wiehle Avenue and within the traffic analysis area.
- **Improve multimodal connectivity** to the Wiehle-Reston East Metrorail Station.
- **Improve accessibility and mobility** to and within the area surrounding the Wiehle-Reston East Metrorail Station.

2.4 STEP III. OTHER CONSIDERATIONS

2.4.1 Traffic Operations Analysis

The current roadway network in the study area includes two crossings of the Dulles Corridor on either side of the Wiehle-Reston East Metrorail Station, at Reston Parkway (Route 602) to the west and Wiehle Avenue (Route 828) to the east. Direct access to the Metrorail station, which opened in July 2014, is provided by way of Wiehle Avenue. Traffic traveling within the study area, traveling to and from the Metrorail station, and entering and exiting the Dulles Toll Road all compete for the same road space on these two roadways. Sunrise Valley Drive and Sunset Hills Road serve east-west travel to the south and north of the Dulles Corridor, respectively.

The traffic analysis area encompasses Reston Parkway, Wiehle Avenue, Sunrise Valley Drive, and Sunset Hills Road. Within this area, which lies within the Wiehle-Reston East Transit Station Area (TSA), intersection level of service (LOS) ⁶ E or better is assumed to be acceptable. As described in the Memorandum of Understanding (MOU) between VDOT and Fairfax County regarding the LOS standard for multimodal mixed use areas, LOS E has been established as the standard in order to balance the mobility needs of bicyclists, pedestrians, transit users, and vehicles. This approach aims to minimize the width of roadways in order to maintain a walkable environment and support the implementation of the grid of streets, which is typical of urban areas and improves mobility for all modes of transportation.

Existing levels of service and associated delay times at intersections within the traffic analysis area are presented in **Table 2-1**.

Table 2-1. Intersection Operations – 2015 Existing Conditions

Intersection No.	Intersection Name	AM Peak Hour		PM Peak Hour	
		Delay (sec)	LOS	Delay (sec)	LOS
1	Sunset Hills Rd at Reston Parkway	63.2	E	57.6	E
2	Sunset Hills Rd at Oracle Way & Old Reston Ave	27.3	C	27.6	C
3	Sunset Hills Rd at Plaza America Dr	5.5	A	11.8	B
4	Sunset Hills Rd at American Dream Way	23.1	C	33.2	C
5	Sunset Hills Rd at Isaac Newton Sq & Metro Ctr Dr	17.0	B	28.8	C
6	Wiehle Ave at Sunset Hills Road	43.7	D	58.4	E
7	Wiehle Ave at Reston Station Blvd	19.4	B	32.0	C
8	Wiehle Ave at WB DTR Ramps	20.0	C	20.8	C
9	Wiehle Ave EB DTR Ramps	29.4	C	19.4	B
10	Wiehle Avenue at Sunrise Valley Drive	50.4	D	50.6	D

⁶ Level of service (LOS) provides a comparative measure of the traffic performance of roads and intersections through a letter grading from A (best) to F (worst).

Intersection No.	Intersection Name	AM Peak Hour		PM Peak Hour	
		Delay (sec)	LOS	Delay (sec)	LOS
11	Sunrise Valley Dr at Soapstone Dr	18.4	B	16.6	B
12	Sunrise Valley Drive at Sheraton Plaza	9.7	A	11.3	B
13	Sunrise Valley Dr at Colts Neck Road	26.0	C	11.1	B
14	Sunrise Valley Drive at Reston Pkwy	66.0	E	82.0	F

As shown in the table, the two Reston Parkway intersections in the traffic analysis study area operate at LOS E or worse during both peak hours under existing conditions, with average delay ranging from 60 to 80 seconds. The Wiehle Avenue intersections with Sunset Hills Road and Sunrise Valley Drive operate at LOS D or worse, with delay ranging from 40 to 60 seconds. Congestion at these intersections acts as a constraint to traffic mobility within the area surrounding the station.

Future year (2046) traffic forecasts were developed for this study to support comparative analyses between the No Build and Build Alternatives. The forecasts were based on project-specific modeling based on the framework of the Metropolitan Washington Council of Governments' (MWCOG) regional travel demand model. The project-specific modeling included the development of a sketch-level⁷ travel demand model focused on the study area. Since the primary purpose of the model was to identify changes in traffic patterns based on the construction of the proposed Soapstone Connector, the two primary inputs to the sketch-level modeling was the roadway network (coded with both No Build and Build conditions) and vehicle trip tables.

As shown in **Table 2-2**, levels of service at the four aforementioned intersections will deteriorate by 2046 under the No Build condition. Operations will worsen by 2046 at these four intersections under the Build condition as well, albeit to a lesser extent with the construction of the Soapstone Connector.

An element of the purpose of the Soapstone Connector project is to reduce traffic congestion and delay along Wiehle Avenue and within the traffic analysis area. The results shown in Table 2-2 allow for the assessment of the project's effect on numerous intersections within the defined project area and allow for a comparison between the 2046 No Build and Build conditions in the NEPA document to support decision-making regarding the Soapstone Connector. As shown in the table, delays at intersections #6 through #10 on Wiehle Avenue (shown in bold font), are anticipated to be lower in the Build condition with the addition of the Soapstone Connector (compared to the No Build condition).

⁷ The model is considered sketch-level as it includes primarily just the traffic assignment step of the traditional four-step model process.

Table 2-2. Intersection Operations – 2046 No Build and Build Conditions

Intersection No.	Intersection Name	2046 No Build Conditions				2046 Build Conditions			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	Reston Pkwy at Sunset Hills Rd	86.9	F	103.4	F	82.7	F	93.2	F
2	Sunset Hills Rd at Oracle Way & Old Reston Ave	41.7	D	50.0	D	63.7	E	41.3	D
3	Sunset Hills Rd at Plaza America Dr	5.6	A	12.4	B	6.5	A	12.7	B
4	Sunset Hills Rd at American Dream Way	25.3	C	41.8	D	25.2	C	52.9	D
NEW	Sunset Hills Rd at Soapstone Connector	-	-	-	-	28.5	C	20.9	C
5	Sunset Hills Rd at Isaac Newton Sq & Metro Ctr Dr	116.5	F	191.3	F	53.9	D	97.6	F
6	Wiehle Ave at Sunset Hills Road	79.2	E	101.3	F	64.2	E	75.7	E
7	Wiehle Ave at Reston Station Blvd	30.5	C	74.8	E	24.5	C	46.9	E
8	Wiehle Ave at WB DTR Ramps	29.3	C	41.2	D	22.9	C	50.9	D
9	Wiehle Ave EB DTR Ramps	39.5	D	22.7	C	26.1	C	22.4	C
10	Wiehle Avenue at Sunrise Valley Drive	62.6	E	65.1	E	39.6	D	46.4	D
11	Sunrise Valley Dr at Soapstone Dr	26.6	C	29.0	C	83.5	F	88.0	F
12	Sunrise Valley Drive at Sheraton Plaza	3.9	A	8.8	A	6.3	A	8.6	A
13	Sunrise Valley Dr at Colts Neck Road	46.0	D	30.7	C	33.1	C	25.8	C
14	Sunrise Valley Drive at Reston Pkwy	105.6	F	144.7	F	95.1	F	123.4	F

Overall, it can be expected that once the Soapstone Connector is in place, travel patterns and route choice will change within the study area, and volumes are likely to fluctuate for a short period of time. Once equilibrium in the system is reached, further studies may be required and localized improvements implemented to improve traffic operations and levels of service at some of these locations. Extension of turn bays or provision of turn lanes may result in increases in pavement at intersections; depending on final design, these may require minor amounts of additional right of way.

Additional information about the traffic forecasting and analysis completed for the Soapstone Connector can be found in the *Traffic Technical Memorandum*.

2.4.2 Engineering/Design and Physical/Environmental Considerations

In the 2013 *Soapstone Connector Feasibility Study*, a wide array of alignments was developed to connect Sunrise Valley Drive and Sunset Hills Road, west of the Wiehle-Reston East Metrorail Station. In total, 30 alternative alignments were identified and screened, taking multiple factors into consideration such as engineering, right of way/displacements, traffic/transportation, and the environment. The most promising five alignments from the initial screening were then developed further and evaluated once again. This second screening included engineering feasibility, Type, Size and Location (TS&L) analysis, environmental features, traffic analysis, pedestrian and bicycle assessment, land use assessment, and cost estimates. The evaluation summary of engineering factors is shown in **Table 2-3** and the evaluation summary of environmental resources is shown in **Table 2-4**.

Table 2-3. Evaluation Summary of Engineering Factors from 2013 Soapstone Connector Feasibility Study

Alternative	Length of Road (mi)	Number of Bridges	Area of Bridge over DTR (1,000 sf)	Area of Bridge over floodplain (1,000 sf)	Area over Pipeline (1,000 sf)	Length of 8% grade (lineal ft)	Total Length with grade greater than 6 % (lineal ft)	Number of Properties within the 100 ft wide Soapstone Connector Right of Way	Number (Size) of Existing Buildings Demolished (each (1,000 sf))	Number of Parking Garages Demolished
Alt 1C	0.52	2	30.8	20.7	0.0	590	590	14	0	1**
Alt 3D	0.54	2	29.4	20.7	0.0	605	605	9	0	1**
Alt 4D	0.51	1	29.4	0.0	25.4	270	270	7	1 (36K)***	0
Alt 5C	0.46	1	29.9	0.0	21.3	0	215	8	1 (33K)****	0
Alt 6E*	0.45	1	29.8	0.0	25.4	300	300	5	0	0

*Also impacts 755 lin ft of stormwater management pond.

