

# Reston Network Analysis

**Final Report**

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**Prepared By:**



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## 1 Executive Summary

After the completion of the Reston Master Plan, the Reston Network Analysis was undertaken to better understand the transportation improvements needed in the areas surrounding each of the three existing and planned Reston Metrorail Stations (Wiehle-Reston East, Reston Town Center, and Herndon). The purpose of the Reston Network Analysis was to evaluate the conceptual grids of streets and road elements in the Reston Transit Station Areas (TSAs) and to determine the improvements necessary to achieve Level of Service (LOS) E or better, while maintaining a walkable grid of streets. To do this a detailed transportation analysis was conducted to help understand current traffic conditions and anticipated traffic challenges associated with the increased mixed use development and density surrounding the three Reston Metrorail Stations. The analysis then recommended potential mitigation measures to accommodate the forecasted increase in vehicular traffic. The analysis was used to communicate the future transportation challenges and potential mitigation measures to the Reston Network Analysis Advisory Group, stakeholders and the community.

To better understand the needs of the transportation network, the PTV Visum modeling tool was used to create mesoscopic models that predict the most likely vehicle paths through the study area. Based upon the traffic volumes generated from this modeling exercise, the most cost effective mitigation measures that minimize right-of-way, property, and environmental impacts were developed. The models were also used to help determine the phasing of the larger transportation projects recommended in the Reston Mater Plan.

Measures of effectiveness (MOEs) for the Reston Transit Station Areas (TSAs) focused on LOS and vehicular delay. These MOEs were used evaluate the performance of the transportation network and to guide the conversation about mitigation measures with the Advisory Group. The goal of the effort was to mitigate all intersections to LOS E (80 seconds or less of delay), but to help guide mitigation measures “Problem Locations” were also identified, which indicated that the average overall intersection delay exceeded 120 seconds per vehicle. These Problem Locations experience delay that was anticipated to be more difficult to mitigate and were used as a benchmark through the process to track the effectiveness of the mitigation measures. These mitigation measures were applied using a three-tiered approach:

1. Tier 1: No right-of-way impact
2. Tier 2: Minor right-of-way impact
3. Tier 3: Large scale mitigations with potentially significant right-of-way impact

As a result of Tier 1 and Tier 2 mitigations, 30 new traffic signals are proposed for the Reston TSAs as well as intersection improvements at multiple locations, including the addition of new left-turn lanes. As part of the Tier 3 analysis the following mitigations were recommended for the study area:

1. Reston Parkway at Lawyers Road: A new connection from Lawyers Road to Fox Mill Road, behind the Reston South Park and Ride facility.
2. Fairfax County Parkway at Spring Street: A new southbound on-ramp from a signalized intersection on the proposed Fairbrook Drive extension.
3. Fairfax County Parkway at Sunrise Valley Drive: A new, grade-separated Single Point Urban Interchange (SPUI) in place of the existing, at-grade intersection.

Prior to the application of the tiered approach, 43 of the 102 intersections in the Reston TSA failed in the AM or PM peak hours. After the completion of Tiers 1 and 2, only 11 intersections experienced failing delays. With the application of Tier 3 only eight intersections still operated at LOS F, three intersections in the AM peak hour and six intersections in the PM peak hour. The Tiered approach allowed for incremental improvements with the minimum amount of cost and right-of-way impact. After all of the approved mitigations are in place, only one intersection was still a Problem Location: Centreville Road at Sunrise Valley Drive, located within the Innovation TSA. However, there are no remaining Problem Locations in any of the three Reston TSAs. The improvements through the Tiered Mitigation process can be seen in Tables 1 and 2.

*Table 1: 2050 LOS F Intersections*

Peak Hour	Pre-Mitigation	Tier 2	Tier 3
AM	35	8	3
PM	39	10	6
In Both AM & PM	31	7	1
In Either AM or PM	43	11	8

*Table 2: 2050 Problem Locations*

Peak Hour	Pre-Mitigation	Tier 2	Tier 3
AM	22	5	1
PM	26	2	0
In Both AM & PM	16	1	0
In Either AM or PM	32	6	1

A Phasing Analysis of the recommendations in the Reston Master Plan was also conducted to understand the general impact of each individual road improvement on the overall network in order to assist in prioritizing roadway improvements in the Reston TSAs based on the benefits each improvement is expected to provide. This phasing analysis was done for both existing conditions and for Full-Buildout to help understand which improvements provide the most benefit in the short term as well as the long term. The analysis showed that the Grid of Streets are of critical importance throughout the Reston's development. It also prioritized the Town Center Underpass and Soapstone Connector as important projects in Reston's existing and future transportation networks.

This analysis, and the models created as part of this project, can be used as tools to help develop long range transportation infrastructure plans by allowing planners to prioritize infrastructure projects based on their benefit to the transportation network as a whole.

## 2 Introduction

Fairfax County Department of Transportation (FCDOT) conducted a detailed analysis of the transportation network surrounding the three Reston TSAs, located in Reston, VA. Fairfax County recently adopted a comprehensive plan amendment that will guide the development of the Reston TSAs into urban centers with a mix of residential, office, retail, and other commercial land uses by 2050. The purpose of the Network Analysis was to evaluate the conceptual Grid of Streets within the Reston portion of the County's Comprehensive Plan, and to ensure that roadway elements at gateways into, and out of, the Reston TSAs result in operating conditions for traffic at Level of Service (LOS) E or better, while still maintaining a walkable grid of streets. To understand what the transportation network will look like as Reston develops two scenarios were analyzed. The first was Full-Buildout, or 2050, which represents the complete buildout of the Reston Master Plan for both land use and transportation. The second scenario was Mid-Buildout, or 2030, which represented a midpoint in development, when some but not all of the Reston Master Plan's guidance for land use and transportation is realized.

A tiered approach was taken to conduct the Full-Buildout analysis and to identify appropriate mitigation measures. To guide this process Measures of effectiveness (MOEs) for the Reston Transit Station Areas (TSAs) were developed which focused on LOS and vehicular delay. These MOEs were used evaluate the performance of the transportation network and to guide the conversation about mitigation measures with the Advisory Group. The goal of the effort was to mitigate all intersections to LOS E (80 seconds or less of delay), but to help guide mitigation measures "Problem Locations" were identified, which indicated that the average overall intersection delay exceeded 120 seconds per vehicle. These Problem Locations experience delay that was anticipated to be more difficult to mitigate and were used as a benchmark through the process to track the effectiveness of the mitigation measures. These mitigation measures were applied using a three-tiered approach:

1. Tier 1: No right-of-way impact
2. Tier 2: Minor right-of-way impact
3. Tier 3: Large scale mitigations with potentially significant right-of-way impact

As part of this work, the software package PTV Visum was chosen as the preferred mesoscopic modeling tool to analyze operating conditions throughout the study area. The purpose of this report is to document the Visum model development and traffic mitigation procedures and to present the results found as part of the overall process.

The extent of the primary study area, surrounding the three Reston Metrorail stations, and the selected Visum modeling tool, have allowed for a comprehensive study of transportation in the area and help facility planning level decision making. When any recommendations from this study move forward to the design level, more detailed transportation analysis of individual land use applications will be needed. This study has confirmed that the conceptual Grid of Streets identified in the Reston Master Plan will be adequate to achieve a Level of Service (LOS) E or better for intersections within the TSAs. As development occurs in the TSAs additional analysis at individual intersections will be necessary to reflect the impacts of specific development proposals. This analysis will need to include warrant analyses for traffic signalization and additional turn lanes.

## 2.1 Primary Study Area

The Reston Network Analysis primary study area is delineated in **Figure 2.1**, and is comprised of:

- The Reston TSAs: Areas surrounding the existing Wiehle-Reston East Metrorail Station and planned Reston Town Center and Herndon Metrorail Stations;
- Seven (7) primary corridors: VA 267-Dulles Toll Road (DTR), VA 286-Fairfax County Parkway, Sunrise Valley Drive, Sunset Hills Road, Wiehle Avenue, Reston Parkway, and Centreville Road;
- 42 primary intersections within the Study Area shown where counts were taken; and
- All other intersections in the Reston TSAs.

The geographic area covered by the PTV Visum model needed to take into account a broader geographic area than the primary study area in order to fully evaluate the effect on facilities within the study area and capture traffic diversion. The Reston Network Analysis Visum model area is defined by the region delineated in **Figure 2.2**. It extends to Arlington County to the east, Route 28 and Loudoun County to the west, Beach Mill Road and the Potomac River to the the north, and south of Route 50 to the south. It includes the three areas, Reston TSA, Innovation TSA and Tysons Corner Urban Center, which will account for the land use potential in the Comprehensive Plan. It also includes major roadways in the greater area including, a I-66, I-495, Route 28, and Route 7, in order to integrate the larger regional transportation network.

Figure 2.1: Reston Network Primary Study Area

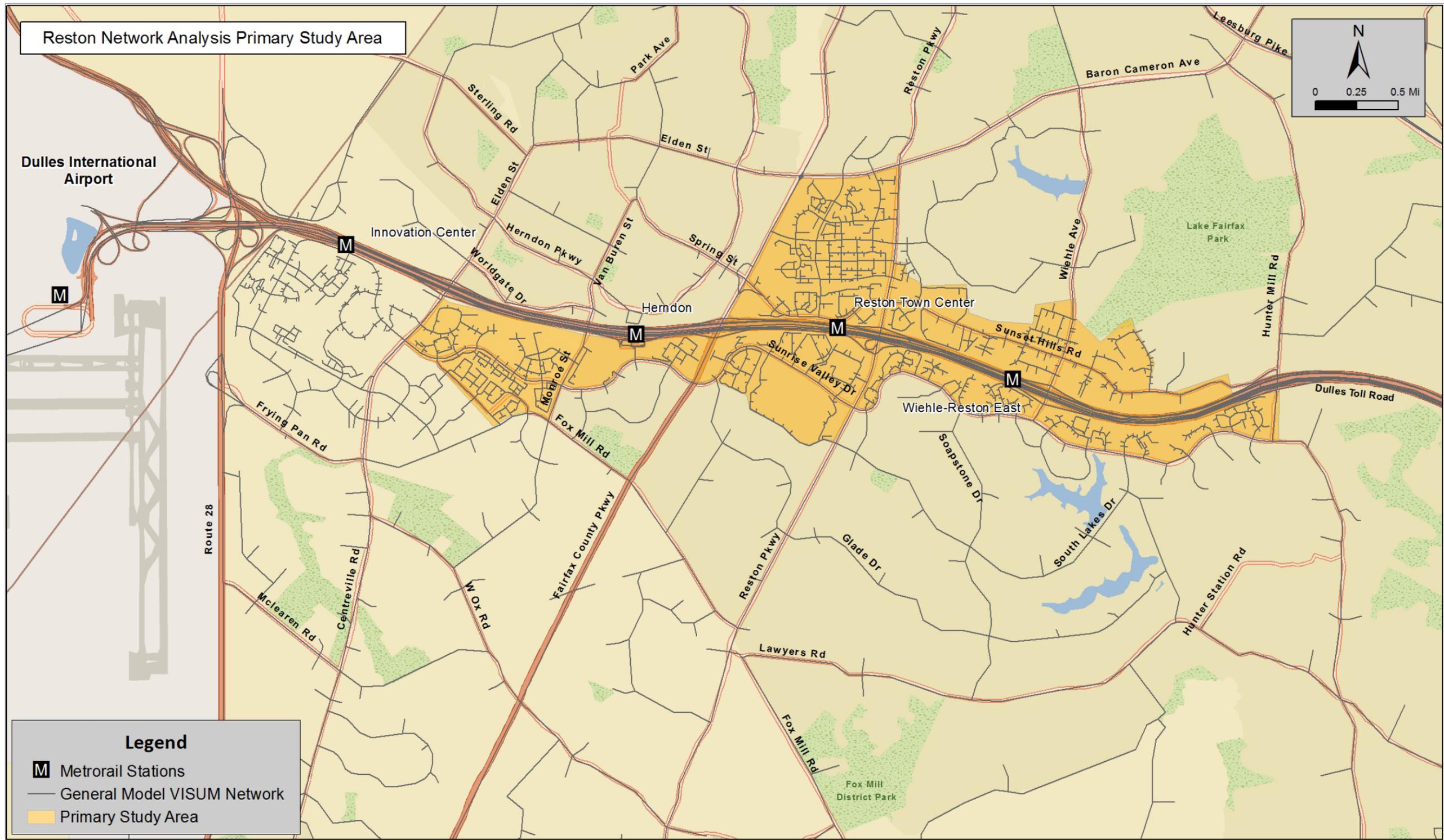
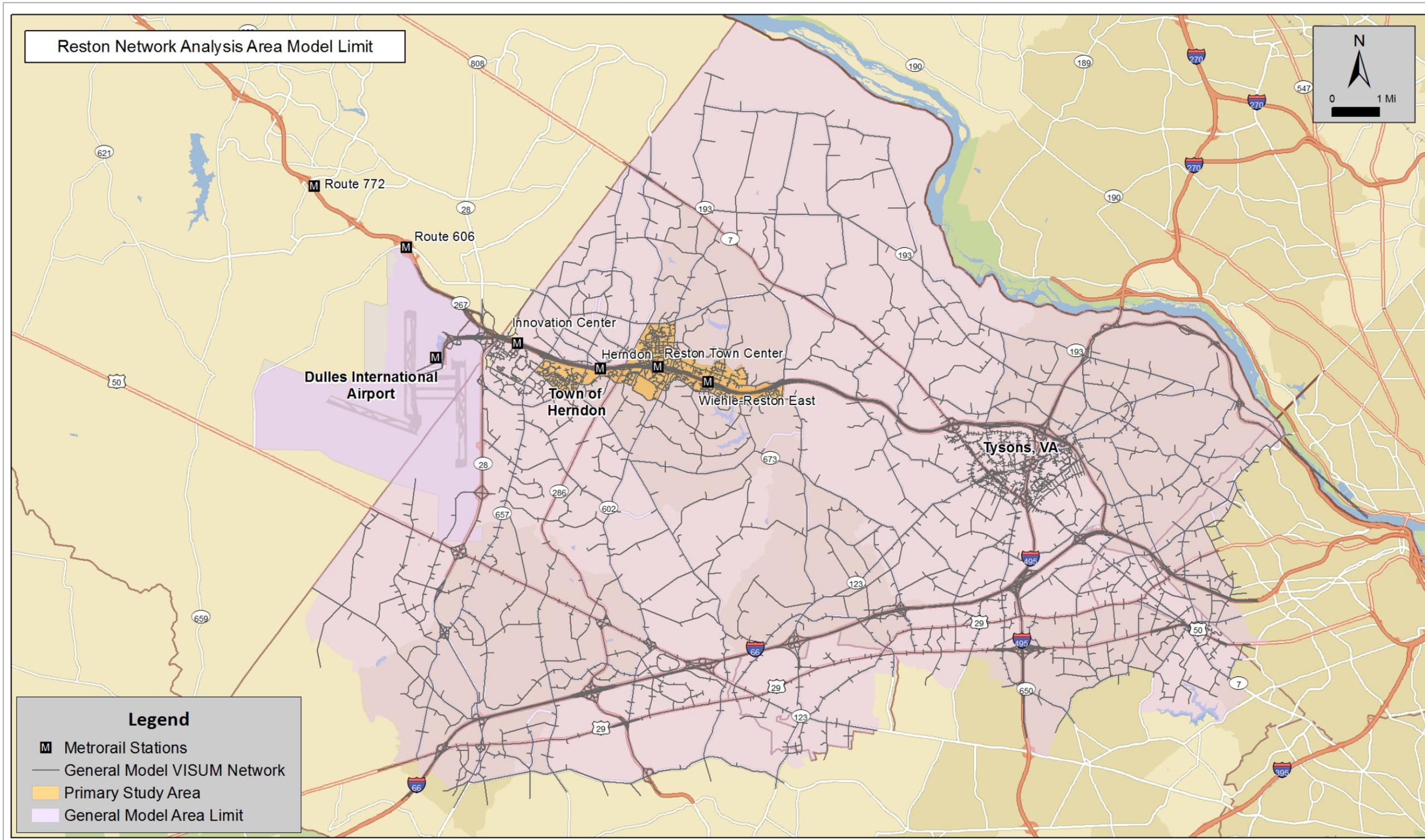


Figure 2.2: Reston Network Visum Model Area



### 3 Analysis Methodology

#### 3.1 Summary of Analysis Approach

The Regional Model and the Fairfax County Model were used as the base for trip making in the Reston Network Analysis. These models accounted for all trips starting outside the three Reston TSAs. Within the Reston TSAs the Visum model was used to generate trips. This model was used because it can account for detailed trip generation and assignment to the roadway network. The land use in the Reston Master Plan was broken down by the Department of Planning and Zoning into parcel level areas called transportation analysis zones (TAZ) and integrated into the Visum model. This was done for both Full-Buildout (2050) and Mid-Buildout (2030).

For the areas in proximity to Metrorail Stations trip reductions were taken to account for the utilization of Metrorail and the ability for people to walk between the different land uses. These reductions were broken down at  $\frac{1}{8}$  mile,  $\frac{1}{4}$  mile and  $\frac{1}{2}$  mile distances from the Metrorail stations. Different rates were taken for Full-Buildout and Mid-Buildout. There was also a trip reduction taken due to increased roadway capacity due to technological advancements. All trip reductions were agreed to by the Virginia Department of Transportation. The reductions taken can be seen in **Table 3.1**.

*Table 3.1: Proposed Total Trip Reduction, VDOT approved October 2015*

Development Type	Reston TSA TDM Vehicle Trip Reduction Goals					
	0 – 1/4 Mile		1/4 to 1/2 Mile		Beyond 1/2 Mile	
	2030	2050	2030	2050	2030	2050
<b>Office</b>	40%	45%	35%	40%	30%	35%
<b>Residential</b>	40%	45%	35%	40%	20%	25%
<b>Technological Advancement for all Trips</b>	-	7.5%	-	7.5%	-	7.5%

Volumes from the Visum model reflecting the trips generated by the future Reston Land Use were used to understand the impact on the planned roadway network. These volumes were analyzed to understand the LOS intersections within the TSAs would operate at. LOS is used to measure traffic service conditions qualitatively based on average delay per vehicle (in seconds). LOS values ranges from LOS A (free flow vehicle movement) to LOS F (breakdown of vehicle flow). The Highway Capacity Manual (HCM) LOS criteria for both signalized and unsignalized intersections is shown in **Table 3.2**. LOS D indicates traffic conditions approaching unstable flow while LOS E represents unstable flow with undesirable delay. LOS F is generally considered as forced flow with congestion and queues consistently failing to clear. LOS E is the standard for the Reston TSAs.

Table 3.2: Level-of-Service Criteria for Signalized Intersections

LOS	Average Intersection Delay (seconds/vehicle)
A	<=10
B	>10 - 20
C	>20 - 35
D	>35 - 55
E	>55 - 80
F	>80

### 3.2 Detailed Methodology

A Multi-resolution Modeling (MRM) approach was used for the Reston Network Analysis. This multi-disciplinary and comprehensive approach is tiered into three levels, intended to capture the relationship between demographics, land use, and development; and their impacts on people movements and vehicular interactions. At the macro level, the travel demand forecast is based on the regional demographics and socio-economic projections. Using the results from the travel demand forecasts, along with parcel level land use data and development site plans, a mesoscopic level model can predict local level trips and traffic volumes by time of day based on travel mode. A traffic microsimulation level model can then be used to further optimize traffic operations and identify mitigation options.

The forecasts for the planned land use in the Reston TSAs were developed with the MRM methodology described above, which takes advantage of methods already in place using the regional static Cube Voyager-based Fairfax County Travel Demand Model (FCTDM). Highway volumes were extracted from the FCTDM and analyzed at a more refined level using the PTV Visum software and the Reston Mesoscopic Model (RMM). This intermediate mesoscopic model used 30-minute time intervals from the FCTDM, based on distribution by trip type. High-level operational analysis was then performed using Synchro, an industry standard intersection analysis software. The detailed procedures used to develop and calibrate existing models are shown in **Figure 3.1**.

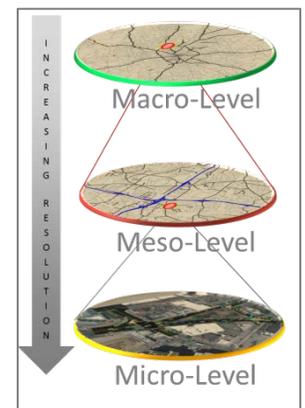
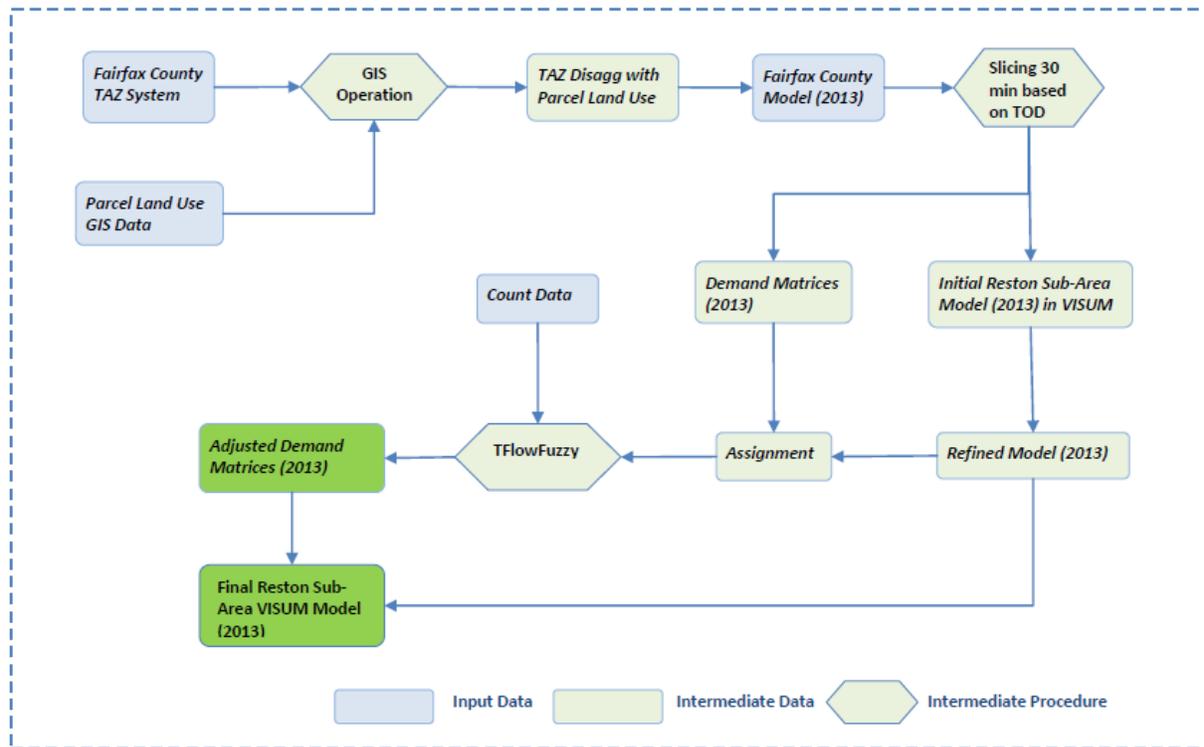


Figure 3.1: Trip Table Development Procedure



### 3.3 Reston Area Parcel-based TAZ System

A parcel-based zone system was developed within the Reston study sub-area where parcels replaced transportation analysis zones (TAZs); outside of the study area, TAZs remain as in the Fairfax County Travel Demand model. Parcels were used as they are a smaller geographic area and allow for more detailed analysis than the larger TAZs. In order to establish this unified TAZ system, parcel overlays, splits, and Geographic Information Systems (GIS) alignment procedures were used to create the zone structure. The same GIS procedures were used to process current TAZs and parcel land use data.

Origin-Destination (O-D) trip table development for this parcel-based TAZ system for the Full-Buildout and Mid-Buildout (2050 and 2030) scenarios include three procedures: the Travel Demand Model, GIS, and matrices manipulation.

- **Travel Demand Model procedure to create initial 30-minute interval trip tables**

Trip tables in the FCTDM were disaggregated into 30-minute slices using diurnal distribution by trip purpose and directionality. A sub-network model, including Reston and surrounding areas, was then extracted from the FCTDM. TAZs within the study area have been replaced with parcels at the FCTDM-level for the extraction. From the parcel-based Reston sub-area model, trip tables were created based on highway modes (Single Occupancy Vehicle (SOV), High Occupancy Vehicle (HOV)2, HOV3, Commercial, Truck, and Air Passengers) and then assigned at 30-minute intervals for both AM and PM peak periods.

- **GIS procedure to create parcel based ITE rated trips for future years (2030 and 2050)**

GIS was used to calculate origin and destination trips (by peak hour and 30-minute intervals) for each parcel in the study area based on Institute of Transportation Engineers (ITE) rates and transit reduction factors.

There are three distance ranges: up to  $\frac{1}{4}$  mile,  $\frac{1}{4}$  to  $\frac{1}{2}$  mile, and beyond  $\frac{1}{2}$  mile from the transit stations, that demarcate trip reduction zones. Trip reduction zones were constructed based on ring buffers around the Metrorail Stations with these three distances.

Each parcel was assigned trip reduction factors by overlaying parcel GIS data with the trip reduction zones. For parcels overlapping reduction zones, their reduction factors were calculated based on the area-weighted average from the reduction rate in each zone; for parcels wholly within a trip reduction zone, their reduction factors were equal to the full reduction rate for that zone.

ITE trip generation rates (from Edition 8 to be consistent with the previously related Tysons study) were applied to parcel land use data to get origin and destination trips for each parcel for both AM and PM peak periods. Then parcel trip reduction factors were applied to the origin and destination trips to get final origin and destination trips for each parcel.

- **Matrix balancing technique to create final 30-minute interval O-D trip tables for future years (2030 and 2050)**

All trip tables, by mode, for a given 30-minute interval, were summed to one trip table, which were adjusted by the parcel ITE trips. Afterwards, final trip tables by mode were proportionally calculated from the adjusted summed trip table.

### 3.3.1 TAZ Development

In order to better represent the land use changes in the Visum model, TAZs in the MWCOG / FCTDM were refined. Refining the zones enabled the model to include a higher level of detail for driveways and other origin/destination access points. After the new TAZs were created in the Reston and Tysons Corner areas, initial trip tables at 30-minute intervals for both AM (6:00 – 9:00) and PM (3:00 – 7:00) peak periods for the six travel modes (Single Occupant Vehicle (SOV), vehicle with two occupants (HOV2), vehicle with 3 or more occupants (HOV3+), Commercial Vehicles, Trucks, and Air Passengers) were generated for the unified TAZ system.

The following lists the main components for the base year Visum network development:

- A unified TAZ system was created by refining Reston and Tysons area TAZ to block/parcel level from MWCOG model. There are 314 zones in Reston area, and 145 zones in Tysons area (**Figure 3.2** and **Figure 3.3**).

Figure 3.2: Reston Area Unified TAZ System

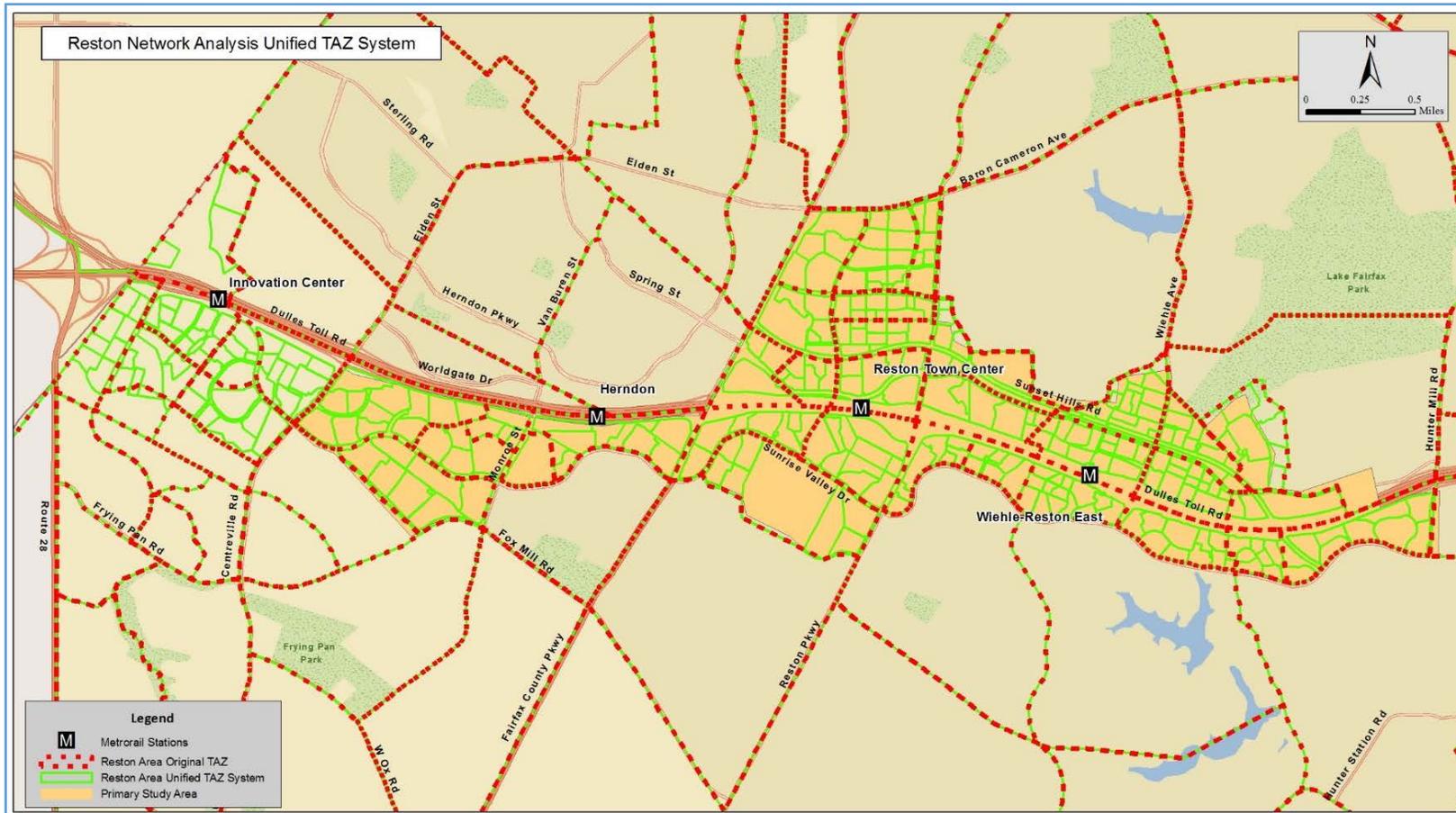
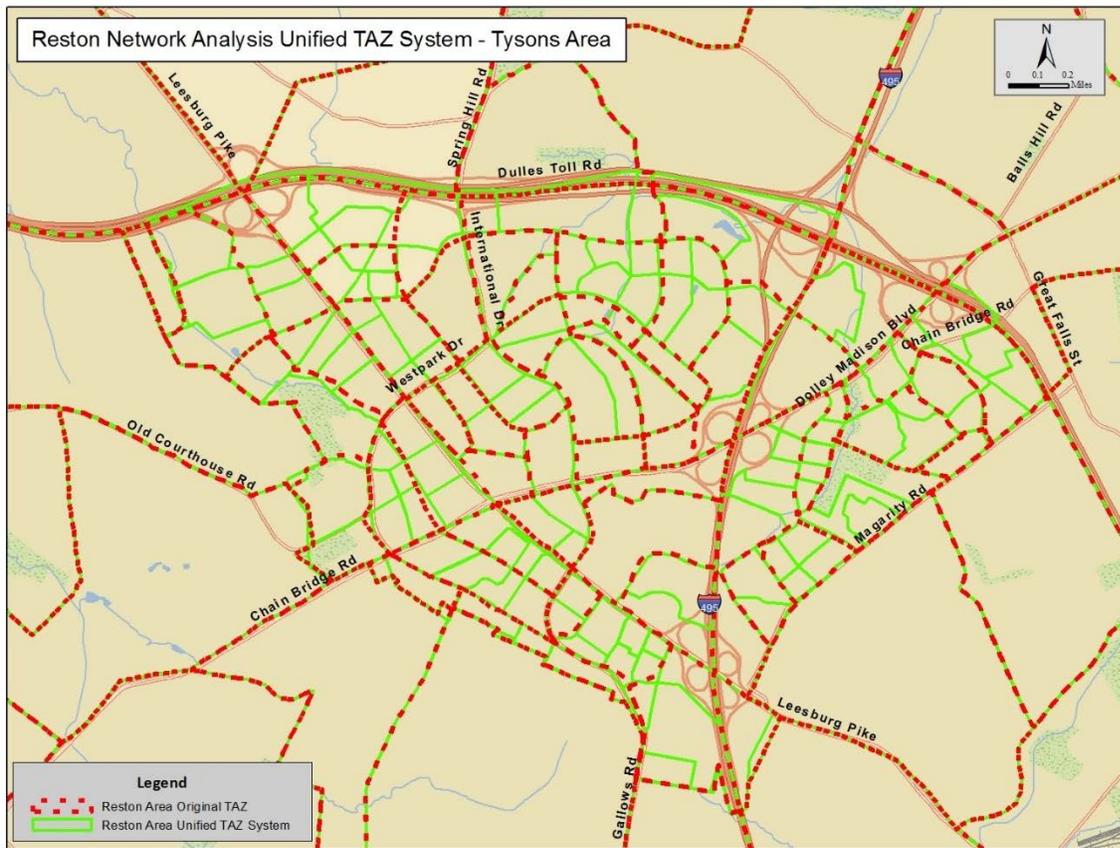


Figure 3.3: Tysons Area Unified TAZ System



- A sub-network from the MWCOC model with 887 zones, including 813 TAZs and 74 external loading zones. This network was imported into Visum as the base for model development. These zones are summarized in **Table 3.3**.

Table 3.3: Disaggregation of 2050 General Build-Out Land Use

Region\Category	Parcel Groups	Disaggregated to Unified TAZ System
Reston TSAs	72	262
Innovation Station TSA	29	49
<b>Reston Area Total</b>	<b>101</b>	<b>311</b>

- Roadway network: Roadway links from the Fairfax County model are kept as the base. Within the study area (Reston Primary Study Area and Tysons Corner Area), more detailed local roads and driveways were added to the network.
- Centroid connectors: Centroid connectors for each parcel (TAZ) within the study area were refined to connect to building driveways. Outside the primary study area, centroid connectors were also refined to connect to stub links for future dynamic user equilibrium assignment.

- Geometric data / network attributes for roadways and intersections in the primary study area include:
  - Number of lanes by travel direction: this information was carried over from the regional model and cross-checked with aerial imagery.
  - Intersection geometry and signal timings for 42 primary intersections were coded.
  - Posted speed.
  - Link Capacity: the functional class code for each link was coded and then was calculated based on a lookup table from the MWCOG model.
  - Turn capacity.
  - Turn restrictions and turn delay.
  - Lane usage restrictions, such as HOV or truck access prohibition.

### 3.4 Capacity Analysis

The capacity analysis performed for the study area intersections used the methodology presented in the 2000 Highway Capacity Manual (HCM). The HCM methodology calculates a volume-to-capacity (v/c) ratio for the approaches, and lane groups, of a controlled intersection. The v/c ratio is one the metrics obtained from a Synchro analysis that allows traffic engineers to assess how well an intersection processes the traffic demand it receives. The HCM methodology also defines the quality of traffic flow in terms of level of service, which, for intersection analysis, is based on the average delay (in seconds) that a vehicle experiences when approaching an intersection during the analysis period. The LOS corresponding to various delays is shown in **Table 3.4** below. It should be noted that for “two-way stop controlled” unsignalized intersections (e.g., controlled by stop signs only on the minor street), the HCM methodology generally assumes that traffic on major streets is not affected by minor-street traffic flows and therefore does not calculate delays for the uncontrolled approaches. To better understand the traffic conditions along each major corridor, as well as the extent of queuing and congestion within the study area, Trafficware’s Synchro software package (Version 9) was employed to carry out the HCM based analysis used to identify the delays and corresponding levels of service at intersections.

*Table 3.4: Intersection LOS Criteria*

Level of Service	Average Delay per Vehicle (seconds)	
	Signalized Intersections	Unsignalized Intersections
A	≤ 10	0 – 10
B	> 10 – 20	> 10 – 15
C	> 20 – 35	> 15 – 25
D	> 35 – 55	> 25 – 35
E	> 55 – 80	> 35 – 50
F	> 80	> 50

Source: Highway Capacity Manual, 2000

## 4 Data Collection

### 4.1 Overview

In order to create a detailed Existing Conditions Visum network that could be used to forecast future conditions, a comprehensive data collection effort was undertaken from May 2015 to June 2015. This data collection effort included:

- Automatic Traffic Recorder (ATR) counts;
- Turning Movement Counts (TMCs);
- GPS travel time runs; and
- Queue measurements.

Signal timings and roadway geometries were provided by FCDOT in the form of Synchro files obtained from the Virginia Department of Transportation (VDOT). This information was reviewed for accuracy and consistency.

### 4.2 ATR Counts

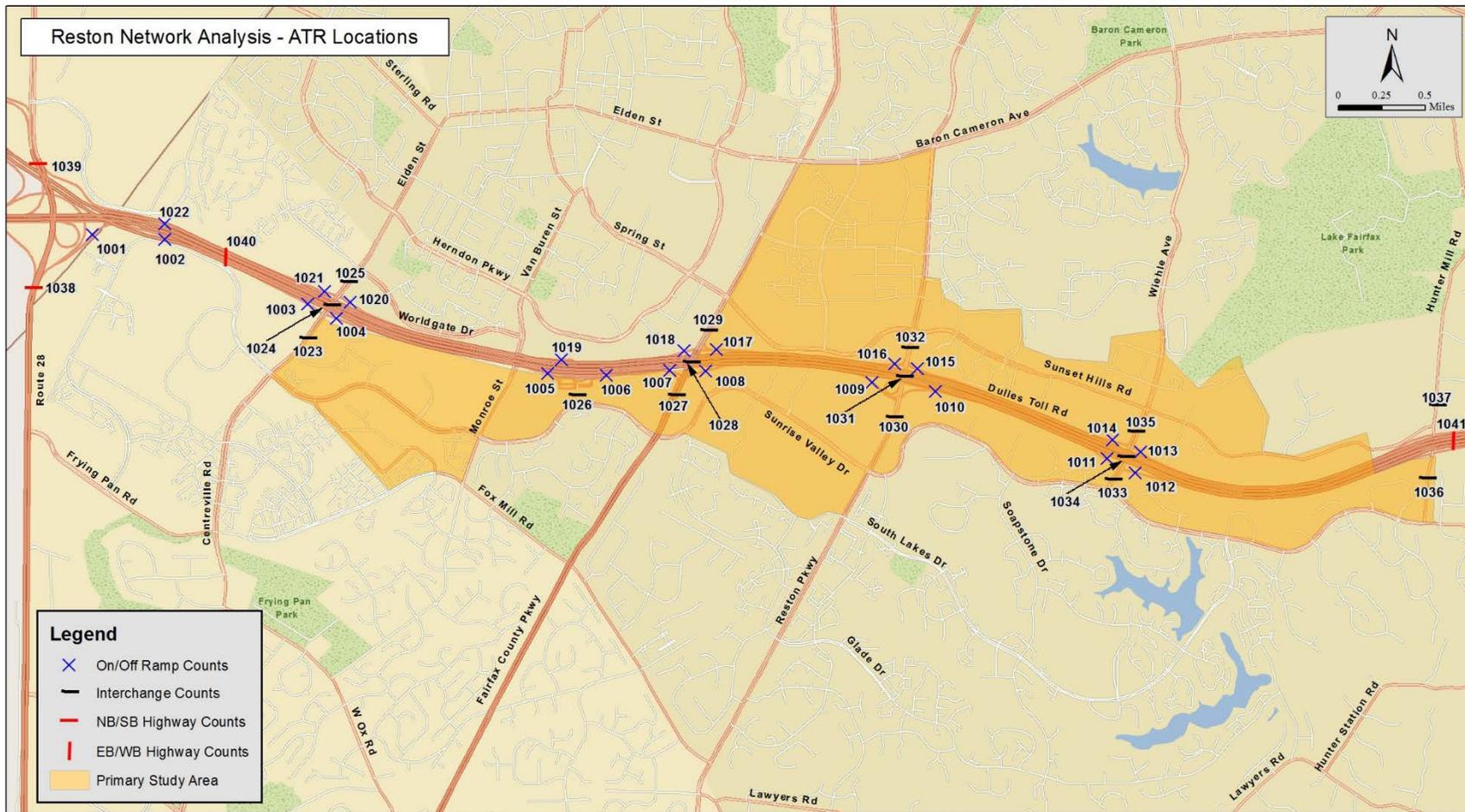
ATR counts were recorded in 15-minute intervals at 41 roadway segment locations within the study area (see **Table 4.1** and **Figure 4.1**). Four of the locations (denoted with an asterisk (\*) in **Table 4.1**) used radar units to collect vehicle count and vehicle classification data.

Table 4.1: ATR Count Locations

ID	Location
1001	Route 28 northbound off-ramp to DTR eastbound
1002	VA 267 Dulles Toll Road (DTR) eastbound ramp to stay of DTR eastbound
1003	DTR eastbound off-ramp to Centreville Road
1004	DTR eastbound on-ramp from Centreville Road
1005	DTR eastbound off-ramp to Herndon-Monroe Park & Ride
1006	DTR eastbound frontage just east of Herndon-Monroe Park & Ride
1007	DTR eastbound frontage road off-ramp to Fairfax County Parkway
1008	DTR eastbound on-ramp from Fairfax County Parkway
1009	DTR eastbound off-ramp to Reston Parkway
1010	DTR eastbound on-ramp from Reston Parkway
1011	DTR eastbound off-ramp to Wiehle Avenue
1012	DTR eastbound on-ramp from Wiehle Avenue
1013	DTR westbound off-ramp to Wiehle Avenue
1014	DTR westbound on-ramp from Wiehle Avenue
1015	DTR westbound off-ramp to Reston Parkway
1016	DTR westbound on-ramp from Reston Parkway
1017	DTR westbound off-ramp to Fairfax County Parkway
1018	DTR westbound on-ramp from Fairfax County Parkway
1019	DTR westbound on-ramp from Herndon-Monroe Park & Ride
1020	DTR westbound off-ramp to Centreville Road
1021	DTR westbound on-ramp from Centreville Road
1022	DTR westbound off-ramp to VA-28 north / Sully Road
1023	Centreville Road south of DTR eastbound ramps (SB)
1024	Centreville Road between eastbound/westbound DTR ramps (NB & SB)
1025	Centreville Road north of DTR westbound ramps (NB & SB)
1026	Roark Drive north of Sunrise Valley Drive (NB & SB)
1027	VA 286 (Fairfax County Parkway) south of DTR eastbound ramps (NB & SB)
1028	Fairfax County Parkway between eastbound/westbound DTR ramps (NB & SB)
1029	Fairfax County Parkway north of DTR westbound ramps (NB & SB)
1030	Reston Parkway south of DTR eastbound ramps (NB & SB)
1031	Reston Parkway between DTR eastbound/westbound ramps (NB & SB)
1032	Reston Parkway north of DTR westbound ramps (NB & SB)
1033	Wiehle Avenue south of DTR eastbound ramps (NB & SB)
1034	Wiehle Avenue between DTR eastbound/westbound ramps (NB & SB)
1035	Wiehle Avenue north of DTR westbound ramps (NB & SB)
1036	Hunter Mill Road south of DTR eastbound ramps (NB & SB)
1037	Hunter Mill Road north of Sunset Hills Rd (NB & SB)
1038	Route 28 south of DTR (NB & SB)*
1039	Route 28 north of DTR (NB & SB)*
1040	DTR eastbound east of Route 28 (EB & WB)*
1041	DTR east of Hunter Mill Road (EB & WB)*

\* Indicates radar used for vehicle counts and vehicle classification counts

Figure 4.1: ATR Data Collection Locations



### 4.3 TMCs

Manual TMCs were conducted at 42 intersections within the study area (see **Table 4.2**) and Figure 4.2. These counts were balanced between adjacent count locations, and are summarized into flow maps representing the 2015 Existing Conditions for the AM and PM peak hours, as shown in **Figure 4.3 - Figure 4.8**. Queue measurements (discussed in **Section 4.5**) were also taken at 20 intersections (denoted with an asterisk (\*) in **Table 4.2**).

Table 4.2: TMC Locations

ID	Intersection	ID	Intersection
1	Centreville Road & Worldgate Drive	22	Sunset Hills Road & Microsoft office
2	Centreville Road & DTR WB off-ramp*	23	Reston Parkway & Baron Cameron Avenue
3	Centreville Road & DTR EB off-ramp*	24	Reston Parkway & New Dominion Parkway/Temporary Road
4	Centreville Road & Sunrise Valley Drive*	25	Reston Parkway & Bluemont Way
5	Centreville Road & Coppermine Road	26	Reston Parkway & Sunset Hills Road*
6	Centreville Road & Frying Fan Road	27	Reston Parkway & DTR WB off-ramp*
7	Sunrise Valley Drive & Frying Pan Road	28	Reston Parkway & DTR EB off-ramp*
8	Van Buren Street/Monroe Street & Worldgate Drive	29	Reston Parkway & Sunrise Valley Drive*
9	Monroe Street & Sunrise Valley Drive*	30	Reston Parkway & South Lakes Drive
10	Monroe Street & Frying Pan Road	31	Reston Parkway & Glade Drive
11	Spring Street & Herndon Parkway	32	Reston Parkway & Fox Mill Road
12	Spring Street & Ramp to Fairfax County Parkway*	33	Reston Parkway & McLearn Road/Lawyers Road
13	Fairfax County Parkway & Baron Cameron Avenue	34	Sunrise Valley Drive & Soapstone Drive
14	Fairfax County Parkway & New Dominion Parkway	35	Wiehle Avenue & Sunset Hills Road *
15	Fairfax County Parkway & Ramp to Spring Street*	36	Wiehle Avenue & WB DTR Ramps*
16	Fairfax County Parkway & Dulles Toll Road WB off-ramp*	37	Wiehle Avenue & EB DTR Ramps*
17	Fairfax County Parkway & Dulles Toll Road EB off-ramp*	38	Wiehle Avenue & Sunrise Valley Drive*
18	Fairfax County Parkway & Sunrise Valley Drive*	39	Hunter Mill Road & Sunset Hills Road*
19	Fairfax County Parkway & Fox Mill Road	40	Hunter Mill Road & WB DTR Ramps*
20	Baron Cameron Avenue & Town Center Parkway	41	Hunter Mill Road & EB DTR Ramps*
21	Sunset Hills Road & Town Center Parkway	42	Hunter Mill Road & Sunrise Valley Drive

\* Queue measurements made at this location.

