2. Roadways

This chapter presents and discusses the results of the traffic analysis completed for the horizon year 2030. The analyses continue from the previous work performed for the Existing Conditions Report. An analysis of the growth of population, employment and travel in the study was conducted and is detailed in this chapter. The analyses examine the baseline conditions of implementing the recommended EIS mitigation strategies, as well as pedestrian improvements, and then identify additional measures to improve traffic conditions. A series of roadway improvements are recommended and prioritized for implementation. Cost estimates for construction are also estimated.

A. Existing Conditions

VHB previously completed an analysis of existing conditions in the study area and the results were presented in the *Wiehle Avenue/Reston Parkway – Station Access Management Plans: Profile of Existing Conditions*, dated June 22, 2007 which can be found at http://www.fairfaxcounty.gov/fcdot/pdf/wr_sam/existing_conditions_june22.pdf. This Existing Conditions Report also presented information relative to the roadway classification of the roadways within the Study Area.

Current traffic operations were analyzed using the simulation tool Synchro (version 6), with input files obtained from the Virginia Department of Transportation (VDOT). The intersection measures of effectiveness (MOEs) such as Level of Service (LOS) and delay were summarized by producing reports in the Highway Capacity Manual (HCM) format that were provided in the Existing Conditions Report. The analysis had shown that most intersections perform at a LOS of "C" or better during the AM and PM peak hours. There are only a handful of the intersections that were examined that performed at an LOS of "D" or worse.

These results raised several issues with respect to the application of the HCM methodology to quantify intersection MOEs. This methodology examines each intersection in isolation; it does not account for metering from upstream intersections, nor does it account for intersection spillback from downstream intersections. For example, the LOS of the intersection of Reston Parkway and Sunset Hills was computed as LOS E in the AM peak hour; however, the intersection of Reston Pkwy and the westbound DIAAH ramps operate at LOS F, and often spills back into this intersection, preventing vehicles from leaving the intersection of Reston Pkwy/Sunset Hills. The actual performance of this intersection is therefore worse than predicted by the HCM methodology, which does not account for queue spillback.

The second issue that was identified in the analysis was that the counts that VDOT provided within their Synchro files do not reflect full demand. The counters that fed information into the Synchro files only reflect intersection throughput, rather than demand, as the intersection cannot process everyone due to capacity constraints or downstream intersection congestion. Thus, when counts from oversaturated conditions are used, intersection MOEs reported by the HCM methodology tend to understate congestion levels and show better operating conditions than actual network performance.

For the reasons described above, the study team applied a much more sophisticated traffic operations analysis software program for future conditions: VISSIM. This program accounts for queue spillback effects and produces more accurate measures of system operational performance.

B. Projected Land Use and Travel Demand Growth

This section summarizes projected land use and travel demand for 2030. As shown in Figure 1-2, the boundaries of the study area include the Fairfax County Parkway to the west, Hunter Mill Road to the east, Fox Mill Road and Lawyers Road to the south, and Wiehle Avenue to the north. In addition, a station influence area that refers to the area immediately surrounding the two proposed stations was identified as a way to focus on the stations in the station access management plans.

a. Land Use Growth

The Metropolitan Washington Council of Governments (MWCOG) Round 7.0 cooperative land use forecasts were used to calculate future 2030 travel demand. Figure 2-1 shows the 2030 projected population around the Reston area. Every zone within the study area will have some level of residential population in 2030. Figure 2-1 shows percent population change from 2005 to 2030 in this area. The total projected population in the study area in 2030 is approximately 82,000, which increases approximately 28% from the 2005 total population. Compared to 2005, the areas that are expected to increase the most in population by 2030 include the station influence area directly adjacent to the stations as well as the residential areas along Route 28, with more than 200% growth.

Figure 2-1: 2030 Study Area Population

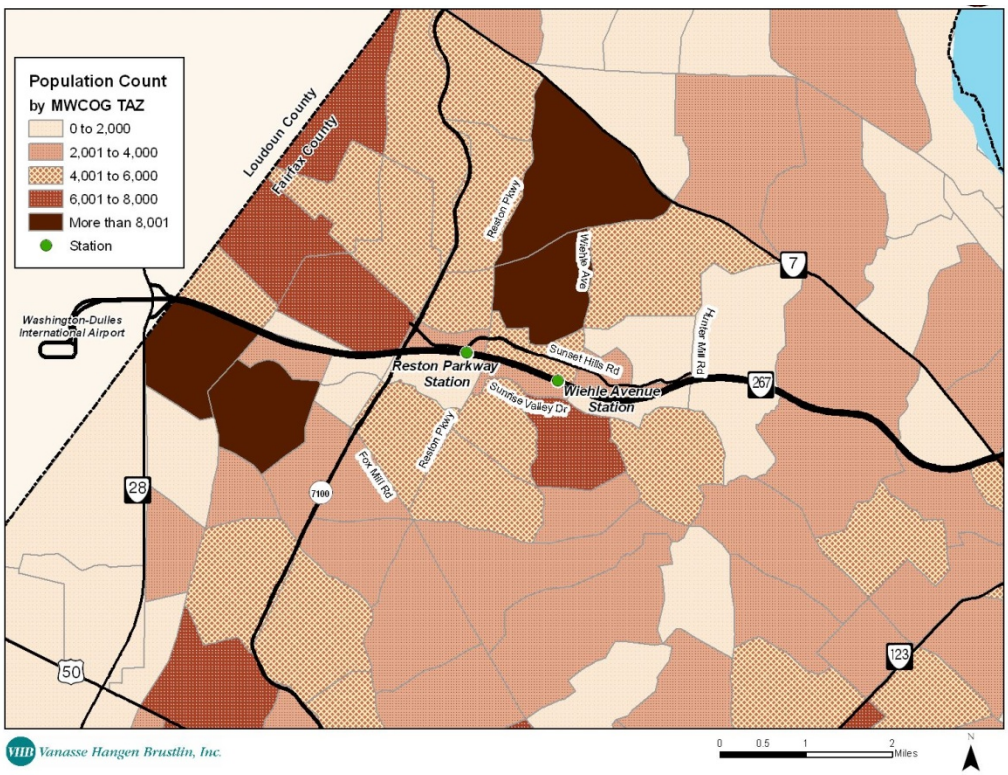


Figure 2-2: 2005 to 2030 Study Area Percent Population Change

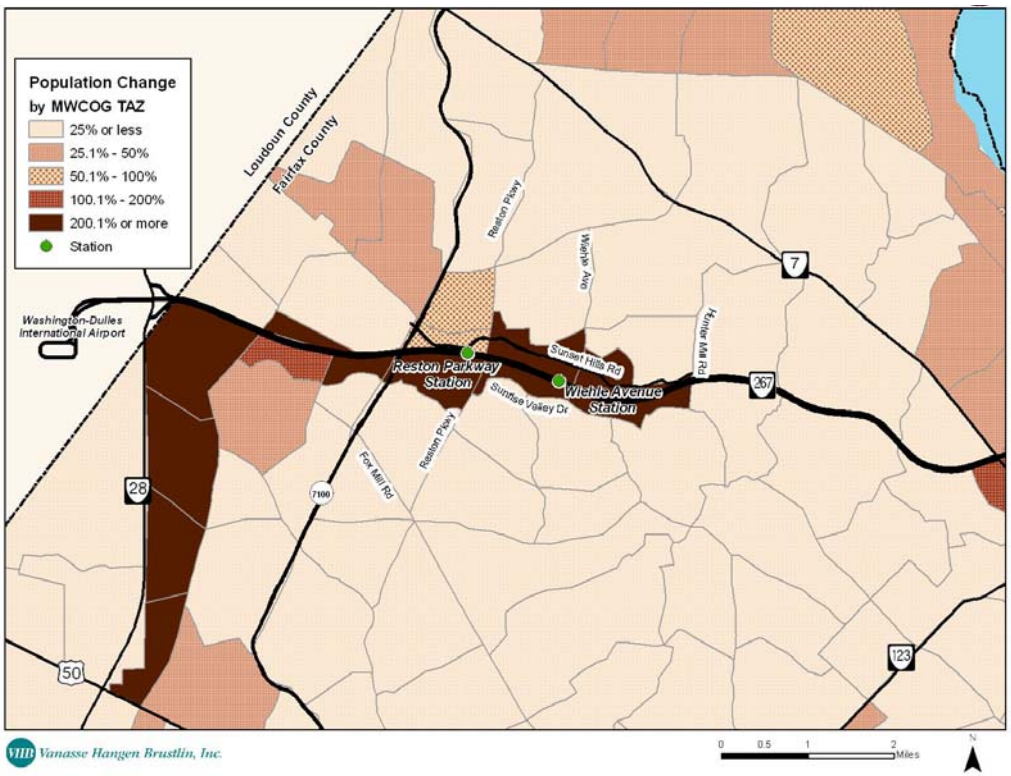


Figure 2-3 shows 2030 projected employment around the Reston area. Although employment will be clustered, all zones in the study area will have some level of employment. Figure 2-4 shows the percent employment change from 2005 to 2030. The total employment in the study area in 2030 is approximately 80,000, an increase of approximately 27% over the total employment in 2005. The total employment in the station area in 2030 is approximately 62,000, also an increase of approximately 27% compared to 2005 total employment. Unlike the population growth pattern, the station area experiences only moderate employment growth, between 25% and 50%.