**Parking Structure for BAE Building

***National Association of Secondary School Principals Building

****The Musica LLC Building

Table 2-4. Evaluation Summary of Environmental Resources from 2013 Soapstone Connector Feasibility Study

Evaluation Criteria	Alternatives					
	No Build	Alt. 1C	Alt. 3D	Alt 4D	Alt. 5C	Alt. 6E
Residential Displacements (# Buildings)	0	0	0	0	0	0
Commercial Displacements (# Buildings)	0	0	0	0	0	0
Industrial Displacements (# Buildings)	0	0	0	1	1	0
Parking Structure Displacements (# Buildings)	0	1	1	0	0	0
Parking Lot Displacements (Acres)	0	1.2	1.1	2.5	1.4	1.9
Parks and Recreation Areas (# Properties)	0	0	0	0	0	0
Impacts to Known Historic or Archeological Sites	None	W&OD Historic District NRHP Eligible	W&OD Historic District NRHP Eligible	W&OD Historic District NRHP Eligible	W&OD Historic District NRHP Eligible	W&OD Historic District NRHP Eligible
Impacts to Known Historic or Archeological Sites (Area)	0	0.4 acres	0.4 acres	0.2 acres	0.2 acres	0.2 acres
Section 4(f) Impacts* *Only applicable if Federal funds used	None	0.4 acres W&OD Historic District	0.4 acres W&OD Historic District	0.2 acres W&OD Historic District	0.2 acres W&OD Historic District	0.2 acres W&OD Historic District
Hazardous Materials Sites	None Disturbed	1 (Registered Petroleum Facility)	0	25,373 sf Transcontinental Gas Pipeline easement	21,293 sf Transcontinental Gas Pipeline easement	25,373 sf Transcontinental Gas Pipeline easement

Source: Michael Baker Jr., Inc.

2.5 ALTERNATIVES NOT CARRIED FORWARD FOR DETAILED STUDY

2.5.1 Alternatives Considered but Dismissed in 2013 Feasibility Study

At the conclusion of the second screening in the 2013 study, none of the five alternatives carried forward emerged as being superior compared to the other alternatives. As shown in Tables 2-3 and 2-4, the potential impacts of each of the five alternatives are similar. Below is a synopsis of the impacts that distinguished each of the alternatives and the main reasons for their dismissal.

- *Alternative 1C.* This alternative would require a second bridge to traverse the floodplain north of the Dulles Corridor and it would require the demolition of an existing multi-level parking garage. It also had poorer network performance metrics compared to other alternatives.
- *Alternative 3D.* This alternative would require a second bridge to traverse the floodplain north of the Dulles Corridor and it would require the demolition of an existing multi-level parking garage.

- *Alternative 4D.* This alternative would traverse the Transcontinental Gas Pipeline Corporation's easement and need to cross over the pipeline, which would require additional mitigation. It would also require the acquisition of the entire property and require the demolition of a 36,000 square foot (sf) office building currently owned by the National Association of Secondary School Principals.
- *Alternative 5C.* This alternative would traverse the Transcontinental Gas Pipeline Corporation's easement and need to cross over the pipeline, which would require additional mitigation. It would also require the acquisition of the entire property and the demolition of the existing 33,000 sf Musica LLC office building.
- *Alternative 6E.* This alternative would traverse the Transcontinental Gas Pipeline Corporation's easement and need to cross over the pipeline, which would require additional mitigation. It would also require additional mitigation since the alignment runs parallel and adjacent to an existing stormwater retention pond. This alignment also had poorer network performance metrics compared to other alternatives.

2.5.2 Alternatives Considered but Dismissed in 2008 Station Access Management Plans Study

The Transportation System Management (TSM) Alternative was considered in the 2008 *Wiehle Avenue/Reston Parkway Station Access Management Plans* study but not carried forward for detailed consideration in the EA due to its inability to address the project purpose and need, as described further below:

Transportation System Management (TSM) Alternative. TSM generally includes implementation of relatively low-cost actions to improve the efficiency of existing transportation systems. Some examples include traffic controls, signal synchronization, turn lanes, parking management, access management, operational modifications, flexible work hours, vanpools, transit scheduling, bicycle and pedestrian improvements, and modifying driver behavior with incentives, pricing, or restrictions. Such actions were identified in the 2008 *Wiehle Avenue/Reston Parkway Station Access Management Plans* study:

Congestion and safety for all modes of transportation will be major issues in Reston for 2030 unless a set of comprehensive actions are implemented to accommodate the projected growth in travel demand. This report details an array of strategies and projects that can be used to improve conditions for all travelers, residents and employees in Reston. Increased roadway capacity, travel demand management (TDM) strategies, additions to the network of pedestrian paths, and spot safety improvements are all represented in these recommendations.

As indicated in Section 1.3.1, at the conclusion of the study, recommendations in all of the categories were divided into three groups based on date of implementation. The Soapstone Connector was included in the first group that would be required at the opening of the Wiehle Avenue station. It was concluded that the other actions identified in the study would likely be implemented as needs arise and funding becomes available. Individually, the TSM-type improvements would not meet the identified needs for this study, i.e., to reduce traffic congestion on Wiehle Avenue and to increase multimodal connectivity and accessibility to the Wiehle-Reston East Metrorail Station. Accordingly, this alternative as a stand-alone solution was eliminated from further study in the EA.

SECTION 3

NO BUILD ALTERNATIVE

3.1 ELEMENTS OF NO BUILD ALTERNATIVE

Included for evaluation in accordance with 23 CFR §1502.14(d), the no action or No Build condition serves as a baseline for comparison against build alternatives. The No Build Alternative assumes that the Soapstone Connector would not be constructed. The transportation network would include existing roads and projects within the study area that are programmed in the National Capital Region's 2015 Financially Constrained Long-Range Transportation Plans (CLRP), adopted by the Transportation Planning Board (TPB) in October 2015. Projects included in VDOT's Six-Year Improvement Program (SYIP) are also assumed to be completed. The following projects were included in the No Build Alternative:

- Dulles Airport Access Road – Widen from 4 to 6 lanes from Dulles Airport to VA 123
- VA 286 Fairfax County Pkwy HOV – Convert from 6 to 4+2 from Dulles Toll Road to Sunrise Valley Drive
- VA 286 Fairfax County Pkwy HOV – Widen from 4 to 4+2 from Sunrise Valley Drive to West Ox Road
- Collector-Distributor Rd EB – New 2 lane road from Wiehle Avenue to Spring Hill Road
- Collector-Distributor Rd WB – New 2 lane road from Spring Hill Road to Wiehle Avenue
- East Elden Street – Widen from 4 to 6 lanes from Monroe Street to Fairfax County Parkway
- Spring Street – Widen from 4 to 6 lanes from Herndon Parkway to Fairfax County Parkway
- Route 602 Reston Pkwy – Widen from 4 to 6 lanes from Sunrise Valley Drive to Baron Cameron Avenue

3.2 ABILITY TO MEET NEEDS

Traffic Congestion. The burden on the transportation network in the study area is expected to increase substantially by 2046 with the completion of Phase 2 of the Dulles Corridor Metrorail Project⁸ and changes in land use in the areas surrounding the Wiehle-Reston East and future Reston Town Center Metrorail Stations. As more people will find these areas highly desirable as residential and commercial locations, density of both residences and offices is likely to increase in the areas closest to the stations. In addition, as the whole region (and particularly Loudoun County) continues to grow, travel through the Reston area is also projected to increase. By 2046, the existing transportation network will not be able to accommodate the projected peak hour demand for vehicular travel within the traffic analysis area. The increased volume of traffic would result

⁸ The Dulles Corridor Metrorail Project is a 23-mile extension of Washington's existing Metrorail System, which is being built in two phases by the Metropolitan Washington Airports Authority (MWAA). Phase 1 of the new line opened on July 26, 2014, connecting East Falls Church with Tysons Corner and Reston, Virginia (at the Wiehle-Reston East Metrorail Station), with downtown Washington, DC and Largo, Maryland. Known as the Silver Line, the extension is operated by the Metropolitan Washington Area Transit Authority (WMATA). Preliminary construction for Phase 2 began in 2014. The extension will run from the Wiehle-Reston East Metrorail Station west to Washington Dulles International Airport and Ashburn in eastern Loudoun County. Within the Reston area, the Reston Town Center Station will be located in the median of the Dulles Toll Road/Dulles International Airport Access Highway just west of the Reston Parkway overpass. This station will have no dedicated parking. Additional information on the project can be found here: <http://www.dullesmetro.com/>.

in worse levels of service and delay, as shown in Table 2-2. Additional details are provided in the *Traffic Technical Memorandum*.

Multimodal Connectivity. There are currently no designated bike lanes on Wiehle Avenue in either the northbound or southbound direction. Wiehle Avenue, along with Sunrise Valley Drive, Sunset Hills Road, and portions of Reston Parkway, is designated as a “Less Preferred Street and Road” for bicycle travel on the Fairfax County Bike Map.⁹ A sidewalk on the west side of Wiehle Avenue connects with a walkway on Sunrise Valley Drive to the south and Sunset Hills Road to the north. There are no pedestrian facilities on the east side of Wiehle Avenue between these two endpoints.

The Wiehle-Reston East Metrorail Station includes entrances via pedestrian bridges on both sides of the Dulles Corridor. Fifteen bicycle racks are located on both the north and south sides; there is also a secure reserved bike room. The Wiehle-Reston East Station Bike Room is Fairfax County’s first enclosed, secure bicycle parking facility with capacity for more than 200 bicycles. There is also bus drop-off/pick-up at both entrances of the station, on either side of the Dulles Corridor. On the north side are 10 bus bays in the covered garage, and there are five bus bays on the south side. A Kiss & Ride facility is available on the north side only. Wiehle Avenue currently serves as the only access to the Metrorail station for buses, which experience the congestion and delays on Wiehle Avenue described above.

As indicated in the discussion on Traffic Congestion above, the density of both residences and offices is likely to increase in the area surrounding the Wiehle-Reston East Metrorail Station, which will generate many more pedestrian and bicycle trips. Additional pathways for these modes of travel must be considered as higher volumes of traffic will make it increasingly more difficult and dangerous for pedestrians and bicyclists to travel in this area since there are limited sidewalks and no bike lanes. Increased congestion and delays on the roadway network will also reduce the efficiency of bus service, which is likely to expand and undergo an increase in bus service levels to serve the two rail stations and accommodate the development growth.

Accessibility and Mobility. The transportation network around the Wiehle-Reston East Metrorail Station is comprised primarily of major roadways (i.e., Wiehle Avenue, Sunset Hills Road, and Sunrise Valley Drive) and much smaller streets and driveways that provide access to individual buildings and developments. Consequently, most vehicles traveling in the area must use one of the major congested routes or intersections.