Figure 4.2: TMC Data Collection Locations

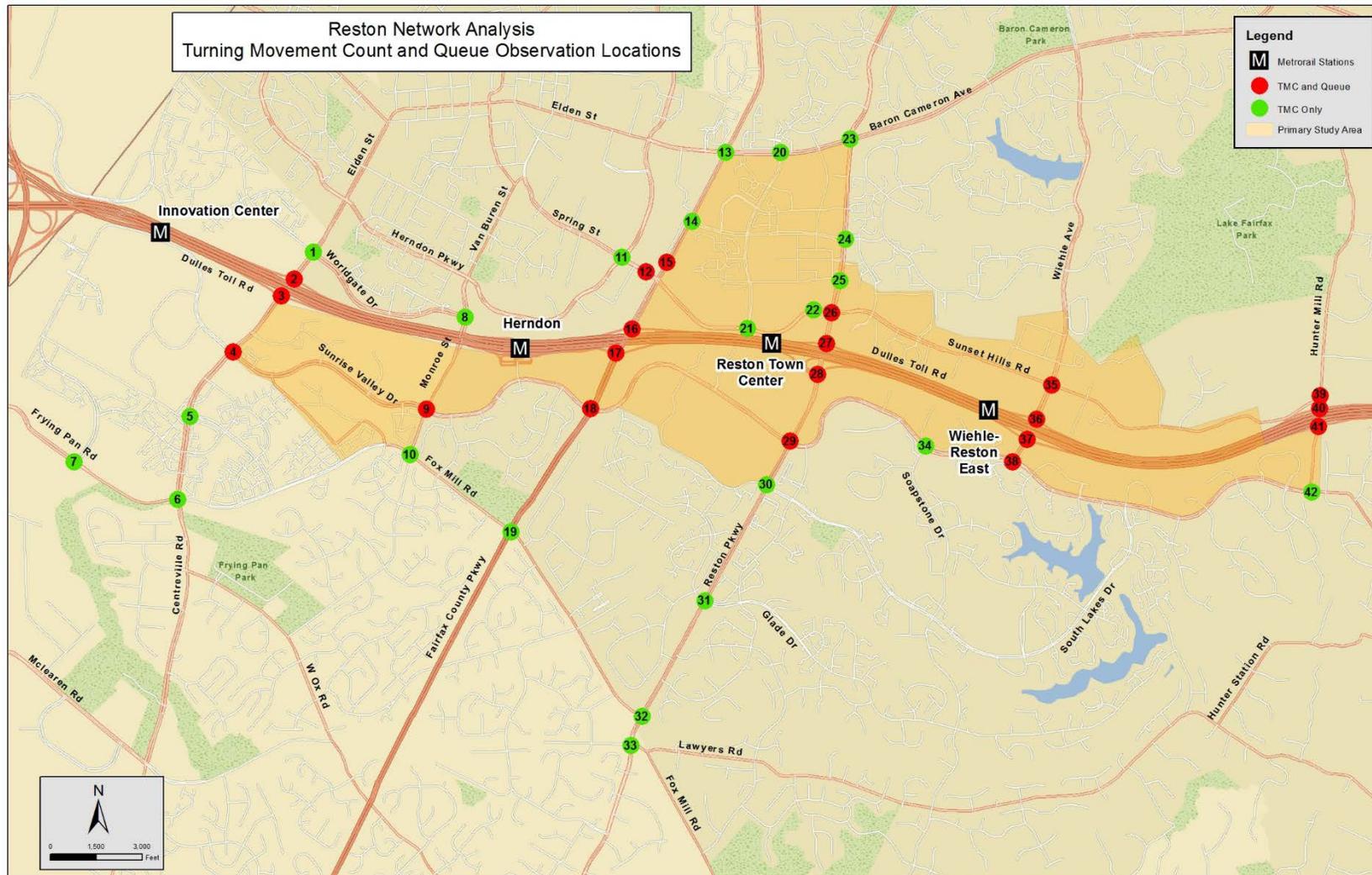


Figure 4.3: AM Existing Peak Hour Turning Movement Volumes (1 of 3)

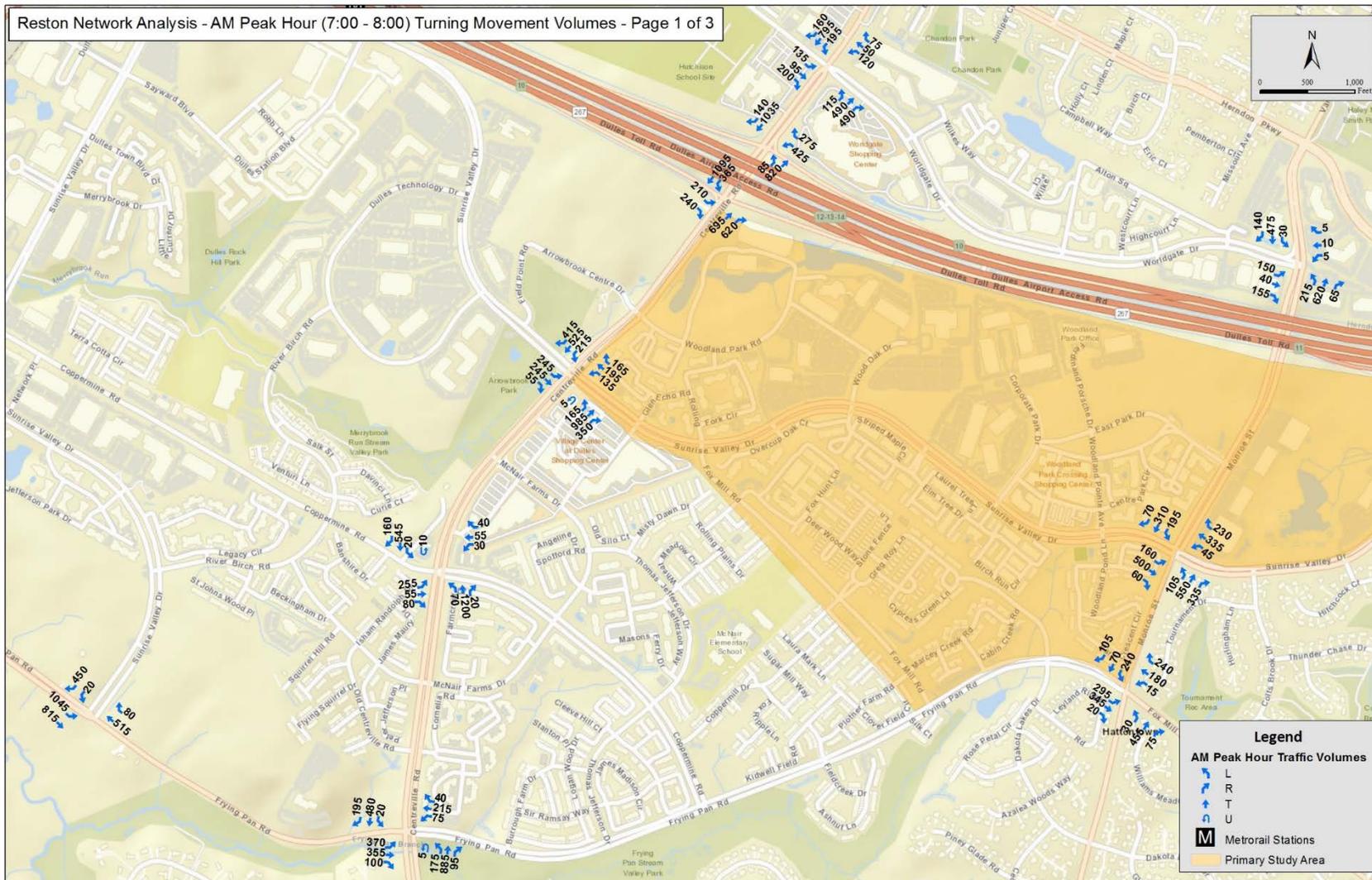


Figure 4.4: AM Existing Peak Hour Turning Movement Volumes (2 of 3)

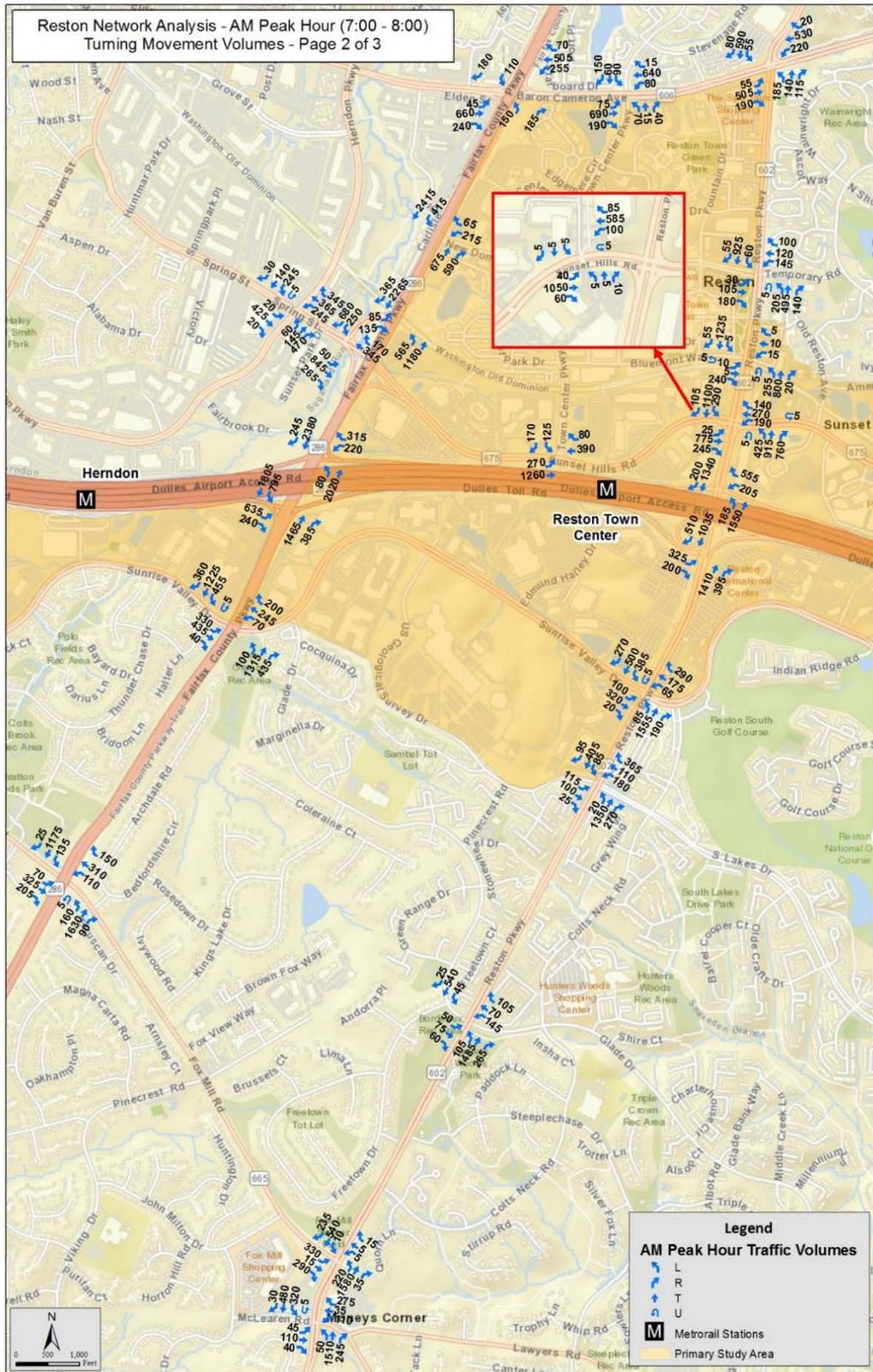


Figure 4.5: AM Existing Peak Hour Turning Movement Volumes (3 of 3)

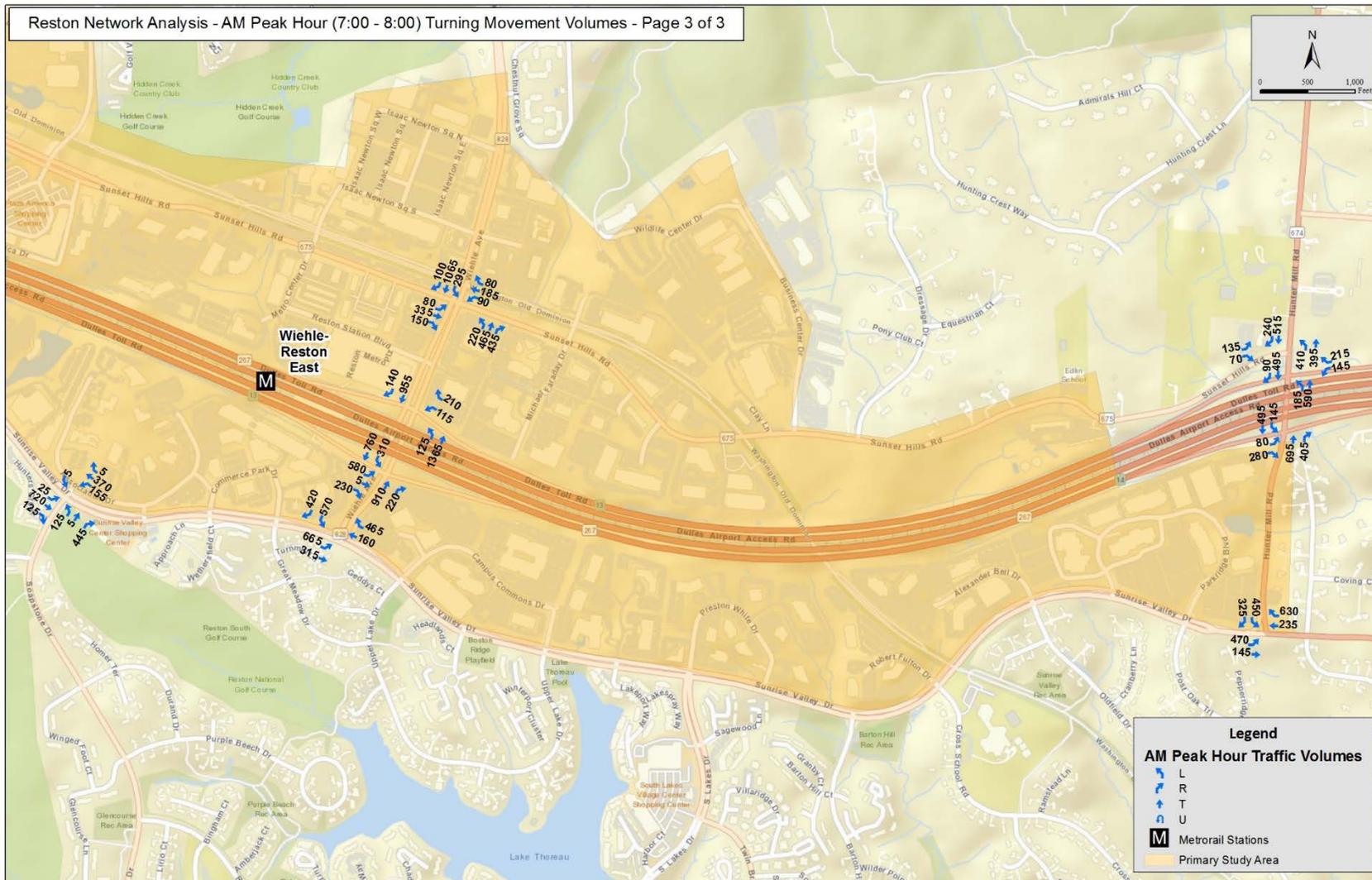


Figure 4.6: PM Existing Peak Hour Turning Movement Volumes (1 of 3)

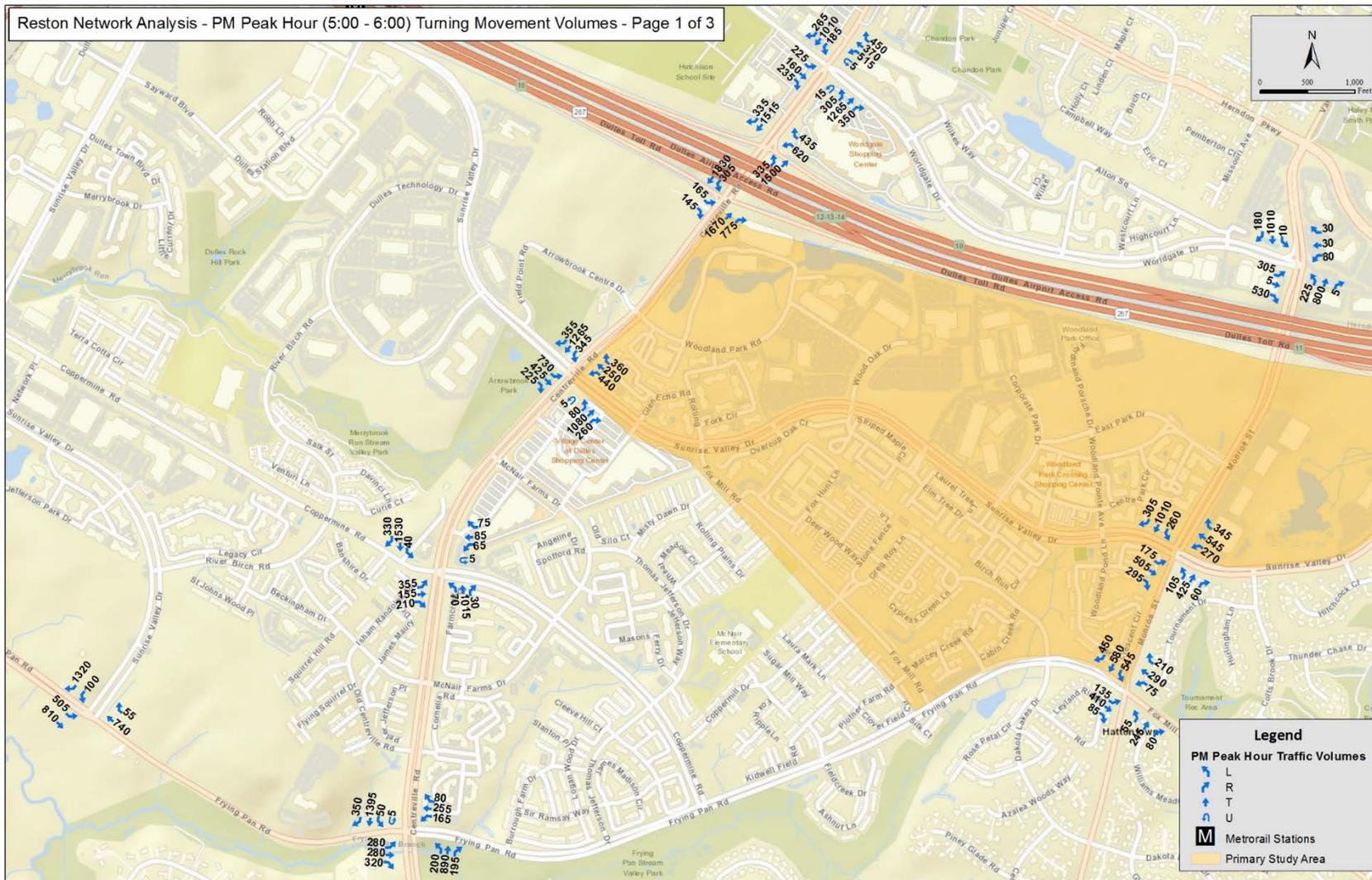
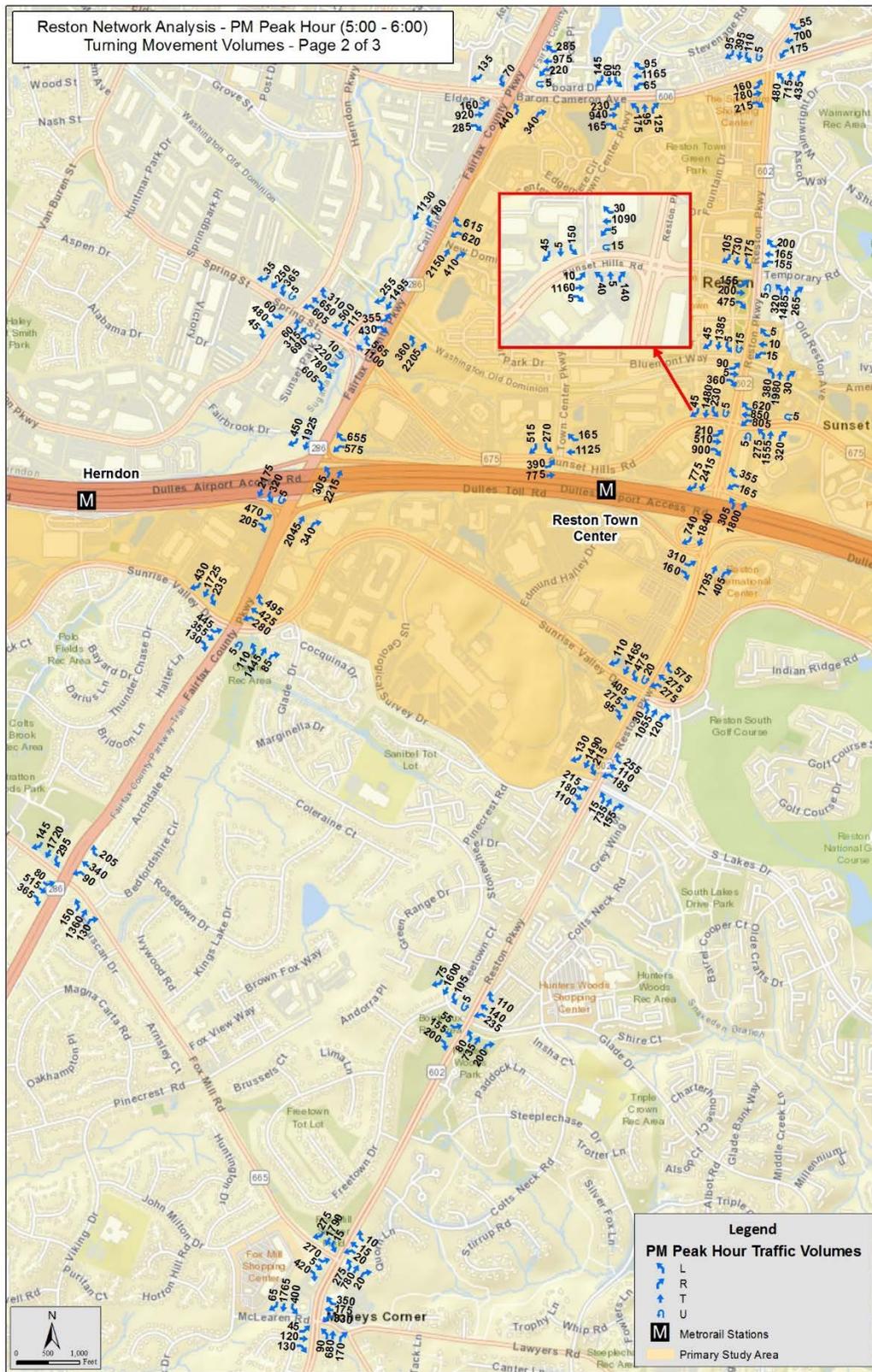


Figure 4.7: PM Existing Peak Hour Turning Movement Volumes (2 of 3)





#### 4.4 Travel Time Runs

Travel time runs were conducted to gather speed and delay information that is used to calibrate the existing conditions models so that they can reasonably replicate typical existing conditions. The runs were conducted along the following seven (7) corridors during the AM and PM peak periods (6:00 AM - 9:00 AM and 3:30 PM - 6:30 PM):

1. Dulles Toll Road (between Route 28 and Hunter Mill Road);
2. Fairfax County Parkway (between Fox Mill Road and Lake Newport Road);
3. Sunrise Valley Drive (between Centreville Road and Hunter Mill Road);
4. Sunset Hills Road (between Fairfax County Parkway and Hunter Mill Road);
5. Reston Parkway (between Lawyers Road and Baron Cameron Avenue);
6. Centreville Road (between West Ox Road and Parcher Avenue/Worldgate Drive); and
7. Wiehle Avenue (between Sunrise Valley Drive and North Shore Drive).

Each vehicle used a GPS data recorder, which records the vehicle's geographical location during every second of the travel time run. Drivers were instructed to drive continuously from one end of the route to the other, for the duration of each peak period. The data was processed to determine the average travel times and, ultimately, speeds for each corridor, by direction (see **Table 4.3** and **Table 4.4**).

Table 4.3: AM Travel Time Run Results

ID	Corridor		AM Peak Period (6:00 AM - 9:00 AM)		AM Peak Hour (7:00 AM - 8:00 AM)	
			Avg Speed (mph)	Number of Runs	Avg Speed (mph)	Number of Runs
1	EB	Dulles Toll Road*	44.2	8	50.2	4
1	WB	Dulles Toll Road	66.7	10	63.8	3
2	NB	Fairfax County Parkway*	33.6	7	34.5	5
2	SB	Fairfax County Parkway	34.5	7	33.9	5
3	EB	Sunrise Valley Drive*	31.0	3	32.9	1
3	WB	Sunrise Valley Drive	32.7	3	31.8	2
4	EB	Sunset Hills Road*	29.2	5	27.9	2
4	WB	Sunset Hills Road	28.0	4	27.6	2
5	NB	Reston Parkway**	28.1	11	34.9	5
5	SB	Reston Parkway**	40.9	10	42.5	5
6	NB	Centreville Road**	31.6	15	30.8	2
6	SB	Centreville Road**	27.2	15	25.0	2
7	NB	Wiehle Avenue	31.9	16	36.8	4
7	SB	Wiehle Avenue*	19.0	15	13.8	3

\* Indicates peak travel direction.

\*\* Indicates the peak direction is toward Dulles Toll Road in the AM peak and away from Dulles Toll Road in the PM peak.

Table 4.4: PM Travel Time Run Results

ID	Corridor		PM Peak Period (3:30 PM - 6:30 PM)		PM Peak Hour (5:00 PM - 6:00 PM)	
			Avg. Speed (mph)	Number of Runs	Avg. Speed (mph)	Number of Runs
1	EB	Dulles Toll Road*	79.1	4	78.8	4
1	WB	Dulles Toll Road	62.5	4	59.7	4
2	NB	Fairfax County Parkway*	33.0	3	33.0	3
2	SB	Fairfax County Parkway	17.4	3	17.4	3
3	EB	Sunrise Valley Drive*	28.4	5	27.4	2
3	WB	Sunrise Valley Drive	32.7	4	23.8	2
4	EB	Sunset Hills Road*	17.1	4	14.1	2
4	WB	Sunset Hills Road	25.8	4	21.3	1
5	NB	Reston Parkway**	27.5	8	25.0	3
5	SB	Reston Parkway**	19.7	7	15.4	3
6	NB	Centreville Road**	21.4	11	21.3	5
6	SB	Centreville Road**	21.5	12	18.8	5
7	NB	Wiehle Avenue	16.7	10	12.6	3
7	SB	Wiehle Avenue*	10.1	10	6.7	3

\* Indicates peak travel direction.

\*\* Indicates the peak direction is toward Dulles Toll Road in the AM peak and away from Dulles Toll Road in the PM peak.

#### 4.5 Queue Measurements

Per VDOT guidance, queue length data at signalized intersections was needed to calibrate the Existing Conditions in the microsimulation model.<sup>1</sup> Although Synchro is not a microsimulation tool, this guideline was used for advisory purposes.

Queue measurements were conducted at 20 intersections within the study area (see **Table 4.5**) during the AM peak hour (7:00 - 8:00 AM) and the PM peak hour (5:00 - 6:00 PM). Data was gathered using a mix of manual counts, descriptive notes, photographs, and videos.

Queue length data was recorded for every lane group at the start of the green-light phase and at the start of the red-light phase. This data was processed to find the average and maximum queue lengths to use as parameters for calibrating the Synchro model for Existing Conditions.

<sup>1</sup> Virginia Department of Transportation. Traffic Engineering Division. Traffic Operations Analysis Tool Guidebook Version 1.1. Section 6.2.5, August 2013

Table 4.5: Queue Measurement Locations

ID	Intersection	ID	Intersection
2	Centreville Road & DTR WB off-ramp	27	Reston Parkway & DTR WB off-ramp
3	Centreville Road & DTR EB off-ramp	28	Reston Parkway & DTR EB off-ramp
4	Centreville Road & Sunrise Valley Drive	29	Reston Parkway & Sunrise Valley Drive
9	Monroe Street & Sunrise Valley Drive	35	Wiehle Avenue & Sunset Hills Road
12	Spring Street & Ramp to Fairfax County Parkway	36	Wiehle Avenue & WB DTR Ramps
15	Fairfax County Parkway & Ramp to Spring Street	37	Wiehle Avenue & EB DTR Ramps
16	Fairfax County Parkway & Dulles Toll Road WB off-ramp	38	Wiehle Avenue & Sunrise Valley Drive
17	Fairfax County Parkway & Dulles Toll Road EB off-ramp	39	Hunter Mill Road & Sunset Hills Road
18	Fairfax County Parkway & Sunrise Valley Drive	40	Hunter Mill Road & WB DTR Ramps
26	Reston Parkway & Sunset Hills Road	41	Hunter Mill Road & EB DTR Ramps

## 5 Existing Conditions

### 5.1 Model Calibration

As shown in the “Reston Network Analysis – Visum Base Year Network Development Memo”, the models were adequately calibrated to match existing conditions and serve as a base for the testing of Full-Buildout and Mid-Buildout of the comprehensive land use and Grid of Streets.

The TFlowFuzzy procedure embedded in the Visum model was used to refine and update the demand matrix from the MWCOC regional models. TFlowFuzzy adjusts the TAZ demand matrix so that the Visum assignment results can reasonably match the field count data. In this study, both ATR link volumes along the DTR, turning movement count data at the primary intersections, and link volumes were used to refine the demand matrix.

AM and PM peak hour model link volume assignments, field counts, and the GEH statistic<sup>2</sup> comparing the model and field counts on the DTR, Fairfax County Parkway, and Reston Parkway are shown in **Table 5.1** and **Table 5.2**. Most locations that were compared to field data had a GEH value of less than 5,

<sup>2</sup> The Geoffrey E. Havers (GEH) statistic is used in transportation modeling as a metric to compare model output values to field values. It takes into account both the absolute difference and the percentage difference between the field values and the modeled values. A GEH value of less than 5 indicates the model output agrees with the field count, a GEH value from 5 to 10 indicates the model output is acceptable, and a GEH value above 10 indicates the part being compared does not agree well with the field count.

indicating that the model output closely agrees with the field count, and all locations have GEH values less than 10, indicating that all compared locations are reasonably calibrated.

Table 5.1: Base Year (2015) AM and PM Assigned Volumes vs. Field Count on DTR, Fairfax County Parkway, and Reston Parkway

Corridor	DIR	Type	Location	AM Peak Hour (7:00 - 8:00)			PM Peak Hour (5:00 - 6:00)		
				Field Count	Assignment Volumes	GEH	Field Count	Assignment Volumes	GEH
DTR	EB	Entrance	Rt28 NB to DTR EB	1313	1056	7.47	780	832	1.83
DTR	EB	Entrance	DTR EB to Stay on DTR EB	3577	3600	0.38	592	580	0.5
DTR	EB	Mainline	DTR EB east of ramps to/from Rt28	6883	6638	2.98	3100	3209	1.94
DTR	EB	Exit	DTR EB to Centreville Rd	450	537	3.92	310	326	0.9
DTR	EB	Entrance	Centreville Rd to DTR EB	985	948	1.19	1080	1028	1.6
DTR	EB	Exit	DTR EB Frontage to Fairfax County Parkway	875	766	3.81	675	634	1.6
DTR	EB	Entrance	Fairfax County Parkway to EB DTR	1180	947	7.14	660	678	0.7
DTR	EB	Exit	EB DTR to Reston Parkway	525	560	1.5	470	483	0.6
DTR	EB	Entrance	Reston Parkway to EB DTR	905	806	3.38	1145	1027	3.58
DTR	EB	Exit	DTR EB to Wiehle Ave	815	786	1.02	375	398	1.17
DTR	EB	Entrance	Wiehle Ave to DTR EB	535	597	2.61	665	693	1.07
DTR	EB	Mainline	DTR East of Hunter Mill Rd	8775	9638	8.99	6096	7086	12.19
DTR	WB	Mainline	DTR East of Hunter Mill Rd	4686	4677	0.13	8544	9309	8.1
DTR	WB	Exit	DTR WB to Wiehle Ave	325	331	0.33	530	586	2.37
DTR	WB	Entrance	Wiehle Ave to DTR WB	265	233	2.03	875	917	1.4
DTR	WB	Exit	DTR WB to Reston Parkway	760	738	0.8	815	965	5.03
DTR	WB	Entrance	Reston Parkway to WB DTR	385	380	0.26	1080	1032	1.48
DTR	WB	Exit	DTR WB to Fairfax County Parkway	535	541	0.26	1230	1286	1.58
DTR	WB	Entrance	Fairfax County Parkway to WB DTR	325	474	7.45	755	804	1.76
DTR	WB	Exit	DTR WB to Centreville Rd	700	709	0.34	1055	1150	2.86
DTR	WB	Entrance	Centreville Rd to DTR WB	225	294	4.28	670	690	0.77
DTR	WB	Mainline	DTR WB just east of Rt28/Rt267 split	2009	2275	5.75	5960	6310	4.47
Fairfax County Parkway	NB	Arterial	Fox Mill Road	1880	2178	6.62	1640	1626	0.35
Fairfax County Parkway	NB	Arterial	Sunrise Valley Drive	1850	1859	0.21	1640	1521	2.99
Fairfax County Parkway	NB	Arterial	South of DTR EB Ramps	1850	2161	6.94	2385	2354	0.64
Fairfax County Parkway	NB	Arterial	Between DTR Ramps	2100	2222	2.62	2520	2495	0.5
Fairfax County Parkway	NB	Arterial	North of DTR WB Ramps	2335	2389	1.11	2870	2801	1.3
Fairfax County Parkway	NB	Arterial	Ramp to Spring Street	1745	1759	0.33	2565	2515	0.99
Fairfax County Parkway	NB	Arterial	New Dominion Parkway	1265	1364	2.73	2560	2516	0.87
Fairfax County Parkway	NB	Arterial	Baron Cameron Avenue	740	793	1.91	2765	2590	3.38
Fairfax County Parkway	SB	Arterial	Baron Cameron Avenue	2830	2462	7.15	1310	1488	4.76
Fairfax County Parkway	SB	Arterial	New Dominion Parkway	2630	2293	6.79	1750	1926	4.11
Fairfax County Parkway	SB	Arterial	Ramp to Spring Street	2400	2113	6.04	1925	2009	1.89
Fairfax County Parkway	SB	Arterial	Fairfax County Parkway SB - North of DTR WB Ramps	2625	2457	3.33	2375	2615	4.8
Fairfax County Parkway	SB	Arterial	Fairfax County Parkway SB - between DTR Ramps	2600	2357	4.88	2495	2791	5.76
Fairfax County Parkway	SB	Arterial	Fairfax County Parkway SB - South of DTR EB Ramps	2040	2116	1.67	2390	2606	4.32
Fairfax County Parkway	SB	Arterial	Sunrise Valley Drive	1335	1313	0.6	2160	2035	2.73
Fairfax County Parkway	SB	Arterial	Fox Mill Road	1490	1511	0.54	2175	2356	3.8

Table 5.2: Base Year (2015) AM and PM Assigned Volumes vs. Field Count on DTR, Fairfax County Parkway, and Reston Parkway (continued)

Corridor	DIR	Type	Location	AM Peak Hour (7:00 - 8:00)			PM Peak Hour (5:00 - 6:00)		
				Field Count	Assignment Volumes	GEH	Field Count	Assignment Volumes	GEH
Reston Parkway	NB	Arterial	McLearen Road/Lawyers Road	1805	1955	3.46	940	1016	2.43
Reston Parkway	NB	Arterial	Fox Mill Road	1835	1831	0.09	1075	1115	1.21
Reston Parkway	NB	Arterial	Glade Drive	1855	1745	2.59	1015	1035	0.62
Reston Parkway	NB	Arterial	South Lakes Drive	1640	1603	0.92	905	919	0.46
Reston Parkway	NB	Arterial	Sunrise Valley Drive	1830	1745	2.01	1205	1162	1.25
Reston Parkway	NB	Arterial	South of DTR EB Ramps	1805	1731	1.76	2200	1923	6.1
Reston Parkway	NB	Arterial	Between DTR Ramps	1735	1679	1.36	2105	1891	4.79
Reston Parkway	NB	Arterial	North of DTR WB Ramps	2100	2022	1.72	2150	2191	0.88
Reston Parkway	NB	Arterial	Bluemont Way	1075	1105	0.91	2390	2346	0.9
Reston Parkway	NB	Arterial	New Dominion Parkway/Temporary Road	840	851	0.38	2070	2039	0.68
Reston Parkway	NB	Arterial	Baron Cameron Avenue	440	500	2.77	1630	1511	3
Reston Parkway	SB	Arterial	Baron Cameron Avenue	1000	1180	5.45	785	773	0.43
Reston Parkway	SB	Arterial	New Dominion Parkway/Temporary Road	1250	1457	5.63	1360	1327	0.9
Reston Parkway	SB	Arterial	Bluemont Way	1490	1747	6.39	1760	1740	0.48
Reston Parkway	SB	Arterial	Reston Parkway SB - North of DTR WB Ramps	1540	1622	2.06	3190	2908	5.11
Reston Parkway	SB	Arterial	Reston Parkway SB - between DTR Ramps	1545	1637	2.31	2580	2542	0.75
Reston Parkway	SB	Arterial	Reston Parkway SB - South of DTR EB Ramps	1235	1443	5.68	2000	2030	0.67
Reston Parkway	SB	Arterial	Sunrise Valley Drive	585	844	9.69	1835	1865	0.7
Reston Parkway	SB	Arterial	South Lakes Drive	610	716	4.12	1780	1695	2.04
Reston Parkway	SB	Arterial	Glade Drive	745	847	3.62	2035	1936	2.22
Reston Parkway	SB	Arterial	Fox Mill Road	830	1064	7.6	2230	2137	1.99
Reston Parkway	SB	Arterial	McLearen Road/Lawyers Road	630	704	2.87	2225	2111	2.45

## 5.2 Synchro Existing Conditions Analysis

The Existing Conditions results show that for the 42 intersections where existing counts were taken all in the AM peak hour (7:00 AM to 8:00 AM) operate at LOS E or better. In the PM peak hour (5:00 PM to 6:00 PM) 41 of the 42 intersections operate at LOS E or better with one intersection operating at LOS F. The intersection results can be seen in **Table 5.3** and **Table 5.4**. Prior to this study, the need for capacity improvements on Reston Parkway and on Fairfax County Parkway at Spring Street and at Sunrise Valley Drive was identified. Mitigations for these locations are proposed as part of the Tier 3 mitigations in Section 6.4.

Existing Conditions is the only scenario where results are reported from Synchro, and represent a subset of the entire study area. The rest of the analysis (for Full-Buildout and Mid-Buildout) was done and reported based on Visum, the forecasting and analysis tool discussed earlier in this report.

The existing Synchro network was used to provide base capacity, signal, and delay information for the Visum models so that the full effect of assigning the demand could be reasonably replicated in Visum.

The calibrated Synchro and Visum models served as the basis for the development of the Full-Buildout and Mid-Buildout models, which were used to assess the impact and potential mitigation measures in the Reston TSAs. More detail on the calibrated network results can be found in the Synchro Existing Conditions Memo.

Table 5.3: AM Synchro Intersection LOS Table

ID	Intersection Name	Average Delay (sec)	LOS
1	Centreville Road (N/S) & Worldgate Drive (E/W)	24.3	C
2	Centreville Road (N/S) & Dulles Toll Road WB ramps	21.8	C
3	Centreville Road (N/S) & Dulles Toll Road EB ramps	20.9	C
4	Centreville Road (N/S) & Sunrise Valley Drive (E/W)	37.9	D
5	Centreville Road (N/S) & Cooppermine Road (E/W)	25.1	C
6	Centreville Road (N/S) & Frying Pan Road (E/W)	46.5	D
7	Sunrise Valley Drive (N/S) & Frying Pan Road (E/W)	19.4	B
8	Van Buren Street (N/S) & Worldgate Drive/Presidents Plaza Entrance (E/W)	17.4	B
9	Monroe Street (N/S) & Sunrise Valley Drive (E/W)	37.4	D
10	Monroe Street (N/S) & Fox Mill Rd (E/W)	61.0	E
11	Herndon Parkway (N/S) & Spring Street (E/W)	26.1	C
12	Fairfax County Parkway ramp (N/S) & Spring Street (E/W)	14.1	B
13	Fairfax County Parkway Ramp (N/S) & Baron Cameron Avenue/Elden Street (E/W)	21.3	C
14	Fairfax County Parkway (N/S) & New Dominion Parkway (E/W)	18.0	B
15	Fairfax County Parkway (N/S) & Spring Street ramp (E/W)	18.4	B
16	Fairfax County Parkway (N/S) & Dulles Toll Rd WB ramps	17.5	B
17	Fairfax County Parkway (N/S) & Dulles Toll Rd EB ramps	34.6	C
18	Fairfax County Parkway (N/S) & Sunrise Valley Drive (E/W)	55.9	E
19	Fairfax County Parkway (N/S) & Fox Mill Road (E/W)	58.1	E
20	Town Center Parkway/Bennington Woods Road (N/S) & Baron Cameron Avenue (E/W)	22.5	C
21	Town Center Parkway (N/S) & Sunset Hills Road (E/W)	11.2	B
22	Microsoft Office / Overlook "East" (N/S) & Sunset Hills Road (E/W)	8.1	A
23	Reston Parkway (N/S) & Baron Cameron Avenue (E/W)	44.6	D
24	Reston Parkway (N/S) & New Dominion Parkway/Temporary Road (E/W)	38.3	D
25	Reston Parkway (N/S) & Bluemont Way/Stratford Park Place (E/W)	32.9	C
26	Reston Parkway (N/S) & Sunset Hills Road (E/W)	44.0	D
27	Reston Parkway (N/S) & Dulles Toll Road WB ramps	16.1	B
28	Reston Parkway (N/S) & Dulles Toll Road EB ramps	11.0	B
29	Reston Parkway (N/S) & Sunrise Valley Drive (E/W)	47.1	D
30	Reston Parkway (N/S) & South Lakes Drive (E/W)	34.2	C
31	Reston Parkway (N/S) & Glade Drive (E/W)	24.5	C
32	Reston Parkway (N/S) & Fox Mill Road (E/W)	21.6	C
33	Lawyers Road/Reston Parkway (N/S) & McLearen Road/Lawyers Road (E/W)	60.5	E
34	Soapstone Drive/Association Drive (N/S) & Sunrise Valley Drive (E/W)	16.1	B
35	Wiehle Avenue (N/S) & Sunset Hills Road (E/W)	36.7	D
36	Wiehle Avenue (N/S) & Dulles Toll Road WB ramps	17.6	B
37	Wiehle Avenue (N/S) & Dulles Toll Road EB ramps	31.8	C
38	Wiehle Avenue (N/S) & Sunrise Valley Drive (E/W)	32.8	C
39	Hunter Mill Road (N/S) & Sunset Hills Road (E/W)	42.3	D
40	Hunter Mill Road (N/S) & Dulles Toll Road EB ramps	13.7	B
41	Hunter Mill Road (N/S) & Dulles Toll Road EB ramps	18.4	B
42	Hunter Mill Road (N/S) & Sunrise Valley Drive (E/W)	32.2	C

Table 5.4: PM Synchro Intersection LOS Table

ID	Intersection Name	Average Delay (sec)	LOS
1	Centreville Road (N/S) & Worldgate Drive (E/W)	42.9	D
2	Centreville Road (N/S) & Dulles Toll Road WB ramps	34.3	C
3	Centreville Road (N/S) & Dulles Toll Road EB ramps	19.0	B
4	Centreville Road (N/S) & Sunrise Valley Drive (E/W)	54.4	D
5	Centreville Road (N/S) & Coopermine Road (E/W)	35.3	D
6	Centreville Road (N/S) & Frying Pan Road (E/W)	42.0	D
7	Sunrise Valley Drive (N/S) & Frying Pan Road (E/W)	29.7	C
8	Van Buren Street (N/S) & Worldgate Drive/Presidents Plaza Entrance (E/W)	38.5	D
9	Monroe Street (N/S) & Sunrise Valley Drive (E/W)	45.5	D
10	Monroe Street (N/S) & Fox Mill Rd (E/W)	49.9	D
11	Herndon Parkway (N/S) & Spring Street (E/W)	52.9	D
12	Fairfax County Parkway ramp (N/S) & Spring Street (E/W)	12.1	B
13	Fairfax County Parkway Ramp (N/S) & Baron Cameron Avenue/Elden Street (E/W)	25.7	C
14	Fairfax County Parkway (N/S) & New Dominion Parkway (E/W)	33.7	C
15	Fairfax County Parkway (N/S) & Spring Street ramp (E/W)	15.8	B
16	Fairfax County Parkway (N/S) & Dulles Toll Rd WB ramps	32.4	C
17	Fairfax County Parkway (N/S) & Dulles Toll Rd EB ramps	21.7	C
18	Fairfax County Parkway (N/S) & Sunrise Valley Drive (E/W)	62.8	E
19	Fairfax County Parkway (N/S) & Fox Mill Road (E/W)	66.0	E
20	Town Center Parkway/Bennington Woods Road (N/S) & Baron Cameron Avenue (E/W)	37.7	D
21	Town Center Parkway (N/S) & Sunset Hills Road (E/W)	35.0	D
22	Microsoft Office / Overlook "East" (N/S) & Sunset Hills Road (E/W)	13.2	B
23	Reston Parkway (N/S) & Baron Cameron Avenue (E/W)	67.4	E
24	Reston Parkway (N/S) & New Dominion Parkway/Temporary Road (E/W)	63.5	E
25	Reston Parkway (N/S) & Bluemont Way/Stratford Park Place (E/W)	38.8	D
26	Reston Parkway (N/S) & Sunset Hills Road (E/W)	55.5	E
27	Reston Parkway (N/S) & Dulles Toll Road WB ramps	20.4	C
28	Reston Parkway (N/S) & Dulles Toll Road EB ramps	15.7	B
29	Reston Parkway (N/S) & Sunrise Valley Drive (E/W)	67.6	E
30	Reston Parkway (N/S) & South Lakes Drive (E/W)	45.2	D
31	Reston Parkway (N/S) & Glade Drive (E/W)	35.2	D
32	Reston Parkway (N/S) & Fox Mill Road (E/W)	65.0	E
33	Lawyers Road/Reston Parkway (N/S) & McLearn Road/Lawyers Road (E/W)	53.7	D
34	Soapstone Drive/Association Drive (N/S) & Sunrise Valley Drive (E/W)	19.2	B
35	Wiehle Avenue (N/S) & Sunset Hills Road (E/W)	84.6	F
36	Wiehle Avenue (N/S) & Dulles Toll Road WB ramps	26.4	C
37	Wiehle Avenue (N/S) & Dulles Toll Road EB ramps	19.9	B
38	Wiehle Avenue (N/S) & Sunrise Valley Drive (E/W)	47.0	D
39	Hunter Mill Road (N/S) & Sunset Hills Road (E/W)	31.2	C
40	Hunter Mill Road (N/S) & Dulles Toll Road EB ramps	44.9	D
41	Hunter Mill Road (N/S) & Dulles Toll Road EB ramps	18.1	B
42	Hunter Mill Road (N/S) & Sunrise Valley Drive (E/W)	25.2	C

## 6 2050 Visum Analysis

### 6.1 2050 Unmitigated Model Development

#### 6.1.1 2050 Plan Full-Buildout Land Use and Disaggregation

The 2050 Full-Buildout land use scenario, created by the Fairfax County Department of Planning and Zoning (DPZ), reflects the development levels proposed by the Comprehensive Plan at the parcel or parcel group level. The land use assumptions tested in this scenario are found in **Table 6.1**. The land use assumptions were informed by the guidance in the Comprehensive Plan, approved re-zonings, existing zoning applications, and pre-applications. While not part of the primary study area, detailed information on the Innovation TSA was included in the analysis due to its proximity to the Reston TSAs.