Figure 2-3: 2030 Study Area Employment Projection

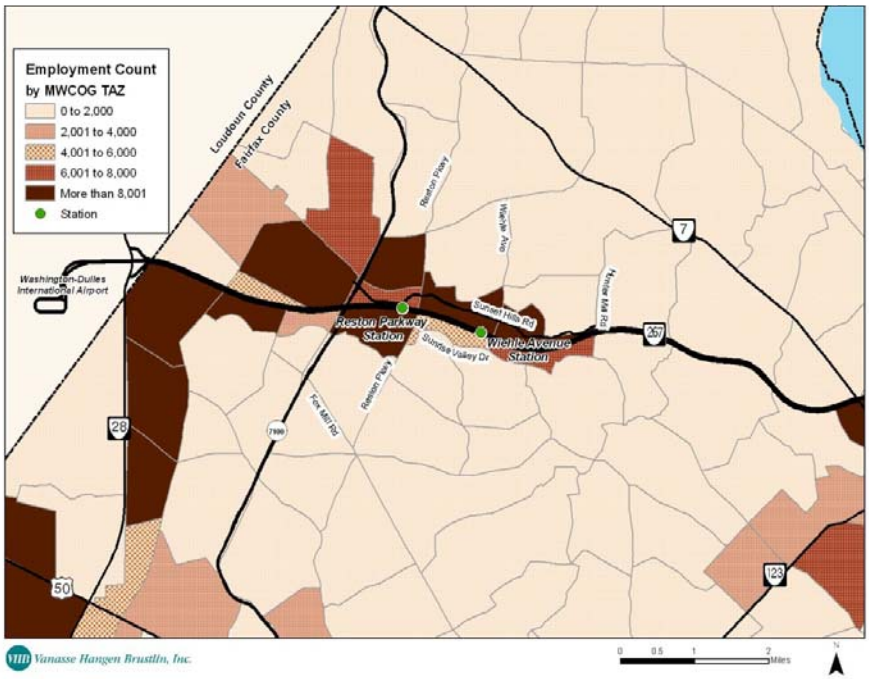
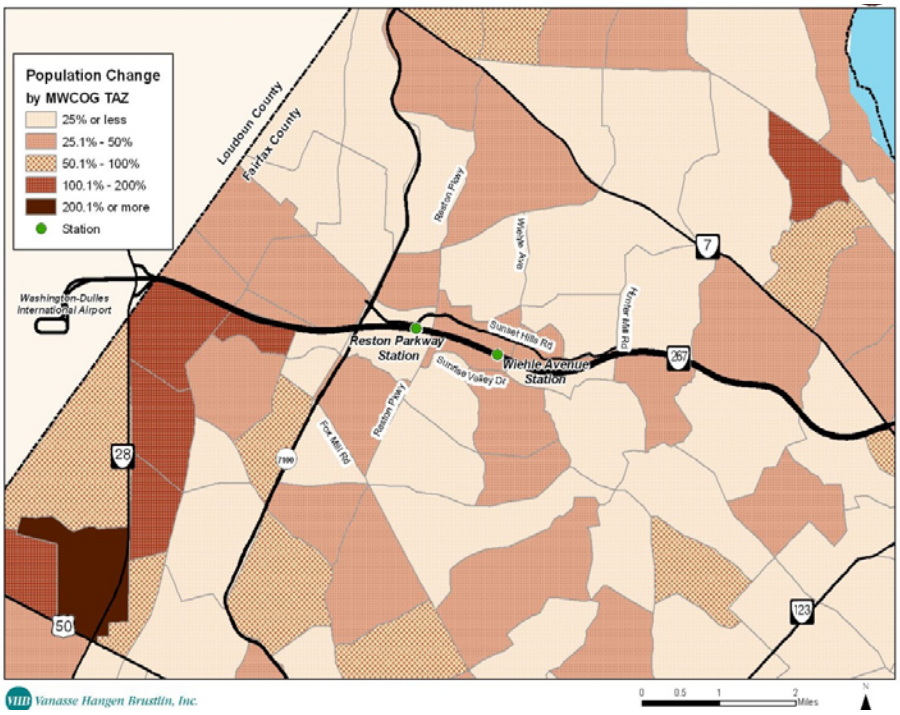


Figure 2-4: 2005 to 2030 Study Area Percent Employment Change



b. Travel Demand Growth

Future travel demand, including automobile, bus and pedestrian modes, was forecast using two primary sources: 1) the Fairfax County regional travel demand model and 2) outputs of the Northern Virginia Major Investment Study Model (NVMISM) that was used for the Dulles Corridor Rapid Transit EIS. The Fairfax County model was used to forecast vehicular demand, not including buses; while NVMISM model outputs were used to forecast bus passenger and pedestrian demand for access to the new Metrorail stations. Automobile demand for the planned park-and-ride structure at the Wiehle Station was forecast independently of the two models based on the assumption that this structure would be operating at capacity by 2030.

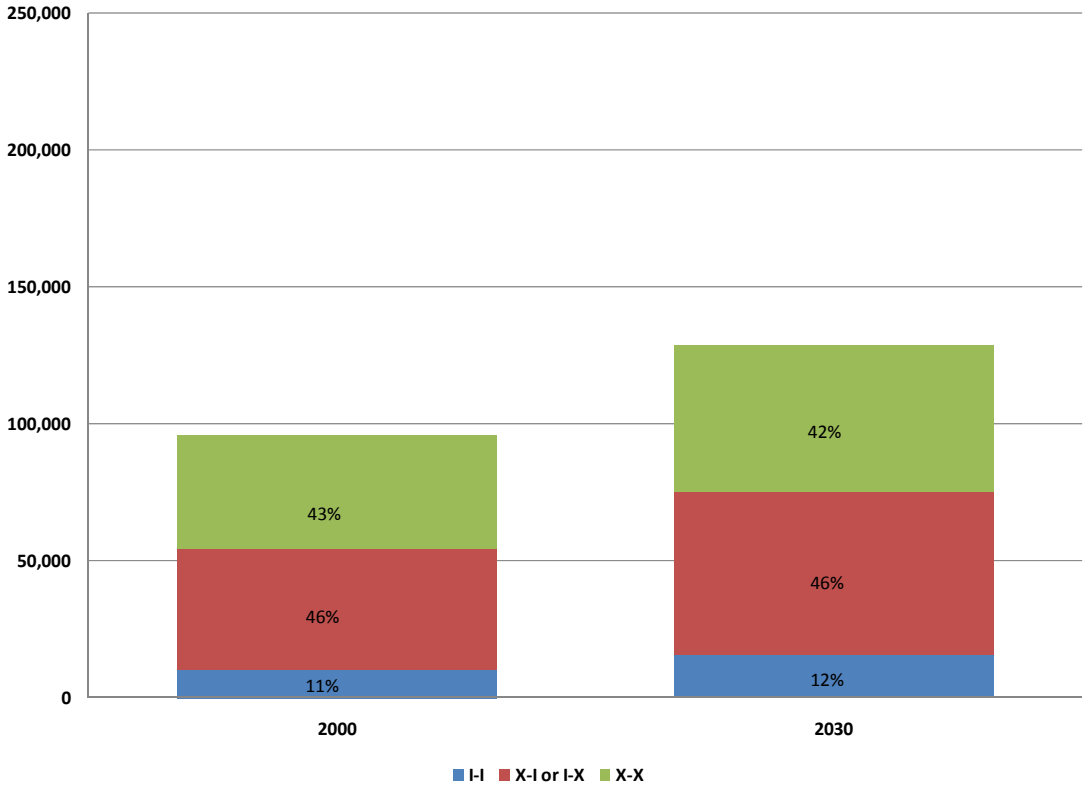
The Fairfax County model is a modified version of the MWCOG regional travel demand model, with a more detailed zone system within Fairfax County. Two sets of refined models were provided to VHB for this study: 1) year 2000 was used as a base year and 2) year 2030 Constrained Long Range Plan (CLRP) network model was used as the future scenario. The modeling periods included the AM peak period from 6 AM to 9 AM and the PM peak period from 4 PM to 7 PM.

A sub-area modeling technique was employed for both the study area and station influence area in order to focus on the trips in the area of interest, as opposed to the whole region. The travel forecasting results for different scenarios were evaluated based on the following three trip types:

- Internal to Internal (I-I): I-I trips are those trips which start and end inside the study area.
- External to Internal (X-I) or Internal to External (I-X): X-I trips are those trips that start outside the study area and end inside the study area. I-X trips are those trips that start inside the study area and end outside the study area.
- External to External (X-X): X-X trips are those trips that start and end outside the study area. They are also called through trips.

Figure 2-5 shows a comparison of total study area trips between 2000 and 2030 for the AM peak period. Overall, the split of the three trip types in 2030 remains almost the same as the base year split. Total trips in 2030 are projected to be 128,867, which is 34% greater than the 95,848 total trips in 2000. I-I trips increase the most of the three types with 55% growth.