The Wiehle-Reston East Metrorail Station includes a 2,300-space covered parking garage north of the Dulles Corridor; an additional 1,000 non-metro spaces are also provided at this location. The heavy traffic exiting the parking garage by way of Reston Station Boulevard during the evening peak period creates weaving conditions on all travel lanes on the southbound segment of Wiehle Avenue between Sunset Hills Road and the Dulles Toll Road. As documented in the April 2008 study, most vehicles turning right when they exit the Metrorail station are not destined to the westbound Dulles Toll Road; therefore, they must move over at least one lane once they turn onto Wiehle Avenue, weaving with vehicles on southbound Wiehle Avenue destined for the westbound exit ramp, as shown in **Figure 3-1**. If a vehicle exiting the Metrorail station entrance is destined to the eastbound Dulles Toll Road ramp, they must weave across four lanes to enter into the left-turn bays. The situation is exacerbated by the short distance (320 feet) between the Wiehle-Reston East Metrorail Station access and the intersection with the westbound ramps; in addition, there is

⁹ <http://www.fairfaxcounty.gov/fcdot/bike/bikemap/>

only an additional 500 feet between the westbound and eastbound ramps on Wiehle Avenue. Combined with the overall high traffic volumes, much of the delay is caused by vehicles forcing their way across travel lanes over this short distance in order to reach their desired lane.

The other bottlenecks along Wiehle Avenue are at the intersections with Sunset Hills Road and Sunrise Valley Drive. The lack of turn lanes for the heavy movements adds to the delays at these locations.

As development in the area and traffic demand increases, accessibility and mobility will be further constrained. The Reston Town Center Metrorail Station that will open as part of Phase 2 of the Dulles Metrorail Project does not include dedicated parking; therefore, vehicular demand at the parking facilities at Wiehle-Reston East Metrorail Station will continue and likely increase, further exacerbating weaving conflicts along Wiehle Avenue. Queue lengths and delays will also likely worsen with the higher traffic volumes in 2046.

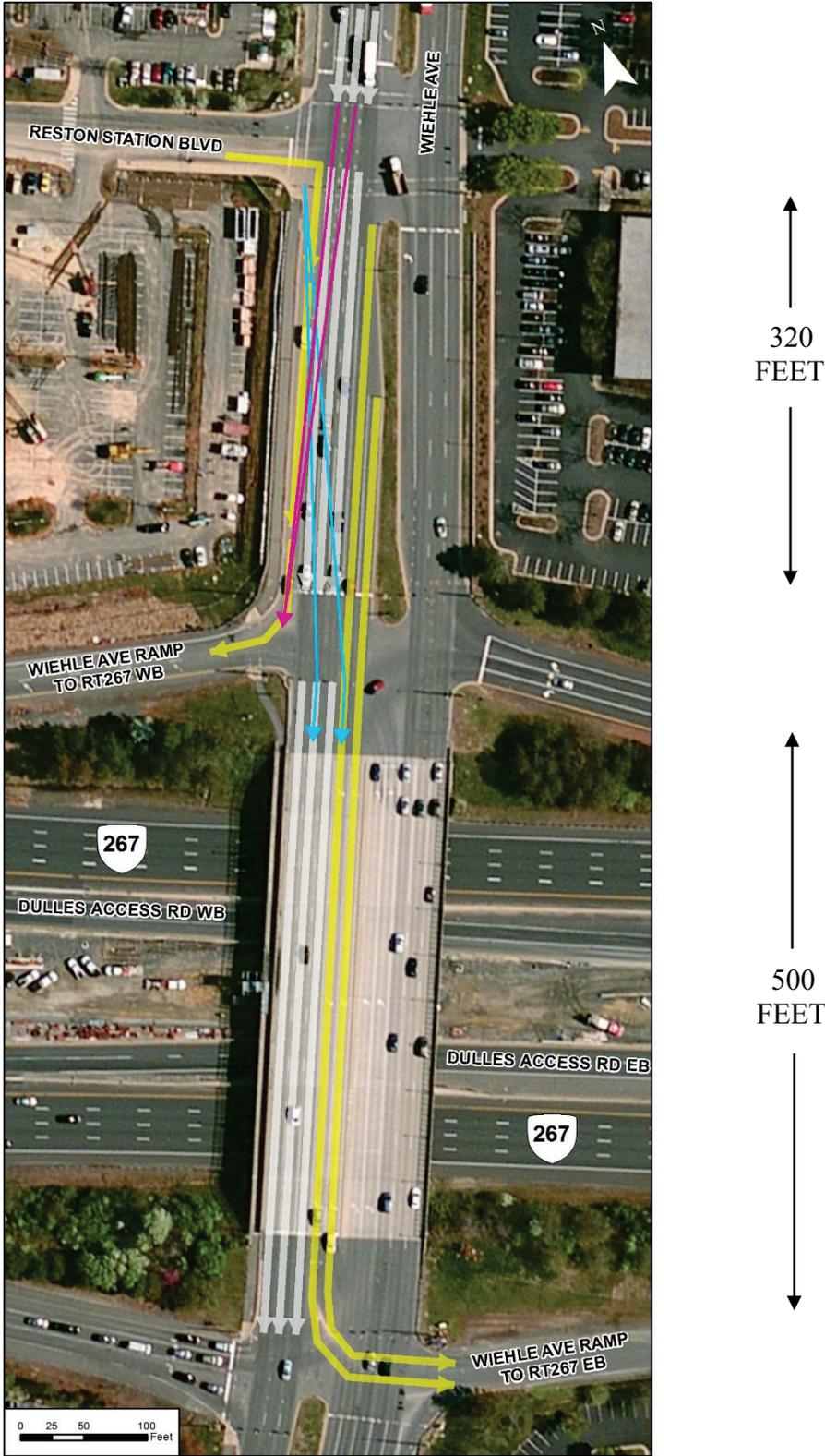


Figure 3-1. Illustration of Weaving on Wiehle Avenue

SECTION 4

BUILD ALTERNATIVES CARRIED FORWARD

4.1 INTRODUCTION

The screening process in the 2013 Feasibility Study resulted in the development of a “hybrid” alternative for further consideration. The “hybrid” alternative was deemed to offer advantages compared to the five evaluated alternatives in terms of consistency with the typical section on Soapstone Drive, construction costs, and enhanced mobility for bicyclists and motorists, among other reasons. This “hybrid” alternative, referred to as Alternative 1 in the EA and hereafter within this memorandum, is further described below.

In addition to Alternative 1, a variation of this alignment is also being assessed in the EA, as introduced in Section 2.2.2. The alignment for Alternative 2 follows the same alignment as Alternative 1 south of the Dulles Corridor, but north of the crossing, the alignments diverge and are offset by up to 150 feet.

Given the similarities between the two alternatives, and the fact that they are functionally equivalent for the purposes of traffic operations and analysis, the alternatives are described concurrently within each section below.

4.2 DESCRIPTION

The Build Alternatives assume completion of those projects identified in the No Build Alternative and the addition of the Soapstone Connector between Sunrise Valley Drive and Sunset Hills Road.

Alternative 1 combines the southern portion of Alternative 4D from the 2013 Feasibility Study with the northern portion of Alternative 5C. The southern terminus is located at the intersection of Soapstone Drive and Sunrise Valley Drive while the northern terminus would connect to Sunset Hills Road, as shown in **Figure 4-1**. In the figure, the alternative is represented as a 200-foot-wide corridor, which would be wide enough to encompass minor variations in actual roadway alignments and design features during the design phase, should a build alternative be selected, and to illustrate the maximum potential impacts of the alternative. The corridor has been estimated for planning purposes and decision-making during the NEPA process, but would be further refined during final design.

Alternative 1 aligns directly with Soapstone Drive at its southern terminus on Sunrise Valley Drive. The alternative is shown to go through the building and traverse a good portion of the property owned by the National Association of Secondary School Principals (1904 Association Drive). The alignment traverses a short section of Association Drive and then a larger portion of the surface parking and the property owned by BDC Sunrise Valley LLC (11600 Sunrise Valley Drive). After bridging over the Dulles Corridor, the alignment would cross the paved surface parking area in the southwest corner of the property owned by iSTAR CTL Sunset Hills – Reston LLC (11493 Sunset Hills Road). The alignment through this parcel will avoid the existing office building at this location. Continuing north, the alignment then traverses a portion of the paved parking area for the property owned by Solus, LLC (11505 Sunset Hills Road). The alignment is shown going through the building owned by Musica, LLC (11501 Sunset Hills Road). The alignment also traverses the easement of the Transcontinental Gas Pipeline Corporation.

The 200-foot-wide corridor for Alternative 2 is shown in **Figure 4-2**, and the alignment is the same as Alternative 1 south of the Dulles Corridor. North of the Dulles Corridor crossing, Alternative 2 is aligned slightly to the east of Alternative 1 and lies within the parking lots between the building owned by Musica, LLC (11501 Sunset Hills Road) and the building owned by Spectra 4 LLP at 11495 Sunset Hills Road. A closer view of the differences between the two alternatives north of the Dulles Access and Roll Road is shown in **Figure 4-3**.

The typical section of the new roadway would feature a three-lane cross-section (one travel lane in each direction and a two-way, left-turn-only lane); 5-foot-wide on-road bicycle lanes on each side; a 5-foot-wide concrete sidewalk on the west side; and a 10-foot-wide shared use path on the east side, as shown in **Figure 4-4**. The typical section for the bridge includes four travel lanes, as shown in **Figure 4-5**.

There are four planned access points throughout the length of the roadway. North of the Dulles Toll Road, access points include an at-grade intersection south of Sunset Hills Road and the intersection with Sunset Hills Road at its northern terminus. South of the Dulles Toll Road, access points include an intersection north of Sunrise Valley Drive and the intersection with Sunrise Valley Drive at its southern terminus. At the northern and southern termini, additional turn lanes would be provided at the intersections of Sunset Hills Road and Sunrise Valley Drive with the Soapstone Connector to accommodate the new or increased turning movement volumes, with the maximum number of lanes constrained to the downstream receiving conditions. This reflects the assumption that the design of the Soapstone Connector intersection configurations would accommodate the demands of turning traffic to the extent possible. The number of lanes by approach and movement for these intersections is shown in **Table 4-1** for the No Build and Build conditions. The build assumptions were made primarily for the purposes of the traffic analysis; the details of each intersection configuration, including number of turn lanes and turning bay length, would be determined during final design.