*Table 6.1: 2050 General Build-Out Land Use Summary*

Region\ Category	Office GFA (ft <sup>2</sup> )	Retail GFA (ft <sup>2</sup> )	Industrial GFA (ft <sup>2</sup> )	Institution GFA (ft <sup>2</sup> )	Hotel GFA (ft <sup>2</sup> )	Total Non- Residential GFA (ft <sup>2</sup> )	Dwelling Units
<b>Reston TSAs</b>	29,700,331	2,055,839	589,133	2,398,272	4,853,452	39,597,027	44,366
<b>Innovation Station TSA</b>	6,899,829	327,753	-	-	1,008,602	8,236,184	7,996
<b>Reston Area Total</b>	36,600,160	2,383,592	589,133	2,398,272	5,862,054	47,833,211	52,362

#### 6.1.2 2050 Unmitigated Road Network

The Fairfax County Comprehensive Plan envisions the transition of the Reston Transit Station Areas into urban centers with a mix of residential, office, retail, and other commercial land uses by 2050. The Comprehensive Plan supports future development in the Reston TSAs by maintaining reasonable accessibility in Reston as development occurs and focusing on the conceptual grids of streets and road elements at gateways.

The following roadway network improvements and connections are part of the Comprehensive Plan and are reflected in the roadway network that is used to assign the trips to the Reston network for the 2050 unmitigated scenario. The 2050 Grid of Streets is shown in **Figure 6.1** and includes:

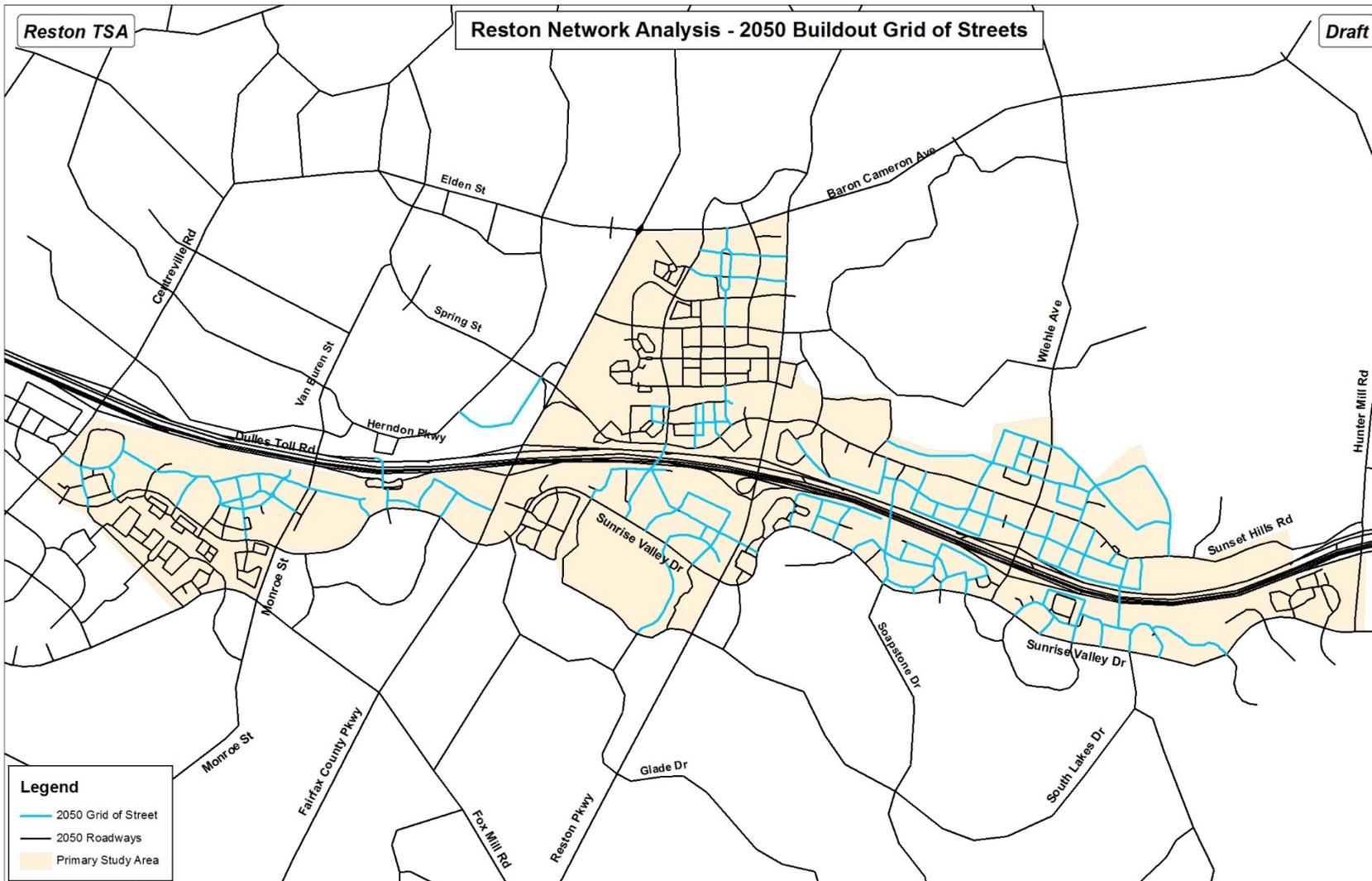
- An enhanced grid of streets to increase connectivity;
- Soapstone Overpass (3-lane bridge) across the Dulles Toll Road (DTR) from Sunset Hills Road to Sunrise Valley Drive approximately at Soapstone Drive;
- Town Center Parkway Underpass (4-lane underpass) from Town Center Parkway and Sunset Hills Road to Sunrise Valley Drive west of Edmund Halley Drive;
- South Lakes Overpass (4-lane bridge) across the DTR from Sunset Hills Road to Sunrise Valley Drive approximately at South Lakes Drive;
- Rock Hill Bridge to across the DTR from Sunrise Valley Drive to Loudon County;
- Interchange at Fairfax County Parkway and Sunrise Valley Drive (assumed in Tier 3);
- Reston Parkway - 6 lanes from South Lakes Drive to the DTR;
- Fairfax County Parkway - 6 lanes with High Occupancy Vehicle (HOV) lane(s);

- Sunset Hills Road – 6 lanes from Wiehle Avenue to Fairfax County Parkway, and 4 lanes from Wiehle Ave to Hunter Mill Road;
- Fox Mill Road - 4 lanes from Reston Parkway to Monroe Street;
- West Ox Road - 4 lanes from Lawyers Road to Centreville Road;
- Monroe Street - 4 lanes from West Ox Road to the Town of Herndon; and
- Extend Pinecrest Road from South Lakes Drive to Sunrise Valley Drive.

Initial assumptions for new intersections with a grid street included:

- Where two grid of streets intersect, the intersection will have an all-way stop;
- Where a new grid street connects to an existing local road, the intersection will have an all-way stop; and
- Where a new grid street connects to a major road, there will be 2-way stop, with the local road stop controlled.

Figure 6.1: 2050 Buildout Grid of Streets



### 6.1.3 2050 Unmitigated Results

Unmitigated AM and PM peak hour assignments were prepared for the Reston area. AM and PM peak hour LOS analyses for signalized and stop control intersections were conducted using Visum's integrated Highway Capacity Manual (HCM) tool. The 2050 Visum Tier 3 Model Development and Phasing memo has the detailed LOS maps.

LOS E (maximum of 80 seconds of average vehicular delay at an intersection) is the standard for the Reston TSAs. Intersections that were forecasted to operate at LOS F (more than an average of 80 seconds of delay per vehicle) without mitigation were identified as locations that required mitigation (shown in **Table 6.2**). Intersections with a delay of 120 seconds or more were identified as problem locations because they may be difficult to mitigate to LOS E with traditional measures. Overall, 22 intersections in AM peak hour and 26 intersections in PM peak hour were identified as Problem Locations in the 2050 Unmitigated scenario; 16 of these locations had delays in excess of 120 seconds during both the AM and PM peak hours. These intersections can be seen in **Table 6.3** and are summarized in **Table 6.4**.

Table 6.2: 2050 LOS F Locations

	Intersection	AM	PM
1	Centreville Road & WB DTR Ramp	X	X
2	Centreville Road & EB DTR Ramp	X	X
3	Centreville Road & Woodland Park Road	X	X
4	Centreville Road & Sunrise Valley Drive	X	X
5	Monroe Street & South of DTR	X	X
6	Monroe Street & Sunrise Valley Dr	X	X
7	Monroe Street & Frying Pan Road/Fox Mill Road	X	X
8	Fairfax County Parkway & Baron Cameron Avenue	X	X
9	Fairfax County Parkway & New Dominion Parkway		X
10	Spring Street & Herndon Parkway	X	X
11	Fairfax County Parkway & Sunrise Valley Drive	X	X
12	Reston Parkway & Baron Cameron Avenue	X	X
13	Reston Parkway & Sunset Hills Road	X	X
14	Reston Parkway & WB DTR Ramp	X	X
15	Reston Parkway & Sunrise Valley Drive	X	X
16	Reston Parkway & South Lakes Drive	X	X
17	Wiehle Avenue & Isaac Newton Square South	X	
18	Wiehle Avenue & Sunset Hills Rd		X
19	Wiehle Avenue & Reston Station Boulevard	X	X
20	Wiehle Avenue & EB DTR Ramp	X	
21	Wiehle Avenue & Sunrise Valley Dr		X
22	Hunter Mill Road & Sunset Hills Road	X	X
23	Hunter Mill Road & WB DTR Ramp	X	X
24	Hunter Mill Road & EB DTR Ramp	X	
25	Hunter Mill Road & Sunrise Valley Drive	X	X
26	Sunrise Valley Drive & Roark Drive	X	X
27	Sunrise Valley Drive & Glade Drive	X	X
28	Sunrise Valley Drive & US Geological Survey Dr/Mercator Dr		X
29	Sunrise Valley Drive & Town Center Underpass	X	X
30	Sunrise Valley Drive & West of Reston Parkway	X	X
31	Sunrise Valley Drive & Soapstone Drive	X	X
32	Sunrise Valley Drive & Commerce Park Drive	X	
33	Sunrise Valley Drive & Campus Commons Drive	X	X
34	Sunrise Valley Drive & South Lakes Drive	X	X
35	Sunset Hills Rd & Target Shopping		X
36	Sunset Hills Rd & Oracle Way/Old Reston Ave	X	X
37	Sunset Hills Rd & American Dream Way		X
38	Town Center Parkway & Baron Cameron Avenue	X	X
39	Town Center Parkway & North of Sunset Hills Rd		X
40	Town Center Parkway & Sunset Hills Road	X	X
41	New Dominion Pkwy & Library St	X	X
42	Baron Cameron Ave & Fountain Dr	X	X
43	Reston Station Blvd & W of Wiehle Ave		X

Table 6.3: 2050 Unmitigated Problem Locations (More Than 120 Seconds of Delay)

	<b>Intersection</b>	<b>AM</b>	<b>PM</b>
1	Centreville Road & Woodland Park Road		X
2	Monroe Street & South of DTR		X
3	Sunrise Valley Drive & Roark Drive	X	
4	Sunrise Valley Drive & Glade Drive	X	X
5	Sunrise Valley Drive & Town Center Underpass		X
6	Sunrise Valley Drive & West of Reston Parkway	X	X
7	Sunrise Valley Drive & Soapstone Drive		X
8	Sunrise Valley Drive & Commerce Park Drive	X	
9	Sunrise Valley Drive & Campus Commons Drive		X
10	Sunrise Valley Drive & South Lakes Drive	X	X
11	Wiehle Avenue & Reston Station Boulevard		X
12	Wiehle Avenue & Isaac Newton Square South	X	
13	Sunset Hills Rd & Old Reston Avenue/Oracle Way	X	X
14	Centreville Road & WB DTR Ramp		X
15	Centreville Road & EB DTR Ramp	X	X
16	Centreville Road & Sunrise Valley Drive	X	X
17	Monroe Street & Frying Pan Road/Fox Mill Road	X	
18	Monroe Street & Sunrise Valley Drive		X
19	Fairfax County Parkway & Baron Cameron Avenue	X	X
20	Fairfax County Parkway & New Dominion Parkway		X
21	Spring Street & Herndon Parkway	X	X
22	Fairfax County Parkway & Sunrise Valley Drive	X	X
23	Town Center Parkway & Baron Cameron Avenue	X	X
24	Town Center Parkway & Sunset Hills Road	X	X
25	Reston Parkway & Baron Cameron Avenue	X	X
26	Reston Parkway & Sunset Hills Road	X	X
27	Reston Parkway & Sunrise Valley Drive	X	X
28	Reston Parkway & South Lakes Drive	X	X
29	Wiehle Avenue & EB DTR Ramp	X	
30	Hunter Mill Road & Sunrise Valley Drive	X	
31	Hunter Mill Road & WB DTR Ramp	X	X
32	Hunter Mill Road & Sunset Hills Road		X

Table 6.4: 2050 Unmitigated Problem Location Summary

<b>Peak Hour</b>	<b>LOS F</b>	<b>Problem Locations</b>
AM	<b>35</b>	22
PM	<b>39</b>	26
AM & PM	<b>31</b>	16
AM or PM	<b>32</b>	32

## 6.2 Mitigation Measures

A tiered mitigation approach was used to address problematic traffic locations, with the goal of reducing vehicle congestion and delays experienced at intersections, and to improve travel time reliability in the TSAs. The tiered mitigation approach included three levels:

- **Tier 1: No right-of-way (ROW) impact**
  - Signal timing modification/optimization
  - Modification of existing lane striping
  - Evaluation of all-way vs. 2-way stops
  - Traffic signal addition
- **Tier 2: Minor ROW impact**
  - Additional signals where needed
  - Turn lanes: new left and right turn lanes
  - Additional through lane(s)
  - Additional grid link(s)
- **Tier 3: Large scale mitigations with potentially significant ROW impact**
  - Median U-Turn/Superstreet
    - Eliminates left turn movement for side streets
    - Increase through movement green time
    - Additional needed ROW to provide turn radius
  - New roadway connection(s)
  - Underpass/Overpass
    - Provides for an uninterrupted through movement
  - Only done in close coordination with the Advisory Group and Stakeholders after all other mitigation measures were not successful

### 6.2.1 Tier 1: No Right-of-Way Impact

Tier 1 mitigations consisted of low cost changes to an intersection. Lane striping options were examined to see if restriping could reduce the delay. The intersection control was also examined; if it was 2-way stop controlled, an all-way stop was considered. If the intersection still showed a failing LOS, a signal was added. If it was already signalized, adjustments were made to the signal timing. All-way stop and traffic signal warrants will be addressed in later studies as development comes on-line.

### 6.2.2 Tier 2: Minor Right-of-Way Impact

Tier 2 mitigations were approached with the goal of improving traffic conditions while utilizing minimal ROW impacts. First, turn bays were added for high volume left or right turns. If the intersection delay was not adequately reduced, additional through lanes were added. If additional through lanes did not adequately decrease delay, additional grid links (roadways) were added to the network to serve as alternative routes.

### 6.2.3 Tier 3: Large Scale Mitigations

Tier 3 mitigations are larger in scale with high cost and/or require the use of large amounts of additional ROW. These were examined closely with the Advisory Group and Stakeholders. Measures considered

included construction of median U-turns, implementation of Superstreet turning movements, and grade-separation.

### 6.3 Recommended Tier 1 and 2 Mitigation Measures

To mitigate traffic congestion, Tier 1 (No ROW Impact) and Tier 2 (Minor ROW Impact) were conducted with the goal of reducing overall intersection delay to LOS E. In addition to trip re-assignment and signal timing modification/optimization, the following sections present the mitigation measures that were tested and are recommended.

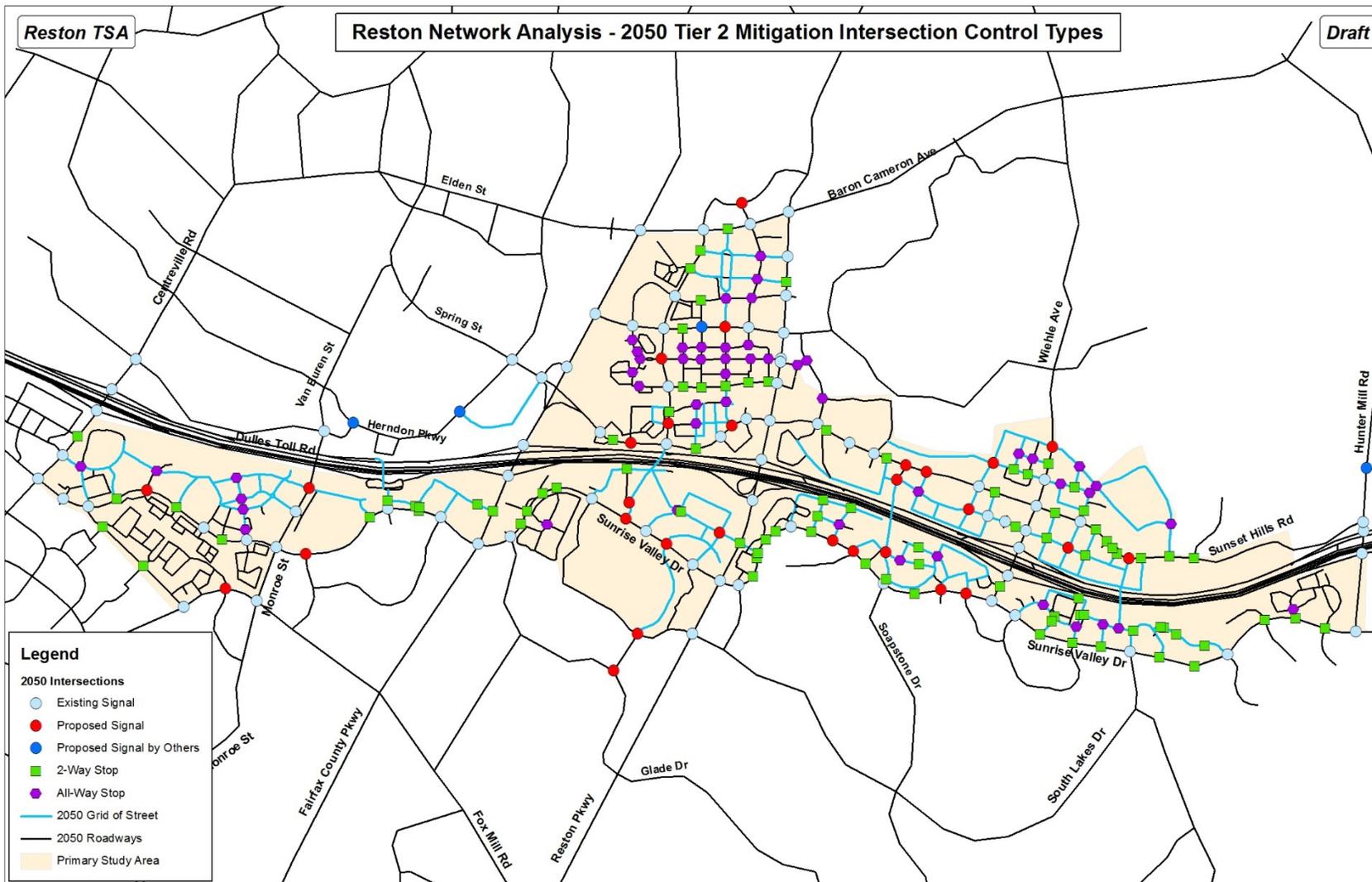
#### 6.3.1 Signalized Intersections

After selecting and testing Tier 1 and Tier 2 mitigations, 30 new signals are proposed in the Reston TSAs, as shown in **Table 6.5** and **Figure 6.2**. There are no new 4-way stops added because either they cannot improve the intersection to LOS E, or the intersection involves a major road, requiring signalization. Although this analysis provides a framework for potential future signalized intersections, traffic signal warrant analyses will still need to be conducted to refine this analysis as development comes on-line. As such, the purpose of noting these locations and intersections is to provide an understanding of where signals might be needed when the Reston TSAs are fully built out.

*Table 6.5: 2050 Proposed Signal Locations*

1. Sunrise Valley Drive @ Wood Oak Drive	2. Sunrise Valley Drive @ Commerce Park Drive East
3. Sunrise Valley Drive @ Colts Brook Drive	4. Soapstone Overpass @ Indian Ridge Rd Extension (grid street)
5. Frying Pan Road @ Greg Roy Ln.	6. Sunset Hills Road @ West of Town Center Parkway
7. Monroe Street @ Future Connection to Herndon Metro	8. Town Center Parkway @ North of Sunset Hills Road
9. Glade Drive @ Pinecrest Road	10. Town Center Parkway @ Market Street
11. South Lakes Drive @ Pinecrest Road	12. Sunset Hills Road @ Library Street
13. Sunrise Valley Drive @ Pinecrest Road Extended	14. Sunset Hills Road @ Soapstone Overpass
15. Sunrise Valley Drive @ Town Center Parkway	16. Sunset Hills Road @ East of Soapstone Overpass
17. Town Center Parkway @ North of Sunrise Valley Drive	18. Sunset Hills Road @ South Lakes Overpass
19. West of Reston Parkway with grid street	20. Reston Station Blvd. @ Metro Center Drive
21. Sunrise Valley Drive @ Roland Clarke Place	22. Reston Station Blvd. @ Michael Faraday Drive
23. Sunrise Valley Drive @ Indian Ridge Road	24. Isaac Newton Square S. @ Isaac Newton Square W.
25. Sunrise Valley Drive @ Commerce Park Drive West	26. Wiehle Avenue @ Isaac Newton Square N.
27. New Dominion Parkway @ Library Street	28. Reston Station Blvd @ Soapstone Drive
29. Bracknell Drive @ Stevenage Road	30. Reston Town Center West consolidated access

Figure 6.2: 2050 Tier 2 Mitigation Intersection Control Types

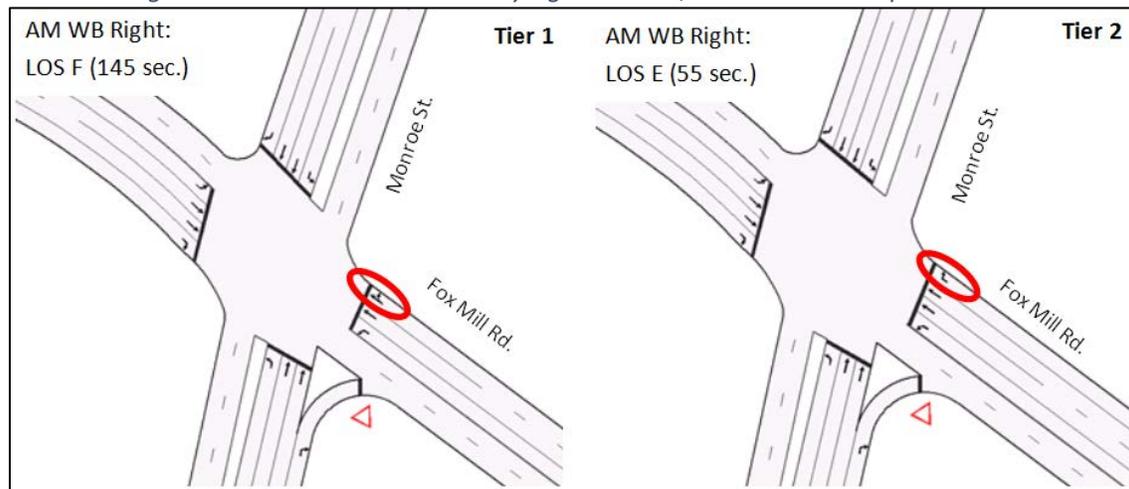


### 6.3.2 Intersection Improvements

There were existing intersections that after Tier 1 mitigation was applied, still exhibited failing levels of service. At multiple intersections the addition of a signal was not sufficient to improve the overall intersection LOS to E. Turn lane additions were tested and are recommended at the following intersections, shown in **Figure 6.3** through **Figure 6.7**.

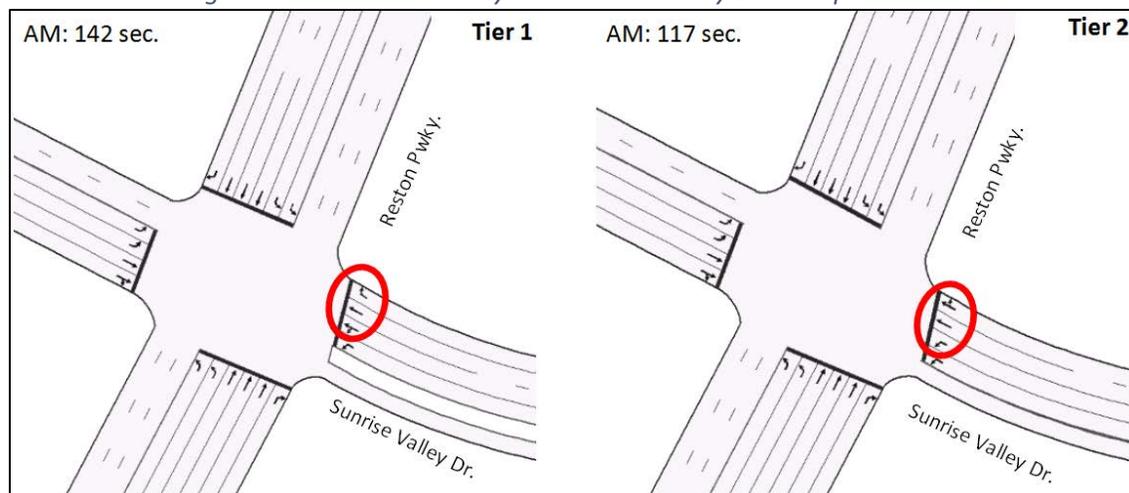
Monroe Street at Frying Pan Road/Fox Mill Road has a new westbound right (WBR) turn lane added, as shown in **Figure 6.3**.

Figure 6.3: Monroe Street and Frying Pan Road/Fox Mill Road Improvement



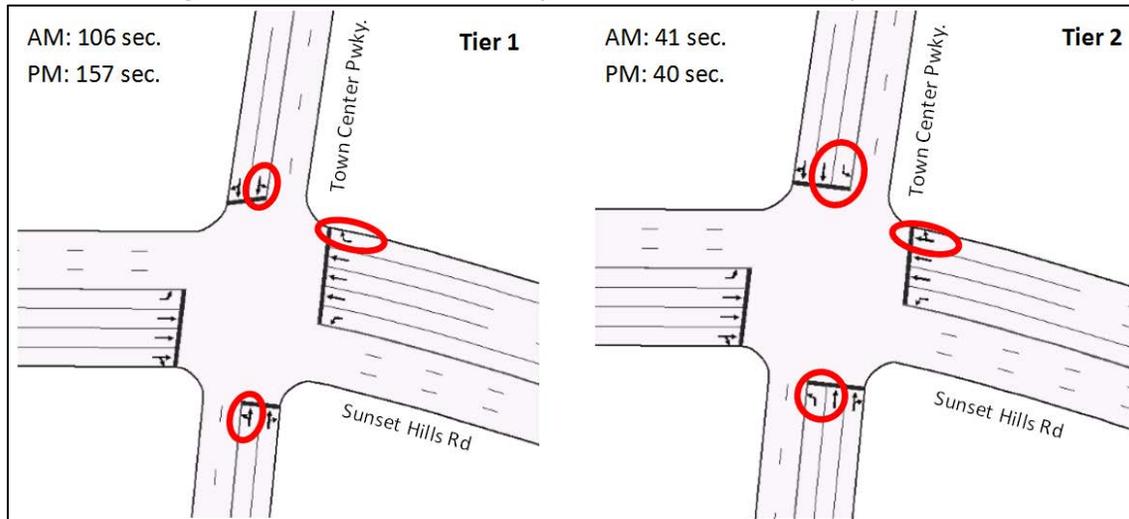
Reston Parkway at Sunrise Valley Drive was restriped, converting the existing westbound approach lanes from left, left/through, through, right to left, left, through, through/right, as shown in **Figure 6.4**.

Figure 6.4: Reston Parkway and Sunrise Valley Drive Improvement



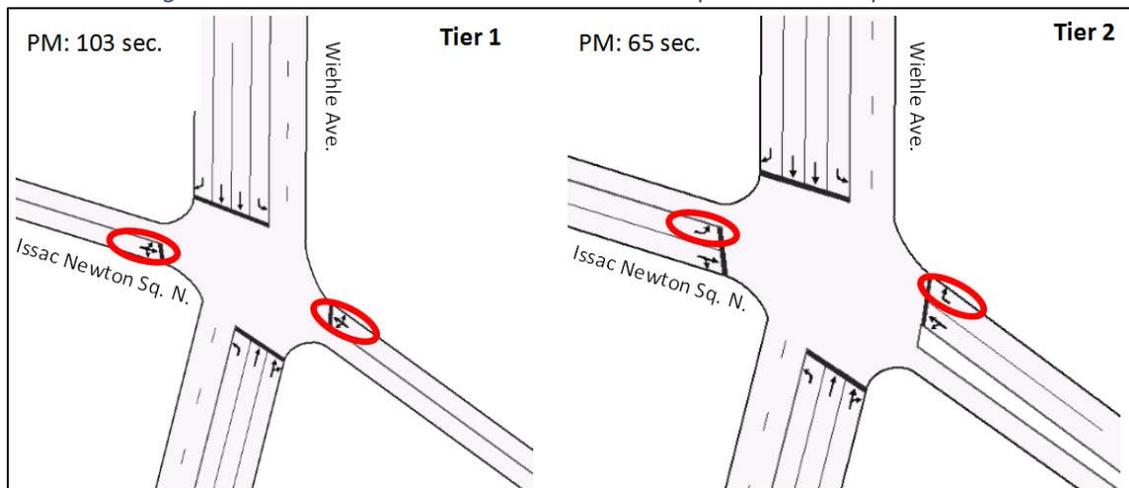
Town Center Parkway at Sunset Hills Road has additional northbound left (NBL) and southbound left (SBL) turn lanes and consolidates the WBR turn lane with the third WB through lane to create one shared through/right turn, lane as shown in **Figure 6.5**.

Figure 6.5: Town Center Parkway and Sunset Hills Road Improvement



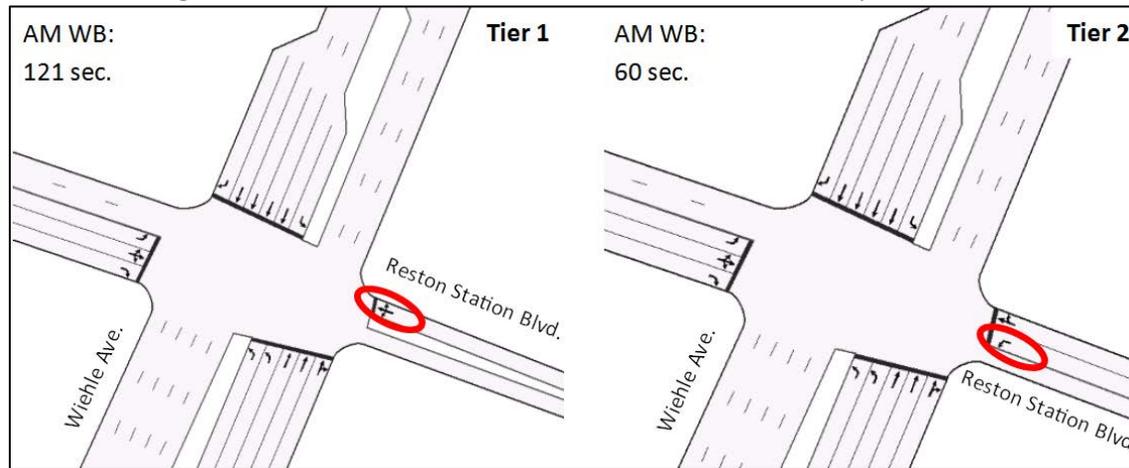
Wiehle Avenue at Isaac Newton Square North has additional eastbound left (EBL) and WBR turn lanes, as shown in **Figure 6.6**.

Figure 6.6: Wiehle Avenue and Isaac Newton Square North Improvement



Wiehle Avenue at Reston Station Boulevard has a westbound left (WBL) turn lane added as shown in **Figure 6.7**.

*Figure 6.7: Wiehle Avenue and Reston Station Boulevard Improvement*



Tier 2 also incorporated improvements recommended in the Town of Herndon's Comprehensive Plan. These improvements are included in the model due to Herndon's proximity to the Reston TSAs and the interrelated transportation network between the Town and Reston. The improvements included in the Tier 2 model runs include:

- Roadway Improvements:
  - Fairbrook Drive Extension: an extension of Fairbrook Drive to Spring Street, terminating at the intersection with the Fairfax County Parkway Ramps, as shown in **Figure 6.8**;
  - Worldgate Drive Extension: an extension of Worldgate Drive, from Monroe Street to Herndon Parkway, as shown in **Figure 6.9**;
  - Spring Street Improvements: various Spring Street enhancements, between Fairfax County Parkway and Herndon Parkway, as shown in **Figure 6.10**; and
  - East Elden Street Widening: a widened Elden Street from Monroe Street to Fairfax County Parkway.
- Comprehensive Plan Turn Lanes
  - Spring Street & Ramp to Fairfax County Parkway
  - Spring Street & Herndon Parkway
  - Monroe Street & Worldgate Drive
  - Monroe Street & Herndon Parkway
- Comprehensive Plan New Signals
  - Worldgate Drive Extension & Herndon Parkway
  - Herndon Pkwy & Fairbrook Drive

Figure 6.8: Fairbrook Drive Extension to Spring Street

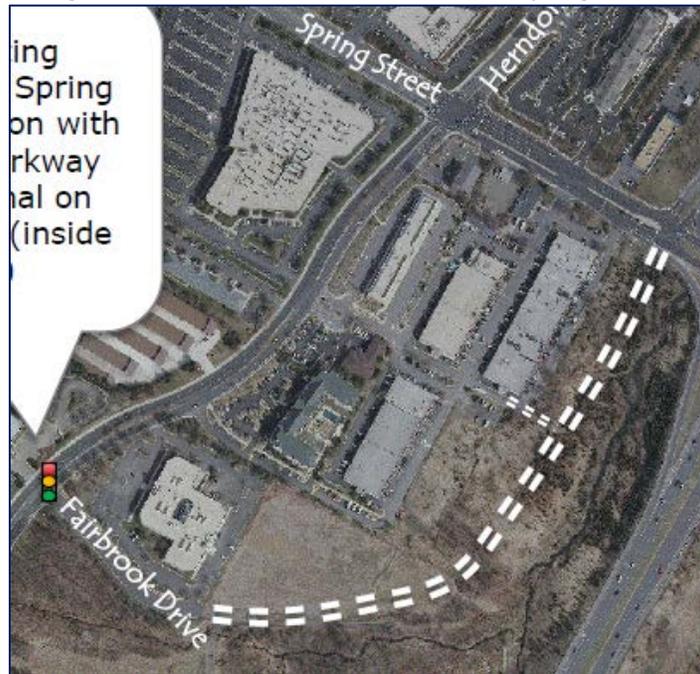


Figure 6.9: Herndon Parkway & Worldgate Drive Extension

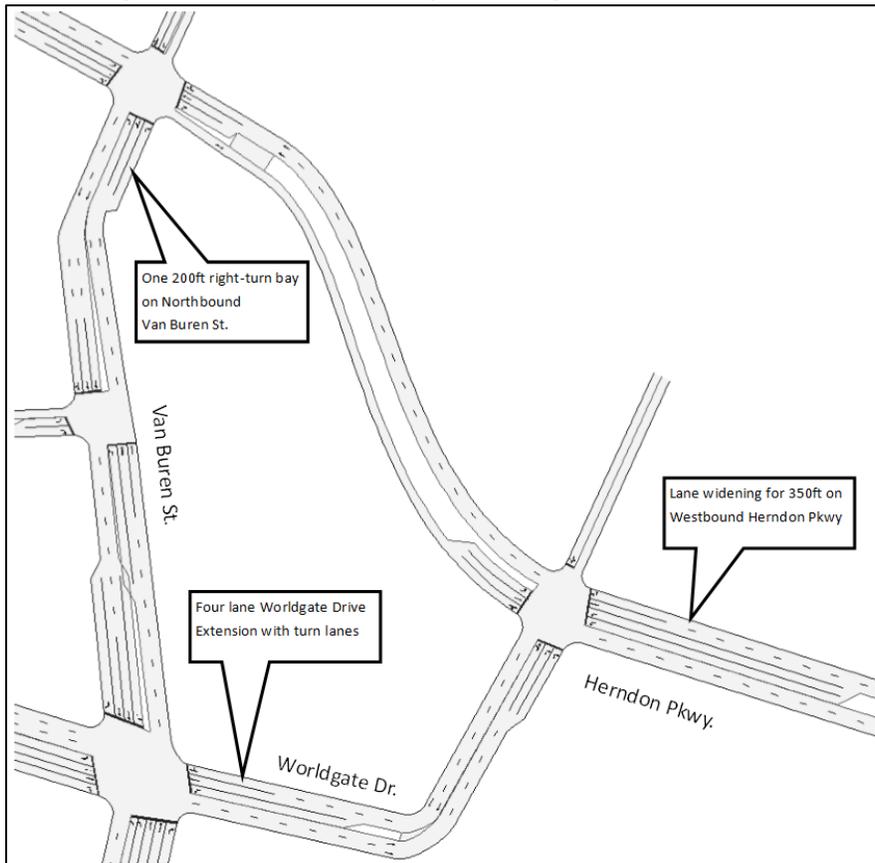
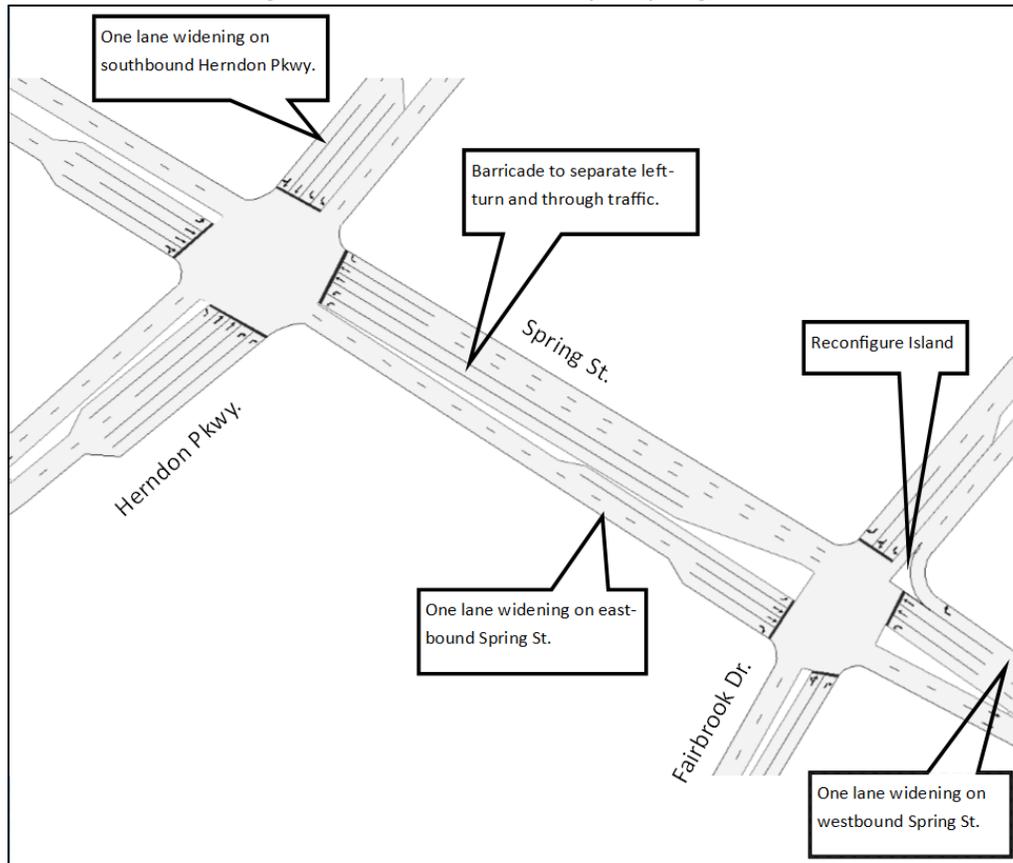


Figure 6.10: Herndon Parkway & Spring Street



### 6.3.3 Tier 1 and 2 Mitigation Results

With the Tier 1 and Tier 2 improvements, the number of intersections experiencing delay in excess of 80 seconds (failing locations) and the number of intersections experiencing delay in excess of 120 seconds (Problem Locations) were reduced significantly, as shown in **Table 6.6** through **Table 6.9**.

Table 6.6: 2050 Tier 2 LOS F Intersections

	Intersection	AM	PM
1	Centreville Road & WB DTR Ramp		X
2	Centreville Road & Woodland Park Road		X
3	Centreville Road & Sunrise Valley Drive	X	X
4	Monroe Street & Frying Pan Road/Fox Mill Road	X	
5	Fairfax County Parkway & Baron Cameron Avenue		X
6	Spring Street & Herndon Parkway	X	X
7	Fairfax County Parkway & Sunrise Valley Drive	X	X
8	Reston Parkway & Baron Cameron Avenue	X	X
9	Reston Parkway & Sunset Hills Road	X	X
10	Reston Parkway & Sunrise Valley Drive	X	X
11	Reston Parkway & South Lakes Drive	X	X

Table 6.7: Count of 2050 LOS F Intersections

Peak Hour	2050 Pre-Mitigation	After 2050 Tier 2 Mitigation
AM	35	8
PM	39	10
In Both AM & PM	31	7
In Either AM or PM	43	11

Table 6.8: 2050 Tier 2 Mitigation Problem Locations (More Than 120 Seconds of Delay)

	Intersection Location	AM	PM
1	Centreville Road & Sunrise Valley Drive	X	
2	Spring Street & Herndon Parkway	X	
3	Fairfax County Parkway & Sunrise Valley Drive	X	X
4	Reston Parkway & Baron Cameron Avenue	X	
5	Reston Parkway & Sunrise Valley Drive		X
6	Reston Parkway & South Lakes Drive	X	

Table 6.9: Count of 2050 Problem Locations

Peak Hour	2050 Pre-Mitigation	After 2050 Tier 2 Mitigation
AM	22	5
PM	26	2
In Both AM & PM	16	1
In Either AM or PM	32	6

## 6.4 Recommended Tier 3 Mitigation Measures

Tier 3 mitigation recommendations were conducted for intersections which could not be mitigated with Tier 1 and 2 improvements.

Under Tier 3 mitigation, three specific areas were examined:

1. Reston Parkway, from Baron Cameron Avenue to Lawyers Road
2. Fairfax County Parkway and Spring Street intersection
3. Fairfax County Parkway and Sunrise Valley Drive intersection

### 6.4.1 Reston Parkway Mitigations

It was recognized early in a brainstorming session that developing a corridor wide solution for the Reston Parkway would be difficult, because the character of the adjacent development and the spacing of the intersections is not uniform throughout the corridor, making it difficult to implement one type of solution. The southern section of the corridor, from Lawyers Road to approximately Sunrise Valley Drive is bordered by mostly single and multi-family residential development. The distance between intersections is long, varying from 750 to 2,000 feet. This character would lend itself to a Median U-Turn or Superstreet solution, where left turns at intersections are not allowed, and are replaced with U-Turns located between intersections. These concepts increase the capacity throughout the corridor by eliminating protected left turn phases at the intersections, allowing more green time to be allocated to the higher volume through traffic.

The section of the Reston Parkway corridor from Sunrise Valley Drive to Sunset Hills Road, which is approximately 3,500 feet in length, includes the interchange with the Dulles Toll Road. The interchange at the Dulles Toll Road is a tight diamond interchange with a directional loop ramp for the southbound Reston Parkway to the eastbound Dulles Toll Road vehicular movement. Considerations for potential alternative mitigations for this portion of Reston Parkway to improve the operations of the two intersections were very limited. Increasing the capacity of the Reston Parkway and Sunrise Valley Drive intersection would result in significant ROW impacts. The Reston Parkway and Sunset Hills Road intersection already has a very large footprint, and increasing this footprint would be a detriment to the walkability of the area.

The section of Reston Parkway, from Sunset Hills Road to Baron Cameron Avenue, is more urbanized with shorter blocks, in the range of 750 feet, and higher density commercial, residential, and office development. The Median U-Turn and Superstreet concept was considered here because it reduces the number of left turns at the intersections and therefore the number of signal phases at each of the intersections.

Some of the overarching principles and considerations in developing the alternatives were:

- Minimize right of way impacts;
- Preserve aesthetics and the view shed (i.e., no elevated structures); and
- Maintain pedestrian friendly intersection crossings, especially in the Town Center Area.