Figure 2-5: Comparison of Study Area AM Peak Period Total Trips

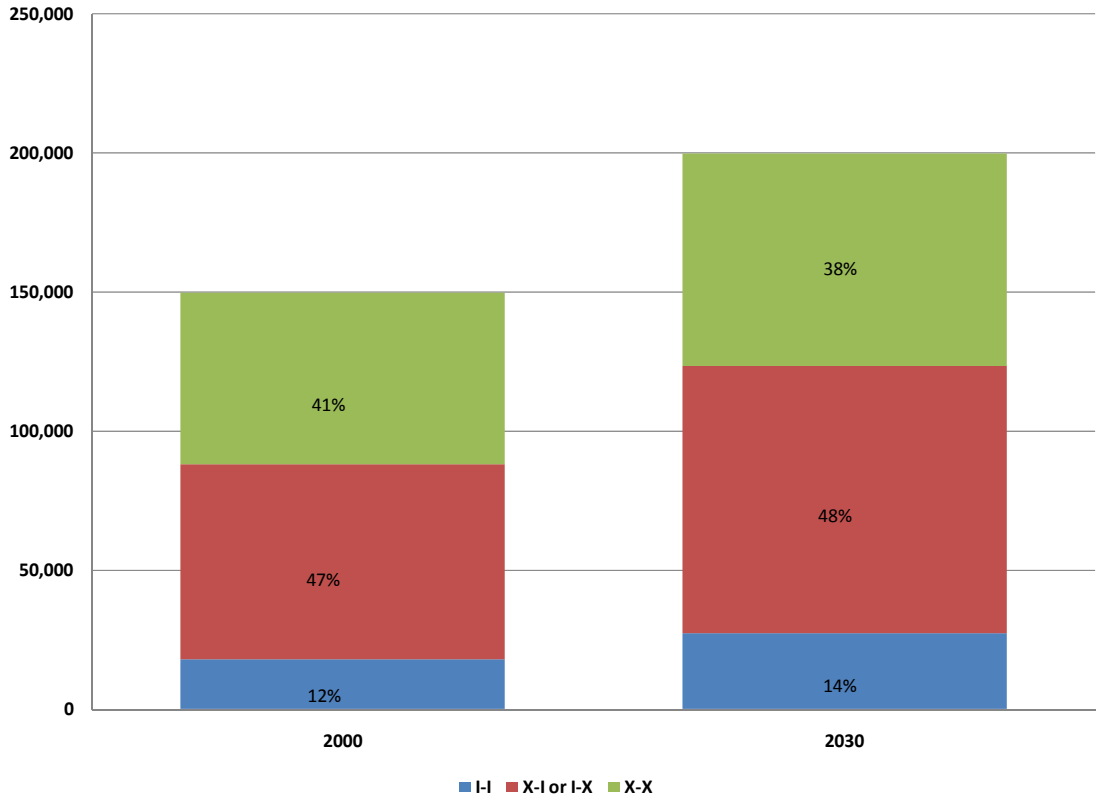


	Year 2000	Year 2030	%Growth
I-I	10,129	15,651	55%
I-X or X-I	44,170	59,633	35%
X-X	41,549	53,583	29%
Total	95,848	128,867	34%

"I-I" are internal to internal trips
"I-X" are internal to external trips
"X-I" are external to internal trips
"X-X" are external to external or through trips

Figure 2-6 shows a comparison of total trips in the study area between 2000 and 2030 for the PM peak period. Overall, total trips in the PM peak period are approximately 55% greater than AM peak period trips in both 2000 and 2030. The split of three trip types in 2030 changes slightly from the base year split. While the X-I or I-X trip split remains almost unchanged, 2-3% of trips would be shifted from X-X trips to I-I trips in 2030. There are 199,415 total trips in 2030, which is 33% greater than the 149,470 total trips in 2000. I-I trips increase the most with growth of 55% over the 30-year period, as in the AM peak period.

Figure 2-6: Comparison of Study Area PM Peak Period Total Trips

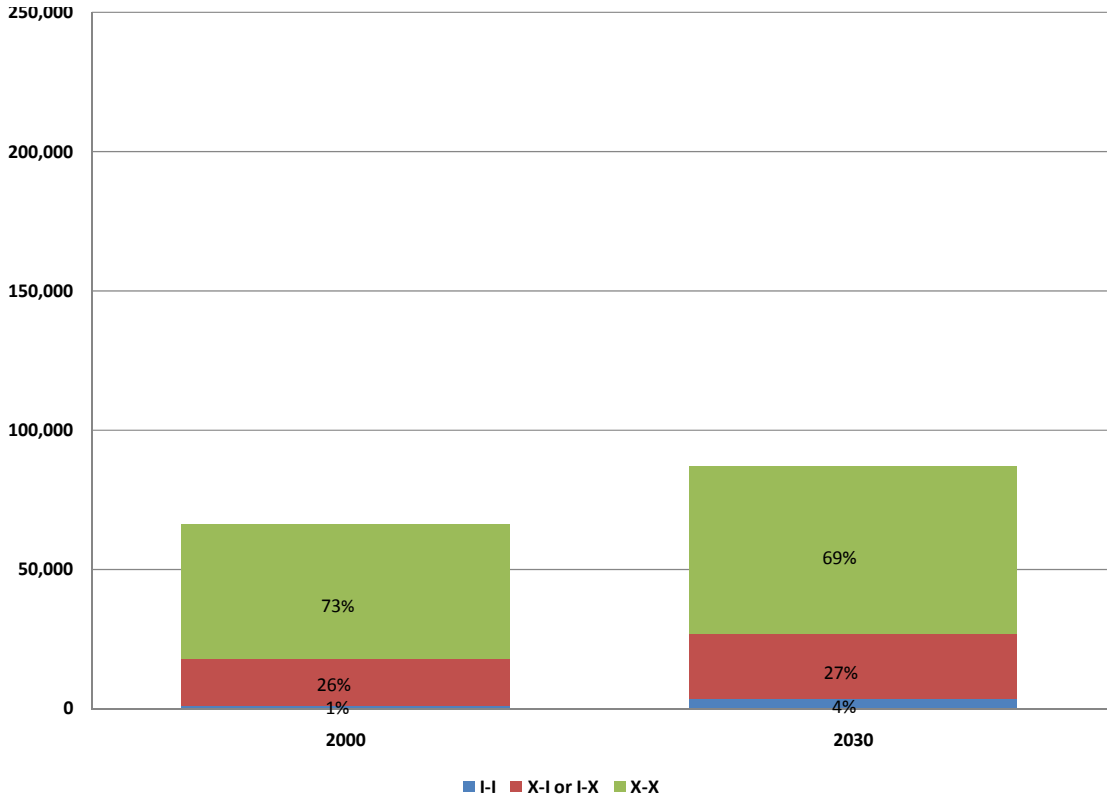


	Year 2000	Year 2030	%Growth
I-I	17,708	27,417	55%
I-X or X-I	70,457	95,591	36%
X-X	61,305	76,407	25%
Total	149,470	199,415	33%

"I-I" are internal to internal trips
"I-X" are internal to external trips
"X-I" are external to internal trips
"X-X" are external to external or through trips

Figure 2-7 shows a comparison of total trips in the station influence area in 2000 and 2030 for the AM peak period. In contrast to travel patterns in the study area, the split of the three trip types in 2030 changes from the base year split. 3-4% of trips would be shifted from X-X trips to I-I trips in 2030. There are 87,379 total trips in 2030, which is 32% greater than the 66,039 total trips in 2000. I-I trips increase the most with 227% growth.

Figure 2-7: Comparison of Station Influence Area AM Peak Period Total Trips



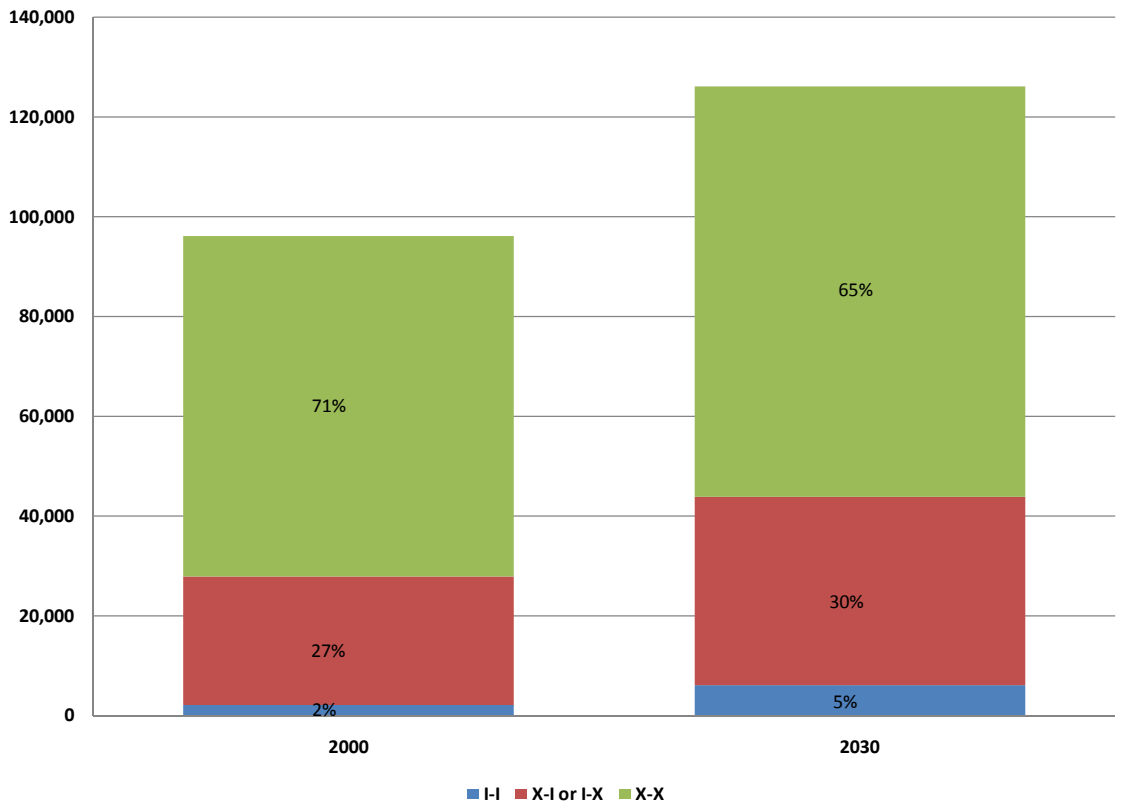
	Year 2000	Year 2030	%Growth
I-I	948	3,100	227%
I-X or X-I	17,008	23,929	41%
X-X	48,083	60,350	26%
Total	66,039	87,379	32%

"I-I" are internal to internal trips
"X-I" are external to internal trips
"I-X" are internal to external trips
"X-X" are external to external or through trips

Figure 2-8 shows a comparison of total trips in the station influence area between 2000 and 2030 for the PM peak period. Overall, total trips in the PM peak period are approximately 45% greater than AM peak period trips in both 2000 and 2030. The split of the three trip types in 2030 all change from the base year split. Both the X-I or I-X trip split and I-I trip split would increase by 3% while the X-X trip split would drop by 6% in 2030. There are 125,888 total trips in 2030, which is 31% greater than the 96,064 total trips in 2000. I-I trips increase the most with 211% growth.