Table 4-1. Soapstone Connector Intersection Configurations

Approach	Movement	Soapstone Connector at Sunset Hills Road		Soapstone Connector/Drive at Sunrise Valley Drive	
		No Build	Build	No Build	Build
EB	Left (L)	-	-	1	1
	Through (T)	2	2	2	2
	Right (R)	-	1	1	1
WB	Left (L)	-	1	1	1
	Through (T)	2	2	1 T, 1 T+R	2
	Right (R)	-	-		1
NB	Left (L)	-	2	1 T+L	1
	Through (T)	-	-		1
	Right (R)	-	1	1	1
SB	Left (L)	-	-	1	2
	Through (T)	-	-	1 T+R	1
	Right (R)	-	-		1

4.3 ABILITY TO MEET NEEDS

Traffic Congestion. As described in Section 2.4.1, future year (2046) traffic forecasts were developed to support comparative analyses between the No Build and Build Alternatives. Approximately 18,000 vehicles per day (vpd) are projected to use the Soapstone Connector in 2046, as shown in **Table 4-2**.

Table 4-2. Existing (2015) and Forecast (2046) Daily Volumes

		Daily Volume (NB + SB) (vehicles per day)						
		2015	2046		No Build vs Existing		Build vs No Build	
		Existing	No Build	Build	Growth	%	Difference	%
Reston Parkway	North of DTR	51,300	68,000	62,000	16,700	33%	-6,000	-10%
	South of DTR	43,700	63,800	57,300	20,100	46%	-6,500	-11%
Soapstone Connector	North of DTR	-	-	18,100	-	-	18,100	-
	South of DTR	-	-	18,300	-	-	18,300	-
Wiehle Avenue	North of DTR	36,900	46,800	37,400	9,900	27%	-9,400	-25%
	South of DTR	34,900	38,500	29,500	3,600	10%	-9,000	-31%

On Wiehle Avenue north of the Dulles Corridor, the 2046 No Build forecast of 46,800 vpd decreases to 37,400 vpd (which is similar to the existing volume of 36,900 vpd) when the Soapstone Connector is added to the roadway network. In other words, north of the Dulles Corridor, the volume on Wiehle Avenue grows by about 10,000 vpd between 2015 and 2046, and nearly all of that is absorbed by the Soapstone Connector under build conditions. There is less growth on Wiehle Avenue south of the Dulles Corridor than north, which leads to lower volumes under the build condition than existing year (year 2015, 2046 No Build, and 2046 Build volumes are 34,900, 38,500, and 29,500 vpd, respectively).

On Reston Parkway, there is also a reduction in traffic in 2046 with the addition of the Soapstone Connector, but the difference from the No Build condition is somewhat lower (both overall volume and in percentage terms) than the difference between the Build and No Build volume on Wiehle Avenue.

On a peak hour basis, the levels of service and delay shown in Table 2-2 confirm that travel delays at intersections on Wiehle Avenue (shown in bold font) are anticipated to be lower in the Build condition with the addition of the Soapstone Connector (compared to the No Build condition). This result satisfies an element of the purpose of the Soapstone Connector project, which is to reduce traffic congestion and delay along Wiehle Avenue.

In general, the provision of the Soapstone Connector serves to redistribute traffic within the traffic analysis area and relieve the two north-south roadways, Wiehle Avenue and Reston Parkway. Overall, it can be expected that once the Soapstone Connector is in place, travel patterns and route choice will change within the study area, and volumes are likely to fluctuate for a short period of time. Once equilibrium in the system is reached, further studies may be required and localized improvements implemented to improve traffic operations and levels of service at some locations.

Multimodal Connectivity. This alternative provides additional capacity for buses to cross over the Dulles Corridor. This would play a key role in improving the bus network in Reston by

providing direct access across the Dulles Corridor and to the station without requiring travel on Wiehle Avenue.

The Soapstone Connector would have two bike lanes, one sidewalk, and one shared use path, which would provide access for pedestrians and bicyclists to safely cross the Dulles Corridor. These facilities would connect with the existing sidewalks and bike lane on Soapstone Drive, the latter extending south to Lawyers Road. Additional multimodal improvements that would connect to the Soapstone Connector are shown in **Figure 4-6**, including a proposed cycle track and sidewalk on Sunrise Valley Drive. At the northern terminus, pedestrians and bicyclists would tie into the existing sidewalk on Sunset Hills Road and could then connect to the Washington & Old Dominion (W&OD) Trail. A new bridge is planned on the W&OD Trail that will extend over Wiehle Avenue and replace the existing at-grade crossing. The new bridge will accommodate both the gravel path and asphalt W&OD Trail. Minor roadway, sidewalk, and median modifications will also be made to Wiehle Avenue at this location to accommodate the bridge.

Accessibility and Mobility. By reducing congestion and providing an additional road crossing over the Dulles Corridor, this alternative would enhance accessibility to the Wiehle-Reston East Metrorail Station and mobility in the surrounding area.

As indicated in Section 1.3.3, the Soapstone Connector was included as a recommended roadway network improvement in the Reston Transit Station Areas Comprehensive Amendment to the Fairfax County Comprehensive Plan in February 2014. At that time, a follow on motion by the Board of Supervisors directed staff to “conduct a detailed evaluation and operational analysis of the enhanced street network shown on the Reston Master Plan, prioritize these improvements, and develop an implementation strategy.” Accordingly, the Reston Network Analysis¹⁰ was initiated to take a long-range look at the transportation conditions in the Reston Transit Station Areas (TSAs) in 2030 and 2050. The Network Analysis is evaluating the conceptual grid of streets in the Reston TSAs adopted in the Reston Phase I Plan Amendment, which includes the Soapstone Connector. In the immediate vicinity of the Soapstone Connector, the grid of streets includes an extension of Reston Station Boulevard to the Connector. From a connectivity perspective, this extension would provide a direct connection to the kiss-and-ride area, the parking garage for the Metrorail station, and future development in the vicinity of the station.