The transportation analysis conducted for the Reston TSA in 2050 showed that Reston Parkway, between Stevenage Road (north of Baron Cameron) in the north and McLearen Road in the south, would be over capacity. After applying the Tier 2 mitigation, there were seven intersections that would operate at Level of Service F in the AM and/or PM peak hours, with four of them located south of the

Dulles Toll Road. As described above, improvement options were developed to reduce vehicle delays and address traffic operational concerns. The options developed for Reston Parkway included:

- Option 1 - Create median U-turns along the corridor to reroute left turns at seven of the intersections.
- Option 2 - Create an alternative, direct connection between Lawyers Road and Reston Parkway, at Fox Mill Road, around the park and ride facility, to alleviate the high left turn volume at the Reston Parkway and Fox Mill Road intersection.
- Options 3 - Create a flyover at Reston Parkway and Sunset Hills Road to mitigate the high delay for left turning traffic
- Option 4 - Create a Continuous Flow Intersection (CFI) configuration at Reston Parkway and Sunset Hills Road to mitigate the high delay for left turning traffic.

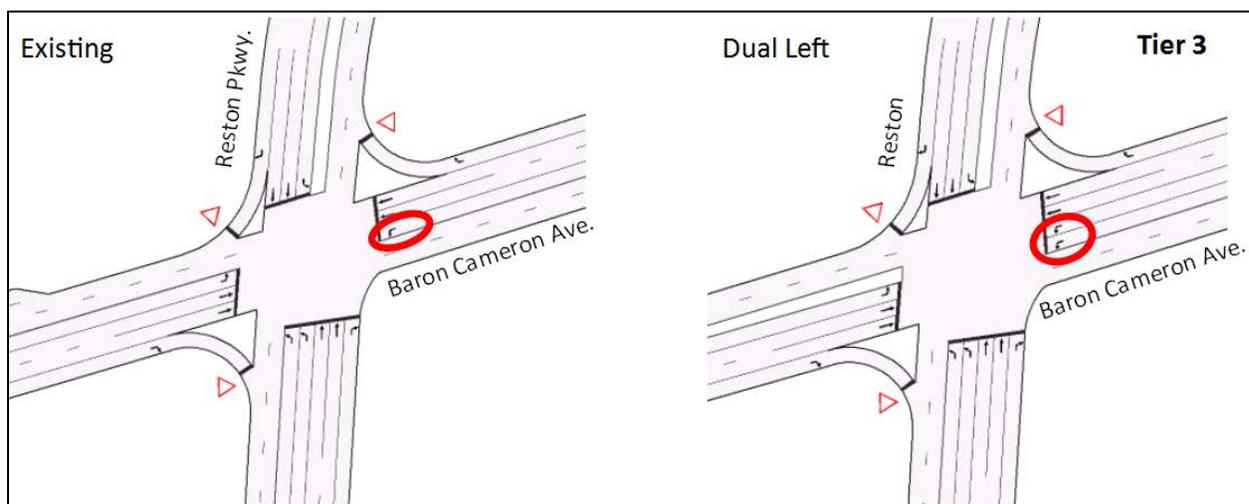
This analysis was done at a planning level and was used to understand the benefits and/or shortcomings of each alternative.

Through consultation with the Advisory Group and the Stakeholders Group, it was determined that the Lawyers Road Connection (Option 2) would be chosen for Visum modeling, along with dual left turn lanes from westbound Baron Cameron Avenue to southbound Reston Parkway. Only these two improvements are described below. Please refer to “Reston Tier 3 Alternative Analysis Memo” for more information.

#### 6.4.1.1 Dual Left Turns from Westbound Baron Cameron Avenue to Southbound Reston Parkway

In both the AM and PM peak hours, high westbound left turn volumes from Baron Cameron Avenue to southbound Reston Parkway cause extensive delays of 225 seconds and 171 seconds, respectively. In Tier 3, a second westbound left turn lane was added to address this issue, shown in **Figure 6.11**. This recommendation was identified as part of the analysis of the Reston Parkway. While the modification is similar to those in Tier 2, it was not identified till Reston Parkway was addressed in Tier 3.

Figure 6.11: Baron Cameron Avenue @ Reston Parkway Improvement

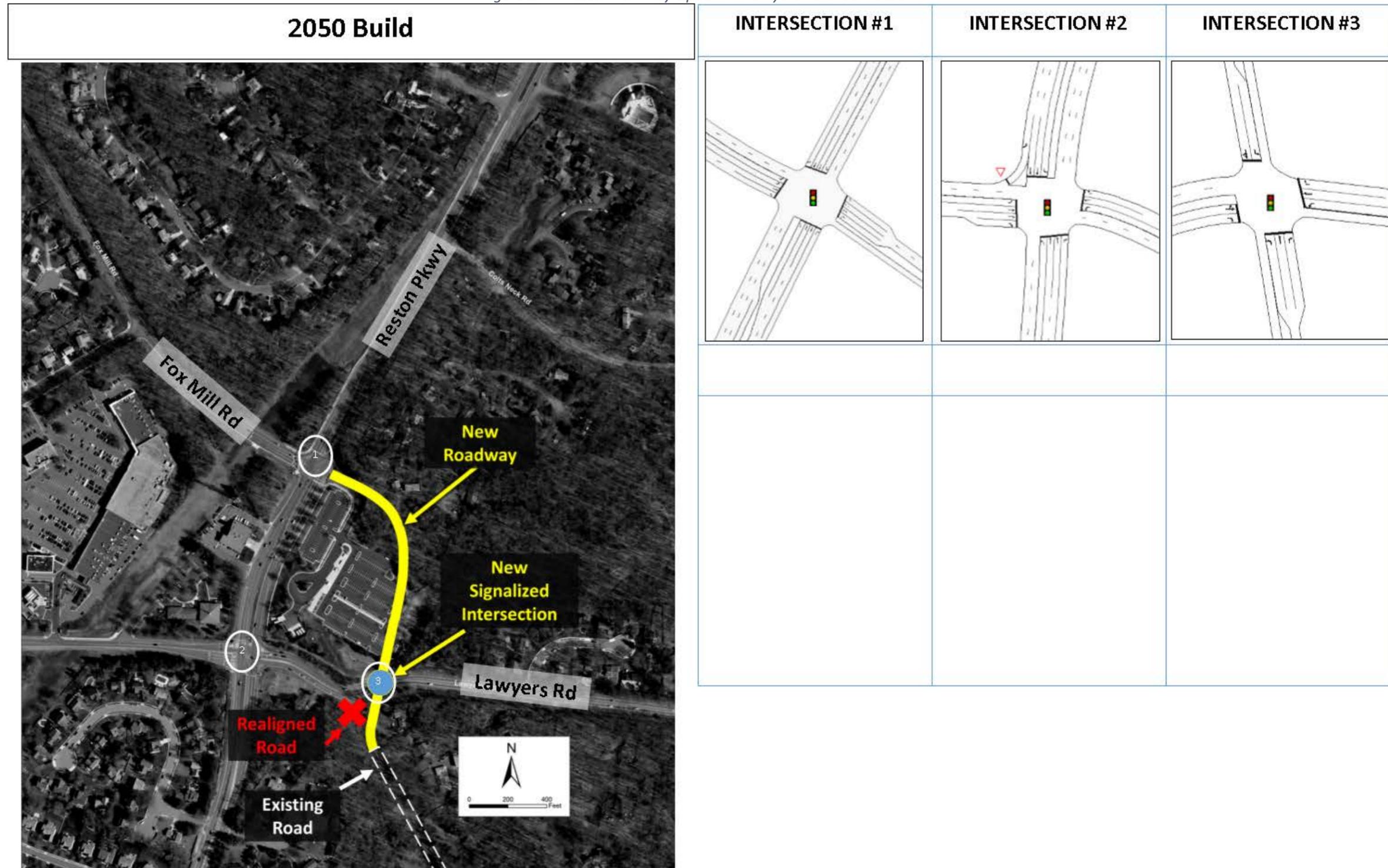


#### 6.4.1.2 Reston Parkway Option 2: Lawyers Road Connection

The intersection of Reston Parkway and Fox Mill Road has a significant projected northbound left turn volume in the future. During the morning peak, a high volume of traffic originates east of Reston Parkway on Lawyers Road, destined for Fox Mill Road. There is no existing direct connection to Fox Mill Road, therefore motorists must turn right onto Reston Parkway, make the jog, and turn left onto Lawyers Road to continue their journey. Option 2 provides a direct connection between Fox Mill Road and Lawyers Road. This will allow vehicles to avoid turning onto and from Reston Parkway. The connection would take advantage of the existing park and ride location, and would be designed to limit impact on the existing homes, as shown in **Figure 6.12**.

The proposed connection would require the acquisition of ROW. There do not appear to be any environmental constraints, but the proximity to a housing development may present challenges such as noise, dust, and operating times during construction of the road. The new connection could also facilitate the improvement of the existing bend in Lawyers Road, south of the park and ride.

Figure 6.12: Reston Parkway Option 2 - Lawyers Road Connection<sup>3</sup>



<sup>3</sup> This configuration, that directly connects Fox Mill Road to the new roadway, was tested in Synchro after Tier 3 Visum mitigation results were obtained.

## 6.4.2 Fairfax County Parkway Mitigations

Fairfax County Parkway is an important north-south corridor in the study area. It operates like a limited access corridor with grade separations and larger intersection spacing in its approaches to the Reston TSAs, from both the north and south. The posted speed limit is 50 mph, with open shoulder sections, except around most of the major intersections.

After Tier 2 mitigations, the intersection of Fairfax County Parkway with Sunrise Valley Drive continued to operate at unacceptable LOS. The Fairfax County Parkway Ramp intersection with Spring Street/Sunset Hills Road was also anticipated to operate over capacity in the future. Alternative concepts were developed to address the future deficiencies at these locations, and a preliminary analysis was performed to understand the future operating conditions if these alternatives were implemented. This analysis was done at a planning level and was used to understand the benefits or short comings of each alternative.

### 6.4.2.1 Fairfax County Parkway & Sunrise Valley Drive: SPUI

The intersection of Fairfax County Parkway and Sunrise Valley Drive was originally evaluated in May 2013 as part of the Reston Phase I Master Plan. Early in the Network Analysis, several innovative intersection solutions were considered to determine if one of these alternatives could be implemented at this intersection to meet the future travel demand. This was done to understand if an improvement with lower impacts than a grade-separated interchange was feasible. Three potential alternatives were considered:

- A Median U-Turn Crossover,
- A Thru-Turn Intersection, and
- A Continuous Flow Intersection (CFI).

The “Reston Tier 3 Alternative Analysis Memo” has graphics of each of the tested options.

The Median U-Turn Crossover and the Thru-Turn Intersection were each dismissed because they do not provide significant enough improvement to this intersection, and would need to be part of a corridor-based solution to capture the benefits of these designs. The continuous flow intersection at this location would have ROW impacts comparable to grade-separated improvements, due to the need to expand the left turn movement outside of the through lanes on the east side of the north leg and on the west side of the south leg of Fairfax County Parkway. These alternatives were not carried forward to the Tier 3 Mitigation Alternative Development due to their inability to accommodate future demand and the significant ROW impacts.

Two grade-separated improvements were developed as part of the Tier 3 analysis to determine if they would be able to mitigate the forecasted delay at the intersection. The first interchange option developed was a grade-separated urban diamond interchange. The urban diamond interchange would have two signals that control the traffic on Sunrise Valley Drive. The through traffic on the Fairfax County Parkway would bypass the signals, while all turning movements and through traffic on Sunrise Valley Drive would be controlled by signals. For this type of interchange to function well, sufficient queuing distance would be needed for the turning movements between the signals. A similar interchange is located at Fairfax County Parkway and Fair Lakes Parkway.

The second interchange option developed was a single point urban interchange (SPUI). The County prepared a cost estimate on December 4, 2014, with a conceptual design of a SPUI as the basis of the cost estimate. With a SPUI, the through traffic on Fairfax County Parkway would bypass the signal; while all of the turning movements and through traffic on Sunrise Valley Drive would flow through a single intersection. This interchange would function like the existing SPUI located at Fairfax County Parkway and Elden Street/Baron Cameron Avenue. The SPUI design minimizes right of way impacts and the footprint of the interchange structure.

In both alternatives, Fairfax County Parkway would be elevated over Sunrise Valley Drive due to the considerations listed below:

- Minimizing the right of way impacts;
- Avoiding the numerous underground utilities including a major gas transmission line and regulating station;
- Avoiding the existing triple box culvert crossing just to the north and west of the intersection; and
- Constructability and maintenance of traffic for the implementation of the improvement.

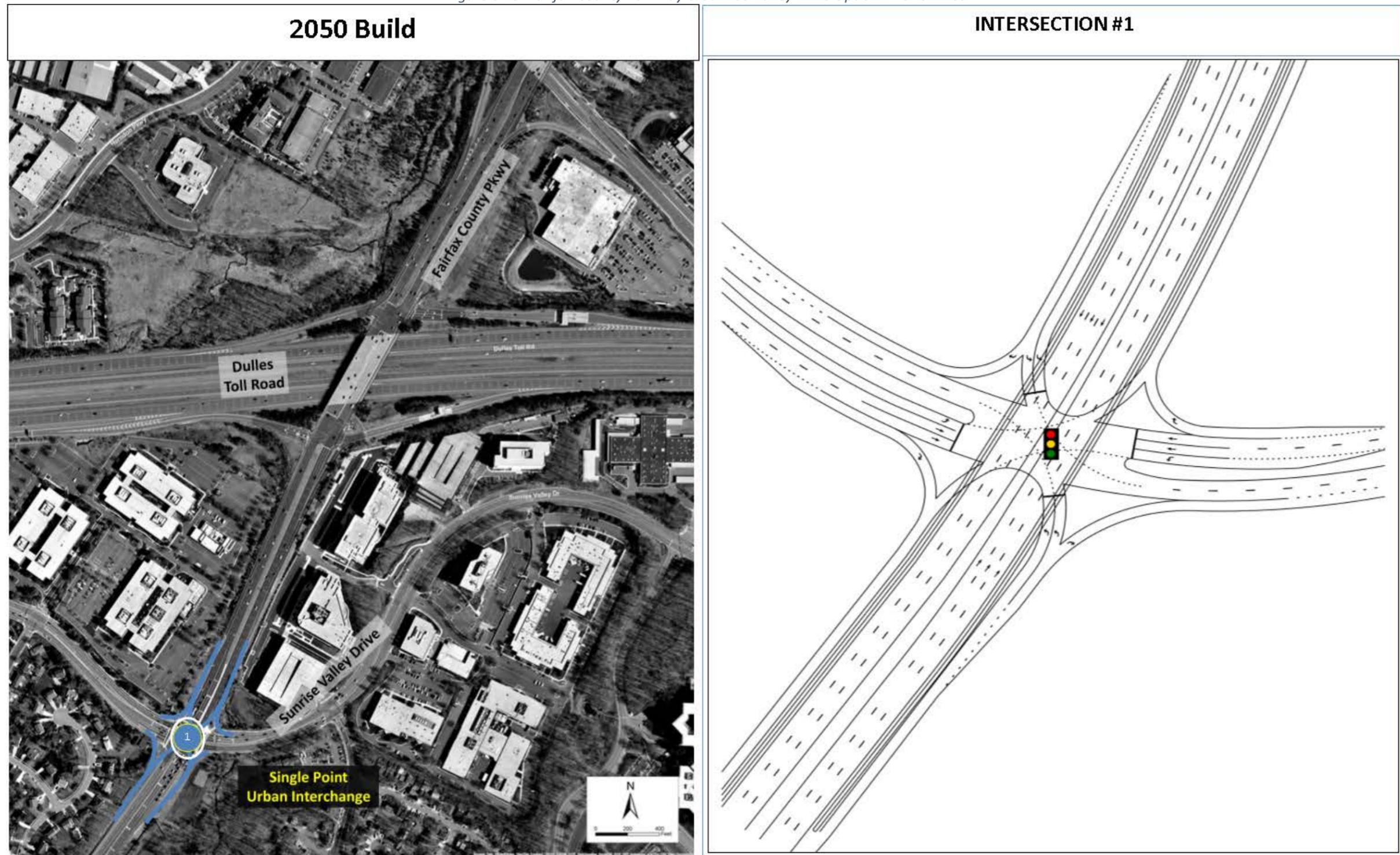
The existing intersection of Fairfax County Parkway and Sunrise Valley Drive contains long pedestrian crossings (up to 125 feet), an unsignalized pedestrian crossing that conflicts with free flow traffic at a channelized right turn, and dual left turn lanes on all approaches. Providing improved pedestrian facilities in each of the proposed alternatives would be necessary if they are implemented.

Despite the large amount of ROW devoted to vehicular traffic, the intersection is not expected to adequately process the projected demand for the year 2050. Through consultation with the Advisory Group and Stakeholders Group, it was decided that the SPUI at Fairfax County Parkway and Sunrise Valley Drive (Option 2) would be included in the Visum model for the Tier 3 analysis. Only the SPUI option is described below. Please refer to the *Reston Tier 3 Alternative Analysis Memo* for more information.

A single point urban interchange (SPUI) would create an overpass over Sunrise Valley Drive, with ramps connecting to a single intersection underneath the overpass. As stated above, it is recommended that Fairfax County Parkway pass over Sunrise Valley Drive. This would limit ROW impacts, as well as access to potential future local businesses and properties in the area. Preliminary analysis shows that a SPUI would cause less delay than the existing intersection, but the left turns from Fairfax County Parkway are still expected to experience failing Levels of Service during the AM peak. The operational function of the SPUI is similar to a diamond interchange, however the SPUI only consists of one signalized intersection, so any queuing that may occur does not impact adjacent intersections, as shown in **Figure 6.13**.

Pedestrian facilities can also be improved to provide defined crossings of the new ramps to and from the single intersection.

Figure 6.13: Fairfax County Parkway & Sunrise Valley Drive Option 2 - SPUI Area



#### 6.4.2.2 Fairfax County Parkway and Spring Street/Sunset Hills Road: Fairbrook Drive Ramp

The interchange of Fairfax County Parkway and Spring Street/Sunset Hills Road is located in both Fairfax County and the Town of Herndon. During the evening peak hour, the intersection of Spring Street and the Fairfax County Parkway Ramps is forecasted to operate at LOS F, with delays in excess of 130 seconds per vehicle. To mitigate this delay, multiple interchange concepts were developed to facilitate the movement of traffic through this intersection. As a starting point, some of the potential alternatives developed during various Town of Herndon planning efforts were used. These are documented the “Transportation Assessment, Potential Herndon Transit Oriented Core Expansion” memo dated August 14, 2012. One key component of the alternatives is the extension of Fairbrook Drive from Herndon Parkway to Spring Street at the location where the loop ramp from Fairfax County Parkway intersects with Spring Street. Alternatives which would eliminate the signal on the Fairfax County Parkway at the Spring Street loop ramp were developed and tested, as well as an alternative that takes advantage of the new Fairbrook Drive connection.

Options were developed based off the following considerations:

- Minimizing the ROW impacts;
- Reducing the impact to the Reston Association Maintenance Yard to the west of the existing interchange;
- Accommodating the Town of Herndon planned improvements;
- Preserving functionality and minimizing the reconstruction of the existing interchange; and
- Constructability and maintenance of traffic for the construction of the facilities.

Using the above criteria four options were examined.

- Option 1 - Provide a new ramp connection from the proposed Fairbrook Drive Extension to Fairfax County Parkway southbound.
- Option 2 - Remove the existing ramp to southbound Fairfax County Parkway from Spring Street and create two new ramps on the east side of Fairfax County Parkway.
- Options 3 - Provide for a Collector Distributor road along the Dulles Toll Road at Fairfax County Parkway with a direct connection to Herndon Parkway.
- Option 4 - Create half of a diamond interchange to/from Sunset Hills Road.

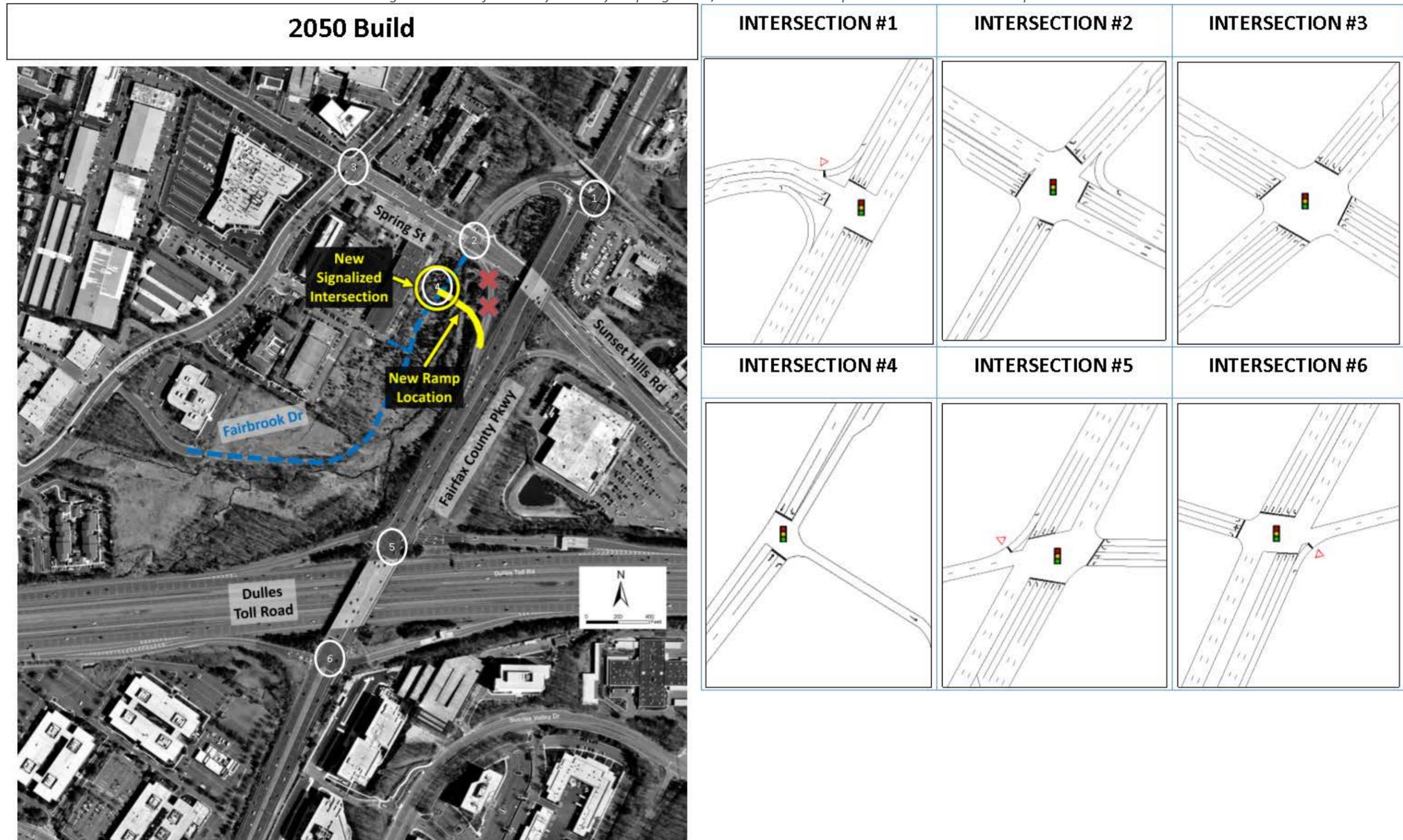
This analysis was done at a planning level and was used to understand the benefits or short comings of each alternative.

Option 1 was identified as the option to include in the Tier 3 Visum modeling, after consulting with the Advisory Group and Stakeholders. Only Option 1 is described below. Please refer to “Reston Tier 3 Alternative Analysis Memo” for more information.

Option 1 relocates the ramp from Spring Street to southbound Fairfax County Parkway from its existing location to the planned extension of Fairbrook Drive, illustrated in **Figure 6.14**. This configuration maintains much of the existing traffic patterns while allowing traffic traveling northbound on Fairbrook Drive destined for southbound Fairfax County Parkway to avoid Spring Street entirely. Option 1 was not developed to improve operating conditions on Fairfax County Parkway. The improvement was developed as an alternative to removing the existing southbound on-ramp and to alleviate the delay at

the intersection of Spring Street and the ramps to Fairfax County Parkway, which is forecasted to fail by 2050. Impacts to the surrounding area would be minimal as the property required to construct this ramp is publicly owned. There is however, a small tributary that would require treatment.

Figure 6.14: Fairfax County Parkway & Spring Street/Sunset Hills Road Option 1-Fairbrook Drive Ramp



## 6.5 Tier 3 Mitigation Results

With the inclusion of the Tier 3 mitigation recommendations in the model, eight intersections in the study area are still expected to operate at LOS F (as shown in **Table 6.10**). Of these eight intersections, three are outside of the Reston TSA, while five are within the TSA. The LOS F intersections include:

### Outside of Reston TSA

- Centerville Road at WB Dulles Toll Road Ramps (not in Reston TSA) with 114 seconds of delay in the PM
- Centerville Road at Woodland Park Road (in Innovation TSA) with 91 seconds of delay in the PM
- Centerville Road at Sunrise Valley Drive (in Innovation TSA) with 131 seconds of delay in the AM and 86 seconds of delay in the PM (Problem Location)

### Within Reston TSA

- Frying Pan Road at Monroe Street with 112 seconds of delay in the AM
- Fairfax County Parkway at Baron Cameron Avenue with 100 seconds of delay in the PM
- Reston Parkway at Sunrise Valley Drive with 96 seconds of delay in the PM
- Reston Parkway at South Lakes Drive with 95 seconds of delay in the AM
- Reston Parkway at Sunset Hills Road with 83 seconds of delay in the PM

*Table 6.10: 2050 LOS F Intersections*

Peak Hour	Pre-Mitigation	Tier 2	Tier 3
AM	35	8	3
PM	39	10	6
In Both AM & PM	31	7	1
In Either AM or PM	43	11	8

As a result of Tier 3 mitigations the number of Problem Locations was reduced to one, Centerville Road and Sunrise Valley Drive, which is not located within the Reston TSAs, as shown in

**Table** and **Figure 6.15** through **Figure 6.26**, the detailed Tier 3 LOS maps (shown in **Figure 6.15** - **Figure 6.26**). The 2050 intersection geometries are shown in **Figure 6.27** - **Figure 6.33**.

*Table 6.11: 2050 Problem Locations*

Peak Hour	Pre-Mitigation	Tier 2	Tier 3
AM	22	5	1
PM	26	2	0
In Both AM & PM	16	1	0
In Either AM or PM	32	6	1

Figure 6.15: 2050 AM Peak Hour (7:00 – 8:00) Tier 3 Mitigation Visum LOS Map (1 of 6)

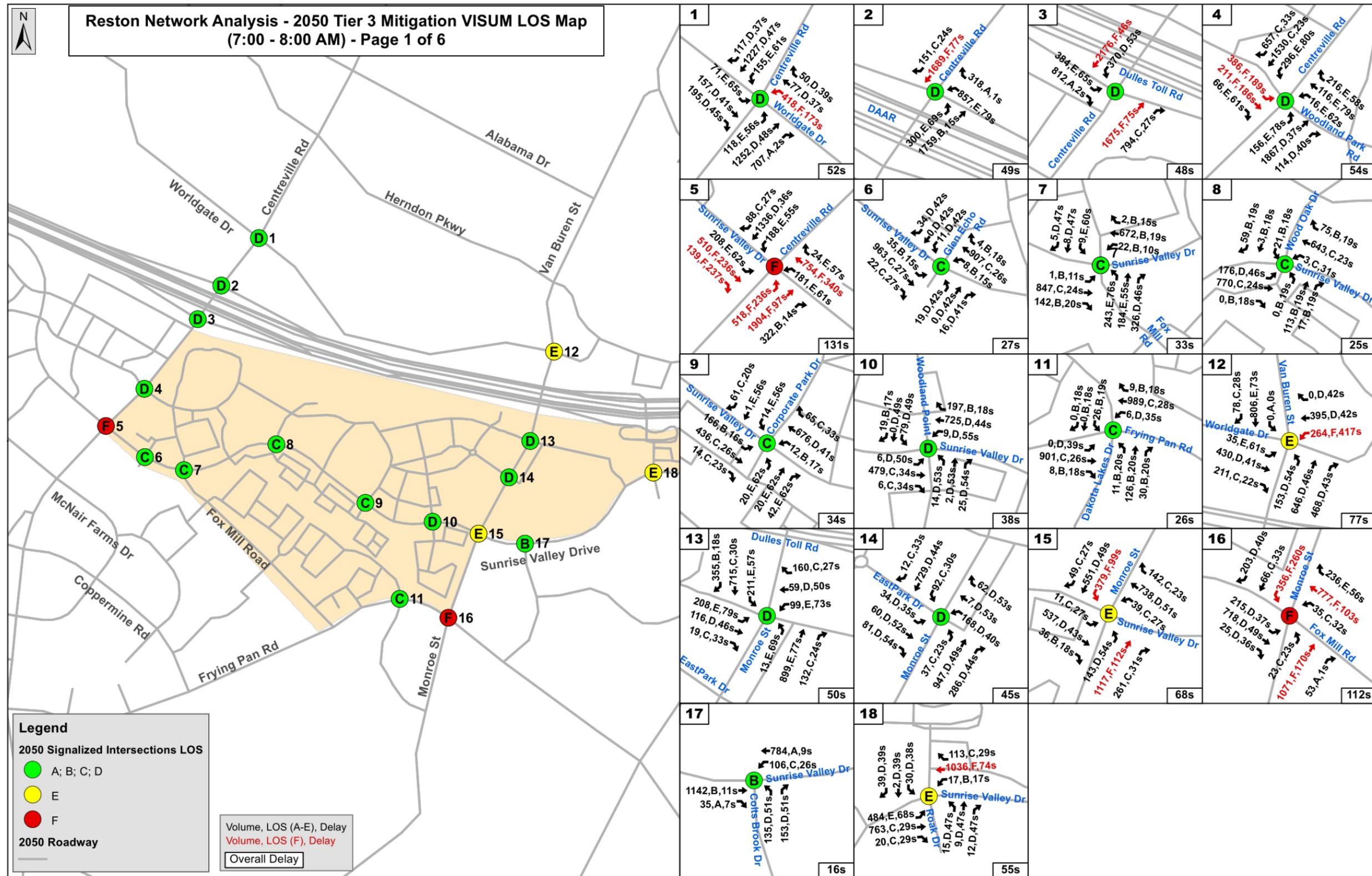


Figure 6.16: 2050 AM Peak Hour (7:00 – 8:00) Tier 3 Mitigation Visum LOS Map (2 of 6)

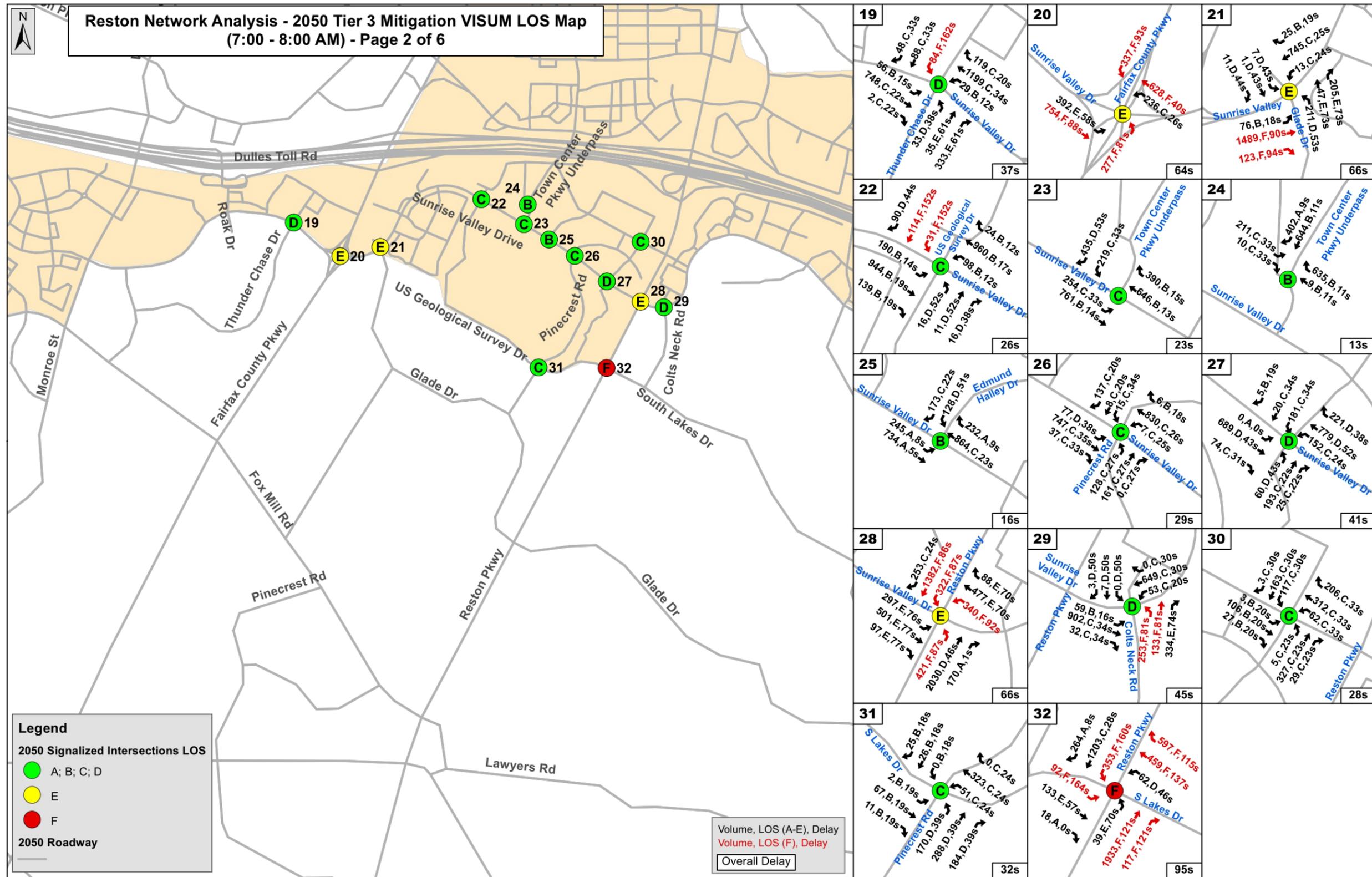


Figure 6.17: 2050 AM Peak Hour (7:00 – 8:00) Tier 3 Mitigation Visum LOS Map (3 of 6)

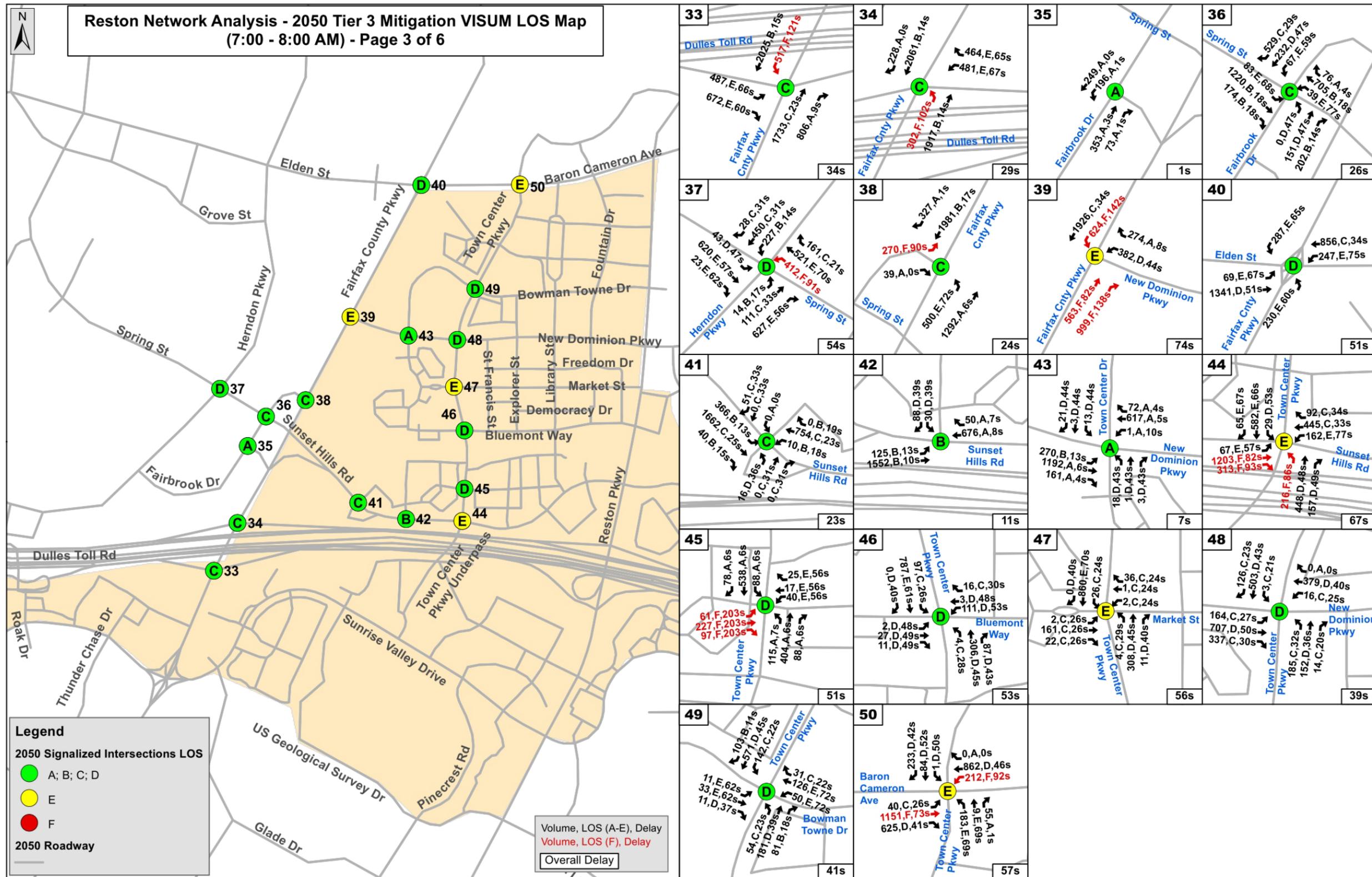


Figure 6.18: 2050 AM Peak Hour (7:00 – 8:00) Tier 3 Mitigation Visum LOS Map (4 of 6)

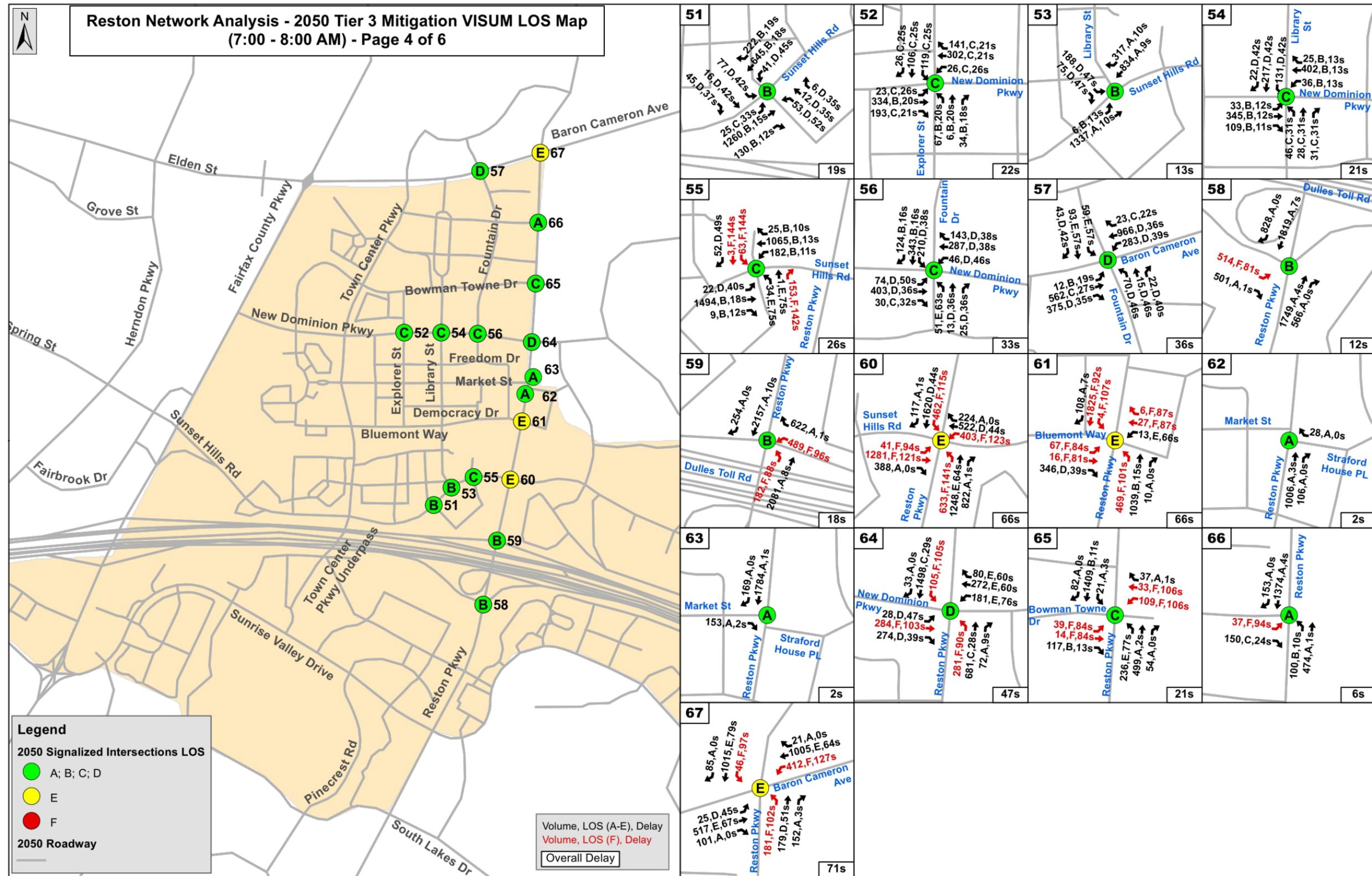


Figure 6.19: 2050 AM Peak Hour (7:00 – 8:00) Tier 3 Mitigation Visum LOS Map (5 of 6)

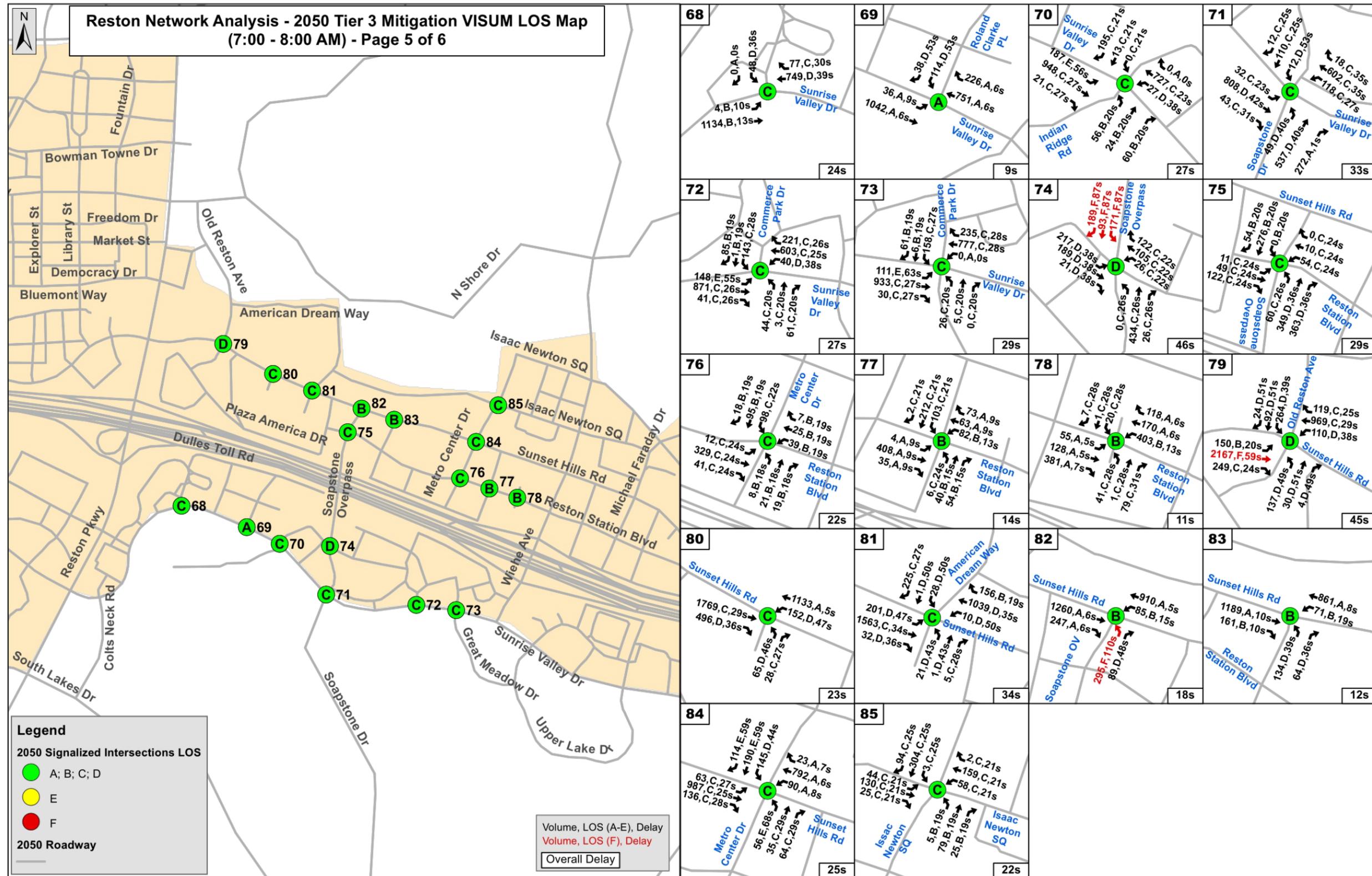


Figure 6.20: 2050 AM Peak Hour (7:00 – 8:00) Tier 3 Mitigation Visum LOS Map (6 of 6)