The impact of the proposed stations is more prominent in the station influence area. More trips would be generated with origins and/or destinations that are inside the influence area.

Figure 2-8: Comparison of Station Influence Area PM Peak Period Total Trips



	Year 2000	Year 2030	%Growth
I-I	1,898	5,902	211%
I-X or X-I	25,801	37,925	47%
X-X	68,365	82,061	20%
Total	96,064	125,888	31%

"I-I" are internal to internal trips "I-X" are internal to external trips
"X-I" are external to internal trips "X-X" are external to external or through trips

The DIAAH has a large number of trips that pass through the Reston area without leaving the facility. Table 2-1 shows DIAAH through trips for the study area and station influence area in 2000 and 2030. The volume of trips during the AM peak period in 2030 is projected to be 26%-33% greater than the volume of trips in 2000, while the corresponding growth is projected to be 4%-9% for the PM peak period. One interesting finding is that there are fewer future year AM peak period trips than PM peak period trips in the base year. This indicates that demand is currently approaching or exceeding roadway capacity on the DIAAH during the PM peak period, but not during the AM peak period.

Table 2-1: DIAAH Through Trips

		Year 2000	Year 2030	%Growth
Study Area	AM Peak Period	15,085	19,055	26%
	PM Peak Period	21,716	22,481	4%
Station Influence Area	AM Peak period	15,865	21,054	33%
	PM Peak Period	23,295	25,492	9%

Excluding these DIAAH through trips, study area and station influence area trips for both AM and PM peak periods were compared between 2000 and 2030 (see Table 2-2and Table 2-3). Since the DIAAH trips were counted as X-X trips, the trips for the other two trip types remain unchanged. Figure 2-9 and Figure 2-10 show the trip type proportions - excluding DIAAH through trips - for the study area and station influence area, respectively. The extraction of DIAAH trips results in an increase in the proportion of I-I trips and the proportion of X-I or I-X trips, and a reduction in the proportion of X-X trips when compared to the proportions when DIAAH through trips are included. In the study area, the proportion of I-I, X-I and I-X trips will drop by 2% from 2000 to 2030 for the AM peak period while the proportion will decrease by 1% for the PM peak period. In the station influence area, the proportion of I-I, X-I and I-X trips will drop by 3% from 2000 to 2030 for the AM peak period, while the proportion will also decrease by 3% for PM peak period. This represents a reduction in study and influence area through trips associated with regional roadways in the future, which indicates that the growth in locally-oriented trips is displacing regional through trip demand.

Table 2-2: Comparison of Study Area Trips Excluding DIAAH Through Trips

		Year 2000	Year 2030	%Growth
AM Peak Period	I-I	10,129	15,651	55%
	I-X or X-I	44,170	59,633	35%
	X-X	26,464	34,528	30%
	Total	80,763	109,812	36%
PM Peak Period	I-I	17,708	27,417	55%
	I-X or X-I	70,457	95,591	36%
	X-X	39,589	53,926	36%
	Total	127,754	176,934	38%

Table 2-3: Comparison of Station Influence Area Trips Excluding DIAAH Through Trips

		Year 2000	Year 2030	%Growth
AM Peak Period	I-I	948	3,100	227%
	I-X or X-I	17,008	23,929	41%
	X-X	32,218	39,296	22%
	Total	50,174	66,325	32%
PM Peak Period	I-I	1,898	5,902	211%
	I-X or X-I	25,801	37,925	47%
	X-X	45,070	56,569	26%
	Total	72,769	100,396	38%

Figure 2-9: Study Area Trip Purpose Split Excluding DIAAH Through Trips

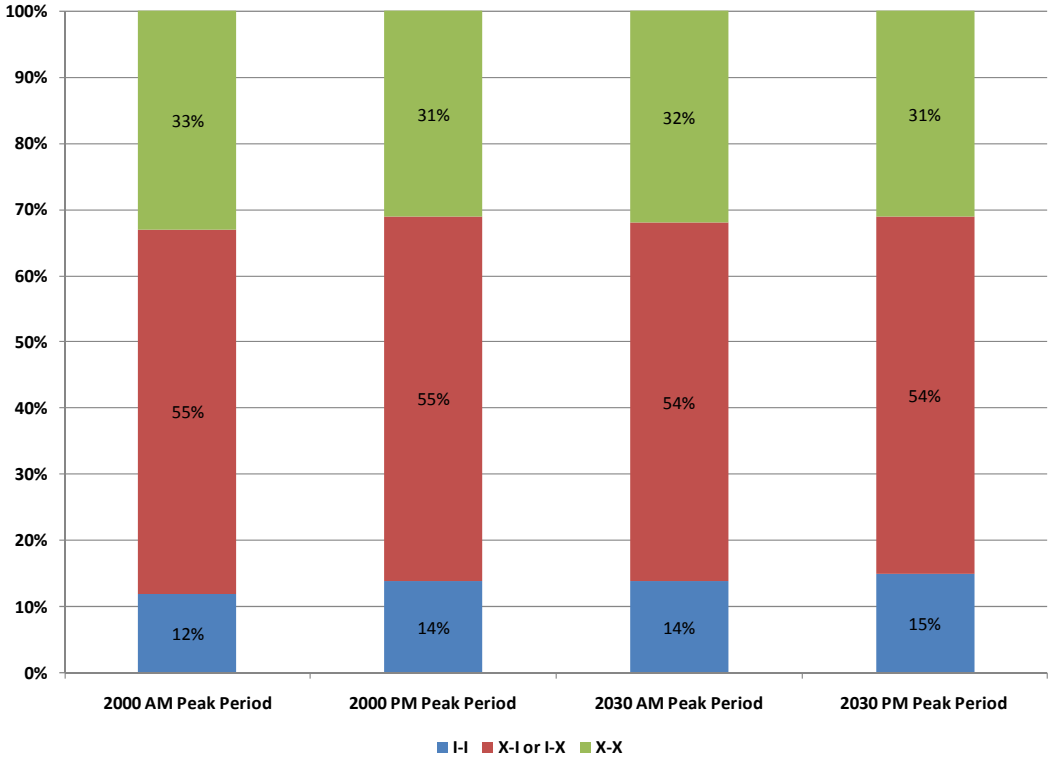
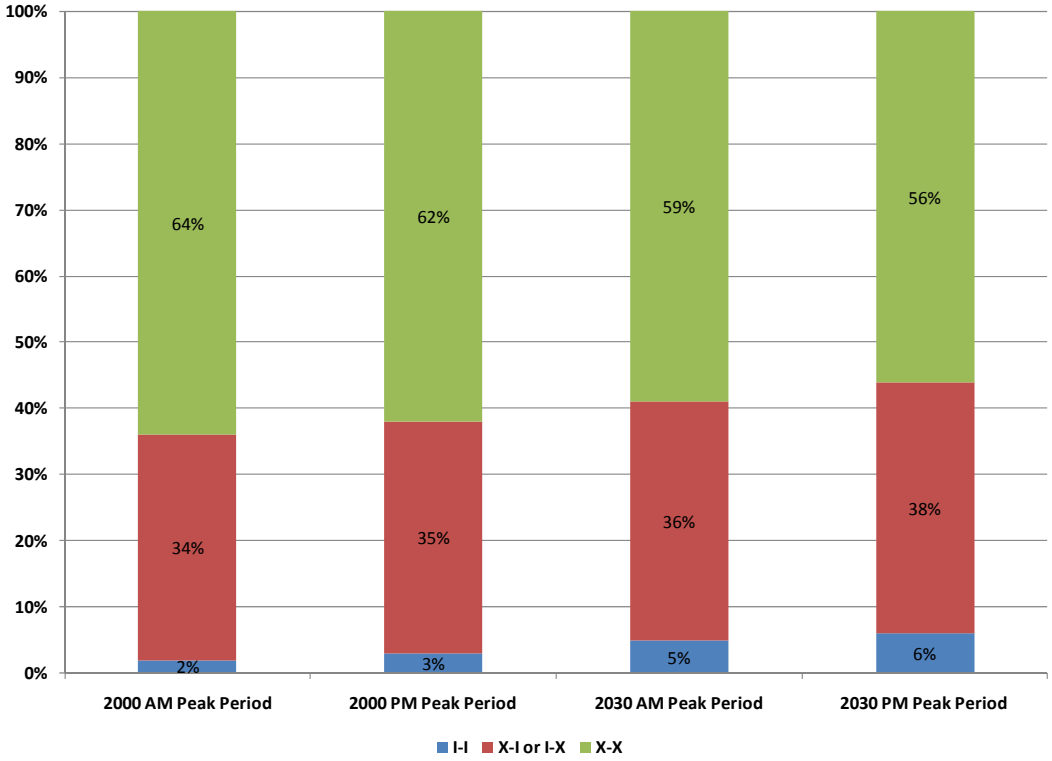


Figure 2-10: Station Influence Area Trip Purpose Split Excluding DIAAH Through Trips



"I-I" are internal to internal trips
"X-I" are external to internal trips
"I-X" are internal to external trips
"X-X" are external to external or through trips

c. 2030 Traffic Projections

Future 2030 traffic projections were developed for the AM and PM peak periods, as opposed to only the AM and PM peak hours. This is due to the fact that since the peak hours are projected to be heavily congested, which will force the peak demand to spread outside of the peak hours. When this occurs, the evaluation of potential roadway improvements should focus on measures that address demand over peak periods. The VISSIM simulation model allowed for this type of extended period analysis.