¹⁰ <http://www.fairfaxcounty.gov/fcdot/restonnetworkanalysis/>

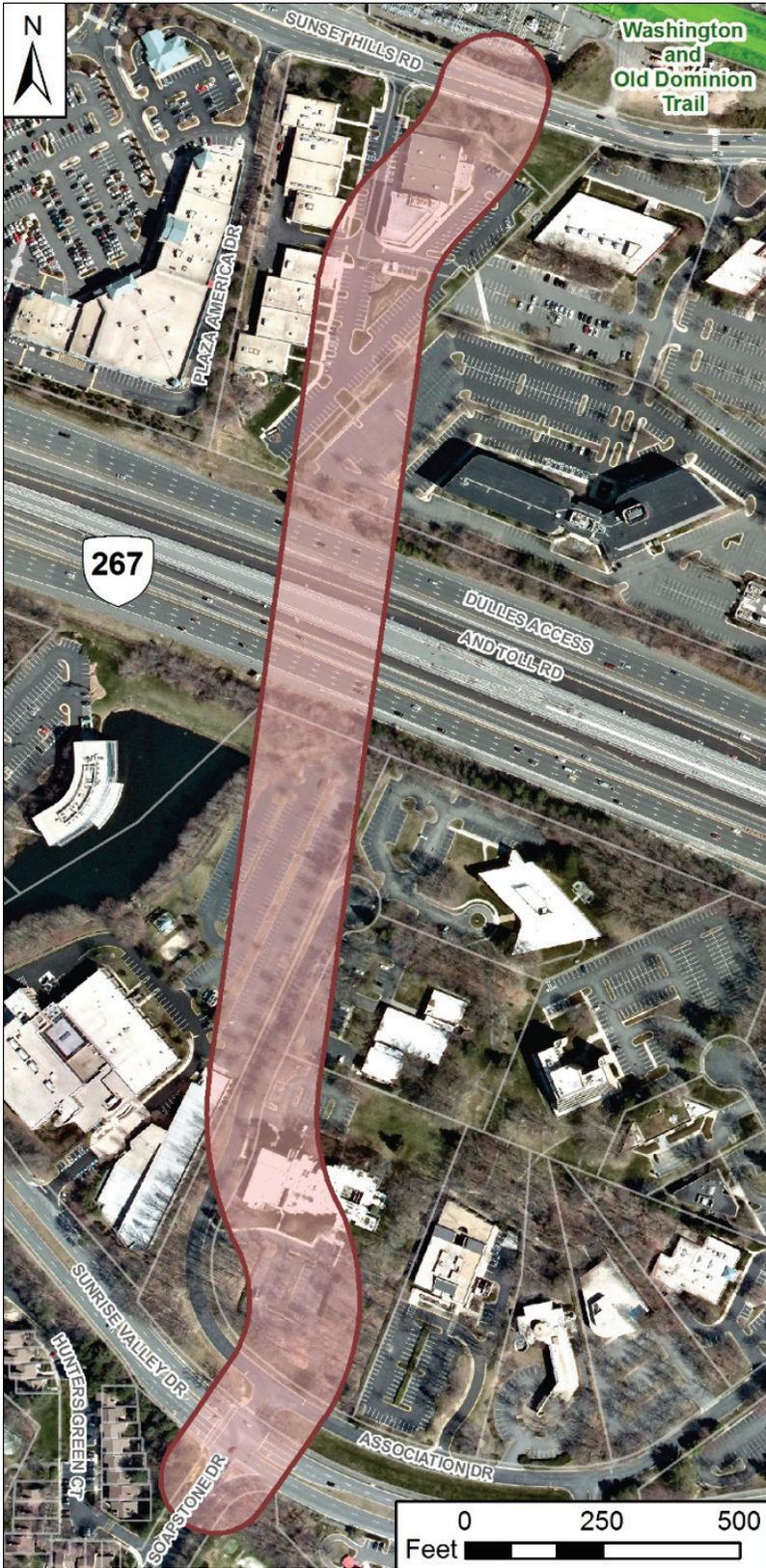


Figure 4-1. Alternative 1

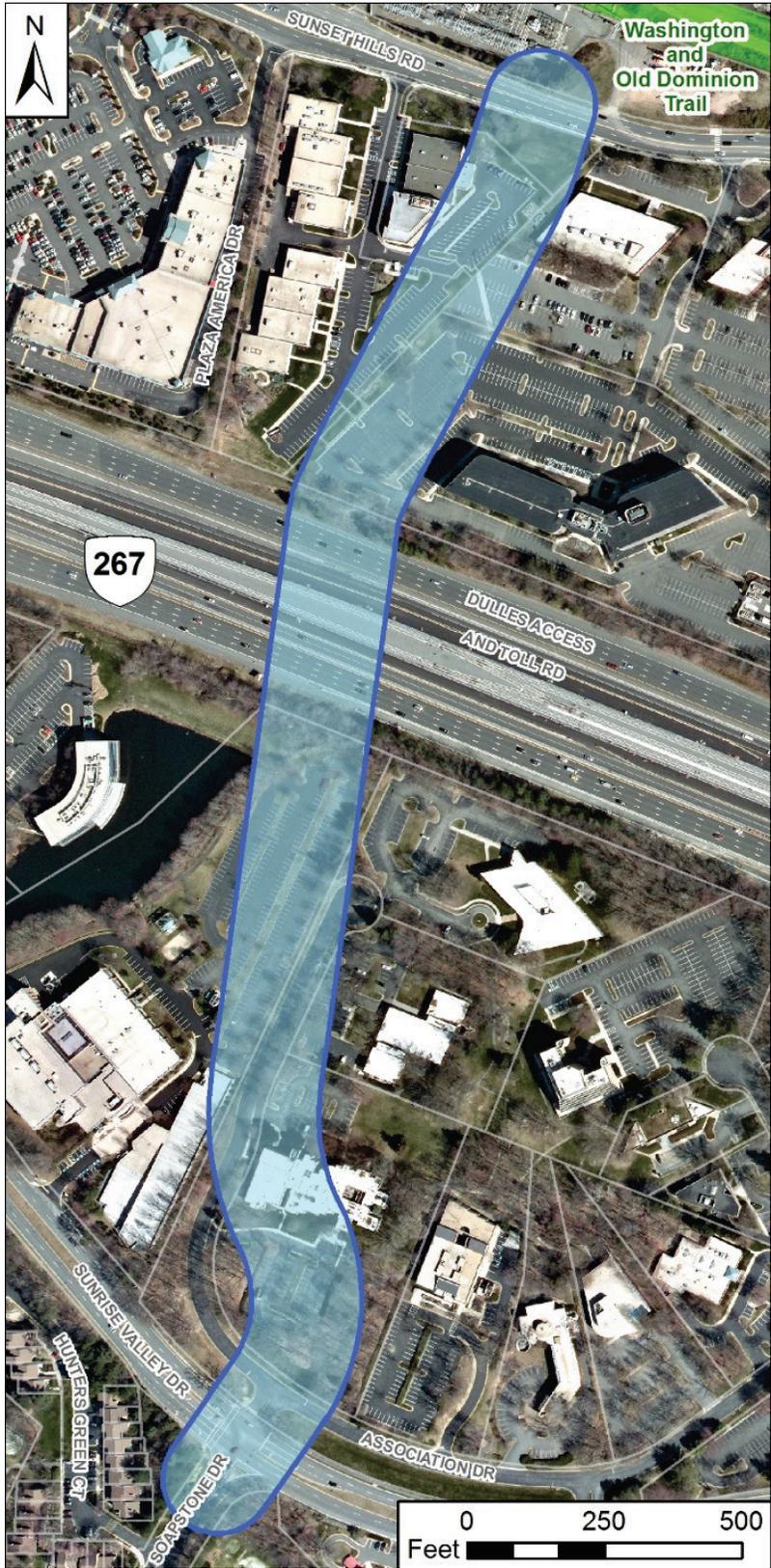


Figure 4-2. Alternative 2

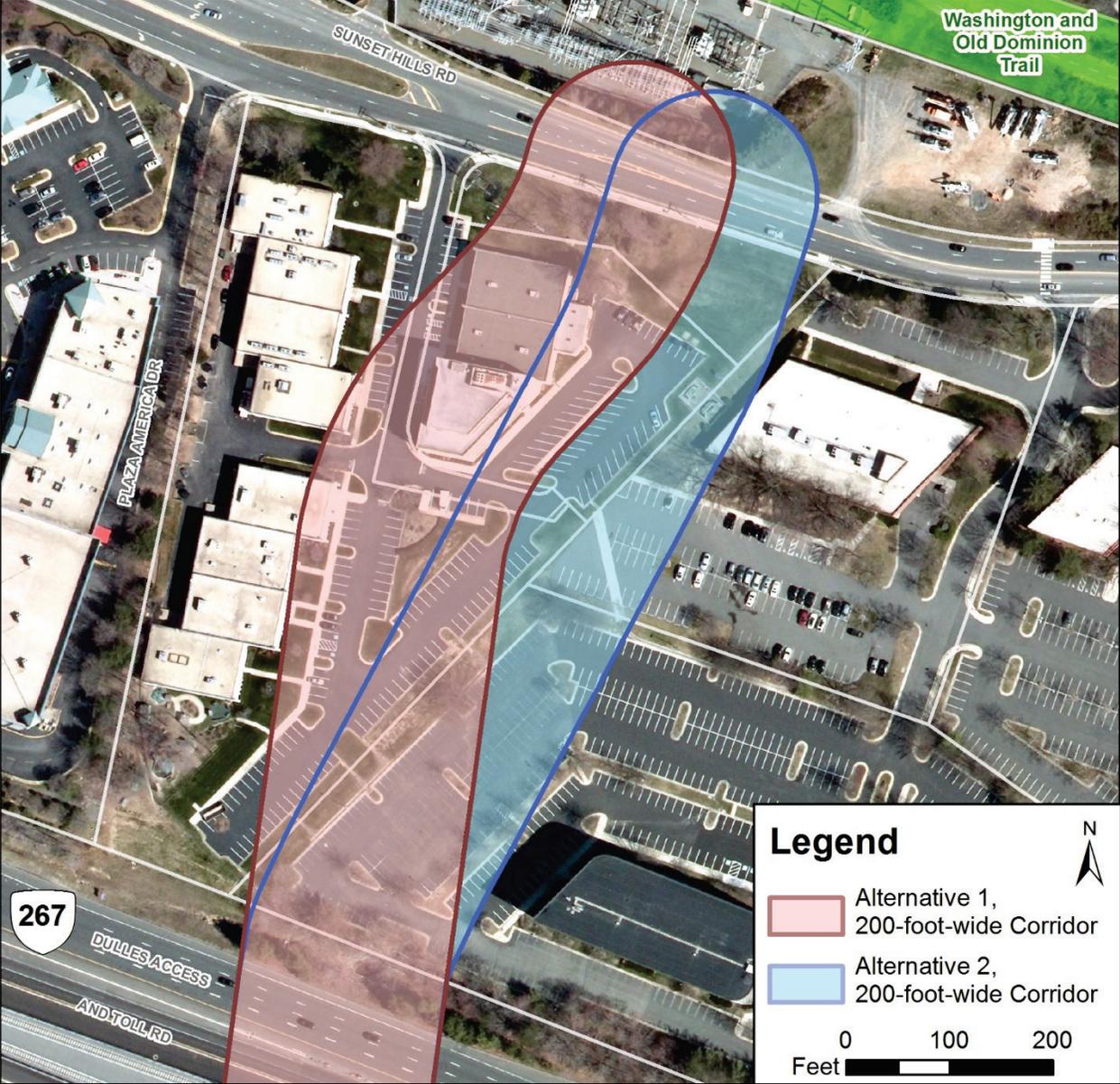


Figure 4-3. Comparison of Alternatives 1 and 2 North of Dulles Corridor

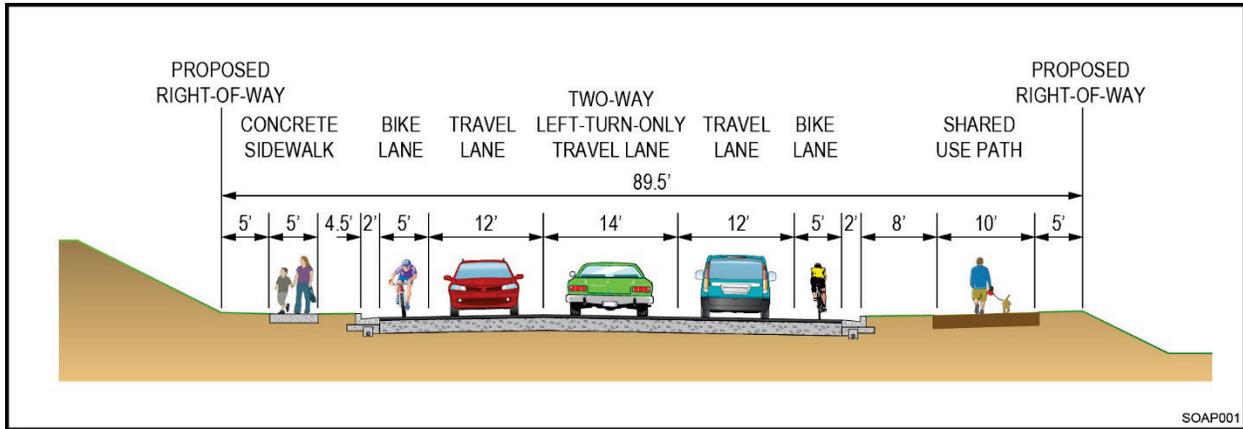


Figure 4-4. Typical Roadway Section

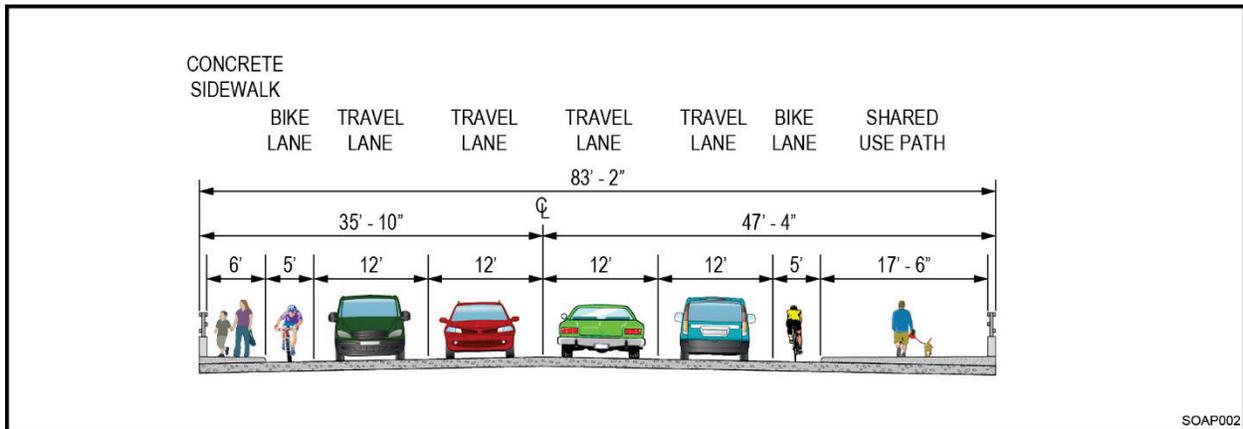


Figure 4-5. Typical Bridge Section

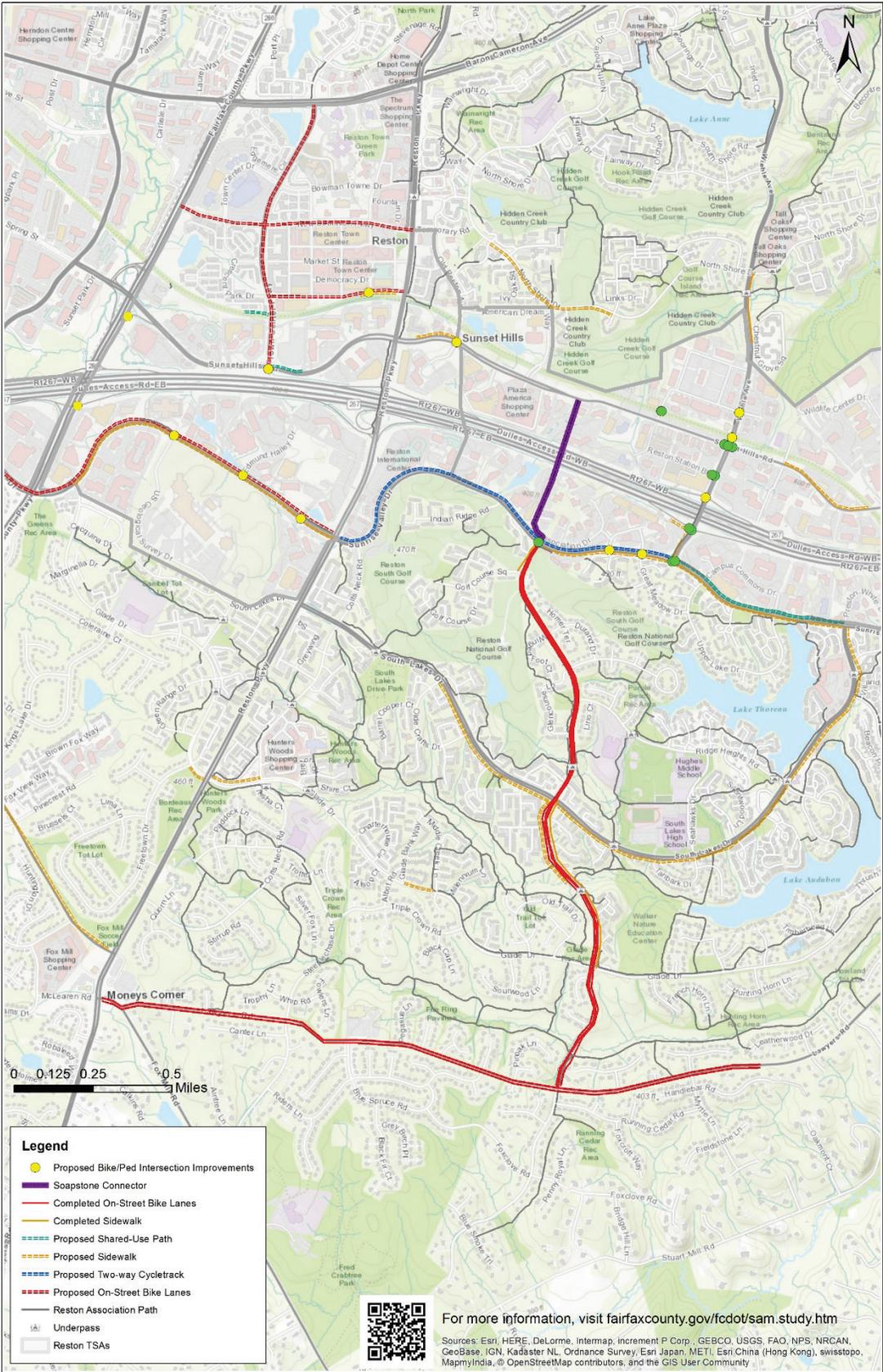