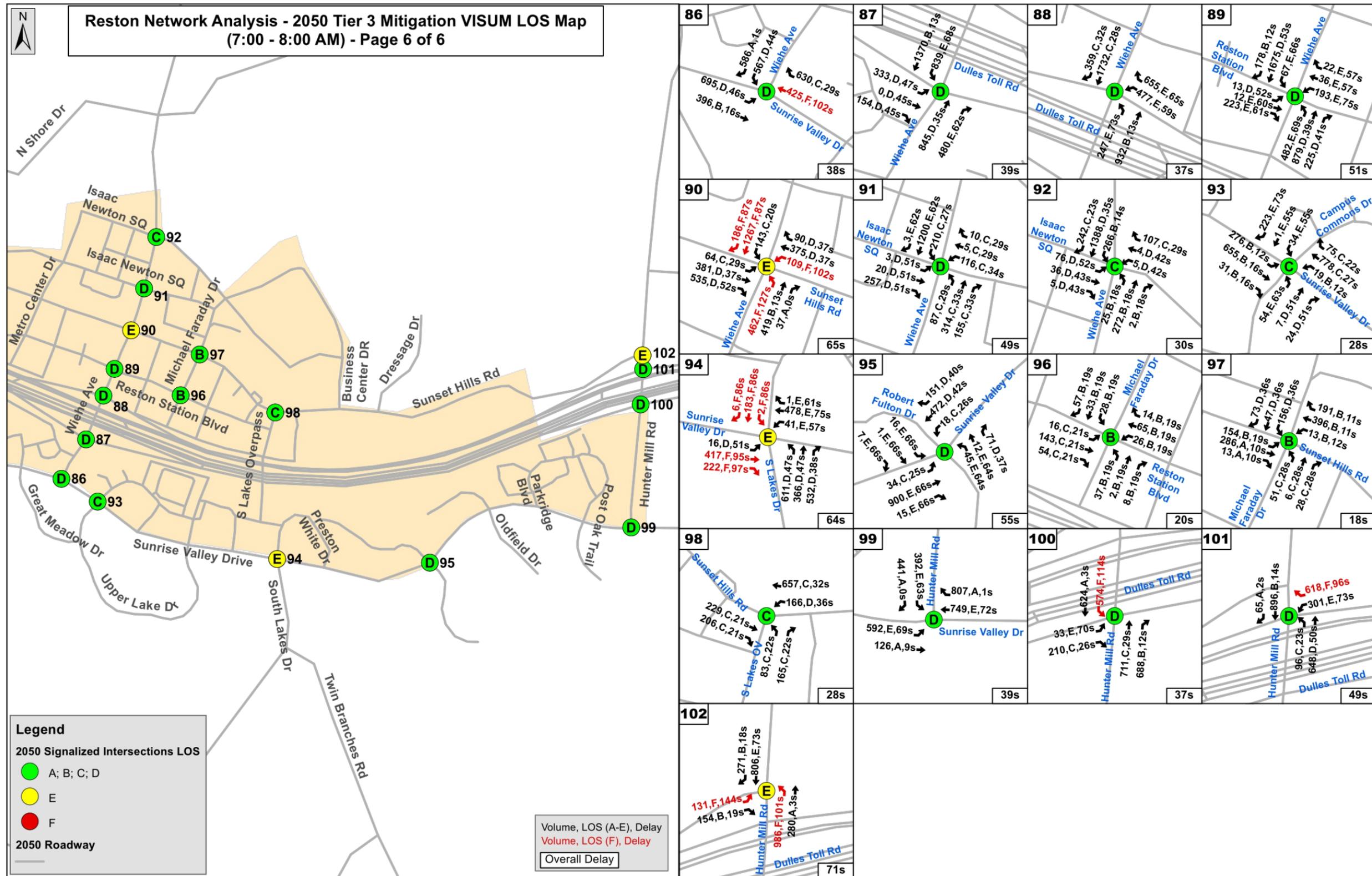


Figure 6.21: 2050 PM Peak Hour (5:00 – 6:00) Tier 3 Mitigation Visum LOS Map (1 of 6)

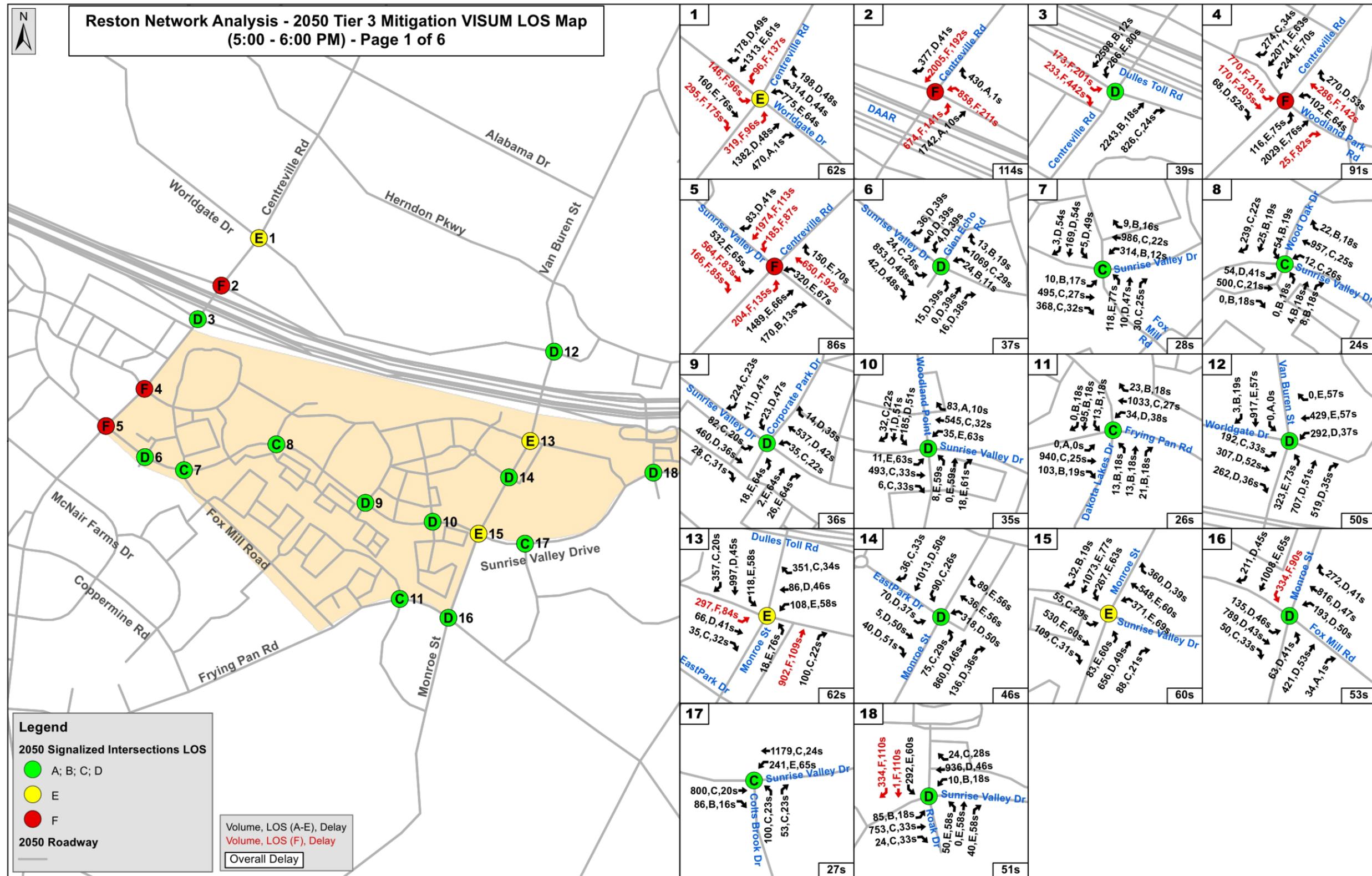


Figure 6.22: 2050 PM Peak Hour (5:00 – 6:00) Tier 3 Mitigation Visum LOS Map (2 of 6)

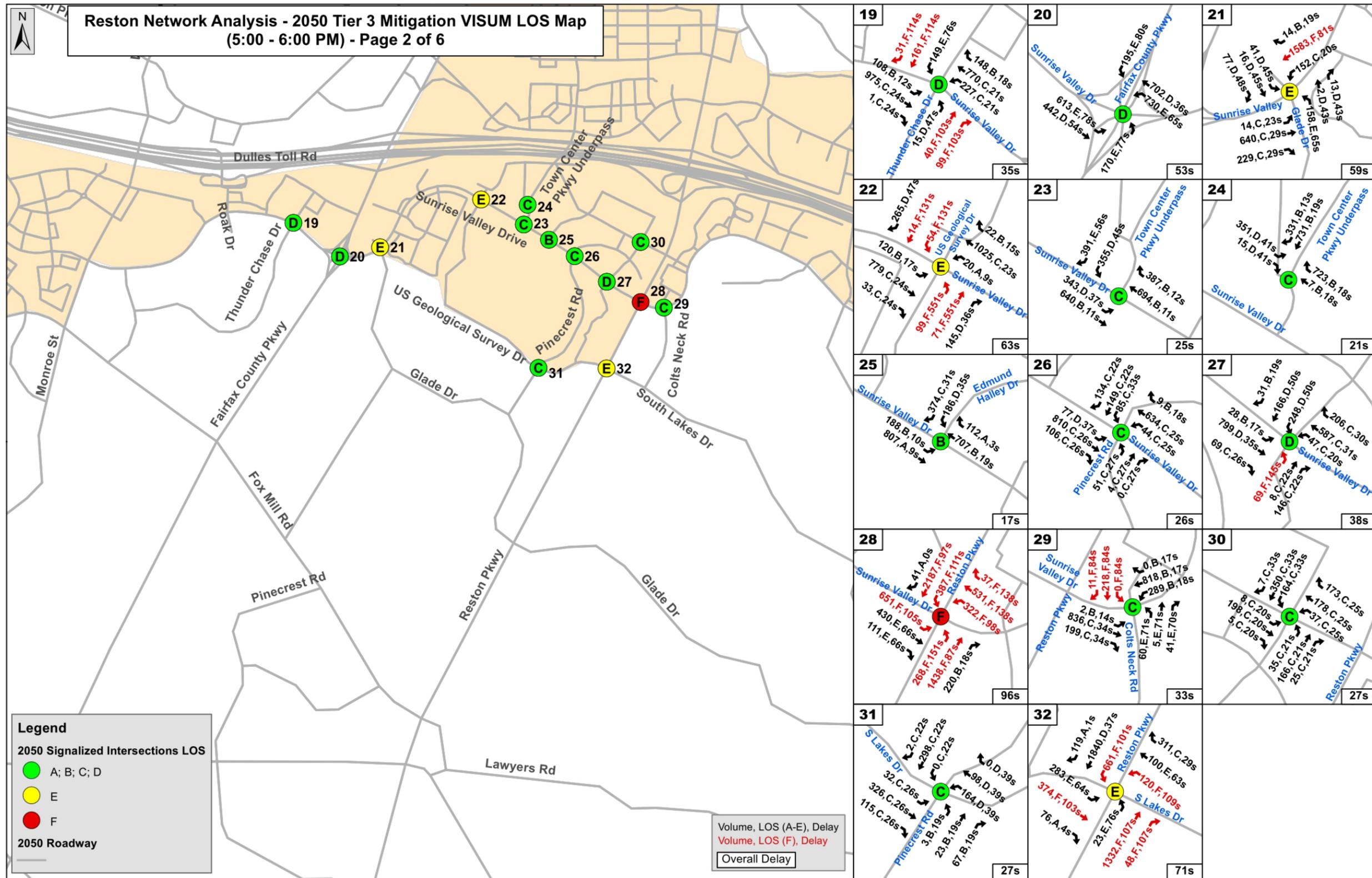


Figure 6.23: 2050 PM Peak Hour (5:00 – 6:00) Tier 3 Mitigation Visum LOS Map (3 of 6)

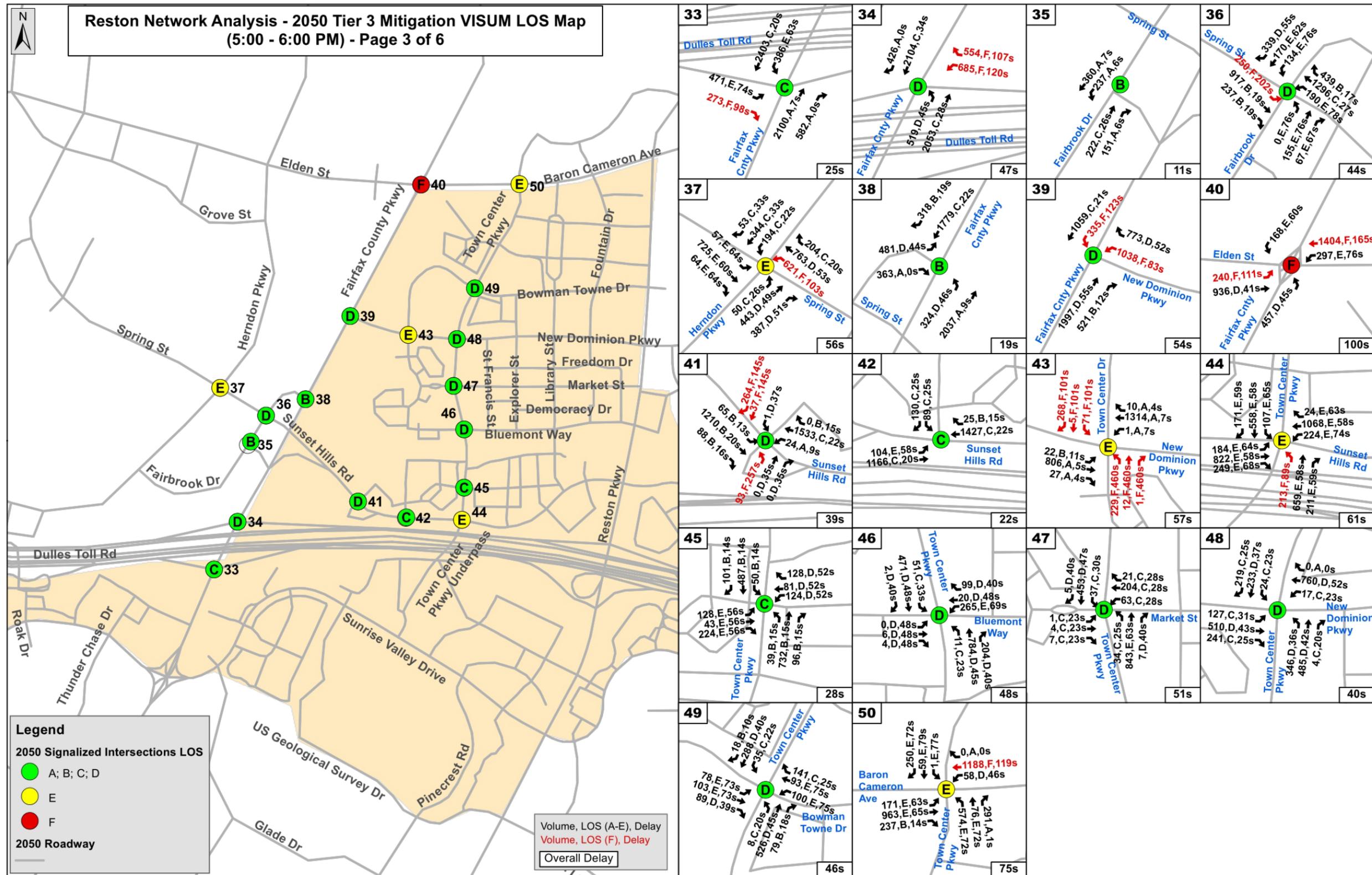


Figure 6.24: 2050 PM Peak Hour (5:00 – 6:00) Tier 3 Mitigation Visum LOS Map (4 of 6)

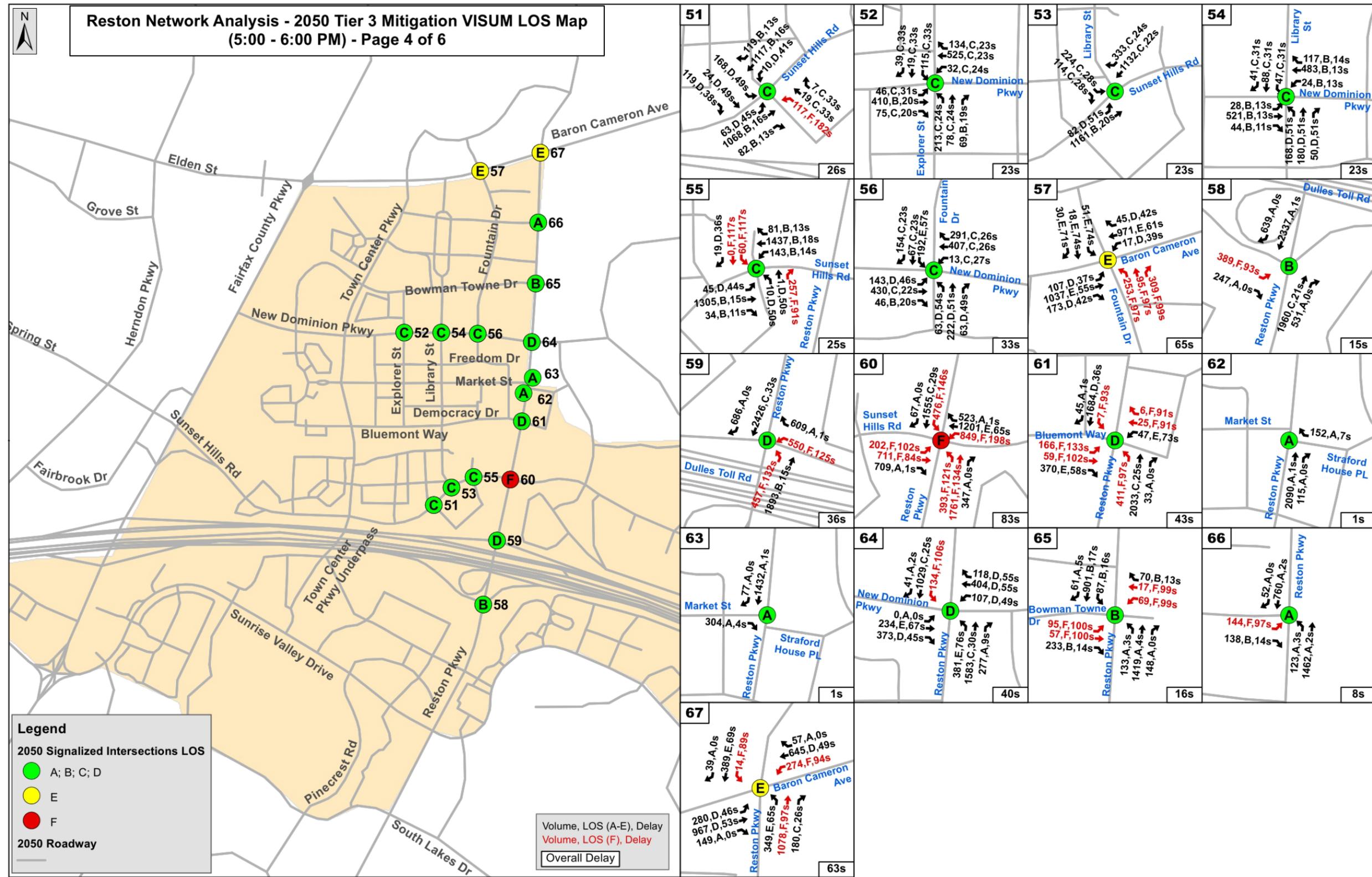


Figure 6.25: 2050 PM Peak Hour (5:00 – 6:00) Tier 3 Mitigation Visum LOS Map (5 of 6)

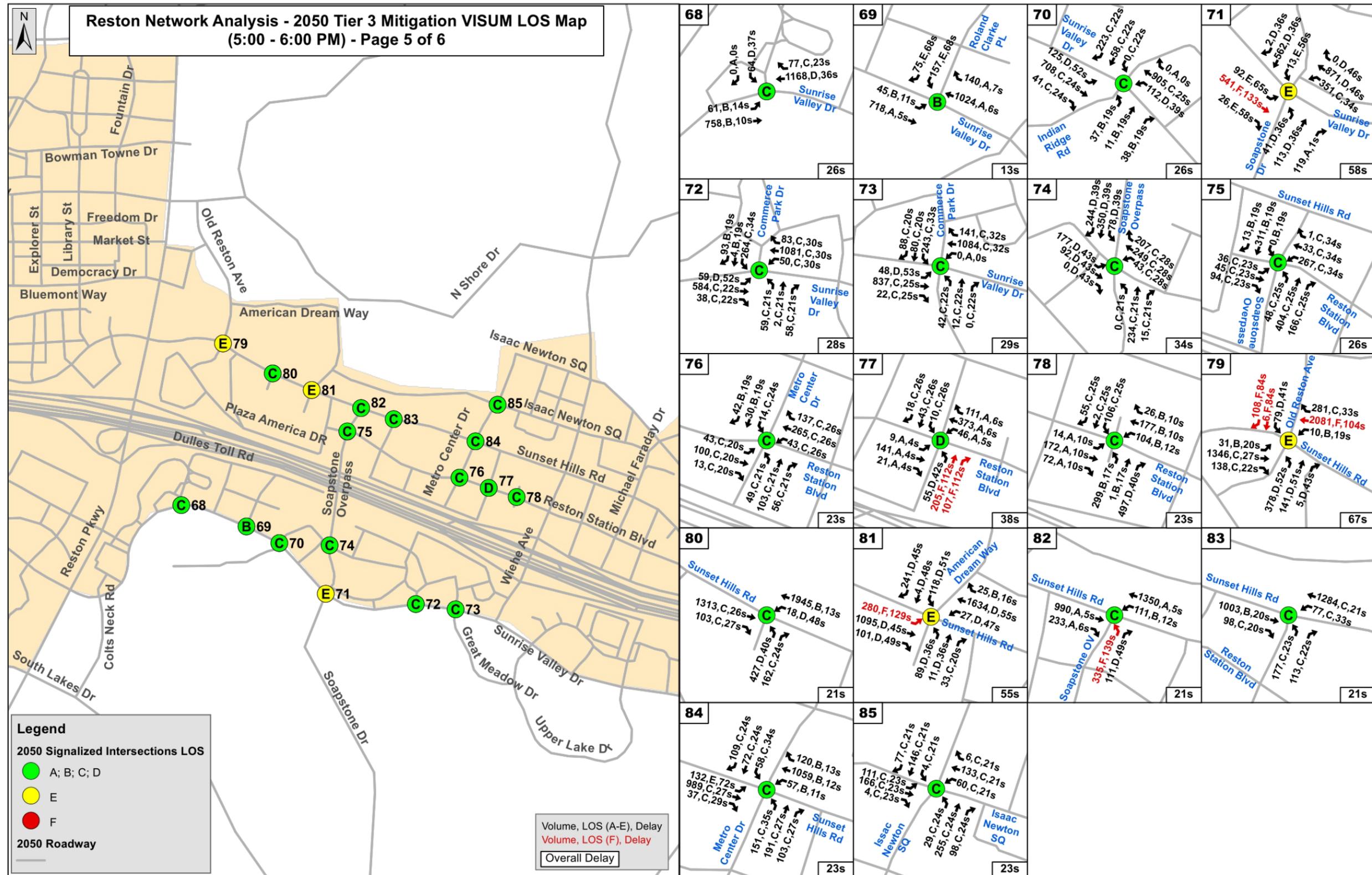


Figure 6.26: 2050 PM Peak Hour (5:00 – 6:00) Tier 3 Mitigation Visum LOS Map (6 of 6)

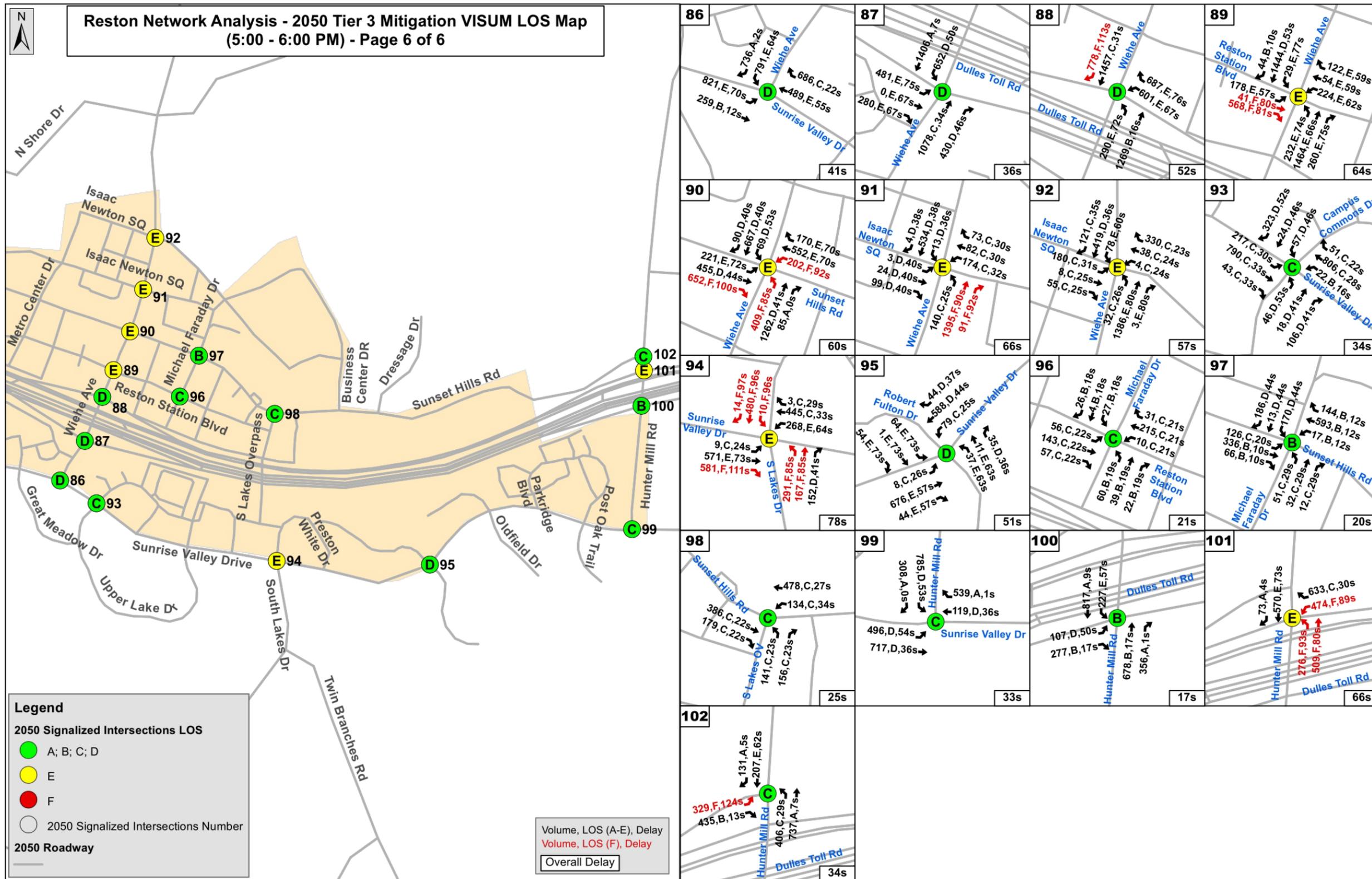


Figure 6.27: 2050 Intersection Geometry (1 of 7)

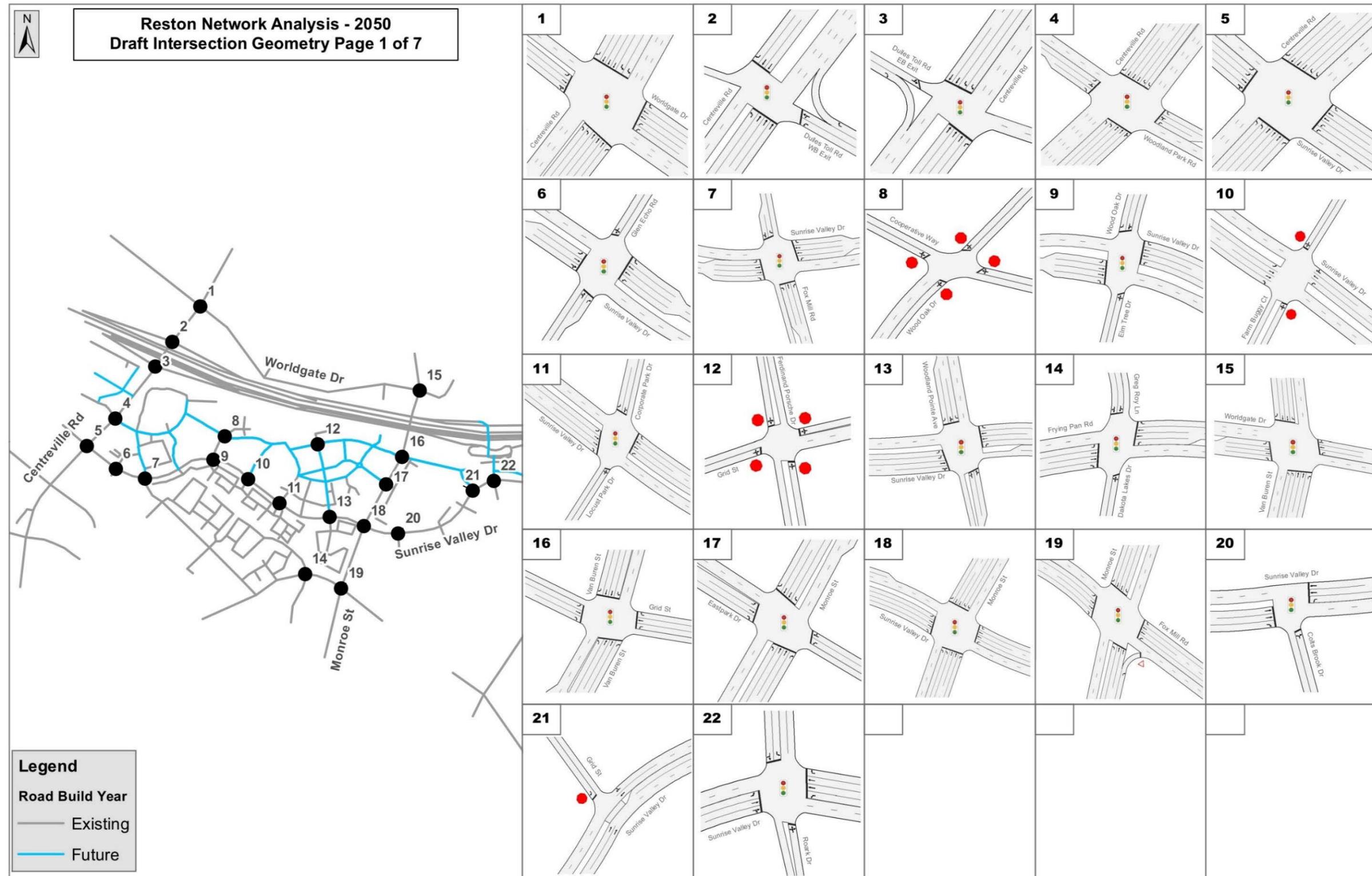


Figure 6.28: 2050 Intersection Geometry (2 of 7)

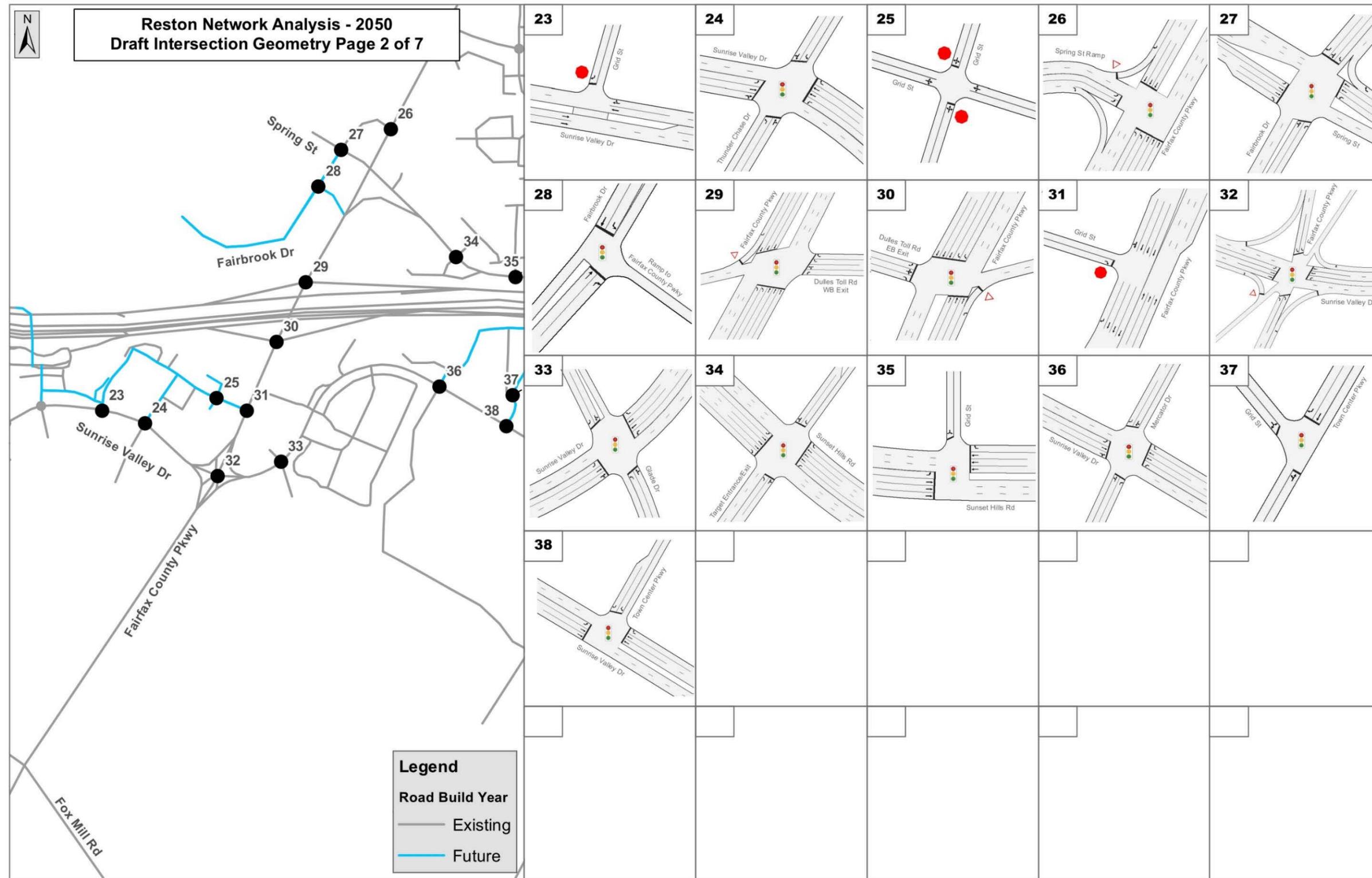


Figure 6.29: 2050 Intersection Geometry (3 of 7)

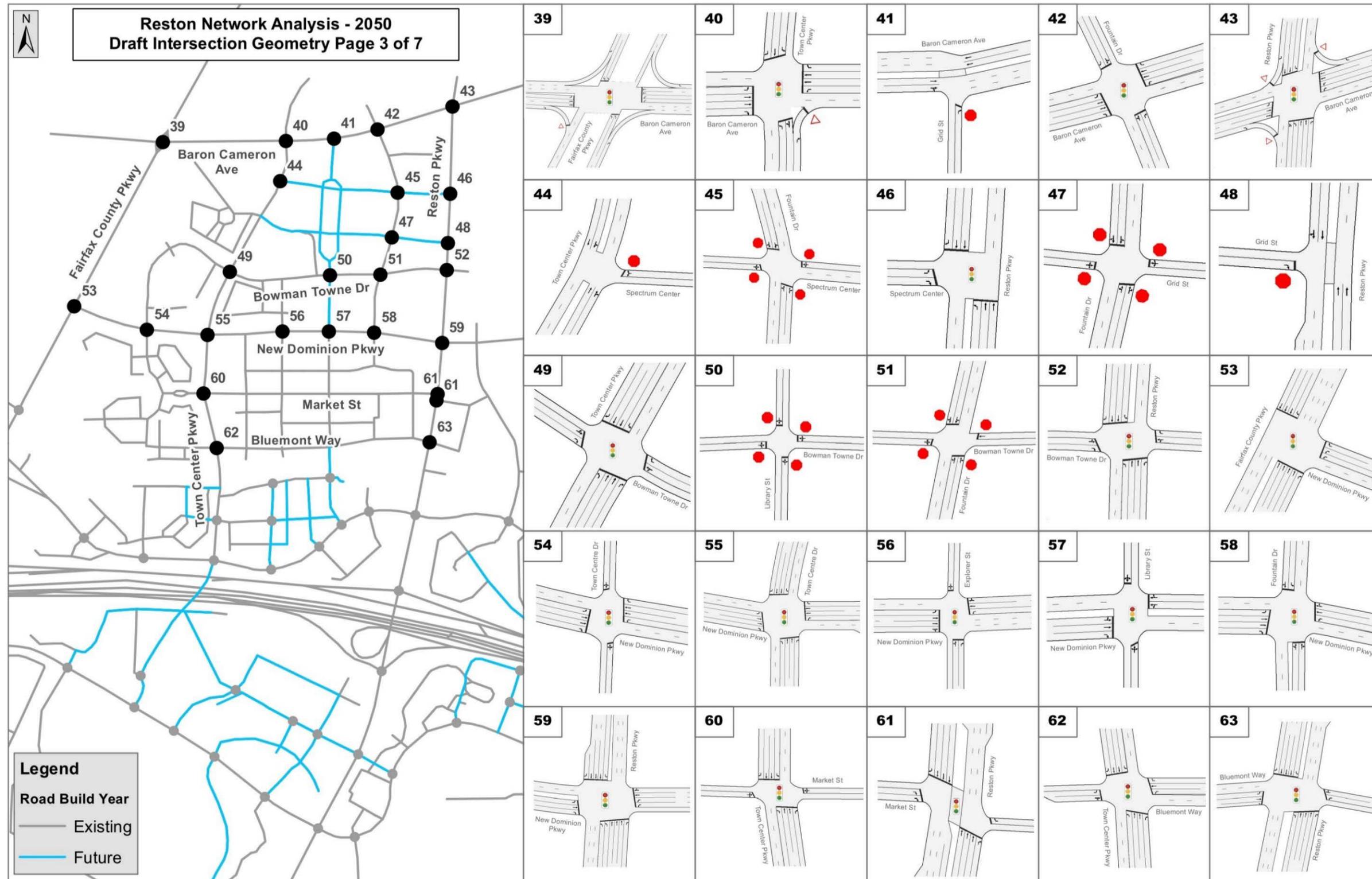


Figure 6.30: 2050 Intersection Geometry (4 of 7)



Figure 6.31: 2050 Intersection Geometry (5 of 7)

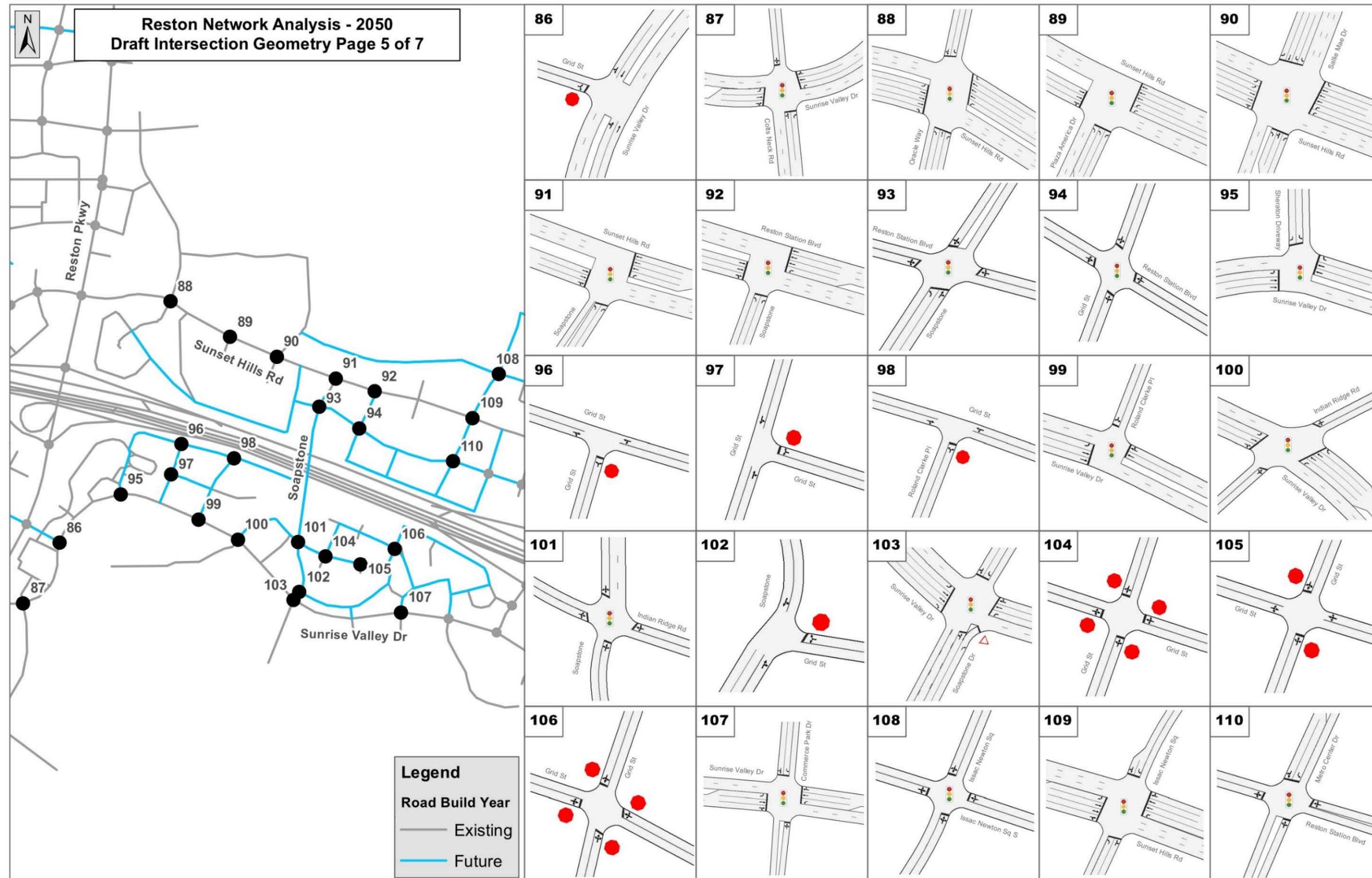


Figure 6.32: 2050 Intersection Geometry (6 of 7)

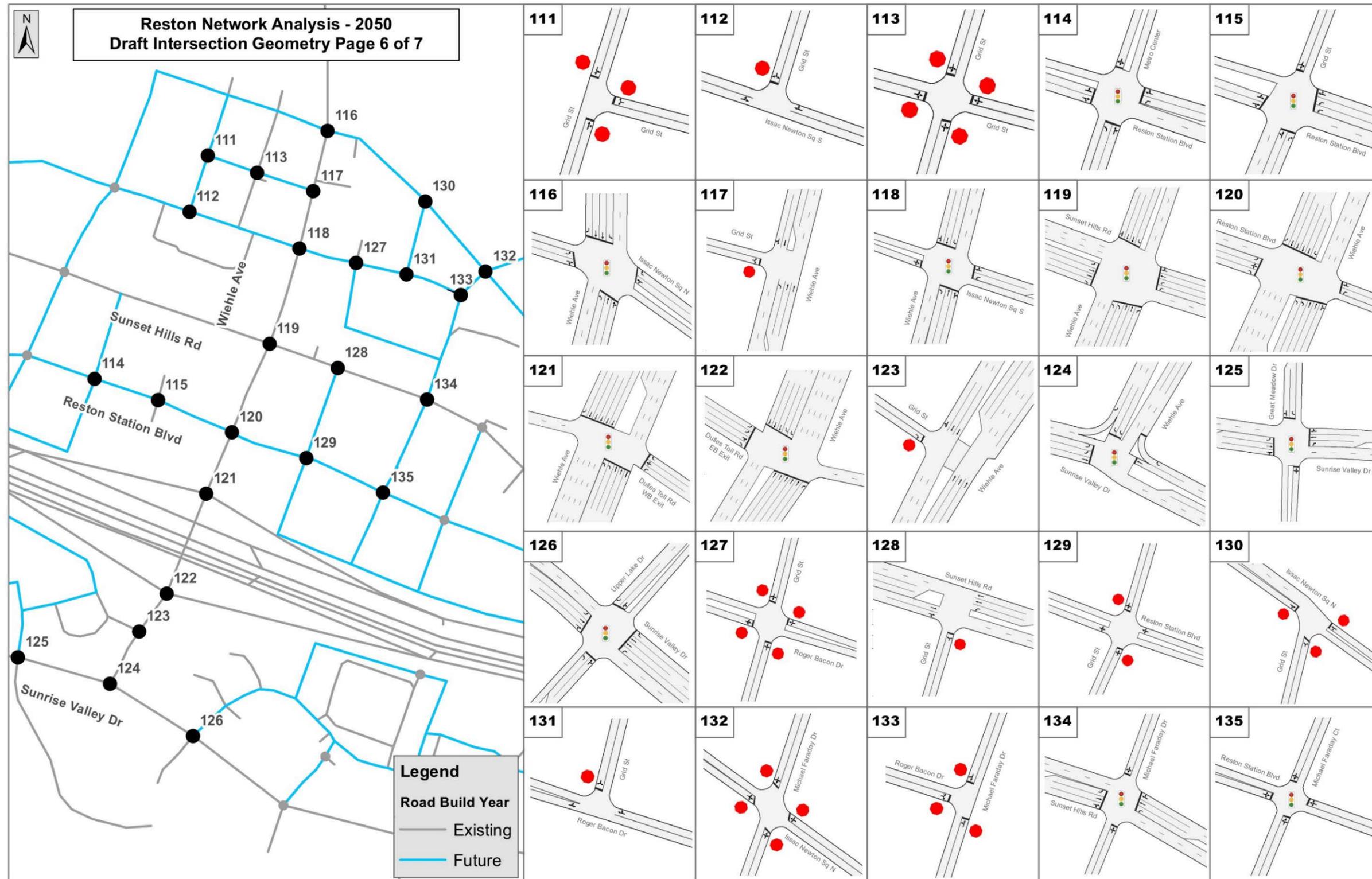
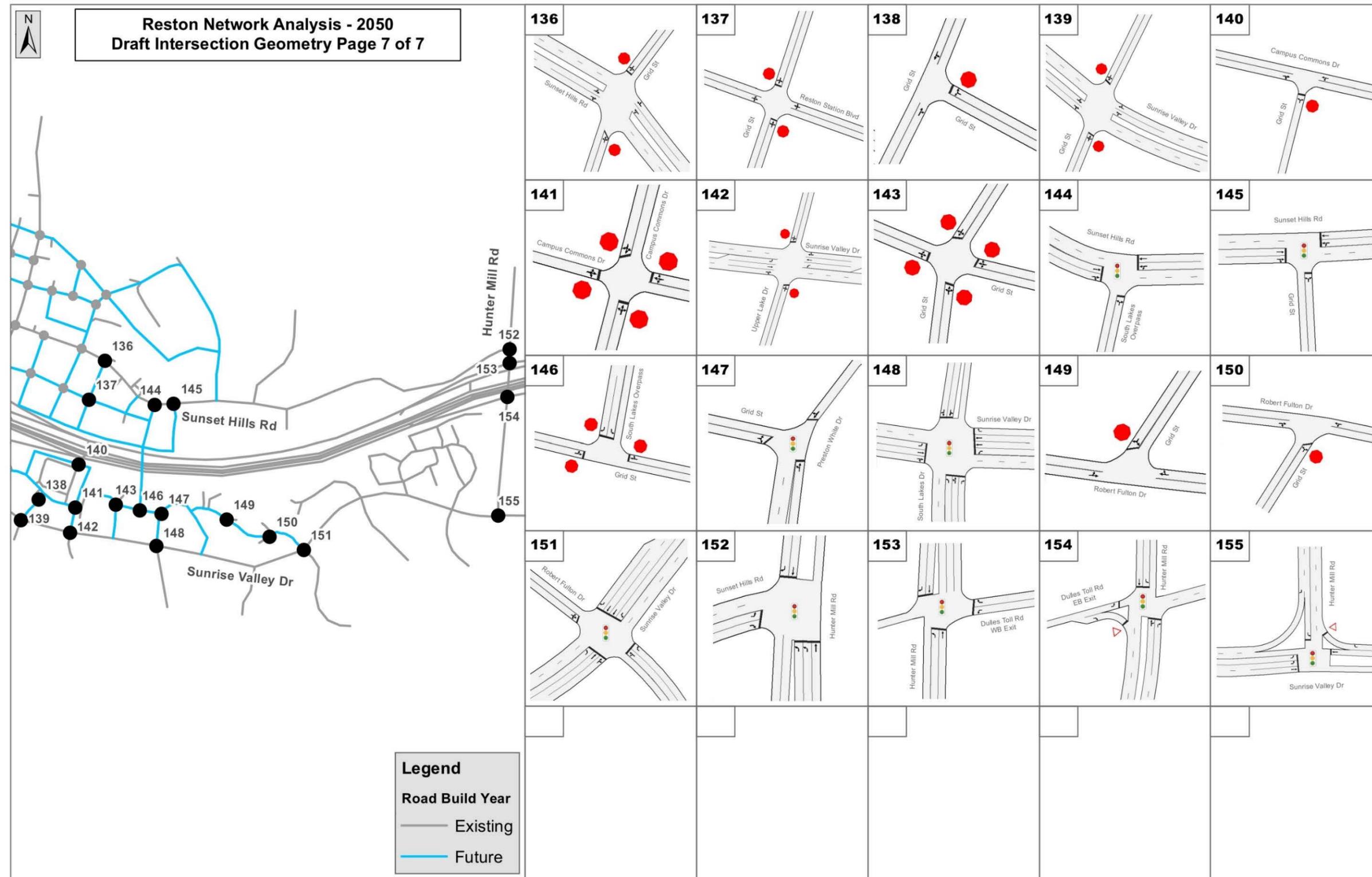


Figure 6.33: 2050 Intersection Geometry (7 of 7)



## 7 2030 Visum Analysis

### 7.1 2030 Overview

2030 was identified as the Mid-Buildout year. The Mid-Buildout analysis of the conceptual Grid of Streets within the Reston TSAs was conducted to assess the operating conditions at a potential midpoint in the development of the Reston TSAs. As part of this work, 2030 Visum models were developed and the traffic mitigation procedures were conducted using Visum and Synchro.