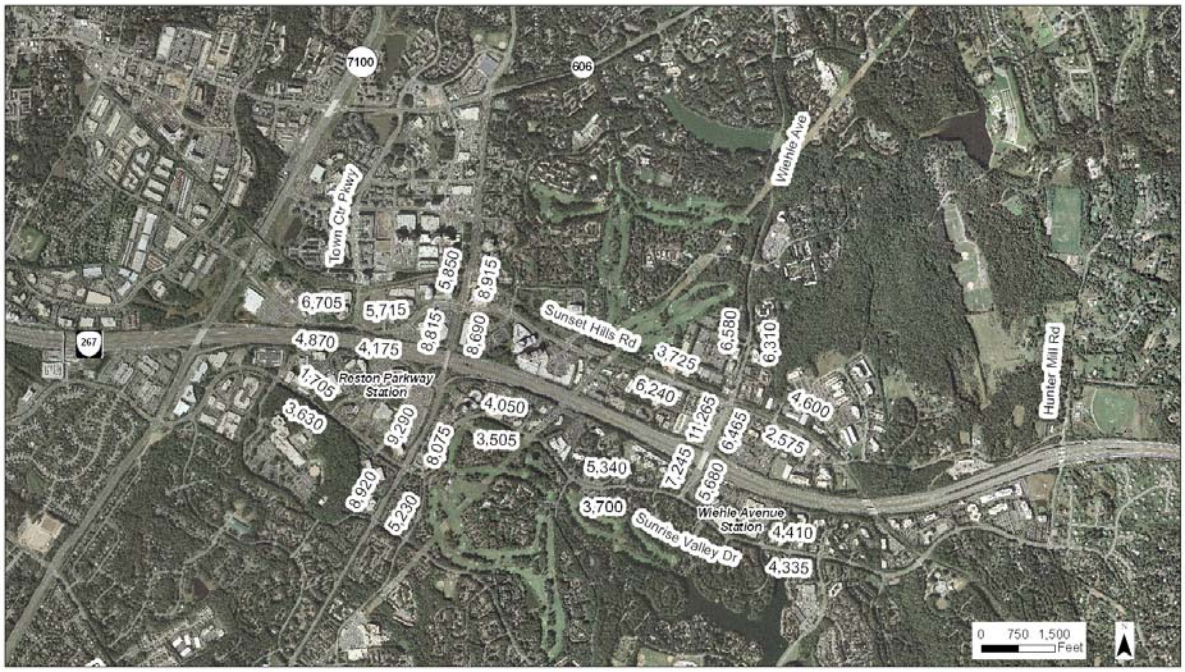
It is also important to note that the 2030 traffic projections used for this study maintained consistency with 2030 traffic projections developed in a previous study of the area around the Wiehle Station[3].

Figure 2-11 and Figure 2-12 present the AM Peak Period and the PM Peak Period volumes, respectively, that were used for the analyses.

Figure 2-11: AM 3- hour Peak Period Roadway Link Volumes within the Station Influence Area (2030)

[3] *Dulles Corridor Metrorail Project, Traffic Operational Analysis – Phase 2*, Cambridge Systematics, Inc., March 12, 2007.

Figure 2-12: PM 3- hour Peak Period Roadway Link Volumes within the Station Influence Area (2030)



C. Roadway Capacity Additions

For the 2030 analysis, a set of roadway capacity additions (roadway actions) were included with the baseline assumptions, and then additional improvements were included under a more "robust" system. The baseline roadway capacity additions are the actions that were identified in the Dulles Rail FEIS as appropriate mitigation measures.

There is a need to balance the roadway improvements with improvements for other modes, to reflect the fact that access to the stations will need to focus on transit and pedestrian modes, as well as vehicular modes. In fact, the Reston Metrorail Access Group (RMAG) that helped guide this study identified pedestrian, bicycle and transit access as priorities over automobile access. For example, widening a roadway from 4 to 6 lanes will improve road capacity and the ability to process more vehicles; however, this type of improvement could potentially hinder pedestrian movements, especially at larger intersections, as it increases the crossing distance for pedestrians.

There are three groupings of roadway actions that were analyzed for 2030 conditions: 1) those actions for roadways that provide immediate Metro access, 2) general roadway actions and 3) robust actions that would be intended to mitigate congestion on a long-term scale, including proposed connectors over the DIAAH.

a. Metro Access Actions

The actions discussed in this section will provide increased capacity in the immediate vicinity of the Metrorail stations on roadways that provide direct access into the stations. These actions include:

1. New signal and turn lanes on Sunset Hills Road for access into the proposed Reston Parkway Metrorail station.

2. New left turn lane for westbound left turning movement at the intersection of Sunset Hills Road/Isaac Newton Square W, which would replace the shared left-through lane by providing a dedicated turn lane.
3. Additional (second) left turn lane for northbound traffic at the intersection of Wiehle Avenue and the station entrance (between Sunset Hills Road and the DIAAH) and provide a second inbound lane.

These roadway actions would improve direct vehicular access into the two proposed Metrorail stations by providing increased turning capacity. This could reduce the potential for traffic volumes that exceed the turn bay capacity and block the through lanes during periods of high demand.

b. General Roadway Actions

In addition to the actions for direct access to the Metrorail stations, other roadway actions would increase intersection capacity, thereby improving operational performance and reducing delay. These actions can range from simply adding a turn bay at an intersection to widening a roadway to provide extra through lanes. The actions analyzed in this category include:

4. Add an additional left turn lane on the eastbound DIAAH off-ramp at Wiehle Avenue.
5. Improve the right turn lane for the eastbound Sunset Hills Road at Wiehle Avenue.
6. Improve the right turn lane for the westbound Sunrise Valley Drive at Wiehle Avenue.
7. Add a northbound through lane on Reston Parkway at Sunrise Valley Drive, continuing this lane to the ramp for eastbound on-ramp to the DIAAH.
8. Improve the right turn lane for southbound Reston Parkway at Sunrise Valley Drive.

These actions are part of the EIS mitigation projects listed in the amended record of decision. Some additional roadway actions have been identified beyond the EIS recommendations that are identified in the following section.

c. Robust Road Actions/Connectors

The baseline traffic analysis identified the need for additional roadway capacity along Wiehle Avenue, as well as additional connections between Sunset Hills Road and Sunrise Valley Drive. Additional projects were developed that would help alleviate these issues. These improvements, considered for the "robust" analysis, include:

9. Add a second right turn lane on the northbound Wiehle Avenue approach at Sunset Hills Road.
10. Add a second right turn lane on the southbound Wiehle Avenue approach at Sunrise Valley Drive.
11. Add an additional left turn lane on the eastbound Sunrise Valley Drive approach at Wiehle Avenue.
12. Provide two new connections over the DIAAH to provide new links to connect Sunset Hills Road and Sunrise Valley Drive:
    i. Connection between Town Center Parkway and Edmund Halley Drive.
    ii. Connection between Soapstone Drive and Isaac Newton Square W.

D. Traffic Analysis Results

The traffic software used for the 2030 analysis was VISSIM, a micro-simulation program. The advantage of using such a program is that it permits analysis of roadway networks that are oversaturated (i.e., congested) and accounts for queue spillbacks affecting upstream intersections and reduction of

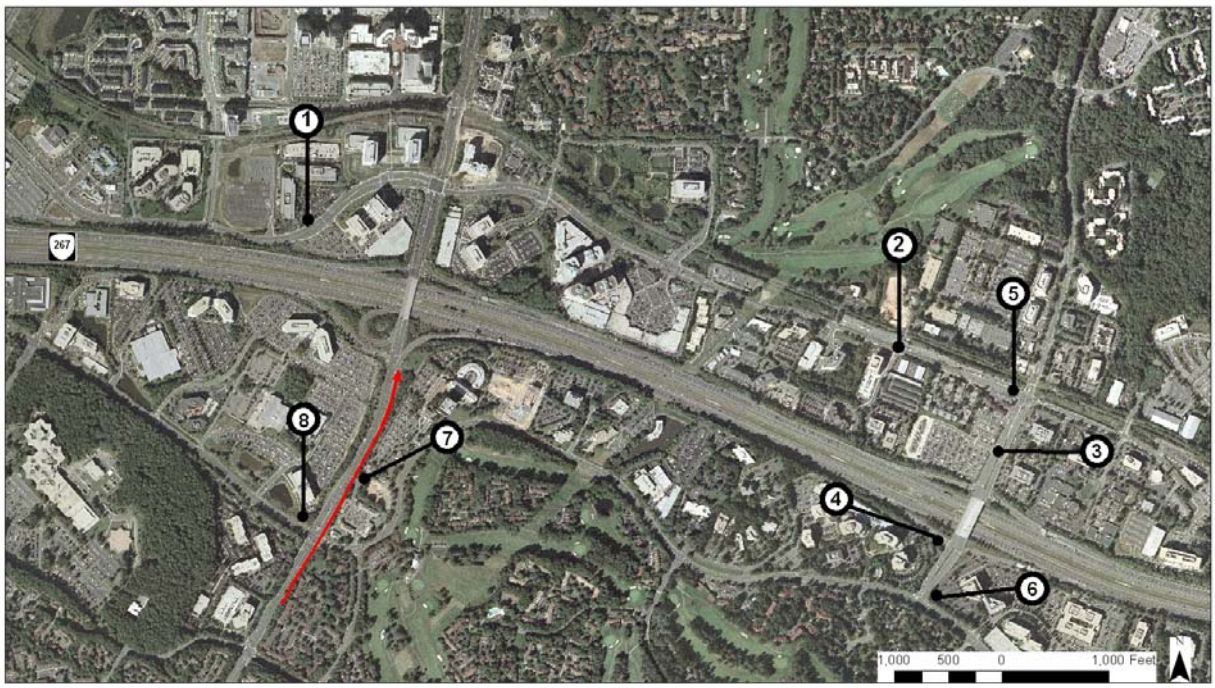
throughput. The VISSIM software, by micro-simulating the network, is able to determine the intersection-throughput on a location-by-location basis in congested conditions. Macroscopic programs such as the Highway Capacity Manual Software (HCS) and Synchro can only analyze intersections in an isolated fashion; they do not account for queue spillback from downstream intersections.