Figure 4-6. Fairfax County Funded Bicycle and Pedestrian Projects

APPENDIX A

PROJECT HISTORY FIGURES

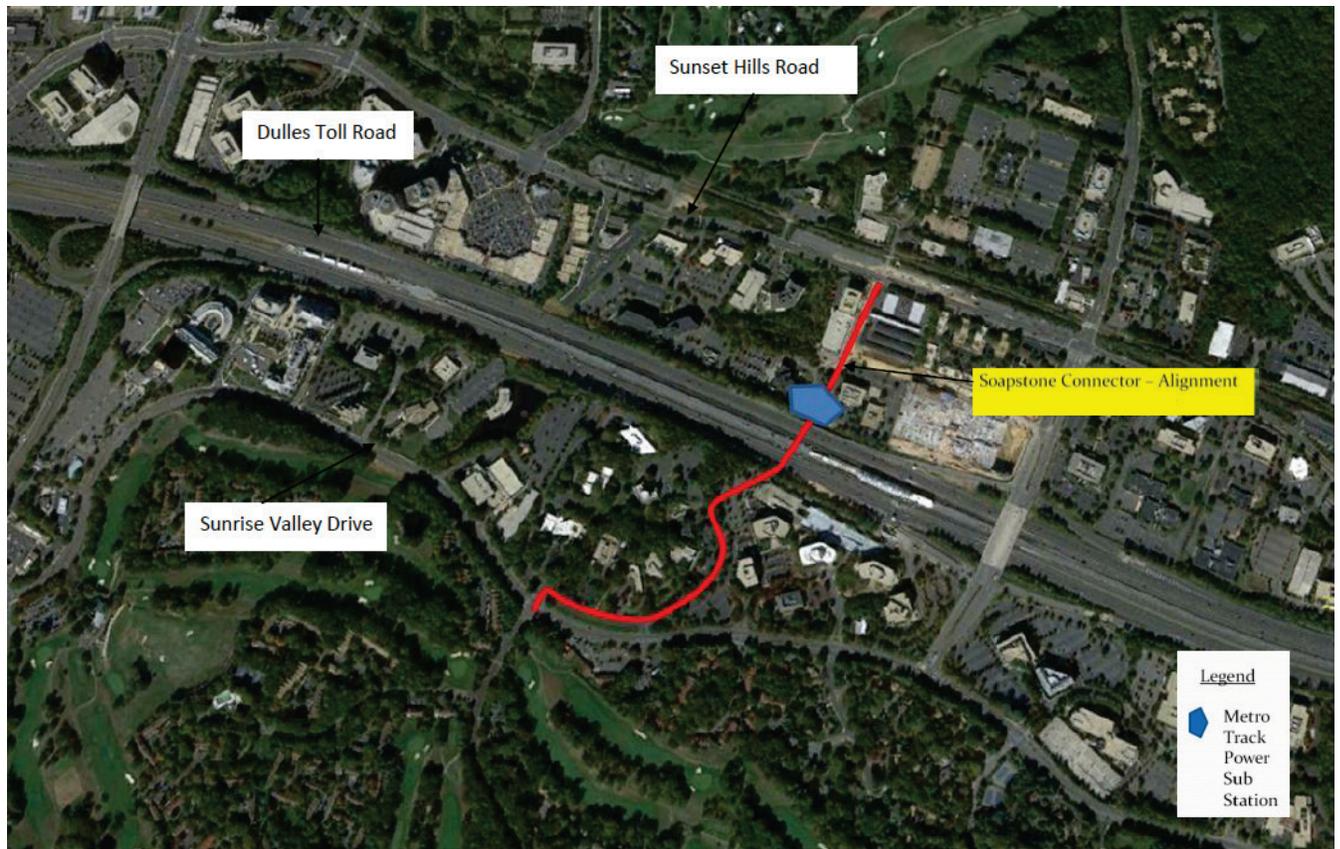


Figure A-1. Study Area with Soapstone Connector Horizontal Alignment
(From *Wiehle Avenue/Reston Parkway Station Access Management Plans*, April 2008)

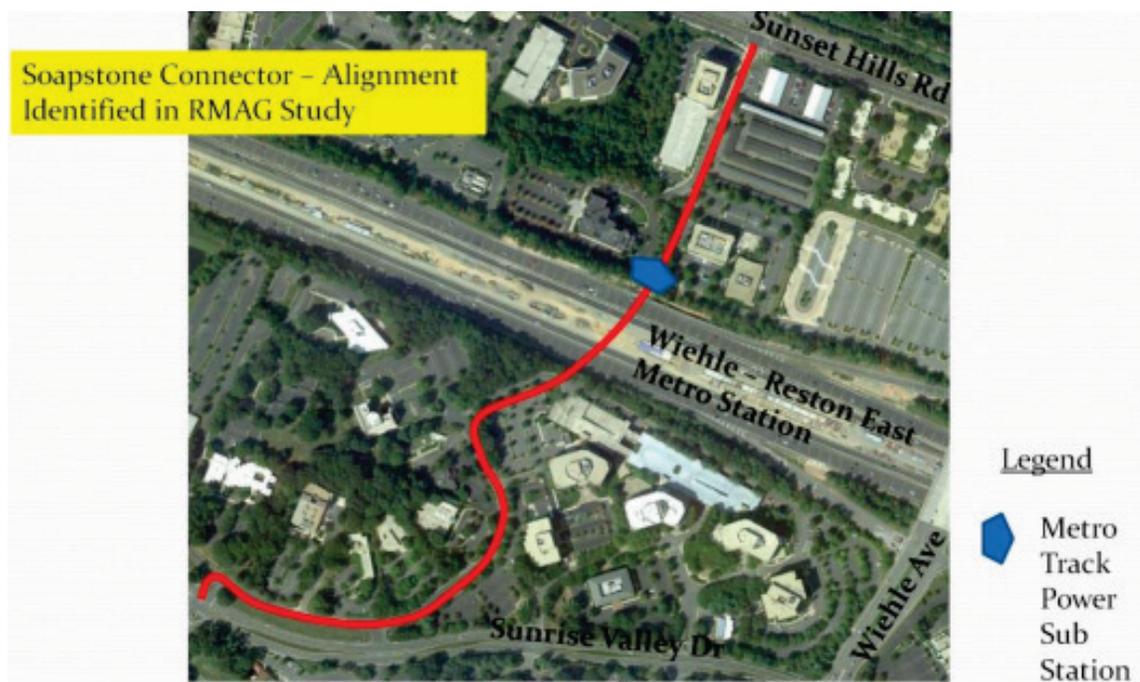


Figure A-2. Horizontal Alignment of Soapstone Connector
(From *Wiehle Avenue/Reston Parkway Station Access Management Plans*, April 2008)