As with the 2050 model, the initial 2030 Visum trip tables were extracted and processed from the Fairfax County Travel Demand Model (FCTDM) as a subset of the Version 2.3 Metropolitan Washington Council of Government (MWCOC) model. Based on anticipated Mid-Buildout land use, ITE trips were calculated and applied to the refined zones with additional Transportation Demand Management trip reduction factors. As shown in **Table 7.1** below, the 2030 trip reduction factors were smaller than the 2050 trip reduction factors. Final 2030 trip tables were then developed for use in Visum.

*Table 7.1: Trip Reduction Factors*

Development Type	Reston TSA TDM Vehicle Trip Reduction Goals					
	0 – 1/4 Mile		1/4 to 1/2 Mile		Beyond 1/2 Mile	
	2030	2050	2030	2050	2030	2050
Office	40%	45%	35%	40%	30%	35%
Residential	40%	45%	35%	40%	20%	25%

As part of the Comprehensive Plan, the 2030 road network and planned improvements were then incorporated in the Visum models which included a partial build out of the Grid of Streets, Soapstone Overpass, Town Center Parkway Underpass, and the widening of Reston Parkway from the Dulles Toll Road to South Lakes Drive. The Grid of Streets included in the 2030 network were informed by the rezoning applications currently under consideration. Due to the time frame, it was assumed that if an application was not yet being considered, it was not as likely to be implemented by the Mid-Buildout year. The results from the Existing Conditions Phasing analysis (discussed in Chapter 7) informed the selection of the large improvements included in the network.

### 7.2 2030 Road Network and Planned Improvements

The Fairfax County Comprehensive Plan (2013) plans for the transition of the Reston Transit Station Areas (TSAs) into urban centers with a mix of residential, office, retail, and other commercial land uses by 2030.

There were assumptions made about the specific transportation projects likely to be implemented by the Mid-Buildout of the Reston TSAs. The projects and roadway improvements assumed in the 2030 roadway network include:

- A partial buildout of the Grid of Streets (shown in **Figure 7.1**);
- Soapstone Overpass (3-lane bridge) across the Dulles Toll Road (DTR) from Sunset Hills Road to Sunrise Valley Drive approximately at Soapstone Drive;
- Town Center Parkway Underpass (4-lane tunnel) from Town Center Parkway and Sunset Hills Road to Sunrise Valley Drive west of Edmund Halley Drive;
- Reston Parkway widening to 6 lanes from South Lakes Drive to the DTR;

- Six new signals are proposed in the network (shown in **Figure 7.2**):
  - Town Center Parkway @ North of Sunset Hills Road
  - Sunrise Valley Drive @ Town Center Parkway
  - New Dominion Parkway @ Explorer Street
  - Soapstone Overpass @ Sunset Hills Road
  - Reston Station Boulevard Extended @ Sunset Hills Road
  - Hunter Mill Road @ Crowell Road (proffered improvement)
- Intersection improvements:
  - Reston Parkway @ Sunrise Valley Drive (shown in **Figure 7.3**)
  - Reston Parkway @ South Lakes Drive (shown in **Figure 7.4**)
  - Reston Parkway @ Baron Cameron Avenue (shown in **Figure 7.5**)

Figure 7.1: 2030 Mid-Buildout Grid of Streets

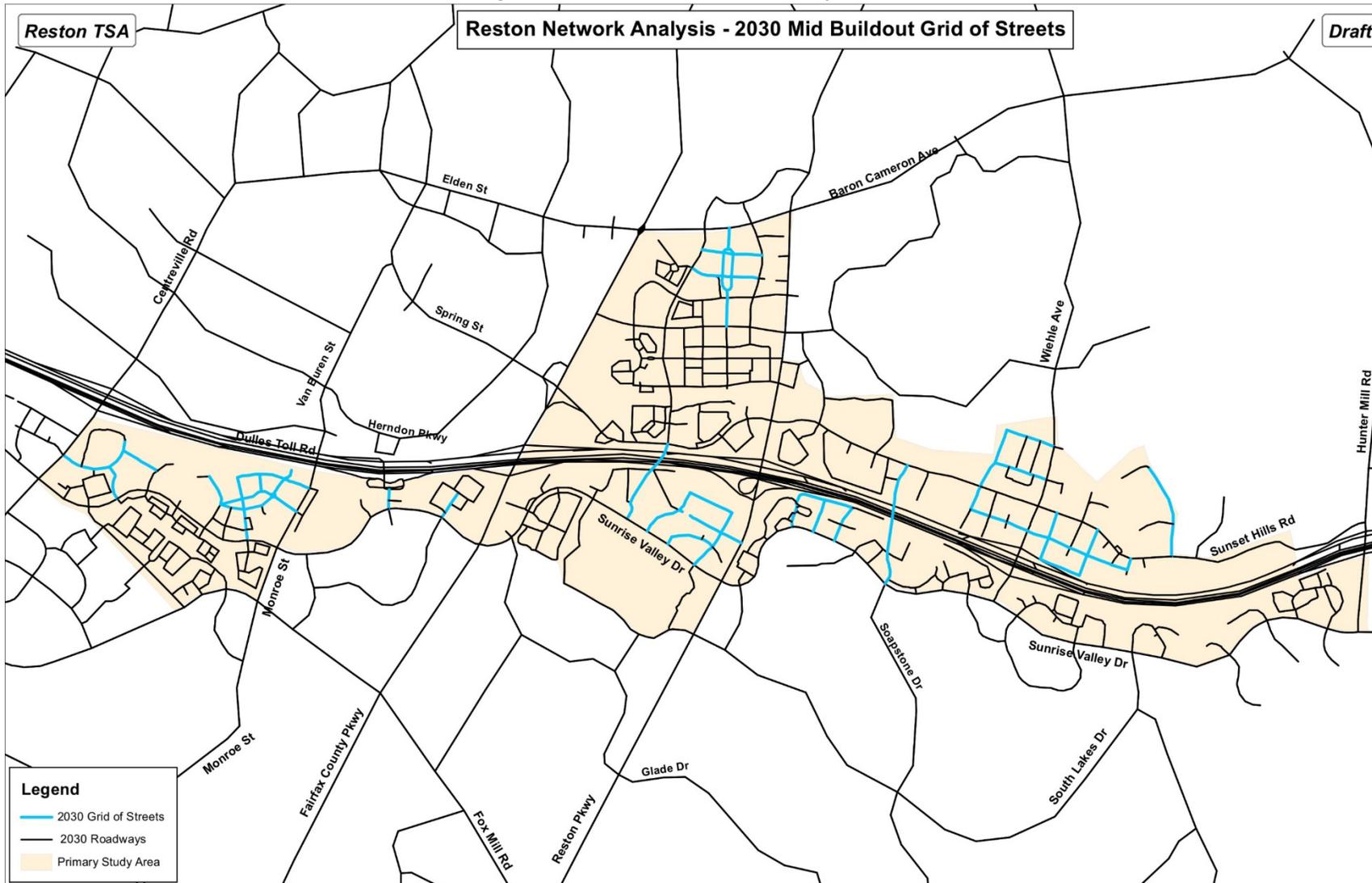


Figure 7.2: 2030 Intersection Control Types

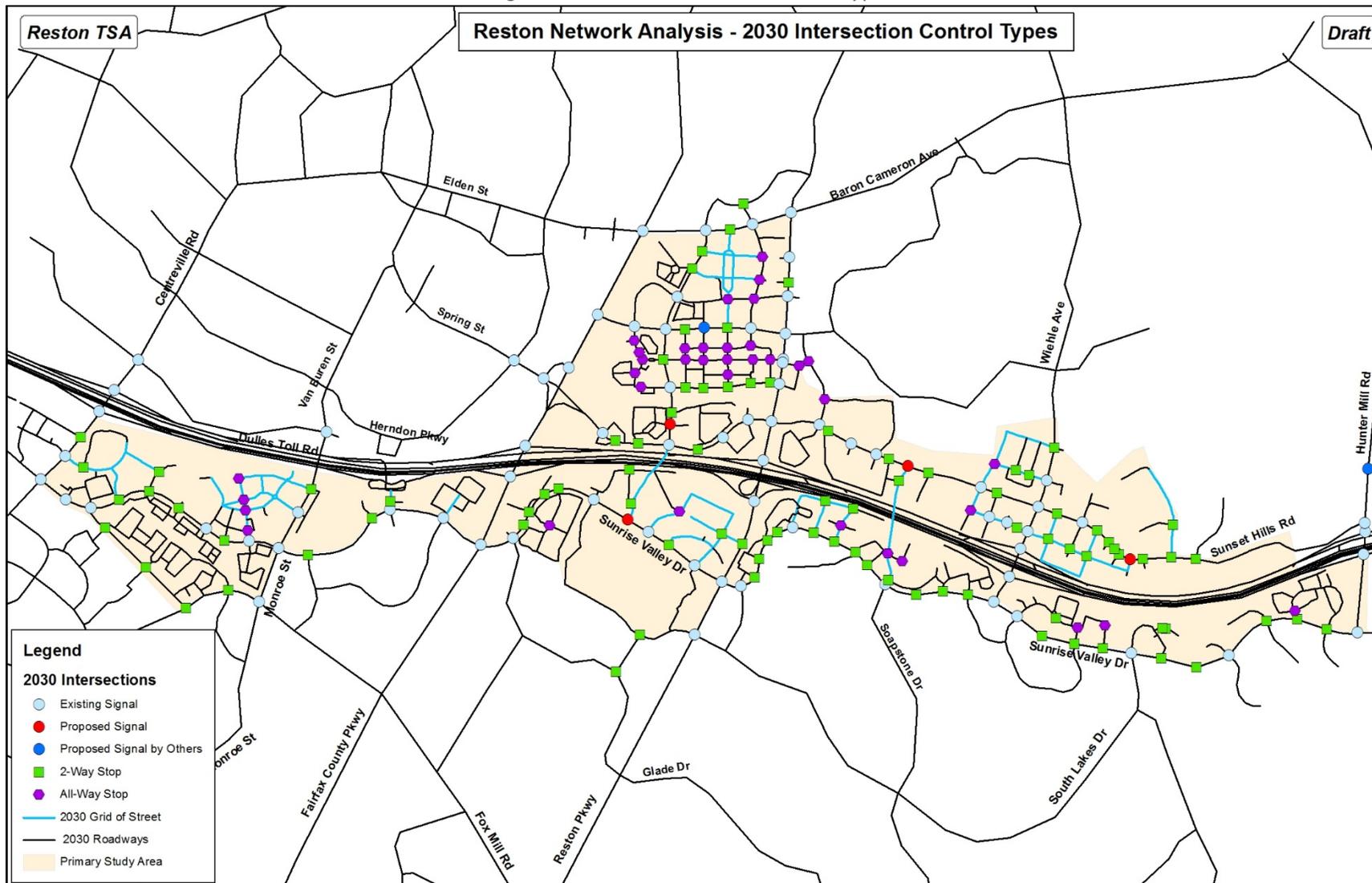


Figure 7.3: Reston Parkway @ Sunrise Valley Drive Improvement

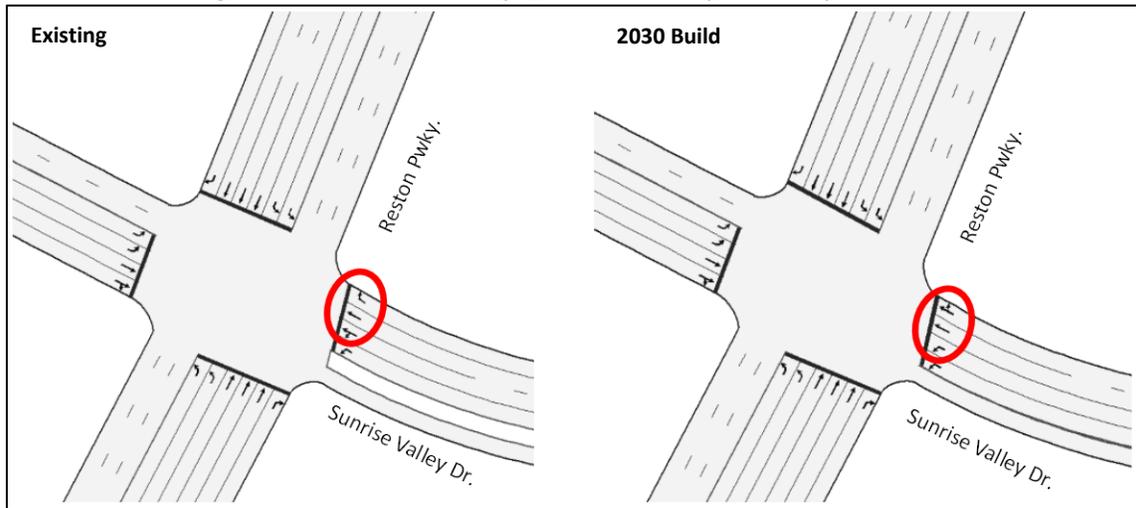


Figure 7.4: Reston Parkway @ South Lakes Drive Improvement

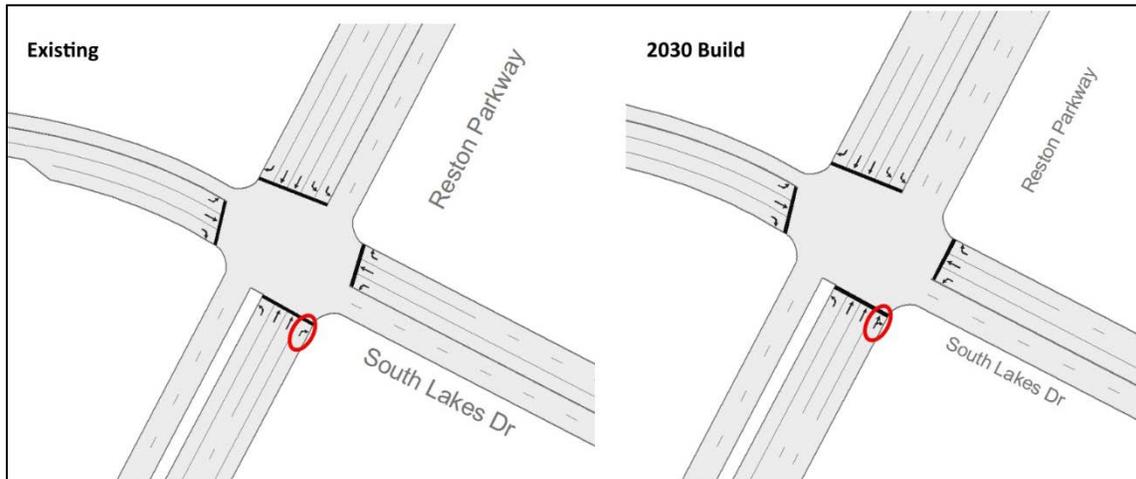
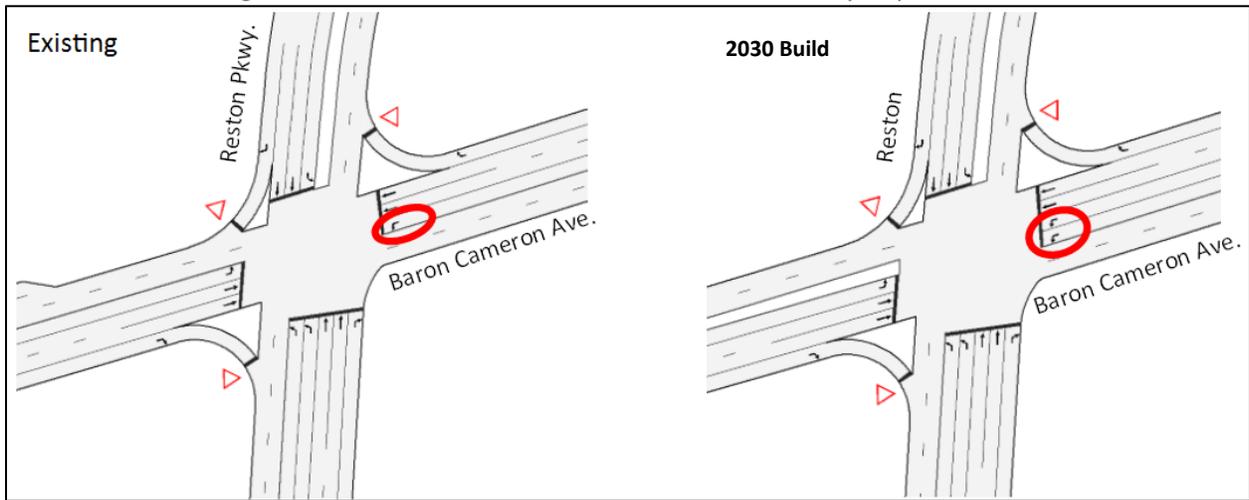


Figure 7.5: Baron Cameron Avenue @ Reston Parkway Improvement



### 7.3 2030 Analysis

AM and PM peak hour LOS for signalized and stop control locations were analyzed. To mitigate traffic congestion, trip-reassignment and signal timing modification/optimization were conducted with the goal of reducing overall intersection delay to LOS E. Detailed LOS of the study area maps are shown in **Figure 7.6** through **Figure 7.17**.

Seven intersections in the AM peak hour and five intersections in the PM peak hour are still expected to operate at LOS F. These intersections include:

- Centreville Road at WB Dulles Toll Road Ramps (not in Reston TSA) with 81 seconds of delay in the PM
- Centreville Road at Woodland Park Road (in Innovation TSA) with 106 seconds of delay in the PM
- Centreville Road at Sunrise Valley Drive (in Innovation TSA) with 93 seconds of delay in the AM and 81 seconds of delay in the PM
- Frying Pan Road at Monroe Street with 101 seconds of delay in the AM
- Fairfax County Parkway at Sunrise Valley Drive with 132 seconds of delay in the AM
- Reston Parkway at South Lakes Drive with 143 seconds of delay in the AM
- Sunset Hills Road at Town Center Parkway with 123 seconds of delay in the AM
- Sunrise Valley Drive at South Lakes Drive with 113 seconds of delay in the PM
- Hunter Mill Road at Sunrise Valley Drive with 121 seconds of delay in the AM
- Hunter Mill Road at WB DTR Ramp with 81 seconds of delay in the PM
- Hunter Mill Road at Sunset Hills Road with 87 seconds of delay in the AM

There are no Problem Locations, with a delay in excess of 120 seconds, in the PM peak hour. The following four intersections were identified as Problem Locations in the AM peak hour:

- Fairfax County Parkway @ Sunrise Valley Drive
- Reston Parkway @ South Lakes Drive
- Sunset Hills Road @ Town Center Parkway
- Hunter Mill Road @ Sunrise Valley Drive

2030 is the Mid-Buildout year, with only a partial number of the planned Reston project completed. By Mid-Buildout the partial Grid of Streets, Soapstone Connector, Town Center Parkway Underpass, Reston Parkway widening, six proposed signals, and three intersection improvements are anticipated to be completed. However, due to the lack of Grid of Streets, South Lakes Drive Overpass, Rock Hill Bridge, and other 2050 Tier 3 mitigation, the 2030 model results show higher delay at some intersections compared to 2050. With the 2050 Full-Buildout network and Tier 3 mitigation in place, most of the failing intersections will improve to operate at acceptable conditions. The “2030 Visum Model Development Memo” contains detailed information on the Mid-Buildout.

Figure 7.6: 2030 AM Peak Hour (7:00 – 8:00) Visum LOS Map (1 of 6)

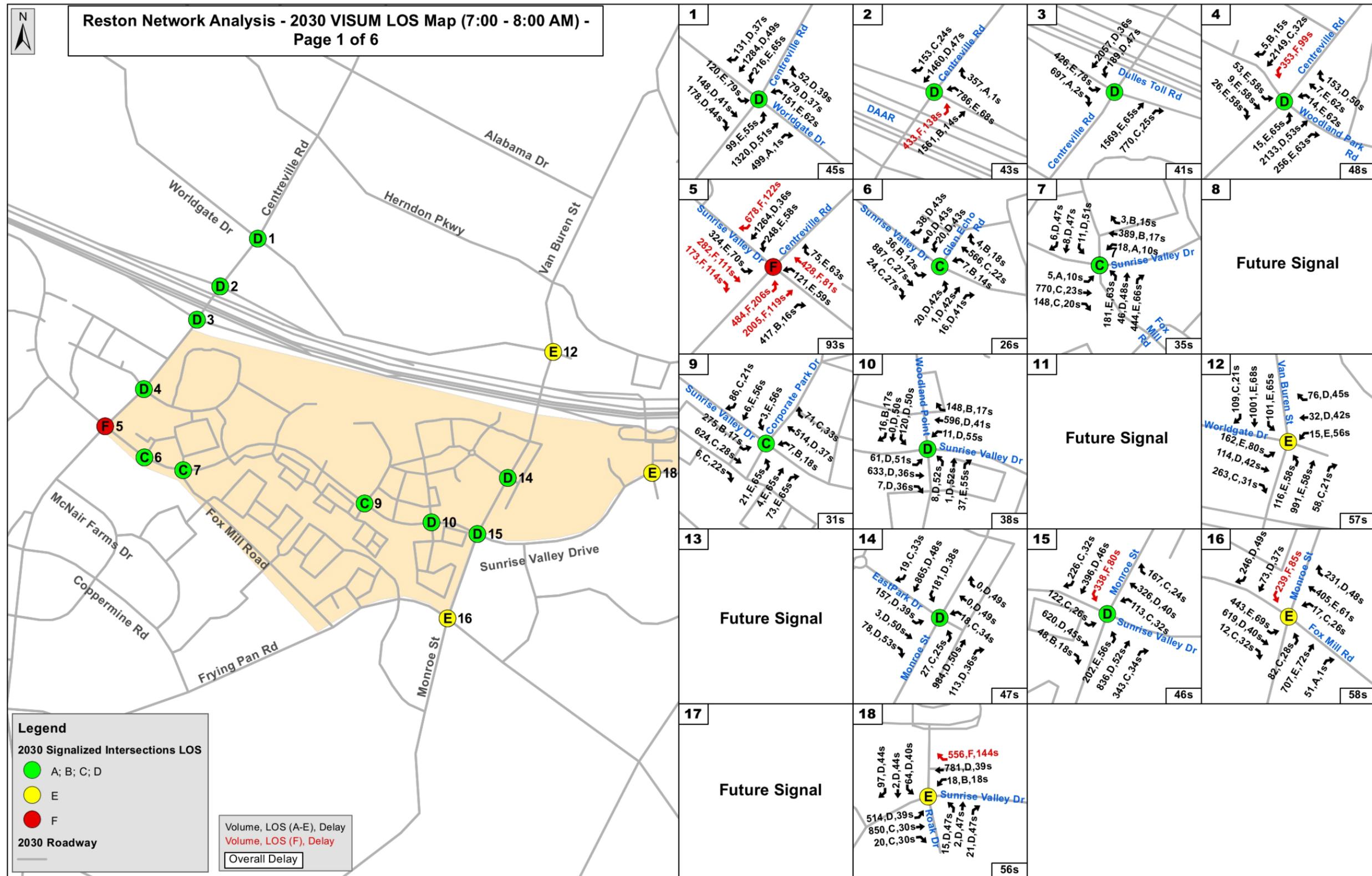


Figure 7.7: 2030 AM Peak Hour (7:00 – 8:00) Visum LOS Map (2 of 6)

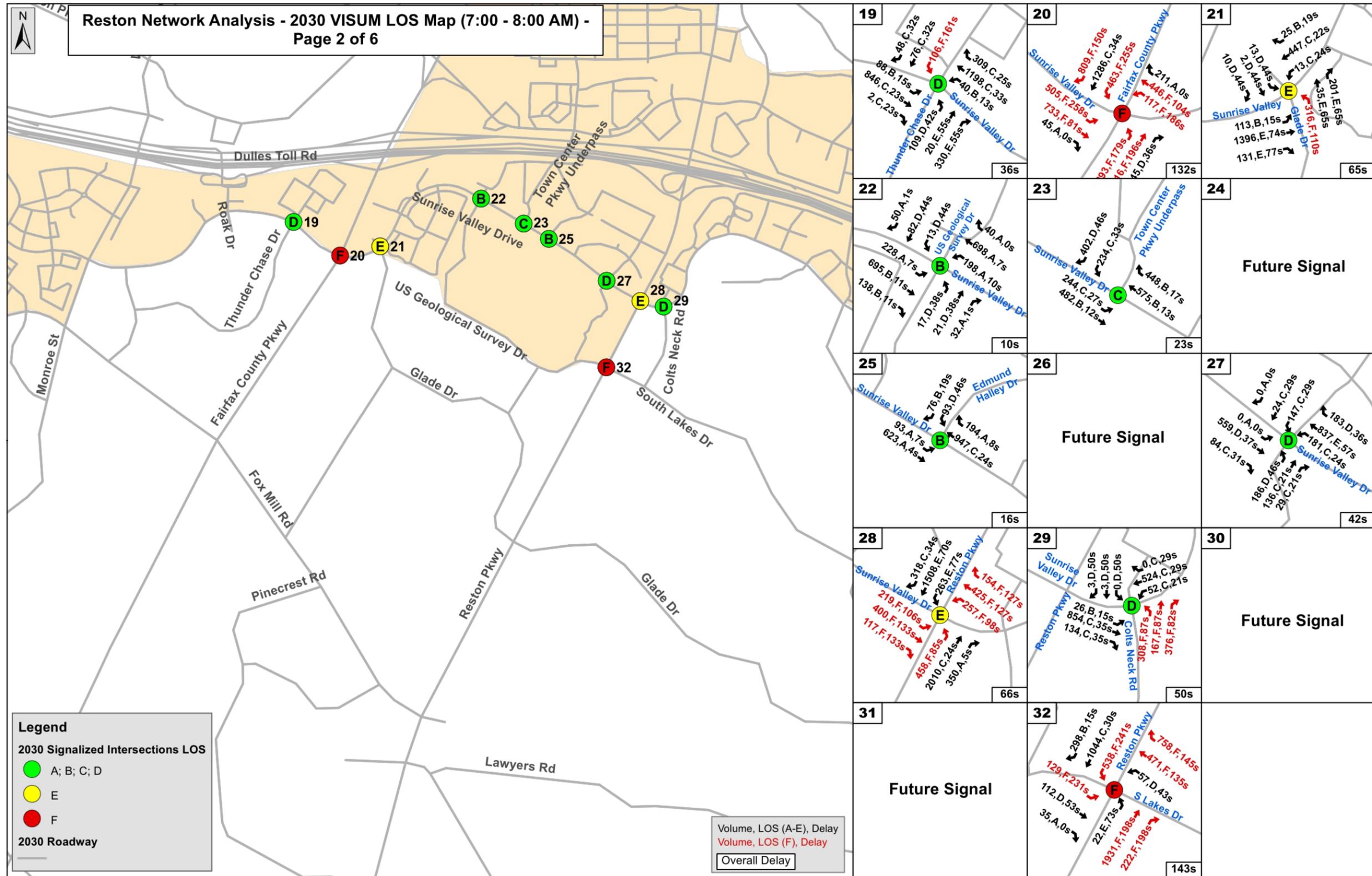


Figure 7.8: 2030 AM Peak Hour (7:00 – 8:00) Visum LOS Map (3 of 6)

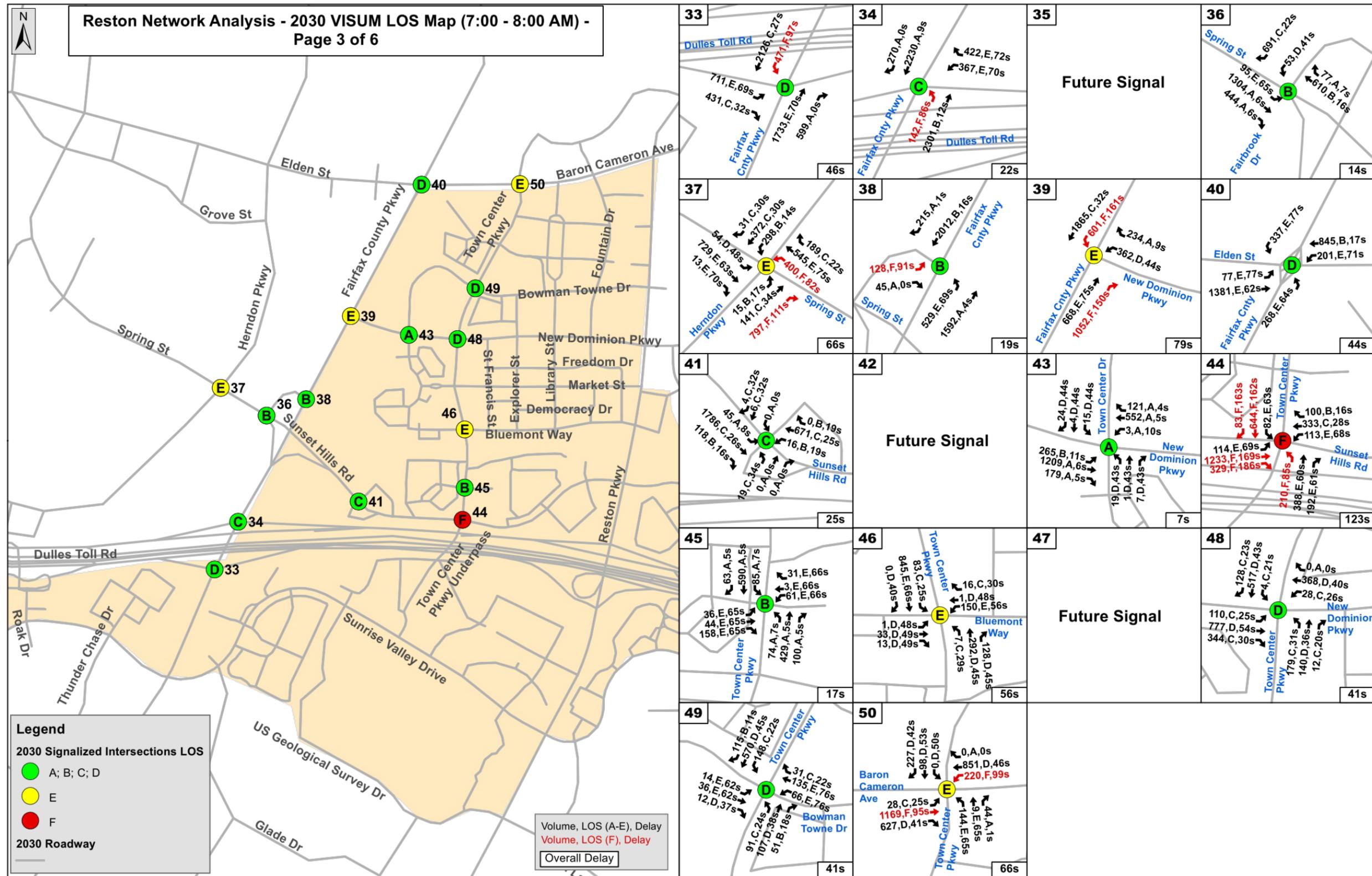


Figure 7.9: 2030 AM Peak Hour (7:00 – 8:00) Visum LOS Map (4 of 6)

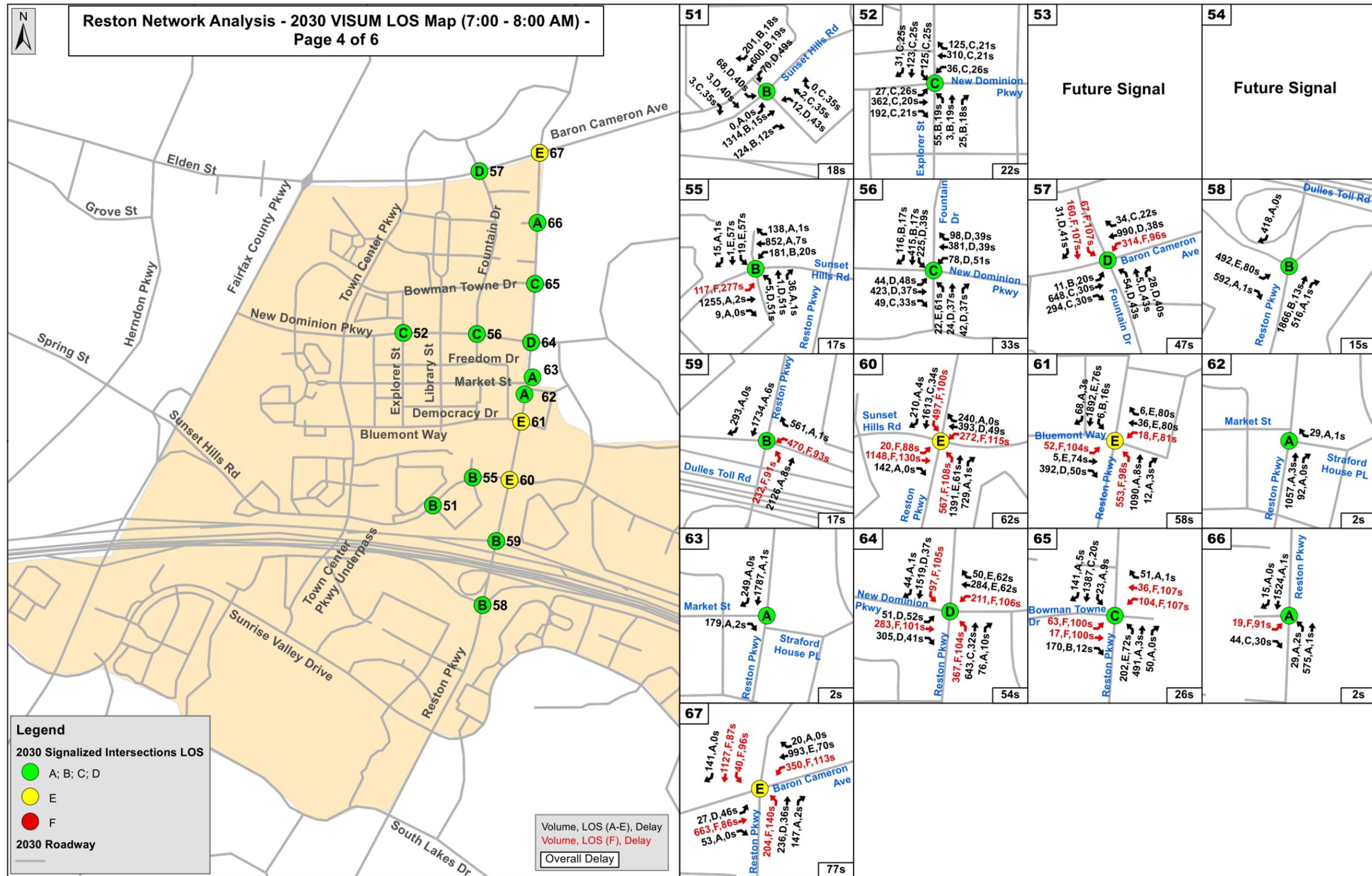


Figure 7.10: 2030 AM Peak Hour (7:00 – 8:00) Visum LOS Map (5 of 6)

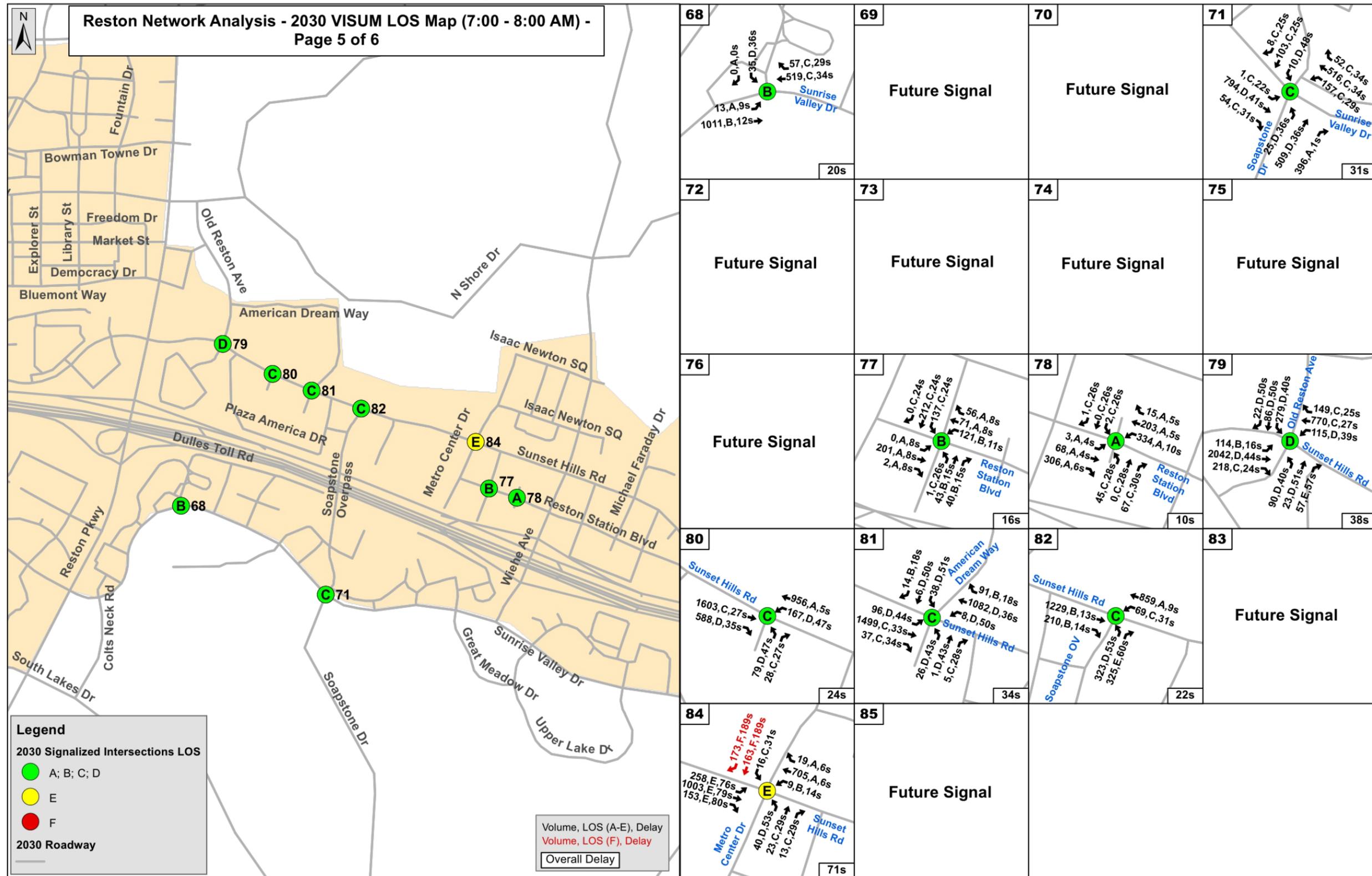


Figure 7.11: 2030 AM Peak Hour (7:00 – 8:00) Visum LOS Map (6 of 6)

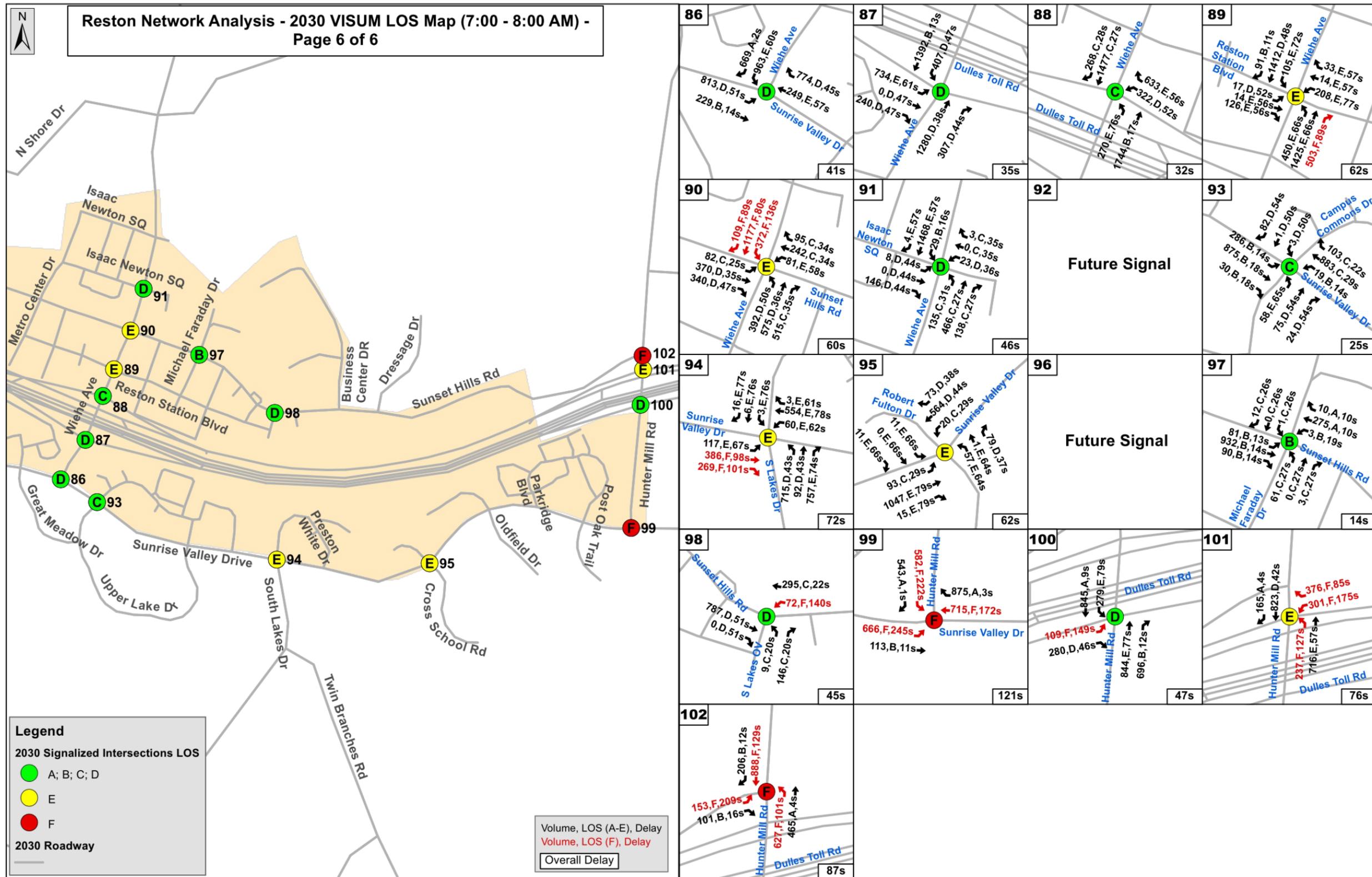


Figure 7.12: 2030 PM Peak Hour (5:00 – 6:00) Visum LOS Map (1 of 6)