The analysis began by examining baseline conditions, which include the EIS improvements, and included pedestrian improvements. Based on the analysis of the baseline conditions, additional roadway actions were developed to improve vehicular flow.

a. Baseline Alternative

The Baseline Alternative included the roadway improvements indentified above and shown in Figure 2-13. (The numbers in the figure correspond to the numbered projects listed on pages 19-20.) In addition to those roadway actions, pedestrian improvements identified by the Pedestrian-Bike Team (and detailed in Chapter 3) were also incorporated. These actions improve the crossing conditions at many intersections for pedestrians by adding pedestrian crosswalks, pedestrian signals and/or pedestrian refuge islands that shorten the crossing distance. Bicycle lanes (while recommended in Chapter 5 for some locations) were not included for the roadway analysis, the primary purpose of which was to evaluate intersection roadway actions, including the effects due to pedestrians.

Figure 2-13: Locations of Roadway Actions for Baseline Conditions

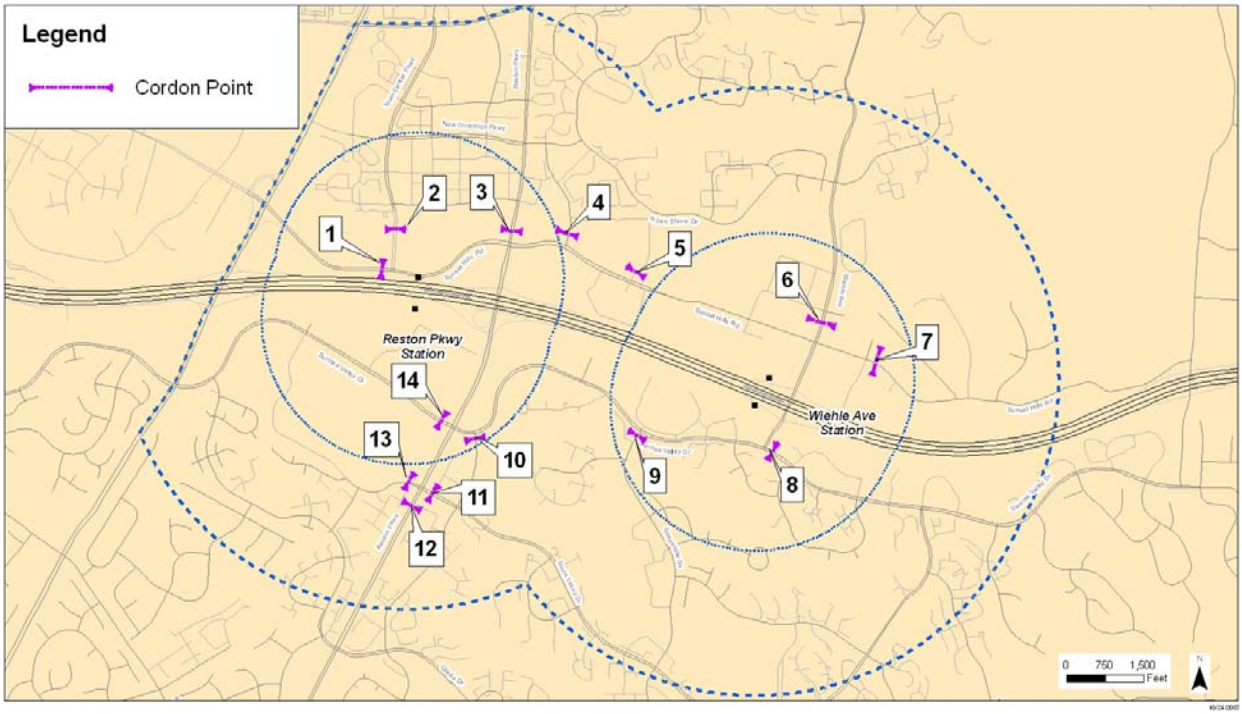


In order to assess the ability of the roadway system to handle the forecasted demand, a Volume-to-Capacity (V/C) calculation was completed for the cordon points to the Station Influence Area (shown in Figure 2-14). This process compared the demand for the link versus the roadway capacity of that link. The V/C calculations were performed on a peak hour and peak period basis for both the AM and PM peaks and are presented in Table 2-4. The assumed roadway capacities at the cordon points were taken from the Fairfax County travel demand model and the volumes are those used in the VISSIM model.

Table 2-4: 2030 Volume to Capacity Ratio at Cordon Points for the Detailed Study Area for AM and PM Peaks – Baseline Alternative

	Cordon Point	Location	Direction	AM Peak Hour			AM Peak Period			PM Peak Hour			PM Peak Period		
				Volume	Capacity	V/C	Volume	Capacity	V/C	Volume	Capacity	V/C	Volume	Capacity	V/C
1	Sunset Hills Rd	west of Town Center Pkwy	In	2,660	2,800	0.95	6,650	8,400	0.79	1,802	2,800	0.64	4,870	8,400	0.58
			Out	1,215	2,300	0.53	3,038	6,900	0.44	2,480	2,300	1.08	6,703	6,900	0.97
2	Town Center Pkwy	north of Sunset Hills Rd	In	760	1,150	0.66	1,900	3,450	0.55	930	1,150	0.81	2,514	3,450	0.73
			Out	1,260	2,800	0.45	3,150	8,400	0.38	821	2,800	0.29	2,219	8,400	0.26
3	Reston Pkwy	north of Sunset Hills Rd	In	2,474	3,825	0.65	6,185	11,475	0.54	2,164	3,825	0.57	5,849	11,475	0.51
			Out	2,028	4,800	0.42	5,070	14,400	0.35	3,299	4,800	0.69	8,916	14,400	0.62
4	Old Reston Ave	north of Sunset Hills Rd	In	625	850	0.74	1,563	2,550	0.61	619	850	0.73	1,673	2,550	0.66
			Out	617	850	0.73	1,543	2,550	0.60	681	850	0.80	1,841	2,550	0.72
5	Salliemae Dr	north of Sunset Hills Rd	In	132	7,000	0.02	330	21,000	0.02	431	7,000	0.06	1,165	21,000	0.06
			Out	407	7,000	0.06	1,018	21,000	0.05	127	7,000	0.02	343	21,000	0.02
6	Wiehle Ave	north of Sunset Hills Rd	In	2,715	3,150	0.86	6,788	9,450	0.72	2,434	3,150	0.77	6,578	9,450	0.70
			Out	2,001	3,700	0.54	5,003	11,100	0.45	2,324	3,700	0.63	6,281	11,100	0.57
7	Sunset Hills Rd	east of Michael Farraday Dr	In	641	2,400	0.27	1,603	7,200	0.22	1,380	2,400	0.58	3,730	7,200	0.52
			Out	2,216	2,400	0.92	5,540	7,200	0.77	819	2,400	0.34	2,214	7,200	0.31
8	Sunrise Valley Drive	east of Wiehle Ave	In	2,179	1,550	1.41	5,448	4,650	1.17	1,633	1,550	1.05	4,414	4,650	0.95
			Out	2,083	3,200	0.65	5,208	9,600	0.54	1,603	3,200	0.50	4,332	9,600	0.45
9	Soapstone Dr	south of Sunrise Valley Dr	In	952	1,150	0.83	2,380	3,450	0.69	1,355	1,150	1.18	3,662	3,450	1.06
			Out	191	3,100	0.06	478	9,300	0.05	1,092	3,100	0.35	2,951	9,300	0.32
10	Colts Neck Rd	south of Sunrise Valley Dr	In	890	1,700	0.52	2,225	5,100	0.44	461	1,700	0.27	1,246	5,100	0.24
			Out	271	1,700	0.16	678	5,100	0.13	883	1,700	0.52	2,386	5,100	0.47
11	South Lakes Dr	east of Reston Pkwy	In	1,214	1,700	0.71	3,035	5,100	0.60	841	1,700	0.49	2,273	5,100	0.45
			Out	628	2,800	0.22	1,570	8,400	0.19	1,447	2,800	0.52	3,911	8,400	0.47
12	Reston Pkwy	south of South Lakes Dr	In	2,512	3,150	0.80	6,280	9,450	0.66	1,939	3,150	0.62	5,241	9,450	0.55
			Out	1,224	3,150	0.39	3,060	9,450	0.32	3,372	3,150	1.07	9,114	9,450	0.96
13	South Lakes Dr	west of Reston Pkwy	In	413	850	0.49	1,033	2,550	0.40	1,194	850	1.40	3,227	2,550	1.27
			Out	870	850	1.02	2,175	2,550	0.85	521	850	0.61	1,408	2,550	0.55
14	Sunrise Valley Drive	west of Reston Pkwy	In	920	1,700	0.54	2,300	5,100	0.45	1,343	1,700	0.79	3,630	5,100	0.71
			Out	2,150	2,800	0.77	5,375	8,400	0.64	630	2,800	0.23	1,703	8,400	0.20