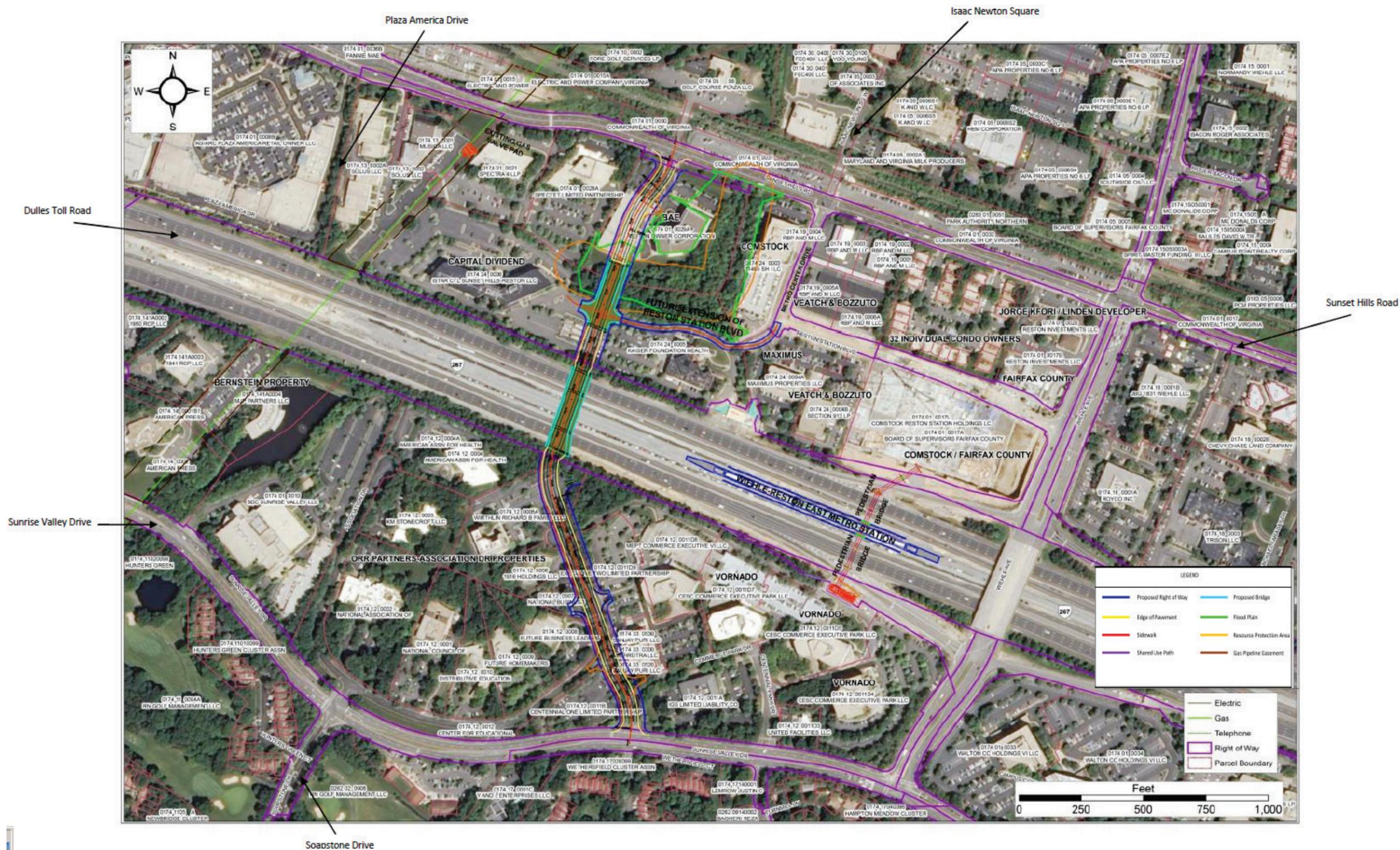


Figure A-3. Plan View of Alternative 1C
(From Soapstone Connector Feasibility Study, November 2013)



Figure A-4. Plan View of Alternative 3D
(From Soapstone Connector Feasibility Study, November 2013)

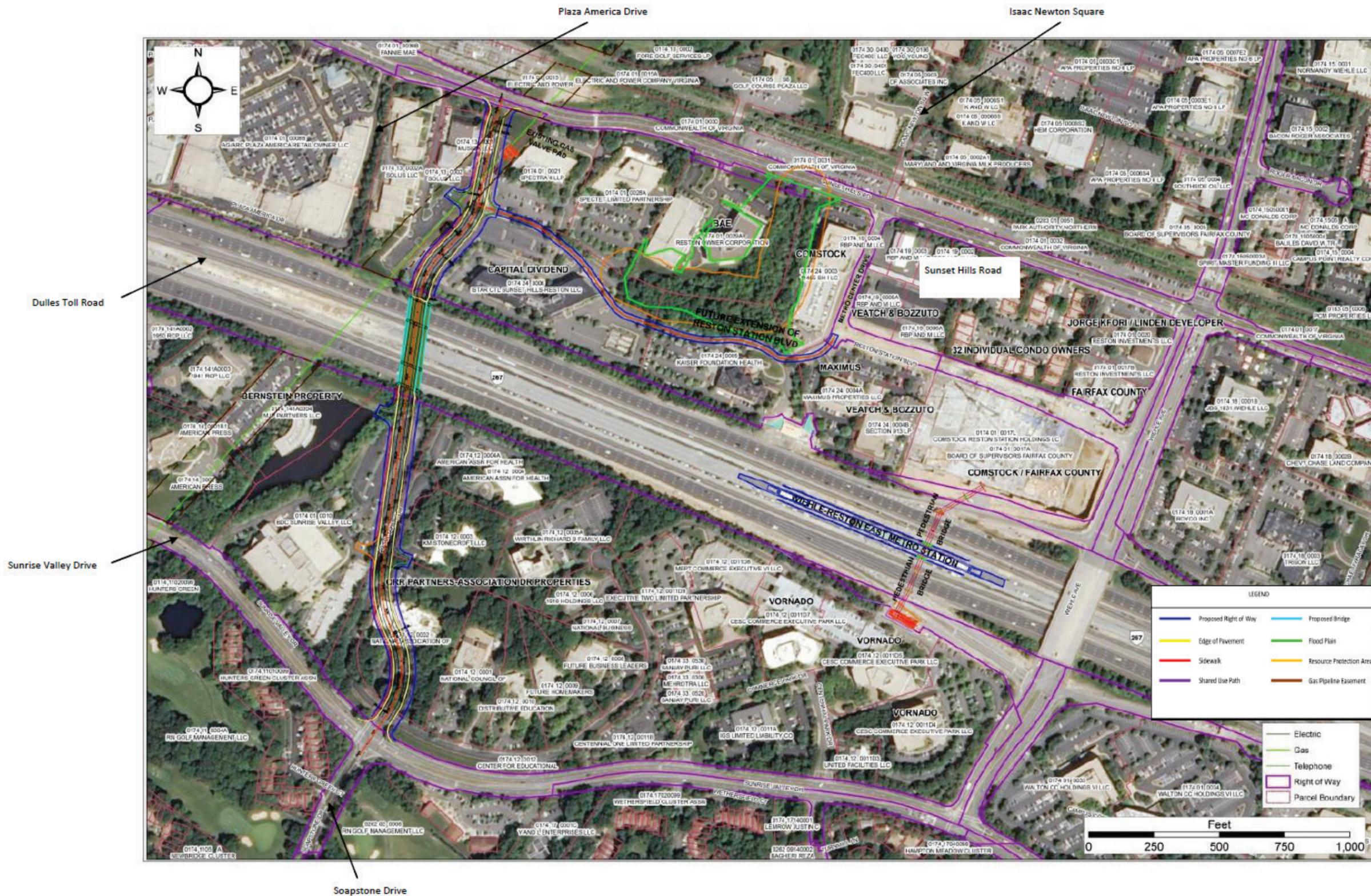


Figure A-5. Plan View of Alternative 4D
(From Soapstone Connector Feasibility Study, November 2013)