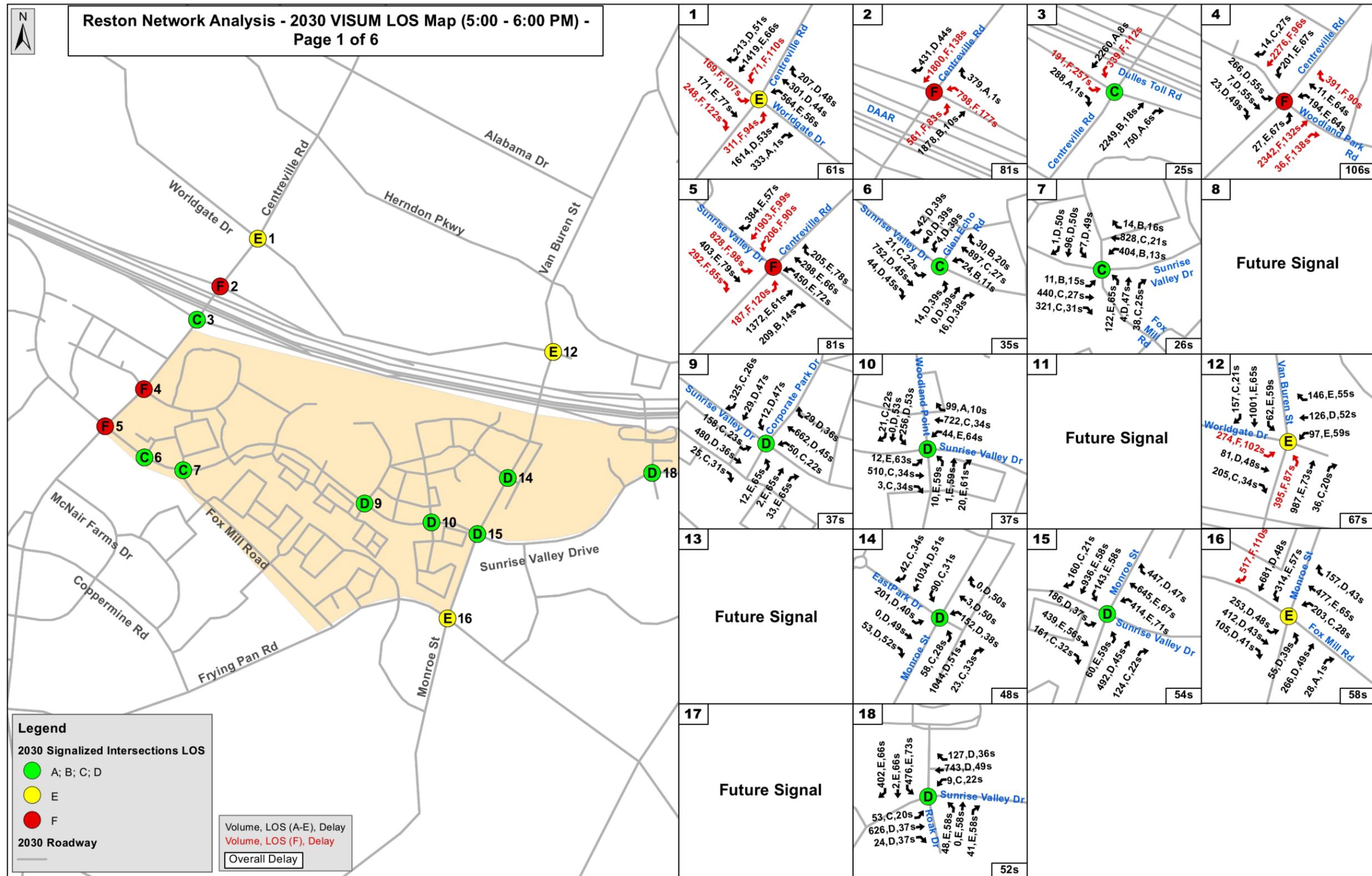


Figure 7.13: 2030 PM Peak Hour (5:00 – 6:00) Visum LOS Map (2 of 6)

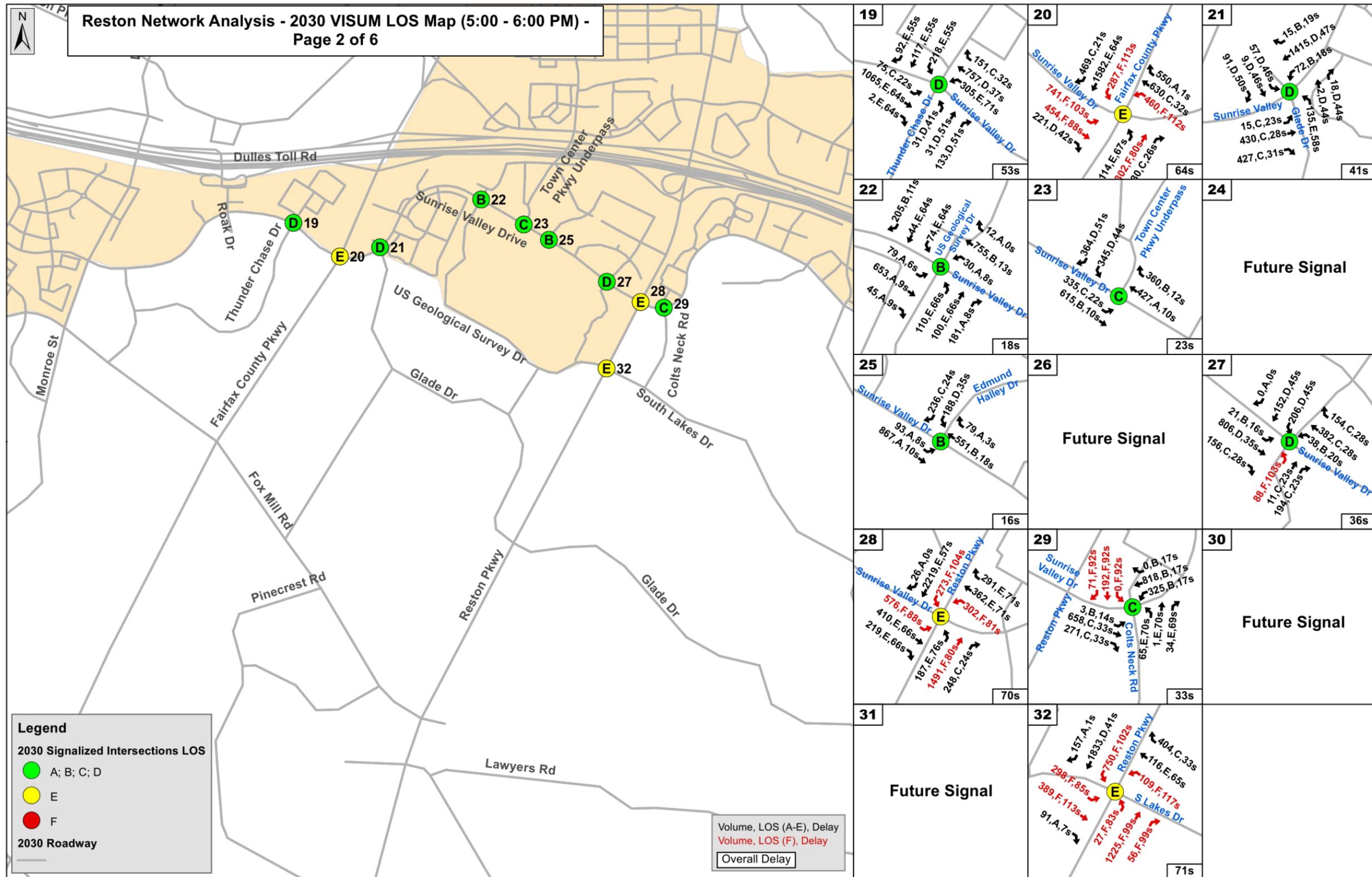


Figure 7.14: 2030 PM Peak Hour (5:00 – 6:00) Visum LOS Map (3 of 6)

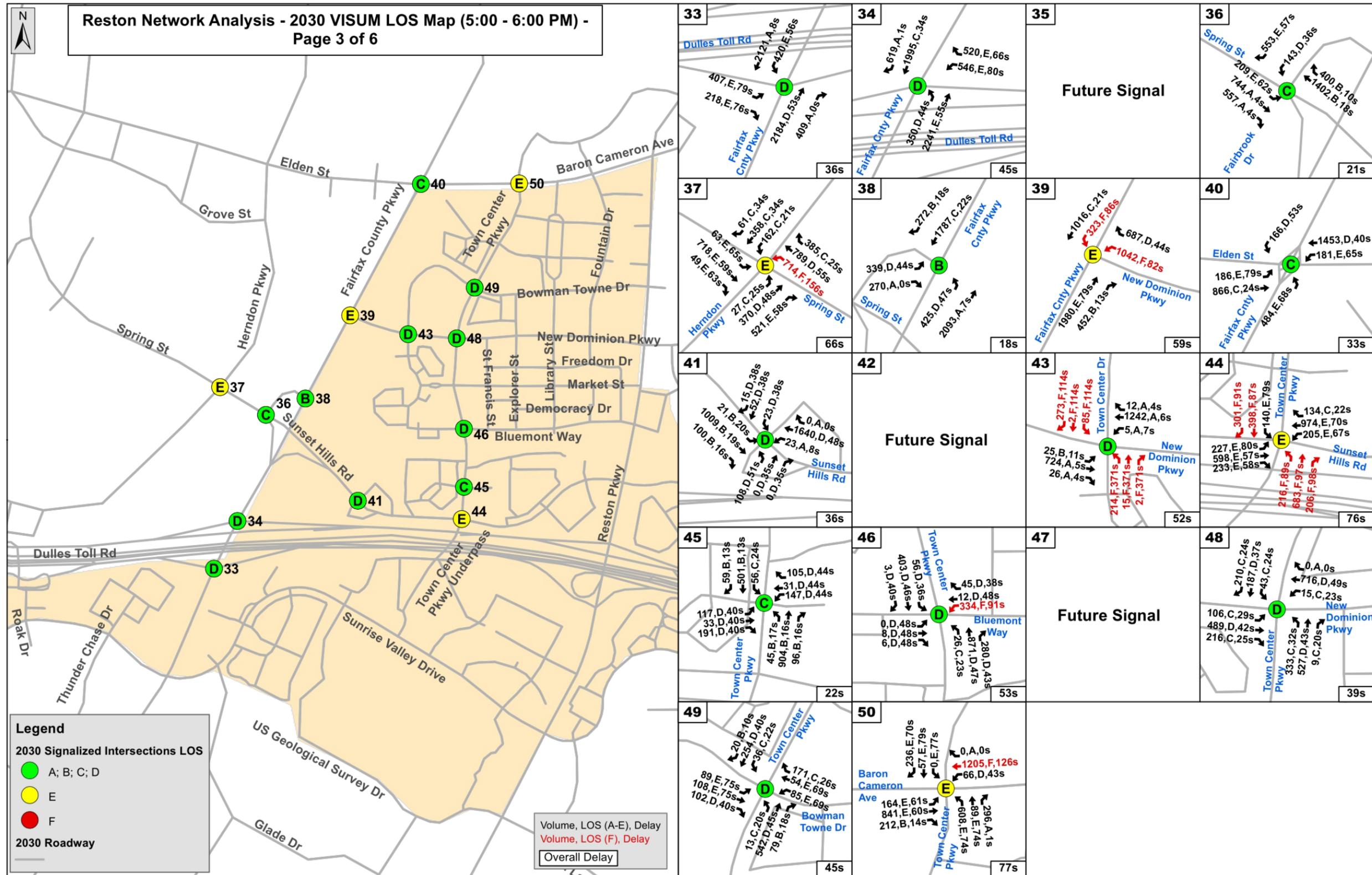


Figure 7.15: 2030 PM Peak Hour (5:00 – 6:00) Visum LOS Map (4 of 6)

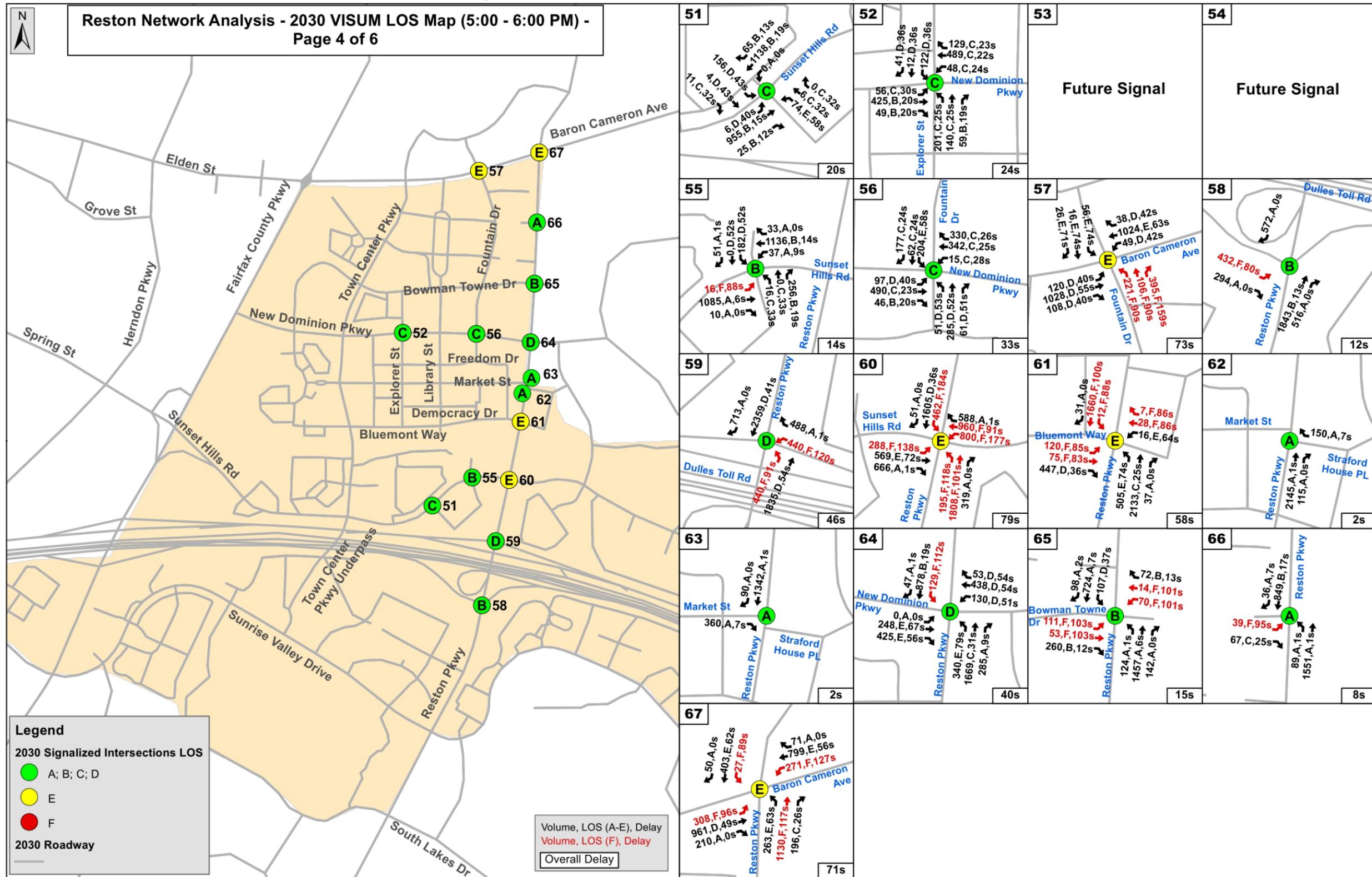


Figure 7.16: 2030 PM Peak Hour (5:00 – 6:00) Visum LOS Map (5 of 6)

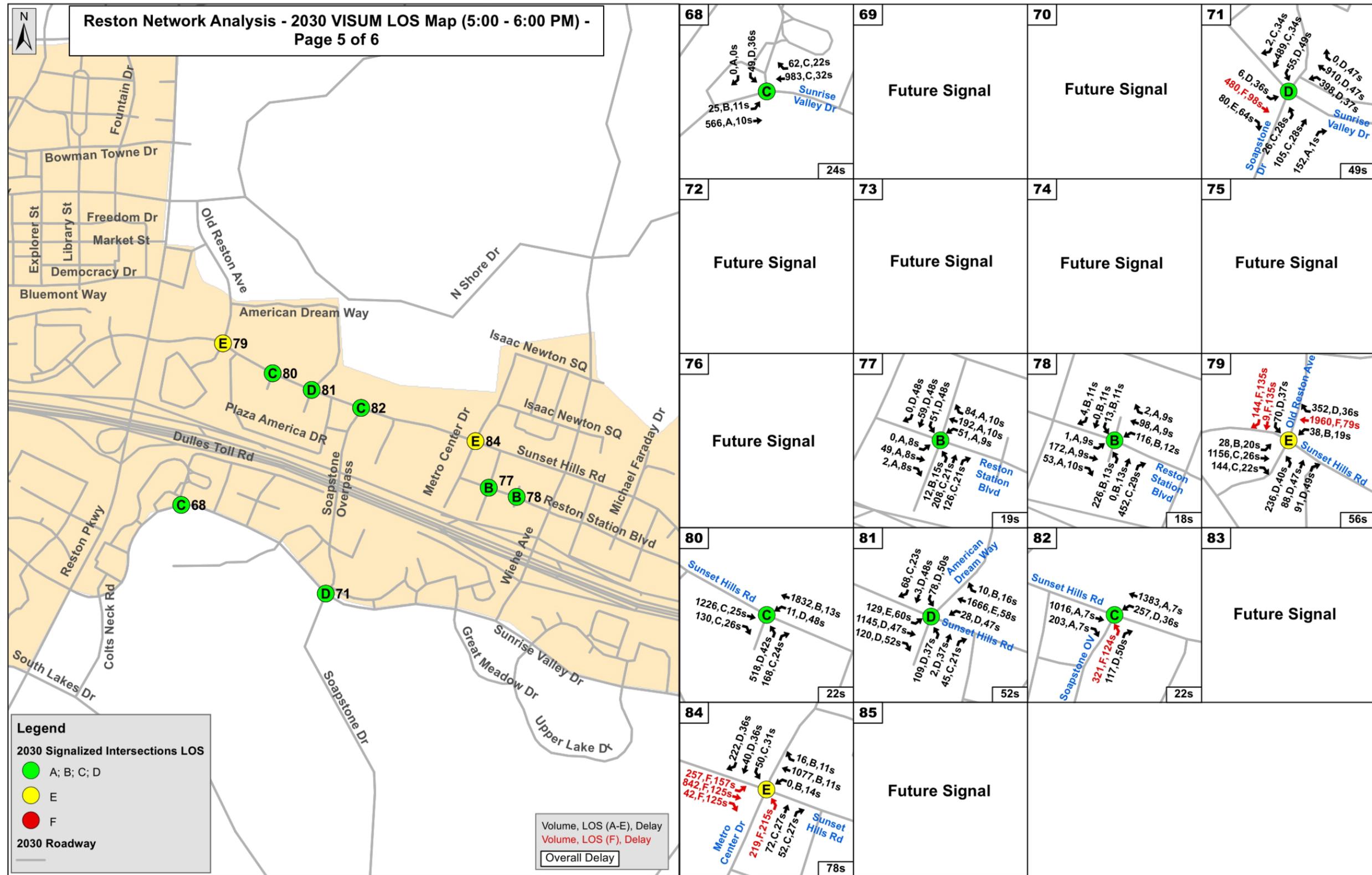
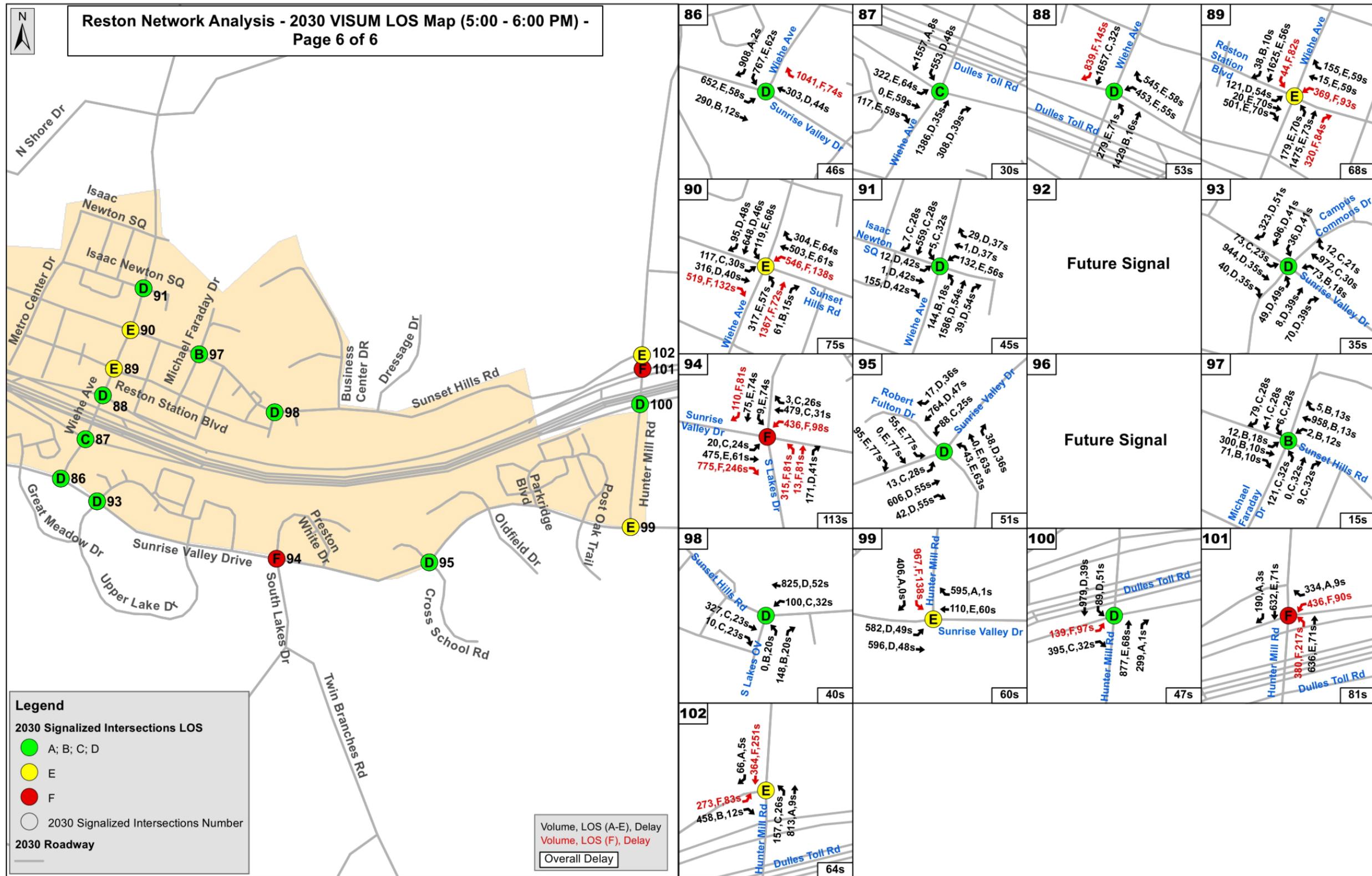


Figure 7.17: 2030 PM Peak Hour (5:00 – 6:00) Visum LOS Map (6 of 6)



## 8 Phasing Analysis

The Reston Comprehensive Plan recommends 12 road improvements to help accommodate the anticipated transportation demand associated with the development of the Reston TSAs. These improvements include:

- A. An enhanced Grid of Streets to increase connectivity;
- B. Soapstone Overpass (3-lane bridge) across the Dulles Toll Road from Sunset Hills Road to Sunrise Valley Drive approximately at Soapstone Drive;
- C. A grade-separated interchange at Fairfax County Parkway and Sunrise Valley Drive;
- D. South Lakes Overpass (4-lane bridge) across the Dulles Toll Road from Sunset Hills Road to Sunrise Valley Drive approximately at South Lakes Drive;
- E. Reston Parkway - 6 lanes from South Lakes Drive to the Dulles Toll Road;
- F. Fox Mill Road - 4 lanes from Reston Parkway to Monroe Street;
- G. Monroe Street - 4 lanes from West Ox Road to the Town of Herndon;
- H. An extension of Pinecrest Road from South Lakes Drive to Sunrise Valley Drive;
- I. Fairfax County Parkway - 6 lanes with High Occupancy Vehicle (HOV) lane(s);
- J. Town Center Parkway Underpass (4-lane tunnel) from Town Center Parkway and Sunset Hills Road to Sunrise Valley Drive west of Edmund Halley Drive;
- K. West Ox Road - 4 lanes from Lawyers Road to Centreville Road; and
- L. Sunset Hills Road – 6 lanes from Wiehle Avenue to Fairfax County Parkway and 4 lanes from Wiehle Avenue to Hunter Mill Road.

The goal of the phasing analysis was to understand the general impact of each individual road improvement on the overall network in order to assist in prioritizing roadway improvements in the Reston TSAs based on the benefits each improvement is expected to provide. This phasing analysis was done for both existing conditions and for 2050 conditions with the purpose of determining which improvements provide the most benefit in the short term as well as for the longer term.

### 8.1 Existing Conditions

The 12 road improvements are planned to be added to Reston’s transportation network in the future. This section describes the results of the analysis of existing conditions. These results will help the County prioritize improvements in the Reston TSAs in the near term. Results will also assist in understanding the timeframe for major improvements such as the four crossings of the DTR, the proposed grade separation at Fairfax County Parkway and Sunrise Valley Drive, and the Grid of Streets.

To this end, the calibrated existing conditions Visum AM (7:00 AM – 8:00 AM) and PM (5:00 PM – 6:00 PM) peak hour models were used to test the benefit of each individual improvement on the overall network, 24 unique phasing models (12 phasing models each for AM and PM peak hour) were created of existing conditions. The Visum analysis was conducted for twelve AM and twelve PM scenarios, one scenario for each recommended improvement.

The time saved for the whole network will show the benefit of each individual project under current conditions. System wide total vehicle hours of delay (VHD) and vehicle hours travelled (VHT) were collected and compared to measure network efficiency in the area shown in **Figure 8.1** below. The comparison of VHD and VHT for 12 planned improvements is shown in **Table 8.1**.

Figure 8.1: Phasing Analysis Area

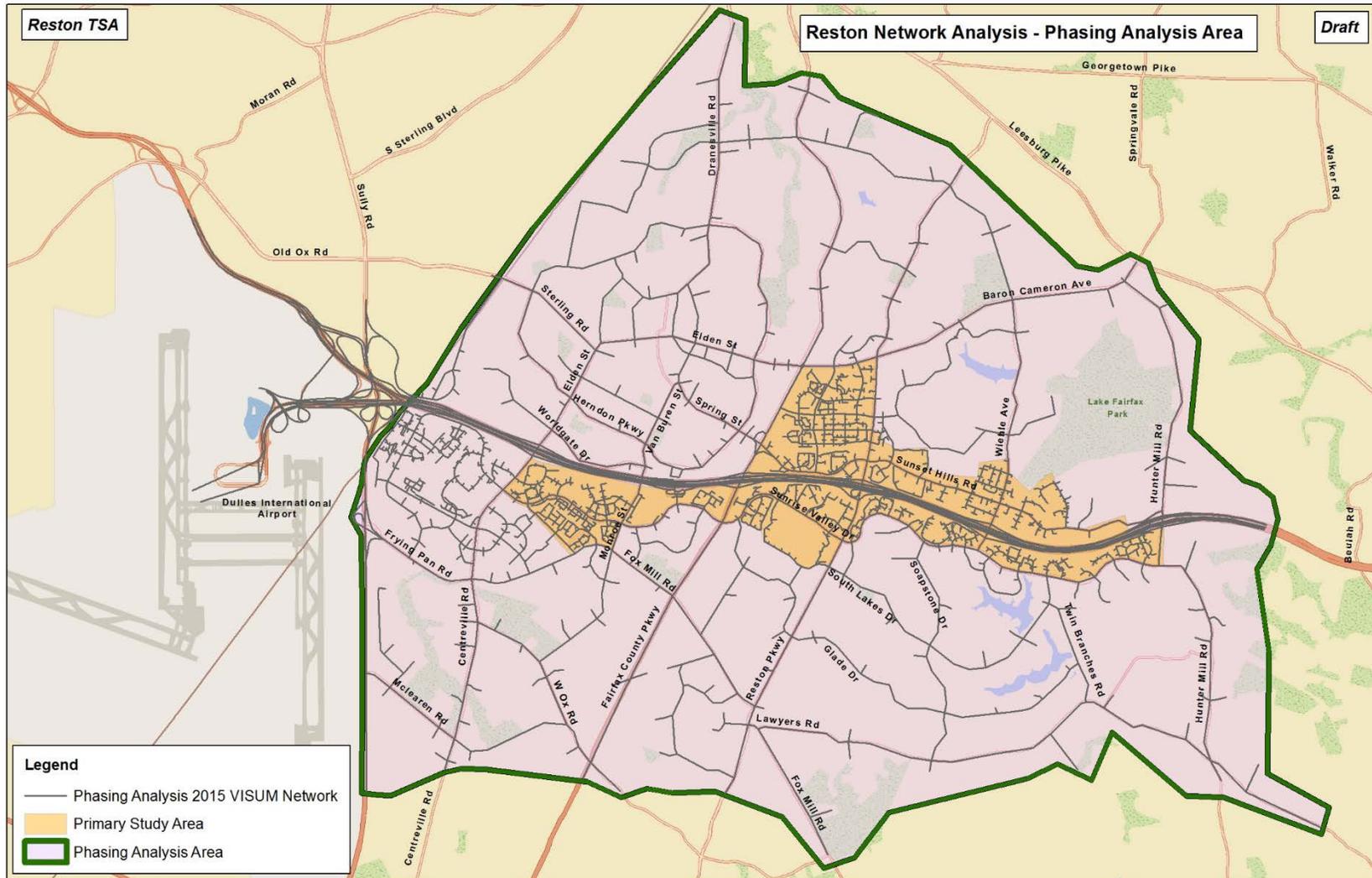


Table 8.1: Comparison of AM & PM Peak Hour VHD and VHT for 12 Roadway Improvements - Existing Conditions

Phasing	Phase	Description of Improvement Added	AM Peak Hour (7:00 - 8:00)				PM Peak Hour (5:00 - 6:00)				AM & PM Peak Hours			
			VHD (hours)	Hours Saved	VHT	Hours Saved	VHD (hours)	Hours Saved	VHT	Hours Saved	VHD (hours)	Hours Saved	VHT	Hours Saved
	Base	Base Year Network	3,895.7		13,552.6		6,135.6		17,445.0		10,031.3		30,997.6	
A	Grid of Streets	An enhanced Grid of Streets to increase connectivity	3,753.4	-142.3	13,295.7	-256.9	5,471.6	-664.0	16,486.2	-958.8	9,225.0	-806.3	29,781.9	-1,215.7
B	Soapstone	Soapstone Overpass (3-lane bridge) across the Dulles Toll Road from Sunset Hills Road to Sunrise Valley Drive approximately at Soapstone Drive	3,842.6	-53.1	13,475.6	-77.0	5,990.7	-144.9	17,222.2	-222.8	9,833.3	-198.0	30,697.8	-299.8
C	FCP/SRV	Grade-separated interchange at Fairfax County Parkway and Sunrise Valley Drive	3,794.8	-100.9	13,460.4	-92.2	6,037.8	-97.8	17,353.6	-91.4	9,832.6	-198.7	30,814.0	-183.6
D	South Lakes	South Lakes Overpass (4-lane bridge) across the Dulles Toll Road from Sunset Hills Road to Sunrise Valley Drive approximately at South Lakes Drive	3,853.7	-42.0	13,489.1	-63.5	5,998.3	-137.3	17,268.9	-176.1	9,852.0	-179.3	30,758.0	-239.6
E	Reston Pkwy	Reston Parkway - 6 lanes from South Lakes Drive to the Dulles Toll Road	3,949.6	53.9	13,543.1	-9.5	6,194.6	59.0	17,372.1	-72.9	10,144.2	112.9	30,915.2	-82.4
F	Fox Mill	Fox Mill Road - 4 lanes from Reston Parkway to Monroe Street	3,969.3	73.6	13,565.3	12.7	6,225.9	90.3	17,432.0	-13.0	10,195.2	163.9	30,997.3	-0.3
G	Monroe	Monroe Street - 4 lanes from West Ox Road to the Town of Herndon	3,893.2	-2.5	13,546.3	-6.3	6,124.5	-11.1	17,424.0	-21.0	10,017.7	-13.6	30,970.3	-27.3
H	Pinecrest	Extend Pinecrest Road from South Lakes Drive to Sunrise Valley Drive	3,895.9	0.2	13,552.0	-0.6	6,136.3	0.7	17,443.7	-1.3	10,032.2	0.9	30,995.7	-1.9
I	FCP/HOV	Fairfax County Parkway - 6 lanes with High Occupancy Vehicle (HOV) lane(s)	3,788.3	-107.4	13,386.5	-166.1	6,069.6	-66.0	17,312.0	-133.0	9,857.9	-173.4	30,698.5	-299.1
J	Town Center	Town Center Parkway Underpass (4-lane tunnel) from Town Center Parkway and Sunset Hills Road to Sunrise Valley Drive west of Edmund Halley Drive	3,855.4	-40.3	13,454.6	-98.0	6,023.8	-111.8	17,169.0	-276.0	9,879.2	-152.1	30,623.6	-374.0
K	West Ox	West Ox Road - 4 lanes from Lawyers Road to Centreville Road	4,004.8	109.1	13,604.8	52.2	6,174.7	39.1	17,420.5	-24.5	10,179.5	148.2	31,025.3	27.7
L	Sunset Hills	Sunset Hills Road – 6 lanes from Wiehle Ave to Fairfax County Parkway, and 4 lanes from Wiehle Ave to Hunter Mill Road	3,881.5	-14.2	13,494.2	-58.4	5,972.1	-163.5	17,246.5	-198.5	9,853.6	-177.7	30,740.7	-256.9

Projects were ranked based off the vehicle hours of delay they saved the whole network under existing conditions. The more VHD the project hour saves, or improves traffic conditions by, the higher the project is ranked. The priority ranking results are shown in **Table 8.2**.

*Table 8.2: AM & PM Peak Hour Roadway Improvement Ranking based on VHT Reduction in Existing Conditions*

<b>Phase</b>	<b>Improvement</b>	<b>Ranking</b>
Grid of Streets	An enhanced Grid of Streets to increase connectivity	1
Town Center	Town Center Parkway Underpass (4-lane tunnel) from Town Center Parkway and Sunset Hills Road to Sunrise Valley Drive west of Edmund Halley Drive	2
Soapstone	Soapstone Overpass (3-lane bridge) across the Dulles Toll Road from Sunset Hills Road to Sunrise Valley Drive approximately at Soapstone Drive	3
FCP/HOV	Fairfax County Parkway - 6 lanes with High Occupancy Vehicle (HOV) lane(s)	4
Sunset Hills	Sunset Hills Road – 6 lanes from Wiehle Avenue to Fairfax County Parkway, and 4 lanes from Wiehle Avenue to Hunter Mill Road	5
South Lakes	South Lakes Overpass (4-lane bridge) across the Dulles Toll Road from Sunset Hills Road to Sunrise Valley Drive approximately at South Lakes Drive	6
FCP/SRV	Grade-separated interchange at Fairfax County Parkway and Sunrise Valley Drive	7
Reston Pkwy	Reston Parkway - 6 lanes from South Lakes Drive to the Dulles Toll Road	8
Monroe	Monroe Street - 4 lanes from West Ox Road to the Town of Herndon	9
Pinecrest	Extend Pinecrest Road from South Lakes Drive to Sunrise Valley Drive	10
Fox Mill	Fox Mill Road - 4 lanes from Reston Parkway to Monroe Street	11
West Ox	West Ox Road - 4 lanes from Lawyers Road to Centreville Road	12

The Grid of Streets has the most significant positive impact on the performance of the Reston network, with the Town Center Underpass and the Soapstone Overpass ranking second and third. These results mean that if improvements were built today, projects that have the would provide the most benefit to the transportation network would reduce VHD and VHT. If the Grid of Streets were built now travelers in the Reston area would spend 1,215.7 fewer hours traveling (VHT) during the morning and evening peak

hours, and 806.3 fewer hours driving in congestion (VHD). The greater the reduction in hours, the better the improvement is for the existing transportation network.

## 8.2 2050 Conditions

A phasing analysis of the proposed Reston roadway network improvements was also conducted for the Full-Buildout (2050). The 2050 Tier 3 Visum AM and PM peak hour models served as the starting point for the phasing analysis. Each planned network improvement (phase) was removed from the 2050 Visum models, then Intersection Capacity Analyses (ICA) for stop controlled and signalized locations within the area, shown in **Figure 8.1**, were conducted for new traffic assignments through the altered network. The 2050 AM and PM peak hour models and a total of 24 phasing models (12 phasing models each for AM and PM peak hour) were then analyzed and compared. The comparison of VHD and VHT for removal of 12 planned improvements is shown in **Table 8.3**.

The analysis for Full-Buildout was done differently than for Existing Conditions. Since by Full-Buildout all improvements are anticipated to be in place, projects were removed from the transportation network to determine which would have the most detrimental effect on travel if it is not built. This effect is shown by how much more time people would spend traveling (VHT) or how much more delay (VHD) people would experience if the project were not built by 2050. Projects with the highest numbers of VHT and VHD increase without the project are considered the most important to the network.

The results of the ranking are shown in **Table 8.4**, the highest ranked projects are those that would have the greatest negative impact on travel if they are not built.

Table 8.3: Comparison of AM &amp; PM Peak Hour VHD (Vehicle Hours of Delay) and VHT (Vehicle Hours Travelled) for Removal of 12 Roadway Improvements Individually in 2050

Phasing	Phase	Description of Improvement Removed	AM Peak Hour (7:00 - 8:00)				PM Peak Hour (5:00 - 6:00)				AM & PM Peak Hours			
			VHD (hours)	Hours Saved	VHT	Hours Saved	VHD (hours)	Hours Saved	VHT	Hours Saved	VHD (hours)	Hours Saved	VHT	Hours Saved
	2050 Network	2050 Tier 3 Network	11,970		35,501		11,296		30,266		23,266		65,767	
A	Grid of Streets	Grid of streets	13,022	1,052	37,651	2,150	12,889	1,593	32,933	2,667	25,911	2,645	70,584	4,817
B	Soapstone	Soapstone Overpass (3-lane bridge) across the Dulles Toll Road from Sunset Hills Road to Sunrise Valley Drive approximately at Soapstone Drive	12,141	171	35,746	245	11,535	239	30,621	355	23,676	410	66,367	600
C	FCP/SRV	Grade-separated interchange at Fairfax County Parkway and Sunrise Valley Drive	12,152	182	35,723	222	11,532	236	30,558	292	23,684	418	66,281	514
D	South Lakes	South Lakes Overpass (4-lane bridge) across the Dulles Toll Road from Sunset Hills Road to Sunrise Valley Drive approximately at South Lakes Drive	12,085	115	35,677	176	11,487	191	30,552	286	23,572	306	66,229	462
E	Reston Pkwy	Reston Parkway Improvement - 6 lanes from South Lakes Drive to the Dulles Toll Road	12,000	30	35,662	161	11,259	-37	30,418	152	23,259	-7	66,080	313
F	Fox Mill	Fox Mill Road Improvement - 4 lanes from Reston Parkway to Monroe Street	12,110	140	35,799	298	11,578	282	30,682	416	23,688	422	66,481	714
G	Monroe	Monroe Street Improvement - 4 lanes from West Ox Road to the Town of Herndon	11,925	-45	35,526	25	11,331	35	30,395	129	23,256	-10	65,921	154
H	Pinecrest	Pinecrest Road Extension from South Lakes Drive to Sunrise Valley Drive	11,996	26	35,542	41	11,339	43	30,343	77	23,335	69	65,885	118
I	FCP/HOV	Fairfax County Parkway Improvement - 6 lanes with High Occupancy Vehicle (HOV) lane(s)	12,014	44	35,907	406	11,435	139	30,711	445	23,449	183	66,618	851
J	Town Center	Town Center Parkway Underpass (4-lane tunnel) from Town Center Parkway and Sunset Hills Road to Sunrise Valley Drive west of Edmund Halley Drive	12,307	337	36,083	582	11,661	365	31,006	740	23,968	702	67,089	1,322
K	West Ox	West Ox Road Improvement - 4 lanes from Lawyers Road to Centreville Road	11,675	-295	35,564	63	11,310	14	30,456	190	22,985	-281	66,020	253
L	Sunset Hills	Widening of Sunset Hills Road – 6 lanes from Wiehle Avenue to Fairfax County Parkway, and 4 lanes from Wiehle Avenue to Hunter Mill Road	12,100	130	35,739	238	11,501	205	30,506	240	23,601	335	66,245	478

Table 8.4: AM &amp; PM Peak Hour Roadway Improvement Ranking based on VHT Increase in 2050

Phase	Improvement	Ranking
Grid of Streets	Grid of Streets	1
Town Center	Town Center Parkway Underpass (4-lane tunnel) from Town Center Parkway and Sunset Hills Road to Sunrise Valley Drive west of Edmund Halley Drive	2
FCP/HOV	Fairfax County Parkway Improvement - 6 lanes with High Occupancy Vehicle (HOV) lane(s)	3
Fox Mill	Fox Mill Road Improvement - 4 lanes from Reston Parkway to Monroe Street	4
Soapstone	Soapstone Overpass (3-lane bridge) across the Dulles Toll Road from Sunset Hills Road to Sunrise Valley Drive approximately at Soapstone Drive	5
FCP/SRV	Grade-separated interchange at Fairfax County Parkway and Sunrise Valley Drive	6
Sunset Hills	Widening of Sunset Hills Road – 6 lanes from Wiehle Avenue to Fairfax County Parkway, and 4 lanes from Wiehle Avenue to Hunter Mill Road	7
South Lakes	South Lakes Overpass (4-lane bridge) across the Dulles Toll Road from Sunset Hills Road to Sunrise Valley Drive approximately at South Lakes Drive	8
Reston Pkwy	Reston Parkway Improvement - 6 lanes from South Lakes Drive to the Dulles Toll Road	9
West Ox	West Ox Road Improvement - 4 lanes from Lawyers Road to Centreville Road	10
Monroe	Monroe Street Improvement - 4 lanes from West Ox Road to the Town of Herndon	11
Pinecrest	Pinecrest Road Extension from South Lakes Drive to Sunrise Valley Drive	12

The removal of the Grid of Streets has the most significant negative impact on the performance of the Reston network. The removal of Town Center Parkway Underpass, Fairfax County Parkway HOV improvement, Fox Mill Road improvement, and Soapstone Overpass rank next as most significant in negatively impacting forecasted traffic conditions in 2050. The results show that the most impactful projects create the most delay if they are removed from the future transportation network. If the Grid of Streets were not built by 2050, travelers in the Reston area would spend 4,817 hours more traveling (VHT) during the morning and evening peak hours, and of those hours 2,645 would be spent driving in additional congestion (VHD). The greater the impact on travel time and delay the more important the project is to the planned transportation network at Full-Buildout.

## 9 Roadway Classifications: Complete Streets

The Reston Transit Station Areas are considered Multimodal Centers, and fall under the Virginia Department of Rail and Public Transportation (DRPT) Multimodal Design Guidelines for Roadways. These guidelines provide information and guidance on how roadways interact with their mixed-use environment and are used in place of the standard VDOT Roadway Design Guidelines. As part of the Reston Network Analysis, the Grid of Streets were assigned classifications based on the Multimodal Design Guidelines.

### 9.1 Roadway Classification Types

There are six different functional classifications in the DRPT Multimodal Design Guidelines. Of these six, five are designated as Place Making Corridors, used in Multimodal Centers. These Place Making Corridor classifications are based on their character, as well as what types and how many trips they serve. The character of the road's built (or planned) environment, including the types of uses adjacent to the roadway and whether it is a mixed use, commercial or residential area, is used to inform this classification. The six corridor classifications defined in the DRPT Multimodal Design Guidelines are discussed in the following sections. The descriptions of each facility type are pulled directly from the DRPT *Multimodal Systems Design Guidelines* dated October 2013.

#### 9.1.1 Multimodal Through Corridor

The Multimodal Through Corridor is a higher speed corridor that connects multiple activity centers. It is intended for longer distance, higher speed automobile, bus, or rail travel and ideally has limited at-grade intersections with other roadway types. Multimodal Through Corridors are good candidates for high speed commuter transit having few impediments to traffic flow. High speeds limit pedestrian and bicycle modes and hence the corridor design should provide separated facilities for these modes if they are needed. The design of the adjacent buildings should be oriented away from Multimodal Through Corridors and towards Placemaking Corridors on the other side of the buildings, providing more desirable pedestrian facilities and pedestrian-oriented land uses on the Placemaking Corridors, while still accommodating pedestrian travel along the Multimodal Through Corridors. Design speeds for Multimodal Through Corridors range from 35 to 55 mph.

#### 9.1.2 Place Making Corridors

Within Multimodal Centers, the street network consists of different types of corridors with different functions relative to access, mobility, and multimodal features. Placemaking corridors are thus further divided into five types, each of which has a unique function and interface with the surrounding land uses.

##### **Transit Boulevard**

The Transit Boulevard is the highest capacity and most transit supportive Multimodal Corridor in the typology. It would typically only be found in dense urban centers that have sufficient density and market for premium transit. A Transit Boulevard is a multi-lane and multimodal boulevard with a dedicated lane or right-of-way for transit. Transit technologies could be bus service with a bus only lane (BRT or express bus), light rail, or other transit technologies with a separate right-of-way. Other transit types that share lanes with general traffic, such as streetcar or local bus service, could be accommodated on a Boulevard, Major Avenue, or Avenue, but the dedicated transit-only right-of-way defines the Transit Boulevard corridor type. Design speeds for Transit Boulevards range from 30 to 35 mph.

**Boulevard**

A Boulevard is the corridor type of highest multimodal capacity that accommodates multiple motorized and non-motorized modes. Boulevards allow for higher traffic volumes and greater efficiency of vehicular movements than Major Avenues, Avenues, and Local Streets, and typically have four to six lanes of traffic but may grow to eight in particularly dense centers such as Tysons. Boulevards provide safe and convenient pedestrian and bicycle access to adjacent land uses. Boulevards feature a median, landscape amenity elements, street trees, and wider sidewalks. Design speeds for Boulevards range from 30 to 35 mph.

**Major Avenue**

Major Avenues contain the highest density of destinations, intensity of activity, and mix of modes. Because of the proximity of destinations, pedestrians and street activity are common on Major Avenues. Major Avenues have wide sidewalks to accommodate high numbers of pedestrians and a variety of outdoor activities, including sidewalk cafes, kiosks, vendors, and other street activities. Major Avenues can be areas of high transit ridership for local bus routes. Traffic is low speed and localized. Due to the intensity of destinations, longer regional trips do not use Major Avenues; rather they would typically be on Boulevards or Multimodal Through Corridors. Autos and buses on Major Avenues travel at slow speeds because pedestrian crossings and on-road bicyclists are frequent. Major Avenues typically have four or fewer lanes for motor vehicle travel while providing adequate facilities for bicycling and typically providing roadway space dedicated to on-street parking. Design speeds for Major Avenues range from 30 to 35 mph.