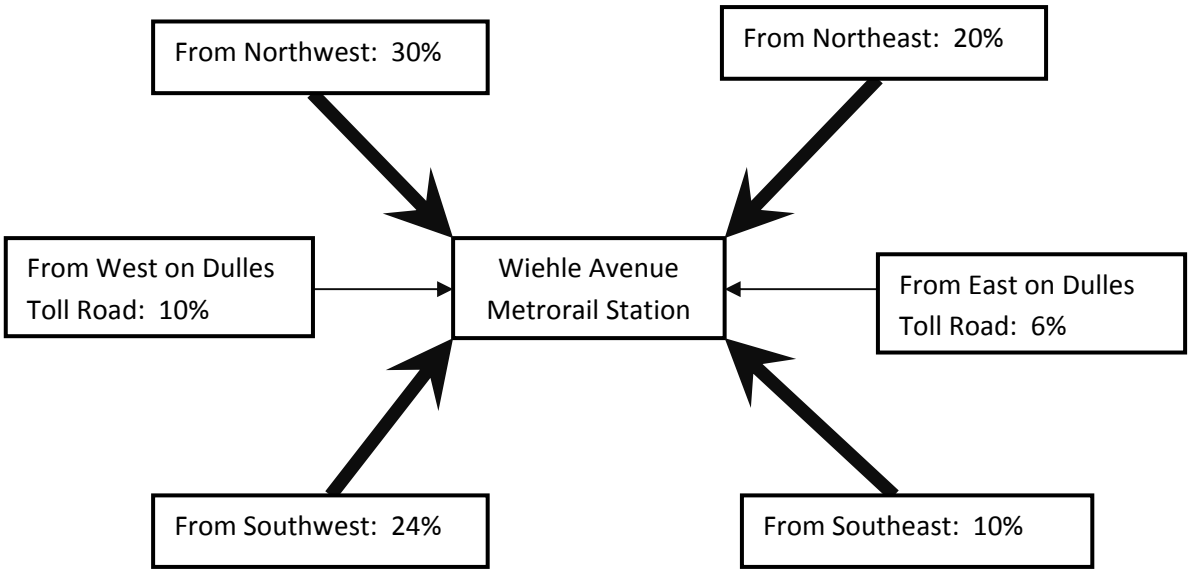
Figure 2-14: Detailed Study Area Cordon Points



Based on the V/C calculations, the demand volumes for most of the cordon points do not exceed the capacity of the roadway links. A few points do exceed capacity, but marginally. V/C calculations were performed on both the peak hour and the peak period because the volume (or the demand) is not constant across each of the three hours in the peak period; rather the peak hour volume is higher than either of the shoulder hours. In several cases, the volume exceeds the capacity during the peak hour, but not during the peak period. Thus, it can be expected that higher congestion levels will occur during the peak hour with lower levels of congestion in the hours before and after the peak hour. This illustrates the fact that the cordon points themselves are not the constraining factor of the system. Thus, virtually all of the demand can enter and exit the Station Influence Areas; however, congestion at the key intersections within the Station Influence Area will act as a constraint to traffic mobility.

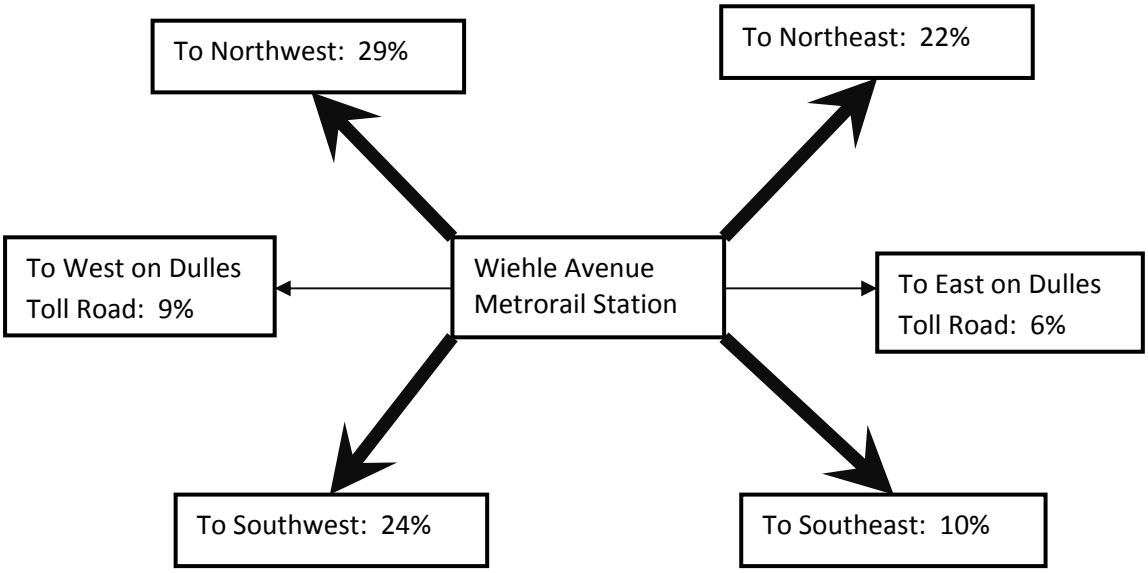
Figure 2-15 and Figure 2-16 present the distribution of vehicle trips to and from the Wiehle Avenue Station in the AM Peak Period (3-hours) and from the Wiehle Avenue Station in the PM Peak Period (3-hours). Approximately 50 percent of trips are to/from the north of the DIAAH, 35 percent are to/from the south of the DIAAH and 15 percent of the trips are to/from the DIAAH.

Figure 2-15: Distribution of Ingress Trips to the Wiehle Avenue Metrorail Station



Source: VHB (2007)

Figure 2-16: Distribution of Egress Trips from the Wiehle Avenue Metrorail Station



Source: VHB (2007)

The analysis was conducted using the VISSIM model for the peak periods, a total of three hours, to examine how the roadway network operates in the shoulder hours before and after the peak hour. The key measure of effectiveness that was used was vehicular throughput at seven key intersections. This gives a measure of how well the demand is being served by the baseline roadway network. Table 2-5 and Table 2-6 present AM and PM peak period throughput summaries at seven key locations within the station influence area.

Table 2-5: AM Peak Period Throughput Summary at Key Intersections – Baseline Alternative (2030)

Intersection	EB Total	WB Total	NB Total	SB Total	Intersection Total Approach
Town Center Pkwy / Sunset Hills Rd					
AM Pk Pd Throughput	4,868	1,776		1,873	8,517
AM Pk Pd Demand	6,650	2,940		1,900	11,490
AM Pk Pd Throughput %	73.2%	60.4%		98.6%	74.1%
Reston Pkwy / Sunset Hills Rd					
AM Pk Pd Throughput	3,907	1,226	3,916	1,770	10,819
AM Pk Pd Demand	4,925	3,175	8,710	6,190	23,000
AM Pk Pd Throughput %	79.3%	38.6%	45.0%	28.6%	47.0%
Isaac Newton Square / Sunset Hills Rd					
AM Pk Pd Throughput	3,892	3,801	770	549	9,012
AM Pk Pd Demand	4,030	5,810	755	555	11,150
AM Pk Pd Throughput %	96.6%	65.4%	102.0%	98.9%	80.8%
Wiehle Ave / Sunset Hills Rd					
AM Pk Pd Throughput	3,016	2,077	5,998	4,475	15,566
AM Pk Pd Demand	3,065	2,025	11,060	6,790	22,940
AM Pk Pd Throughput %	98.4%	102.6%	54.2%	65.9%	67.9%
Wiehle Ave / Sunrise Valley Dr					
AM Pk Pd Throughput	3,073	3,302		3,153	9,528
AM Pk Pd Demand	6,645	5,475		5,085	17,205
AM Pk Pd Throughput %	46.2%	60.3%		62.0%	55.4%
Soapstone Dr / Sunrise Valley Dr					
AM Pk Pd Throughput	2,141	1,604	1,788	140	5,673
AM Pk Pd Demand	4,555	3,875	2,370	150	10,950
AM Pk Pd Throughput %	47.0%	41.4%	75.4%	93.3%	51.8%
Reston Pkwy / Sunrise Valley Dr					
AM Pk Pd Throughput	742	1,584	5,171	3,433	10,930
AM Pk Pd Demand	2,300	3,400	6,880	8,138	20,718
AM Pk Pd Throughput %	32.3%	46.6%	75.2%	42.2%	52.8%
				Overall Throughput	70,045
				Overall Demand	117,453
				AM Peak Pd Throughput as % of Demand	59.6%

Note: Peak period traffic demand projections were based on MWCOG Cooperative Forecasts of Jobs and Housing and developed using the Fairfax County Travel Demand Model. Peak period throughput estimates were developed using the VISSIM traffic simulation model.