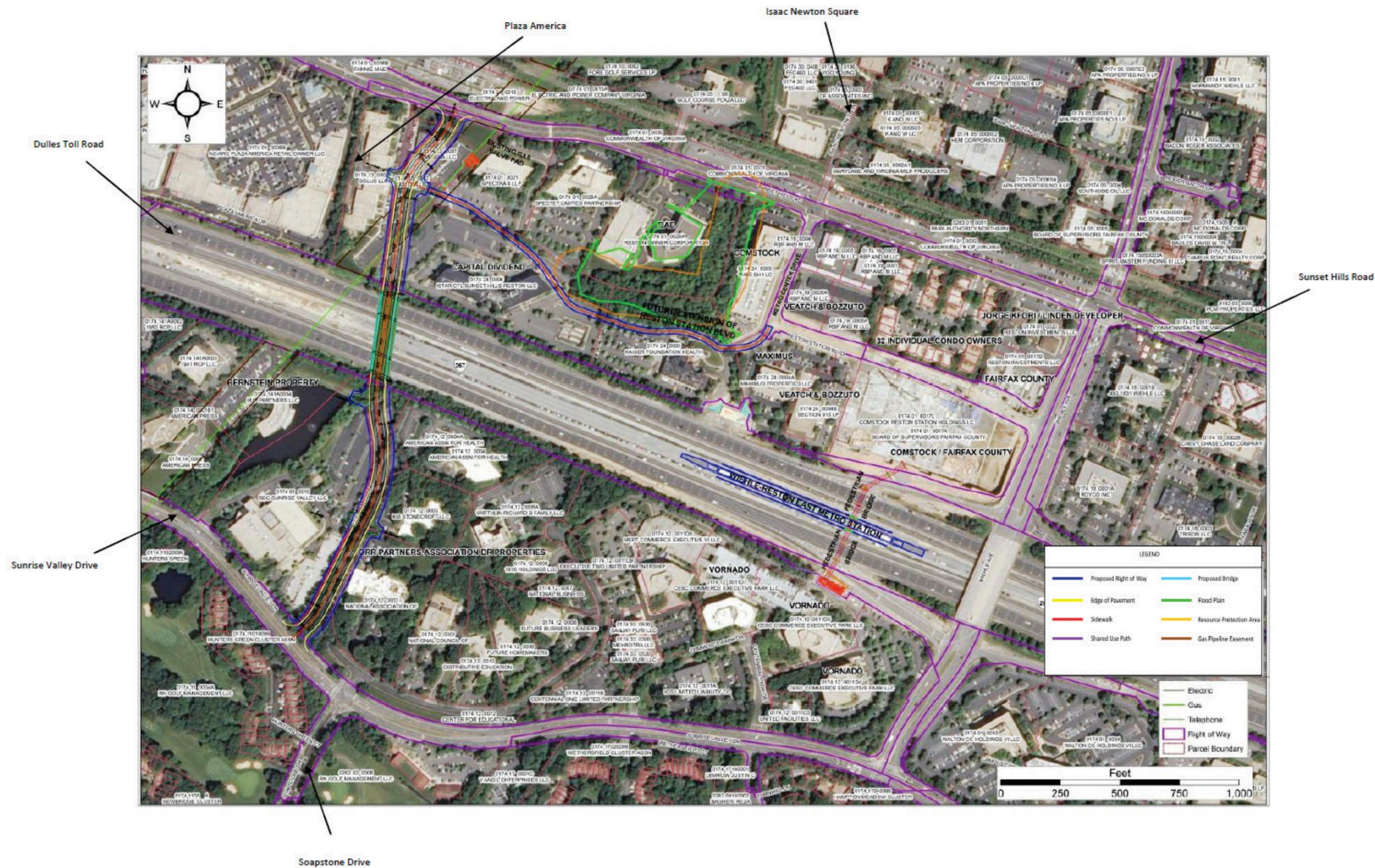


Figure A-6. Plan View of Alternative 5C
(From Soapstone Connector Feasibility Study, November 2013)

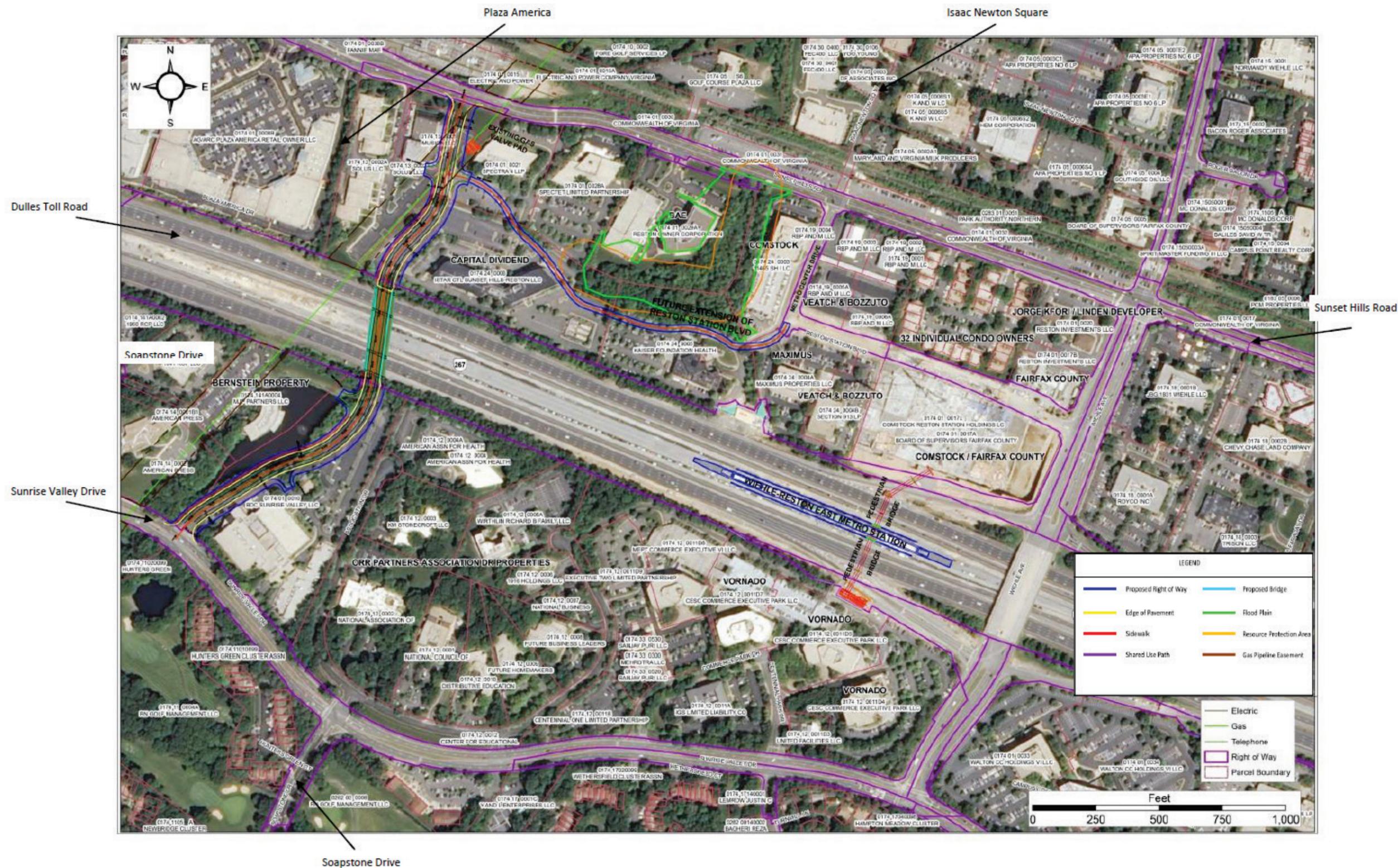


Figure A-7. Plan View of Alternative 6E
(From Soapstone Connector Feasibility Study, November 2013)

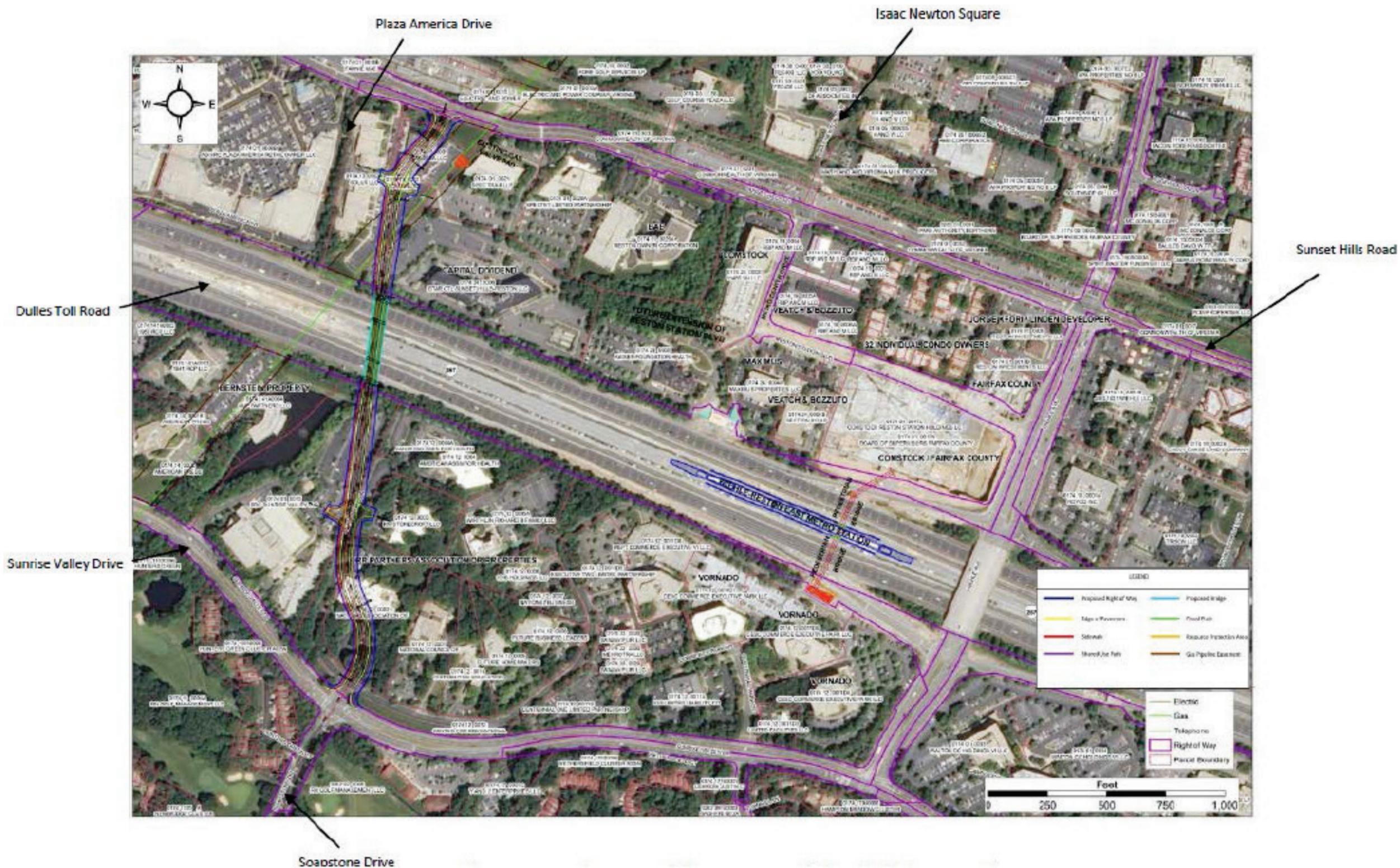


Figure A-8. Plan View of “Hybrid” Alternative
(From Soapstone Connector Feasibility Study, November 2013)