**Avenue**

Avenues provide a balance between access to the businesses and residences that front upon them and the collection of vehicular and pedestrian traffic. While having fewer destinations than Major Avenues, pedestrian and bicycle activity is very common, as Avenues serve as critical links in the non-motorized network. Avenues are low speed roadways that facilitate shorter trips, but still contain a fair amount of destinations. Avenues typically have three travel lanes or fewer, and do not exceed four lanes. Avenues may have roadway space dedicated for on-street parking and provide adequate bicycle facilities. Avenues have a 25-30 mph design speed.

**Local Street**

Local Streets see the lowest amount of activity and have the slowest speeds and the highest access. Bicyclists typically can share the road with autos, because speeds are slow and auto traffic is sparse, although they have separate sidewalks and trails for pedestrian accommodation. Local Streets are primarily in more residential areas and are intended to serve only trips that originate or end along them. They connect to Avenues, Boulevards or Major Avenues, funneling longer trips to these higher capacity corridor types. Local Streets are characterized by slow design speeds, wider setbacks; they may not have lane striping, and they emphasize on-street parking. Local Streets have a 25 mph design speed.

## 9.2 Reston Network Roadway Classifications

The DRPT Multimodal classifications were applied to the three TSAs in Reston based on planned uses surrounding the planned Grid of Streets, the connectivity they provide within the network, forecasted volumes and the classifications of existing roadways. As described in the roadway classifications the character of the area is a very important consideration when classifying roadways. Those facilities that are anticipated to have a variety of uses on them, including retail and residential, were often classified as Avenues. Streets connecting two Avenues or higher classifications were often recognized as an important link in the network, and considered as Avenues. New roadways that will have considerable connectivity, including but not limited to Reston Station Boulevard, Library Street, and a new east-west parallel route to Sunrise Valley Drive were also classified as avenues. The classifications for the grid of streets included only Local and Avenue Designations.

The proposed classifications for the TSAs were developed in consultation between FCDOT, the Department of Planning and Zoning (DPZ) and the Office of Community Revitalization (OCR). They were presented to both the Advisory Group and the Stakeholders for concurrence. The classification for the Wiehle-Reston East TSA can be seen in **Figure 9.1** and **Table 9.1**, the Town Center TSA can be seen in **Figure 9.2** and **Table 9.2**, and the Herndon TSA can be seen in **Figure 9.3** and **Table 9.3**.

The proposed roadway classifications will give guidance on multiple characteristics of the roadway including:

- Medians
- Travel lanes
- Bike Lanes
- On-Street Parking
- Landscape Amenity Panels (LAP)
- Sidewalks
- Building Frontages

Many of these facilities are given modal emphasis in the DRPT classifications. The emphasis types were developed as part of the *Multimodal Systems Design Guidelines* and are intended to designate one or more travel modes that should be emphasized in the design of the cross section. While one mode may be emphasized it does not mean that other travel modes are excluded from the cross section. Since all roadway facilities are anticipated to carry vehicles none of the cross sections have a vehicular emphasis.

Cross sections for the Grid of Streets will vary depending upon planned bike lanes, on street parking locations or the number of travel lanes planned on the facility. **Figure 9.4** shows where bike facilities are planned in the Reston TSAs and **Figure 9.5** shows the number of lanes planned for the roadway network in the TSAs.

Figure 9.1: Wiehle-Reston East TSA DRPT Roadway Classifications

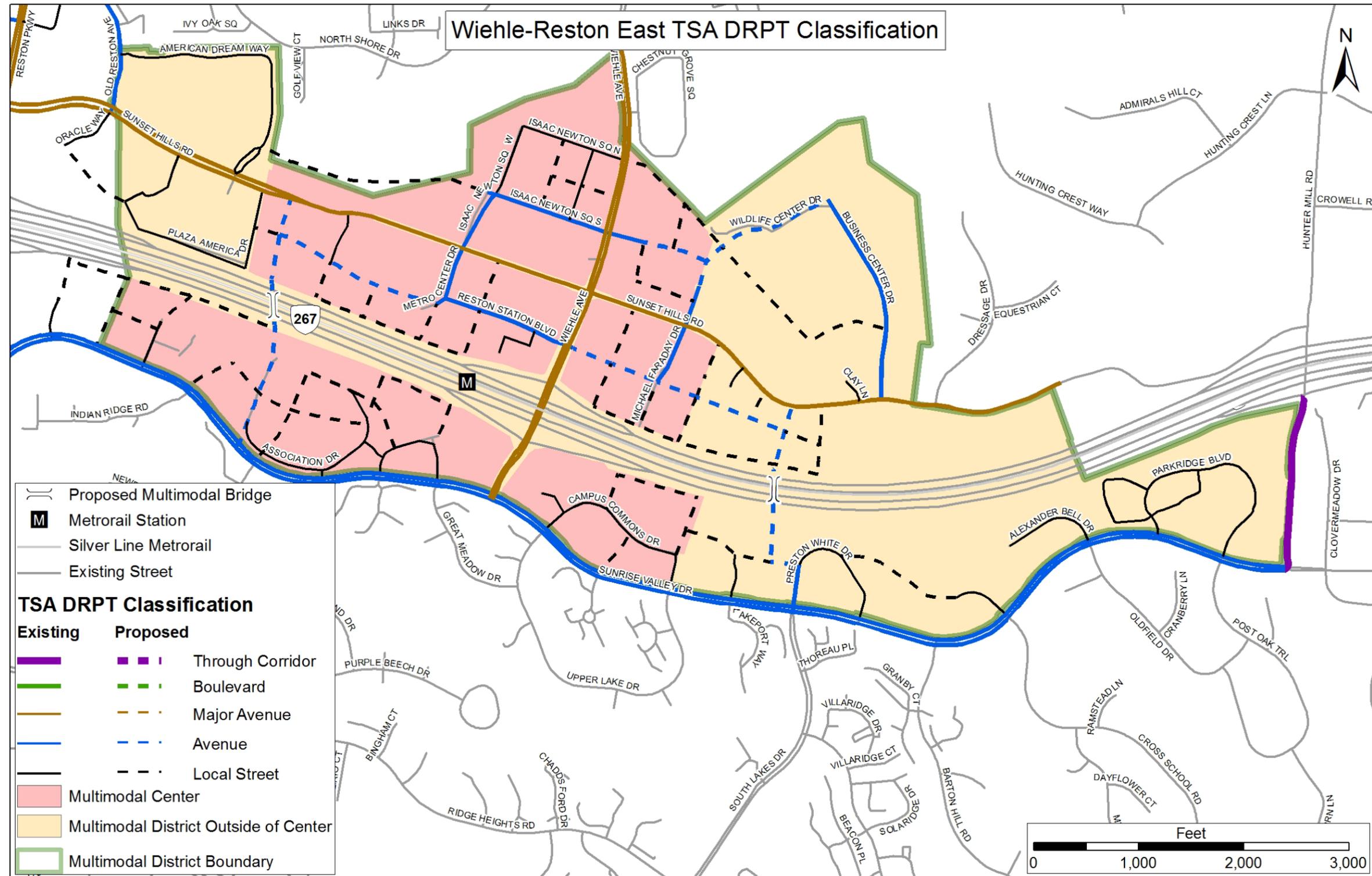


Table 9.1: Wiehle-Reston East TSA DRPT Roadway Classifications

District	Name	From	To	VDOT Functional Classification	FCDOT Functional Classification	DRPT Classification	Modal Emphasis
<b>Planned Grid Links</b>							
Wiehle-Reston East TSA	Soapstone Overpass	Sunset Hills Road	Sunrise Valley Drive	N/A	N/A	Avenue	Bicycle, Pedestrian, Transit
Wiehle-Reston East TSA	South Lakes Overpass	Sunset Hills Road	Sunrise Valley Drive	N/A	N/A	Avenue	Bicycle, Pedestrian, Transit
Wiehle-Reston East TSA	All Other Avenue Grid Links	All	N/A	N/A	N/A	Avenue	Bicycle, Pedestrian, Transit, Parking
Wiehle-Reston East TSA	Local Grid Links	All	N/A	N/A	N/A	Local	Pedestrian, Parking
<b>Existing Roads</b>							
Wiehle-Reston East TSA	Dulles Toll Road	Entirety	N/A	Expressway	Freeway/Expressway	Through Corridor	N/A (Limited Access Highway)
Wiehle-Reston East TSA	Hunter Mill Road	Sunrise Valley Drive	Dulles Toll Road	Minor Arterial	Minor Arterial - B	Through Corridor	Bicycle, Pedestrian, Transit
Wiehle-Reston East TSA	Sunset Hills Road	Entirety	N/A	Minor Arterial	Minor Arterial - B	Major Avenue	Bicycle, Pedestrian, Transit, Median
Wiehle-Reston East TSA	Wiehle Avenue	Sunrise Valley Drive	District Border	Minor Arterial	Minor Arterial - B	Major Avenue	Bicycle, Pedestrian, Transit, Median
Wiehle-Reston East TSA	Business Center Drive	Sunset Hills Road	End of Road	Minor Collector	N/A	Avenue	Bicycle, Pedestrian, Transit, Parking
Wiehle-Reston East TSA	Isaac Newton Square W (S of INS S)	Entirety	N/A	Local	Local	Avenue	Bicycle, Pedestrian, Transit, Parking
Wiehle-Reston East TSA	Isaac Newton Square S	Entirety	N/A	Local	Local	Avenue	Bicycle, Pedestrian, Transit, Parking
Wiehle-Reston East TSA	Metro Center Drive	Sunset Hills Road	Reston Station Boulevard	Local	Local	Avenue	Bicycle, Pedestrian, Transit, Parking
Wiehle-Reston East TSA	Michael Faraday Drive	Entirety	N/A	Local	Local	Avenue	Bicycle, Pedestrian, Transit, Parking
Wiehle-Reston East TSA	Old Reston Avenue	District Border	Sunset Hills Road	Major Collector	N/A	Avenue	Bicycle, Pedestrian, Transit, Parking
Wiehle-Reston East TSA	Reston Station Boulevard	Entirety	N/A	Local	Local	Avenue	Bicycle, Pedestrian, Transit, Parking, Median
Wiehle-Reston East TSA	Sunrise Valley Drive	Entirety	N/A	Minor Arterial	Minor Arterial - B	Avenue	Bicycle Pedestrian, Transit, Median
Wiehle-Reston East TSA	Alexander Bell Drive	Entirety	N/A	Local	Local	Local	Pedestrian, Parking
Wiehle-Reston East TSA	American Dream Way	Entirety	N/A	Local	Local	Local	Pedestrian, Parking
Wiehle-Reston East TSA	Association Drive	Entirety	N/A	Local	Local	Local	Pedestrian, Parking
Wiehle-Reston East TSA	Campus Commons Drive	Entirety	N/A	Local	Local	Local	Pedestrian, Parking
Wiehle-Reston East TSA	Centennial Park Drive	Entirety	N/A	Local	Local	Local	Pedestrian, Parking
Wiehle-Reston East TSA	Clay Lane	Entirety	N/A	Local	Local	Local	Pedestrian, Parking
Wiehle-Reston East TSA	Commerce Park Drive	Entirety	N/A	Local	Local	Local	Pedestrian, Parking
Wiehle-Reston East TSA	Isaac Newton Square E	Entirety	N/A	Local	Local	Local	Pedestrian, Parking
Wiehle-Reston East TSA	Isaac Newton Square N	Entirety	N/A	Local	Local	Local	Pedestrian, Parking
Wiehle-Reston East TSA	Isaac Newton Square W	Entirety	N/A	Local	Local	Local	Pedestrian, Parking
Wiehle-Reston East TSA	Metro Center Drive	Entirety	N/A	Local	Local	Local	Pedestrian, Parking
Wiehle-Reston East TSA	Parkridge Boulevard	Entirety	N/A	Local	Local	Local	Pedestrian, Parking
Wiehle-Reston East TSA	Plaza America Drive	Entirety	N/A	Local	Local	Local	Pedestrian, Parking
Wiehle-Reston East TSA	Preston White Drive	Entirety	N/A	Local	Local	Local	Pedestrian, Parking
Wiehle-Reston East TSA	Robert Fulton Drive	Entirety	N/A	Local	Local	Local	Pedestrian, Parking
Wiehle-Reston East TSA	Roland Clarke Place	Entirety	N/A	Local	Local	Local	Pedestrian, Parking

Figure 9.2: Reston Town Center TSA DRPT Roadway Classifications

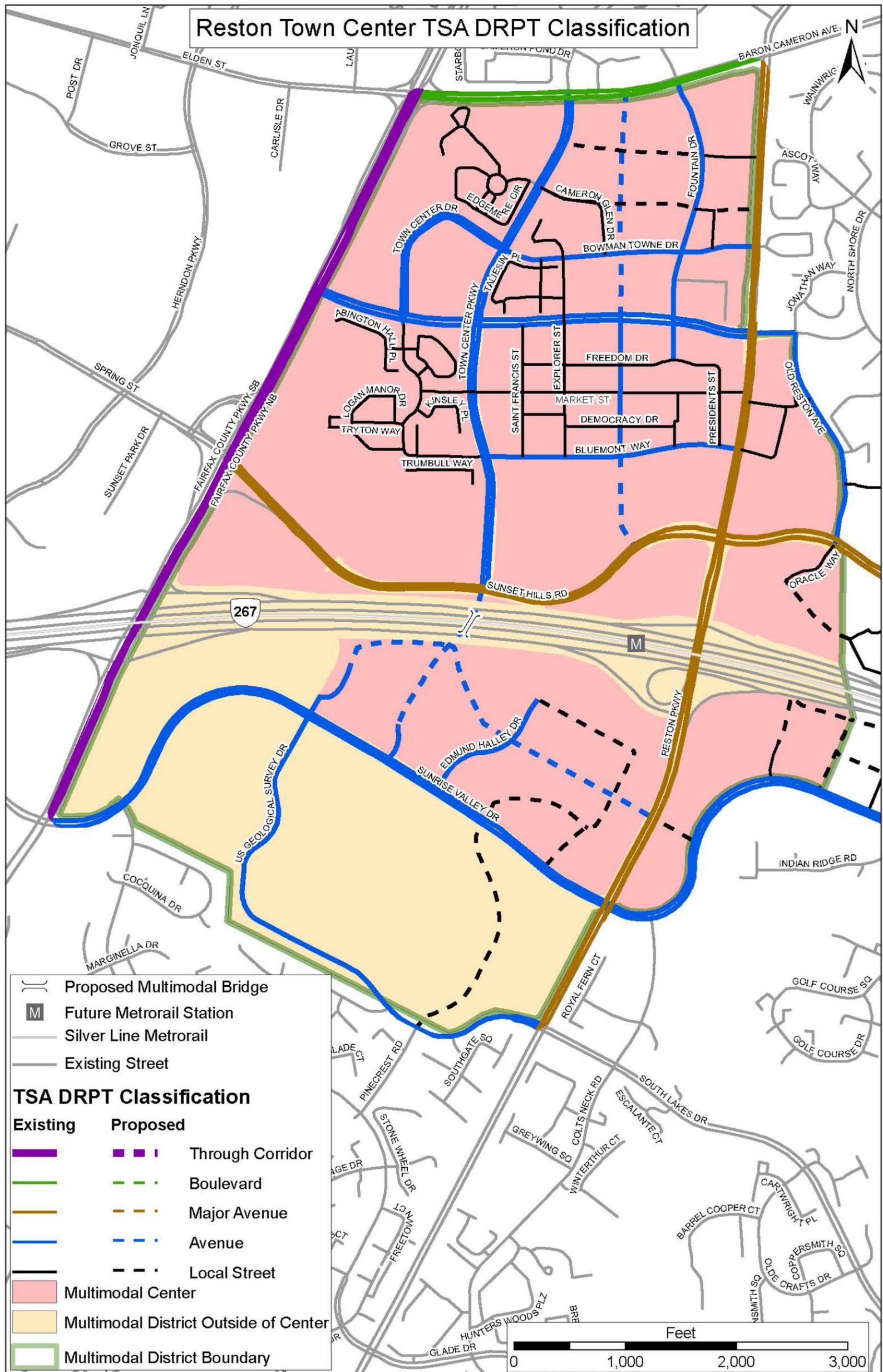


Table 9.2: Reston Town Center TSA DRPT Roadway Classifications

District	Name	From	To	VDOT Functional Classification	FCDOT Functional Classification	DRPT Classification	Modal Emphasis
<b>Planned Grid Links</b>							
Reston Town Center	Town Center Parkway Underpass	Sunset Hills Road	Sunrise Valley Drive	N/A	N/A	Avenue	Bicycle, Pedestrian, Transit
Reston Town Center	All Other Avenue Grid Links	All	N/A	N/A	N/A	Avenue	Bicycle, Pedestrian, Transit, Parking
Reston Town Center	Local Grid Links	All	N/A	N/A	N/A	Local	Pedestrian, Parking
<b>Existing Roads</b>							
Reston Town Center	Fairfax County Parkway	Baron Cameron Avenue	Sunrise Valley Drive	Principal Arterial	Freeway/Expressway	Through Corridor	Bicycle, Pedestrian, Transit, Median
Reston Town Center	Baron Cameron Avenue	Fairfax County Parkway	Reston Parkway	Major Collector	Minor Arterial - A	Boulevard	Bicycle, Pedestrian, Transit, Median
Reston Town Center	Reston Parkway	South Lakes Drive	Baron Cameron Avenue	Minor Arterial	Minor Arterial - A	Major Avenue	Bicycle, Pedestrian, Transit, Median
Reston Town Center	Sunset Hills Road	Entire District	N/A	Minor Arterial	Minor Arterial - B	Major Avenue	Bicycle, Pedestrian, Transit, Median
Reston Town Center	Bluemont Way	Reston Parkway	Town Center Parkway	Major Collector	N/A	Avenue	Pedestrian, Transit
Reston Town Center	Bowman Towne Drive	Town Center Parkway	Reston Parkway	Major Collector	N/A	Avenue	Bicycle, Pedestrian, Transit
Reston Town Center	Crescent Park Drive (north of NDP)	Town Center Parkway	New Dominion Parkway	Major Collector	N/A	Avenue	Pedestrian, Parking
Reston Town Center	Edmund Halley Drive	Entirely	N/A	Local	N/A	Avenue	Bicycle, Pedestrian, Transit
Reston Town Center	Fountain Drive	Baron Cameron Avenue	New Dominion Parkway	Major Collector	N/A	Avenue	Bicycle, Pedestrian, Transit
Reston Town Center	Fountain Drive	New Dominion Parkway	Freedom Drive	Local	Local	Avenue	Pedestrian
Reston Town Center	New Dominion Parkway	Fairfax County Parkway	Reston Parkway	Minor Arterial	N/A	Avenue	Bicycle, Pedestrian, Transit, Median
Reston Town Center	South Lakes Drive	Pinecrest Road	Reston Parkway	Major Collector	N/A	Avenue	Bicycle, Pedestrian, Transit, Median
Reston Town Center	South Lakes Drive	Sunrise Valley Drive	Pinecrest Road	Local	N/A	Avenue	Bicycle, Pedestrian, Transit, Median
Reston Town Center	Sunrise Valley Drive	Entirely	N/A	Minor Arterial	Minor Arterial - B	Avenue	Bicycle, Pedestrian, Transit, Median
Reston Town Center	Town Center Drive	New Dominion Parkway	Town Center Parkway	Minor Collector	N/A	Avenue	Bicycle, Pedestrian, Transit, Median
Reston Town Center	Town Center Parkway	Sunset Hills Road	Baron Cameron Avenue	Major Collector	N/A	Avenue	Bicycle, Pedestrian, Transit, Median
Reston Town Center	Abington Hall Place	Entirely	N/A	Local	Local	Local	Pedestrian
Reston Town Center	Blue Flint Court	Entirely	N/A	Local	Local	Local	Pedestrian
Reston Town Center	Bowman Towne Court	Entirely	N/A	Local	Local	Local	Pedestrian
Reston Town Center	Cameron Glen Drive	Entirely	N/A	Local	Local	Local	Pedestrian, Parking
Reston Town Center	Chancery Station	Entirely	N/A	Local	Local	Local	Pedestrian
Reston Town Center	Crescent Park Drive (south of NDP)	New Dominion Parkway	Town Center Parkway	Minor Collector	N/A	Local	Pedestrian
Reston Town Center	Democracy Drive	Entirely	N/A	Local	Local	Local	Pedestrian, Parking
Reston Town Center	Discovery Street	Entirely	N/A	Local	Local	Local	Pedestrian, Parking
Reston Town Center	Dorrance Court	Entirely	N/A	Local	Local	Local	Pedestrian
Reston Town Center	Edgemere Circle	Entirely	N/A	Local	Local	Local	Pedestrian
Reston Town Center	Edgewater Pond Drive	Entirely	N/A	Local	Local	Local	Pedestrian
Reston Town Center	Explorer Street	Entirely	N/A	Local	Local	Local	Pedestrian, Transit
Reston Town Center	Freedom Drive	Entirely	N/A	Local	Local	Local	Pedestrian, Parking
Reston Town Center	Kemble Court	Entirely	N/A	Local	Local	Local	Pedestrian
Reston Town Center	Kinsley Place	Entirely	N/A	Local	Local	Local	Pedestrian
Reston Town Center	Lake Shore Crest Drive	Entirely	N/A	Local	Local	Local	Pedestrian
Reston Town Center	Library Street	Entirely	N/A	Local	Local	Local	Pedestrian, Parking

District	Name	From	To	VDOT Functional Classification	FCDOT Functional Classification	DRPT Classification	Modal Emphasis
Reston Town Center	Logan Manor Drive	Entirely	N/A	Local	Local	Local	Pedestrian
Reston Town Center	Market Street	Entirely	N/A	Local	Local	Local	Pedestrian, Parking
Reston Town Center	Mercator Drive	Entirely	N/A	Local	Local	Local	Pedestrian, Parking
Reston Town Center	Presidents Street	Entirely	N/A	Local	Local	Local	Pedestrian, Parking
Reston Town Center	Random Stone Court	Entirely	N/A	Local	Local	Local	Pedestrian
Reston Town Center	Saint Francis Street	Entirely	N/A	Local	Local	Local	Pedestrian, Parking
Reston Town Center	Spectrum Center	Entirely	N/A	Local	Local	Local	Pedestrian, Parking
Reston Town Center	Stratford House Place	Entirely	N/A	Local	Local	Local	Pedestrian, Parking
Reston Town Center	Stratford Park Place	Entirely	N/A	Local	Local	Local	Pedestrian, Parking
Reston Town Center	Taliesin Place	Entirely	N/A	Local	Local	Local	Pedestrian
Reston Town Center	Town Square	Entirely	N/A	Local	Local	Local	Pedestrian, Parking
Reston Town Center	Trumbull Way	Entirely	N/A	Local	Local	Local	Pedestrian
Reston Town Center	Tryton Way	Entirely	N/A	Local	Local	Local	Pedestrian

Figure 9.3: Herndon TSA DRPT Roadway Classifications

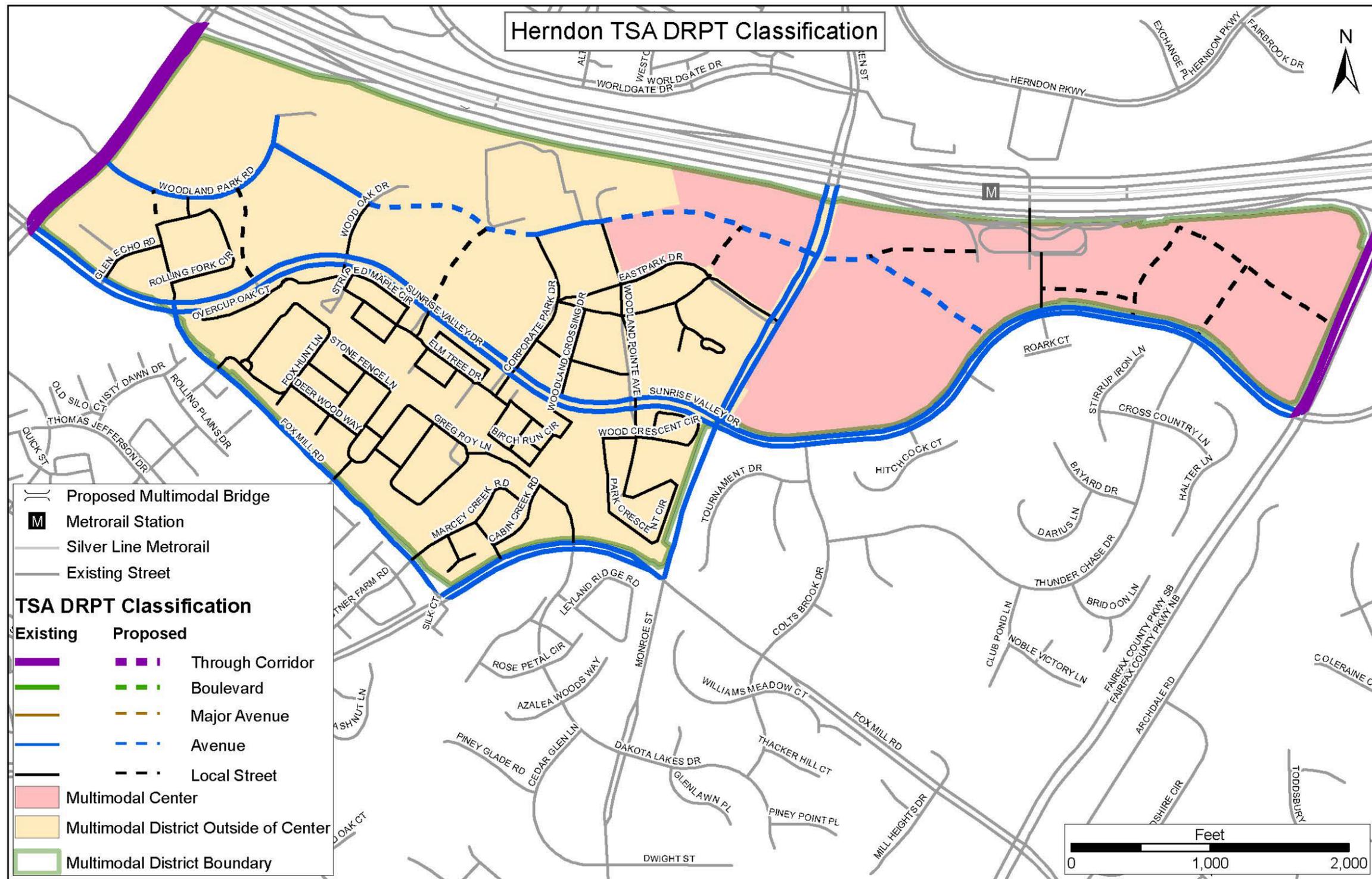


Table 9.3: Herndon TSA DRPT Roadway Classifications

District	Name	From	To	VDOT Functional Classification	FCDOT Functional Classification	DRPT Classification	Modal Emphasis
<b>Planned Grid Links</b>							
Herndon TSA	Avenue Grid Links	All	N/A	N/A	N/A	Avenue	Bicycle, Pedestrian, Transit, Parking
Herndon TSA	Local Grid Links	All	N/A	N/A	N/A	Local	Pedestrian, Parking
<b>Existing Roads</b>							
Herndon TSA	Centreville Road	Sunrise Valley Drive	Dulles Toll Road	Minor Arterial	Minor Arterial -A	Through Corridor	Bicycle, Pedestrian, Transit, Median
Herndon TSA	Fairfax County Parkway	Sunrise Valley Drive	Dulles Toll Road	Principal Arterial	Freeway/Expressway	Through Corridor	Bicycle, Pedestrian, Transit, Median
Herndon TSA	Fox Mill Road	Sunrise Valley Drive	Frying Pan Road	Minor Arterial	Minor Arterial - B	Avenue	Bicycle, Pedestrian, Transit, Parking
Herndon TSA	Frying Pan Road	Fox Mill Road	Monroe Street	Minor Arterial	Minor Arterial - B	Avenue	Bicycle, Pedestrian, Median
Herndon TSA	Monroe Street	Sunrise Valley Drive	Dulles Toll Road	Minor Arterial	Minor Arterial - B	Avenue	Bicycle, Pedestrian, Transit, Median
Herndon TSA	Sunrise Valley Drive	Centreville Road	Fairfax County Parkway	Minor Arterial	Minor Arterial - B	Avenue	Bicycle, Pedestrian, Transit, Median
Herndon TSA	Avalon Bay Lane	Marcey Creek Road	Frying Pan Road	Local	Local	Local	Pedestrian
Herndon TSA	Birch Cove Road	Deer Wood Way	Stone Fence Lane	Local	Local	Local	Pedestrian
Herndon TSA	Birch Run Circle	Entirety	N/A	Local	Local	Local	Pedestrian
Herndon TSA	Black Willow Drive	Sunrise Valley Drive	End	Local	Local	Local	Pedestrian
Herndon TSA	Cabin Creek Road	Avalon Bay Lane	Greg Roy Lane	Local	Local	Local	Pedestrian
Herndon TSA	Coopers Branch Court	Marcey Creek Road	End	Local	Local	Local	Pedestrian
Herndon TSA	Corporate Park Drive	Sunrise Valley Drive	End	Local	Local	Local	Pedestrian, Median, Parking
Herndon TSA	Cypress Cove Circle	Entirety	N/A	Local	Local	Local	Pedestrian
Herndon TSA	Cyprus Green Lane	Greg Roy Lane	Green Grass Court	Local	Local	Local	Pedestrian
Herndon TSA	Cyprus Ridge Lane	Greg Roy Lane	Cypress Green Lane	Local	Local	Local	Pedestrian
Herndon TSA	Deer Wood Court	Deer Wood Way	Deer Wood Way	Local	Local	Local	Pedestrian, Parking
Herndon TSA	Deer Wood Way	Fox Hunt Lane	Stone Fence Lane	Local	Local	Local	Pedestrian
Herndon TSA	Eastpark Drive	Corporate Park Drive	Monroe Street	Local	Local	Local	Pedestrian, Parking
Herndon TSA	Eastpark Drive	Ferdinand Porsche Drive	Monroe Street	Local	Local	Local	Pedestrian, Parking
Herndon TSA	Elm Tree Drive	Sunrise Valley Drive	End	Local	Local	Local	Pedestrian
Herndon TSA	Ferdinand Porsche Drive	Eastpark Drive	End	Local	Local	Local	Pedestrian, Parking
Herndon TSA	Fox Hunt Lane	Fox Mill Road	End	Local	Local	Local	Pedestrian
Herndon TSA	Glen Echo Road	Sunrise Valley Drive	Rolling Fork Circle	Local	Local	Local	Pedestrian
Herndon TSA	Green Grass Court	Greg Roy Lane	Cypress Green Lane	Local	Local	Local	Pedestrian
Herndon TSA	Greg Roy Lane	Stone Fence Lane	Frying Pan Road	Local	Local	Local	Pedestrian, Parking
Herndon TSA	Hickory Nut Lane	Elm Tree Drive	Birch Run Circle	Local	Local	Local	Pedestrian
Herndon TSA	Highland Crossing Drive	Corporate Park Drive	Woodland Point	Local	Local	Local	Pedestrian, Parking
Herndon TSA	Laurel Tree Lane	Entirety	N/A	Local	Local	Local	Pedestrian
Herndon TSA	Locust Park Drive	Sunrise Valley Drive	End	Local	Local	Local	Pedestrian
Herndon TSA	Marcey Creek Road	Fox Mill Road	Cabin Creek Road	Local	Local	Local	Pedestrian
Herndon TSA	Meadow Willow Circle	Entirety	N/A	Local	Local	Local	Pedestrian
Herndon TSA	Overcup Oak Court	Elm Tree Drive	End	Local	Local	Local	Pedestrian
Herndon TSA	Pumpkin Ash Court	Entirety	N/A	Local	Local	Local	Pedestrian

District	Name	From	To	VDOT Functional Classification	FCDOT Functional Classification	DRPT Classification	Modal Emphasis
Herndon TSA	Stone Fence Lane	Entirety	N/A	Local	Local	Local	Pedestrian, Parking
Herndon TSA	Striped Maple Circle	Entirety	N/A	Local	Local	Local	Pedestrian
Herndon TSA	Sycamore View Lane	Elm Tree Drive	End	Local	Local	Local	Pedestrian
Herndon TSA	Weeping Cherry Walk	Hickory Nut Lane	Birch Run Circle	Local	Local	Local	Pedestrian
Herndon TSA	Windy Oak Way	Fox Hunt Lane	Birch Cove Road	Local	Local	Local	Pedestrian
Herndon TSA	Wood Crescent Circle	Entirety	N/A	Local	Local	Local	Pedestrian
Herndon TSA	Wood Oak Drive	Sunrise Valley Drive	End	Local	Local	Local	Pedestrian, Median
Herndon TSA	Woodland Crossing Drive	Sunrise Valley Drive	East Park Drive	Local	Local	Local	Pedestrian, Parking
Herndon TSA	Woodland Park Road	Centreville Road	End	Local	Local	Local	Pedestrian
Herndon TSA	Woodland Pointe Avenue	Sunrise Valley Drive	East Park Drive	Local	Local	Local	Pedestrian, Median
Herndon TSA	Woodland Pond Lane	Sunrise Valley Drive	Park Crescent Circle	Local	Local	Local	Pedestrian

Figure 9.4: Reston Transit Station Area Planned Bike Facilities

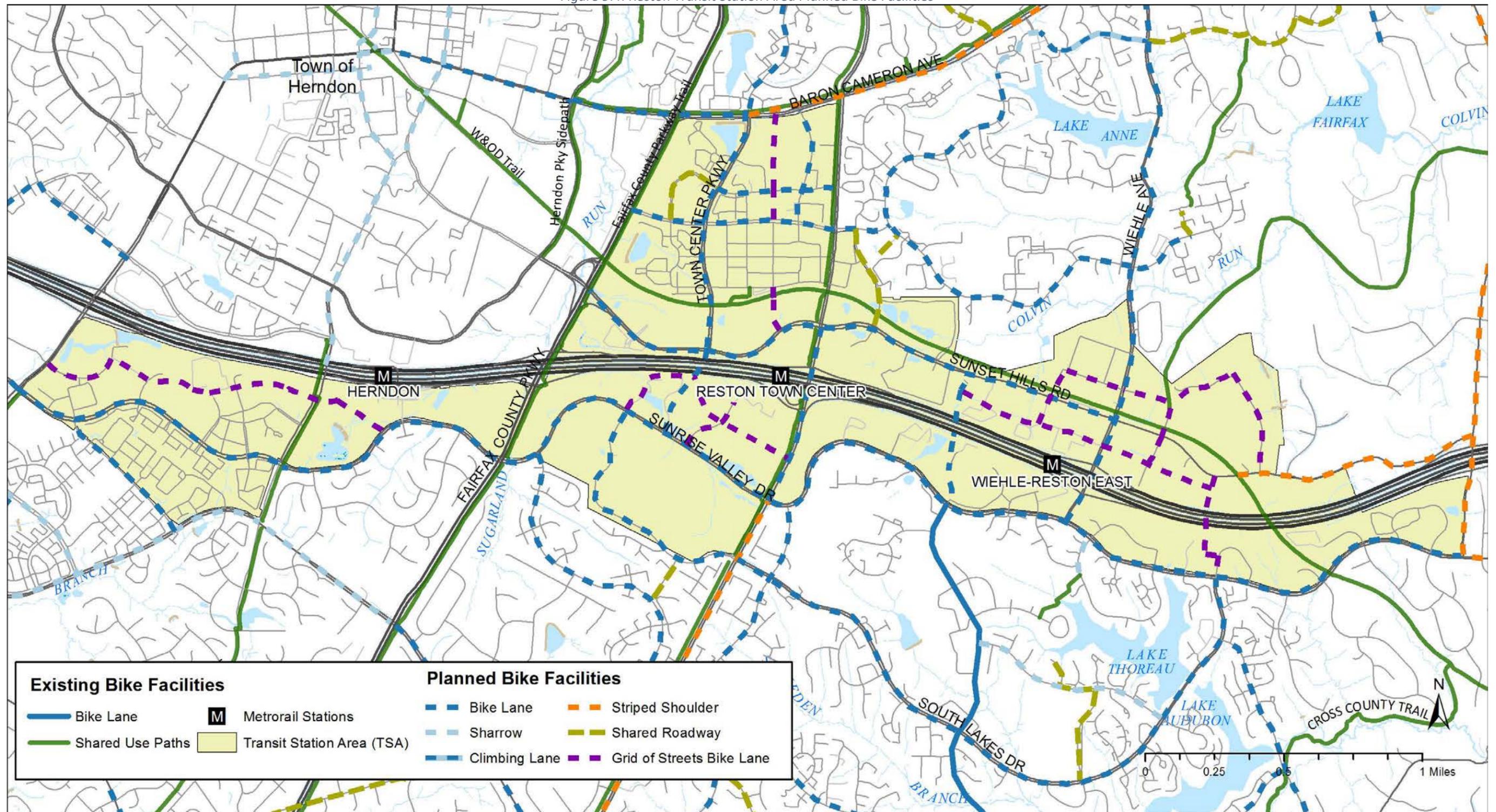
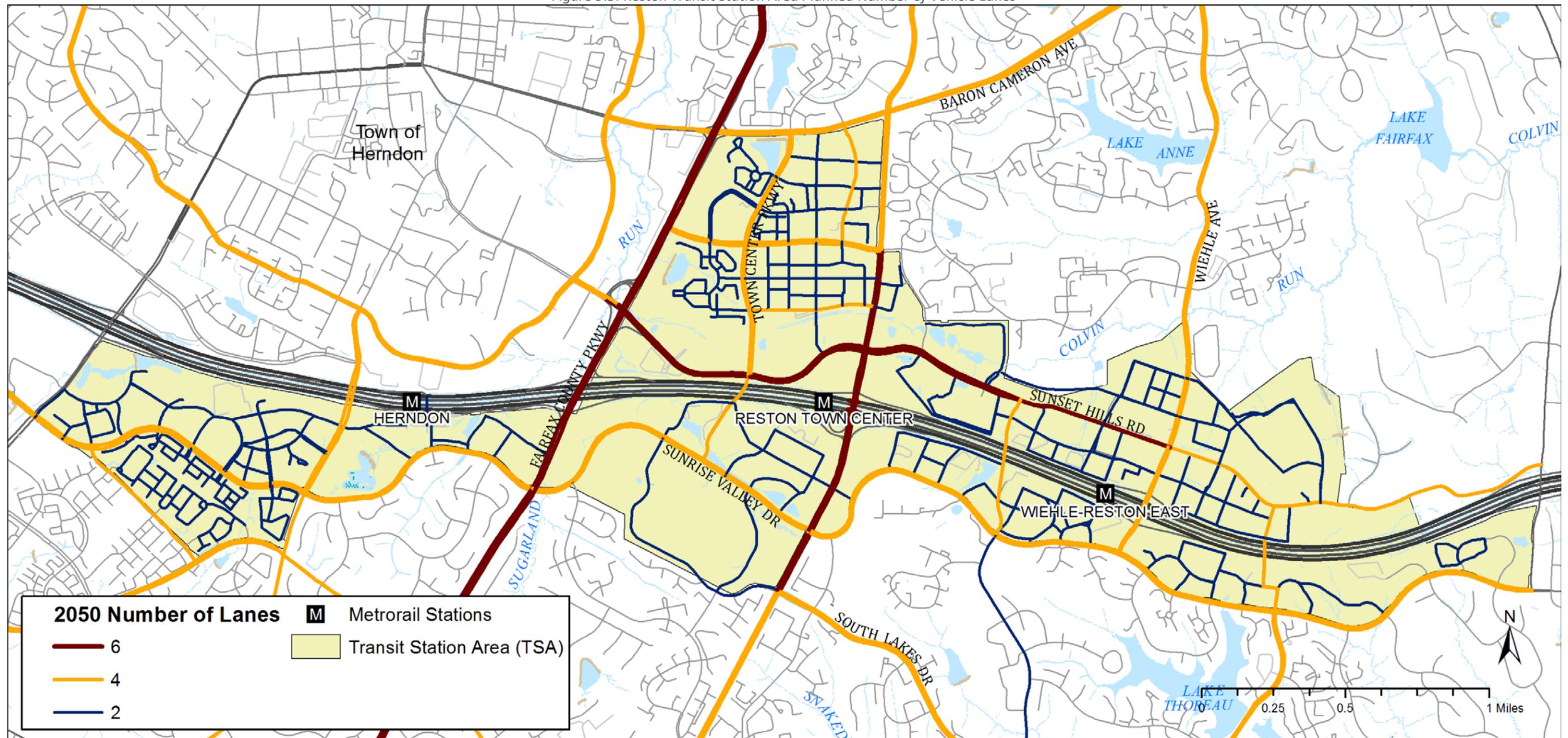


Figure 9.5: Reston Transit Station Area Planned Number of Vehicle Lanes



## 10 Conclusions and Recommendations

The Reston Master Plan envisions the transformation of the area surrounding the three Reston Metrorail Stations into urban areas. The analyses of Full-Buildout and Mid-Buildout in the Reston TSAs have identified the transportation improvements needed to support this planned growth. While it is anticipated that traffic will increase in the Reston TSAs under the proposed land use scenario, the improvements identified in this study will accommodate the transportation needs as Reston redevelops and the Master Plan is realized. The Phasing Analysis provides information on the prioritization of projects, allowing for the changing travel needs in Reston to be supported by improvements to the transportation network. The Soapstone Connector and Town Center Underpass will provide significant benefit to travelers in Reston, but the largest improvement to transportation will come with the Grid of Streets which will support the new mixed-use development surrounding the Metrorail Stations.

The Full-Buildout analysis of the conceptual Grid of Streets within the Reston TSAs identified the improvements needed to achieve Level of Service (LOS) E or better for vehicular traffic, while still maintaining a walkable Grid of Streets. As part of this work, 2050 Visum models were developed and traffic mitigation procedures were conducted using Visum and Synchro. This work identified the transportation improvements needed to support the continued development planned in the Reston TSAs. The tiered approach ensured that these transportation improvements met the transportation needs of Reston while minimizing impact on the surrounding area. This approach included three tiers:

- **Tier 1: No right of way (ROW) impact**
  - Trip re-assignment
  - Signal timing modification/optimization
  - Modification of existing lane striping
  - Evaluation of all-way vs. 2-way stops
  - Traffic signal addition
- **Tier 2: Minor ROW impact**
  - Additional signals where needed
  - Turn lanes: new left and right turn lanes
  - Additional through lane
  - Additional grid link
- **Tier 3: Large scale mitigations with potentially significant ROW impact**
  - Median U-Turn/Superstreet
    - Eliminates left turn movement for side streets
    - Increase through movement green time
    - Additional needed ROW to provide turn radius
  - New roadway connection
  - Underpass/Overpass
    - Provides for an uninterrupted through movement
  - Only done in close coordination with the Advisory Group and Stakeholders after all other mitigation measures were not successful

With the completion of Tier 1 and Tier 2 mitigations, 30 new signals are proposed in the Reston TSAs, additional turn lanes were tested and recommended for multiple intersections, and roadway

improvements in the Town of Herndon were also incorporated. It is important to note that any signal recommended in the Reston Network Analysis would still need a warrant analysis conducted either as development comes on-line or as traffic conditions dictate. The number of intersections with LOS F was reduced from 35 to 8 and from 39 to 10 for the AM and PM peak hours respectively. The number of Problem Locations was reduced from 22 to 5 and from 26 to 2 for the AM and PM peak hours respectively. The majority of Problem Locations are on Reston Parkway and Fairfax County Parkway, which was expected due to their significance in the transportation network.

The following Tier 3 mitigations, ones that are high cost and/or require the use of large amounts of additional right of way, are recommended to reduce intersection delay and improve overall network operations:

1. On Reston Parkway, the Lawyers Road Connection was added between Lawyers Road and Fox Mill Road.
2. At Fairfax County Parkway and Spring Street, a new ramp and signal were added to the Fairbrook Drive extension.
3. At Fairfax County Parkway and Sunrise Valley Drive, a Single Point Urban Interchange replaced the existing 4-way intersection.

With the inclusion of the Tier 3 mitigation recommendations, three intersections in the AM peak hour and six intersections in the PM peak hour are still expected to operate at LOS F (an average delay of more than 80 seconds per vehicle) in 2050 in the Reston TSAs. However, only one location remains a Problem Location, with a delay in excess of 120 seconds – and that intersection is located outside of the Reston TSA. The LOS F and Problem Location intersections are shown below:

#### Problem Location – Average Delay In Excess of 120 Seconds

- Centreville Road at Sunrise Valley Drive (in Innovation TSA) with 131 seconds of delay in the AM

#### LOS F Intersections – Average Delay Above 80 Seconds

- Centreville Road at WB Dulles Toll Road Ramps (not in Reston TSA) with 114 seconds of delay in the PM
- Centreville Road at Woodland Park Road (in Innovation TSA) with 91 seconds of delay in the PM
- Centreville Road at Sunrise Valley Drive (in Innovation TSA) with 131 seconds of delay in the AM (also considered a Problem Location) and 86 seconds of delay in the PM
- Frying Pan Road at Monroe Street with 112 seconds of delay in the AM
- Fairfax County Parkway at Baron Cameron Avenue with 100 seconds of delay in the PM
- Reston Parkway at Sunrise Valley Drive with 96 seconds of delay in the PM
- Reston Parkway at South Lakes Drive with 95 seconds of delay in the AM
- Reston Parkway at Sunset Hills Road with 83 seconds of delay in the PM

The Mid-Buildout year analyses examined forecasted impacts to the Reston area before all 2050 development and transportation network improvements are implemented. The analyses identified four intersections as Problem Locations that may require further mitigations, but were no longer problem locations by Full-Buildout:

- Fairfax County Parkway @ Sunrise Valley Drive

- Reston Parkway @ South Lakes Drive
- Sunset Hills Road @ Town Center Parkway
- Hunter Mill Road @ Sunrise Valley Drive

Phasing analyses were conducted on the Existing Conditions and 2050 Visum networks. This was conducted to understand the impact of each individual road improvement on the overall network in order to prioritize roadway improvements in the Reston TSAs based on the benefits each improvement is expected to provide. Both analysis years showed that the Grid of Streets has the most significant effect on the transportation network in and around the Reston TSAs, with the Soapstone Overpass and Town Center Underpass providing needed connectivity between the areas north and south of the DTR in both scenarios.

The roadway classifications developed for the Grid of Streets will help guide the implementation of the new roadways associated with the redevelopment of the Reston TSAs and help balance the policy of achieving LOS E for vehicular traffic with the need to create safe walkable and bikeable neighborhoods as the TSAs redevelop.

The models and analyses created as part of this project can be used as tools to help develop long range transportation infrastructure plans by allowing planners to prioritize infrastructure projects based on their benefit to the transportation network as a whole.

The Reston Network Analysis has developed a framework for transportation improvements in the Reston TSAs. This framework will help guide development and transportation infrastructure investments for the next forty years. As Reston redevelops it will become a place where people are able to make trips by multiple modes, as well as feel safe walking, biking and taking transit.