Table 2-6: PM Peak Period Throughput Summary at Key Intersections – Baseline Alternative (2030)

Intersection	EB Total	WB Total	NB Total	SB Total	Intersection Total Approach
Town Center Pkwy / Sunset Hills Rd					
AM Pk Pd Throughput	1,369	1,716		816	3,901
AM Pk Pd Demand	4,870	5,715		2,515	13,100
AM Pk Pd Throughput %	28.1%	30.0%		32.4%	29.8%
Reston Pkwy / Sunset Hills Rd					
AM Pk Pd Throughput	809	2,492	2,343	2,467	8,111
AM Pk Pd Demand	4,945	8,680	8,690	5,850	28,165
AM Pk Pd Throughput %	16.4%	28.7%	27.0%	42.2%	28.8%
Isaac Newton Square / Sunset Hills Rd					
AM Pk Pd Throughput	635	904	624	1,081	3,244
AM Pk Pd Demand	5,235	3,725	2,305	1,440	12,705
AM Pk Pd Throughput %	12.1%	24.3%	27.1%	75.1%	25.5%
Wiehle Ave / Sunset Hills Rd					
AM Pk Pd Throughput	779	1,019	2,297	1,292	5,387
AM Pk Pd Demand	6,240	4,600	6,465	6,580	23,885
AM Pk Pd Throughput %	12.5%	22.2%	35.5%	19.6%	22.6%
Wiehle Ave / Sunrise Valley Dr					
AM Pk Pd Throughput	1,568	1,894		1,383	4,845
AM Pk Pd Demand	3,700	4,410		7,245	15,355
AM Pk Pd Throughput %	42.4%	42.9%		19.1%	31.6%
Soapstone Dr / Sunrise Valley Dr					
AM Pk Pd Throughput	1,386	1,332	754	529	4,001
AM Pk Pd Demand	3,105	5,885	850	985	10,825
AM Pk Pd Throughput %	44.6%	22.6%	88.7%	53.7%	37.0%
Reston Pkwy / Sunrise Valley Dr					
AM Pk Pd Throughput	1,039	1,287	3,600	3,192	9,118
AM Pk Pd Demand	3,630	4,055	5,230	9,291	22,206
AM Pk Pd Throughput %	28.6%	31.7%	68.8%	34.4%	41.1%
				Overall Throughput	38,607
				Overall Demand	126,241
				PM Peak Pd Throughput as % of Demand	30.6%

Note: Peak period traffic demand projections were based on MWCOG Cooperative Forecasts of Jobs and Housing and developed using the Fairfax County Travel Demand Model. Peak period throughput estimates were developed using the VISSIM traffic simulation model.

For both peak periods, the internal roadway network is congested. A number of intersections cannot process the demand, which causes queue spillback to adjacent upstream intersections. For the AM peak period, 60% of the demand would be served – meaning that of all the vehicles that would like to drive through the key intersections during the AM peak period, only 60% of those will be able to. Congestion of this type will lead to changes in travel behavior; at least four responses are likely:

- Change time of travel, in which the peak period will extend beyond the traditional 3-hours.
- Change path of travel, through trips will find other routes to avoid the area.
- Change mode of travel, some travelers will choose to use transit or walk/bike.
- Not make the trip at all.

For the PM peak period, 43% of the demand is served. This would cause an even longer lengthening of the peak period compared to the demand of the AM peak period.

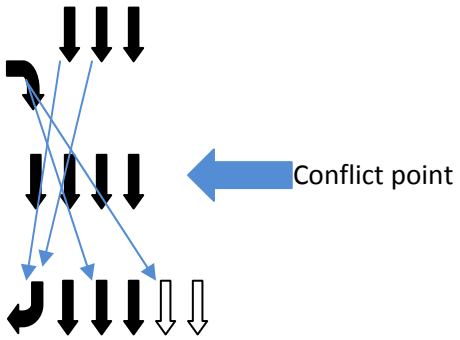
The findings of both models are that projected traffic demand for the Wiehle Avenue corridor is the cause of much of the forecast congestion and delay in the station influence area. There are several components of projected traffic along Wiehle Avenue: external trips, external-internal trips and internal trips. Critical sections of Wiehle Avenue include:

1. Southbound segment of Wiehle between Sunset Hills Road and the DIAAH.
2. Intersection of Wiehle at Sunrise Valley Drive
3. Intersection of Wiehle at Sunset Hills Road

The first bottleneck will cause congestion spillover to adjacent intersections within the station influence area, including extending the queues over to Reston Parkway, which affects north-south travel on that arterial. The latter two locations are likely to have heavy congestion, due in part to the problems caused by the former. Congestion along Reston Parkway is projected to be at a lower level than Wiehle Avenue.

The heavy traffic coming out of the Wiehle metro station during the PM peak period will cause weaving conditions between all travel lanes on the southbound segment of Wiehle Avenue between Sunset Hills Road and the DIAAH, as they come out of the metro station. Most vehicles are not destined to the west, so they must weave over at least one lane. If a vehicle is destined to the eastbound DIAAH ramp, they must weave across 4 lanes to enter into the turn bays. It is only 320 feet from the Wiehle metro station access to the intersection with the westbound ramps, and a further 500 feet to the intersection for the eastbound ramps. This weaving causes turbidity as vehicles force their way over between the travel lanes to reach the lane they desire to reach their destination. Most vehicles that turn right when they exit the Wiehle Avenue metro station entrance will likely be destined to Sunrise Valley Drive and points south and thus would have to weave across at least one lane. Figure 2-17 illustrates this weaving phenomenon.

Figure 2-17: Illustration of Weaving on Wiehle Avenue with Metro Egress



Note: hollow arrows illustrate the lanes that are part of the turn bay at the next signal beyond this intersection

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

The current roadway network provides for two crossings of the DIAAH; traffic traveling within the area, to and from the rail stations; and entering and leaving the DIAAH all will compete for the same road space on Wiehle Avenue and Reston Parkway. Providing alternative routing paths, such as new

connectors over the DIAAH, would permit internal trips and some traffic to and from the rail stations to avoid both Reston Parkway and Wiehle Avenue.

b. "Robust" Alternative

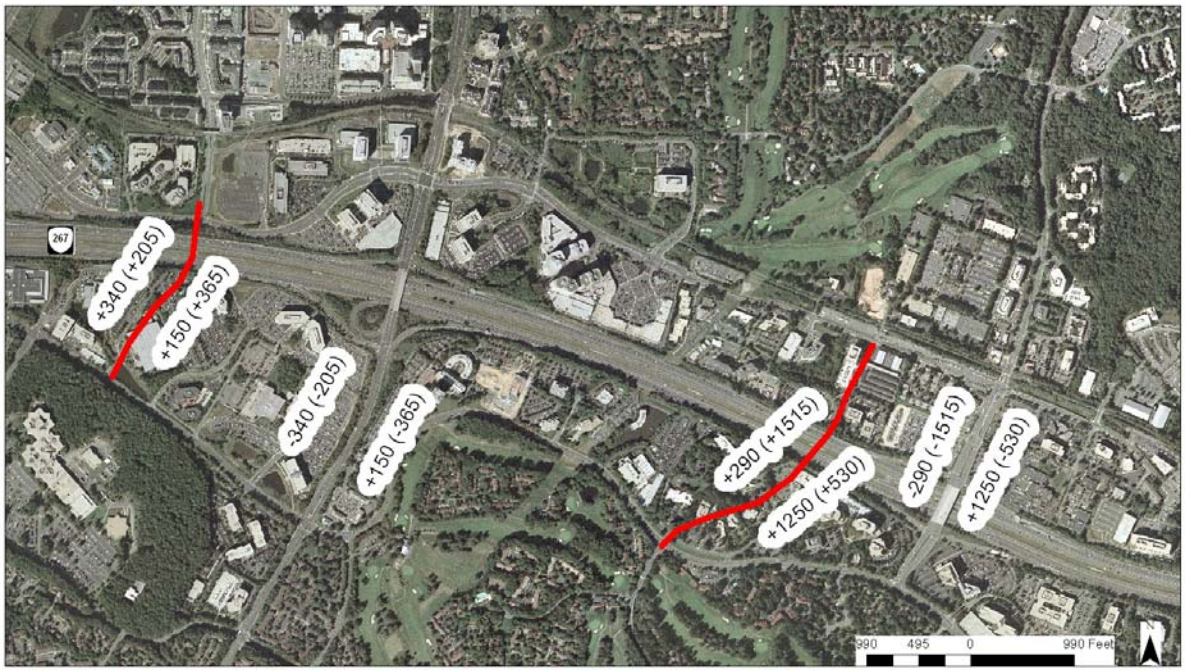
A series of roadway actions, beyond those recommended in the EIS and assumed for the future baseline analysis, were developed to address the bottlenecks along Wiehle Avenue. These improvements would increase intersection capacity and provide alternate routing choices for vehicles. Connectors across the DIAAH would provide north-south alternatives to the congested Reston Parkway and Wiehle Avenue. Intersection modifications, such as adding turn lanes can also reduce traffic delay at intersections. The roadway actions that could be considered to reduce forecast delay at bottlenecks on Wiehle Avenue and Reston Parkway are illustrated in Figure 2-18 and include:

9. Add a second right turn lane for the northbound Wiehle Avenue approach at Sunset Hills Road.
10. Add a second right turn lane for the southbound Wiehle Avenue approach at Sunrise Valley Drive.
11. Add an additional left turn lane for the eastbound Sunrise Valley Drive approach at Wiehle Avenue.
12. Providing two new connections over the DIAAH to provide new links to connect the major east-west roadways: Sunset Hills Road and Sunrise Valley Drive:
    i. Connection between Town Center Parkway and Edmund Halley Drive
    ii. Connection between Soapstone Drive and Isaac Newton Square

The proposed connectors would divert vehicles from the major north-south roadways within the station influence area. These connectors would be grade-separated facilities from the DIAAH and would not include ramps to/from the DIAAH as exemplified by the Monroe Street connector to the west, which passes over the DIAAH without a ramp connection. For example, a trip from Soapstone Drive to the Wiehle Metrorail Station could use one of these connectors and avoid the traffic on Sunrise Valley Drive and Wiehle Avenue, by accessing the Station directly. The potential for trips diverting from Reston Parkway and Wiehle Avenue were estimated manually and assigned on the new routes. Figure 2-19 presents the estimated number of trips expected to make this diversion during the AM and PM peak periods. It should be noted that the Fairfax County Parkway lies outside the station influence area, so there could be potential for trip diversion from that facility to the Town Center Parkway and Edmund Halley Drive connector.

Figure 2-18: Locations of Roadway Actions assumed for the Robust Alternative

Figure 2-19: Estimated Trip Diversion due to Proposed Connectors (2030)



Note: AM (PM) volumes presented here are peak period (3-hour) volume)

The actions incorporated in the robust concept were added to the baseline roadway network in VISSIM, and the trips were reassigned. The actions are projected to have a greater effect in the PM peak period, as the combined throughput at the seven key intersections is projected to increase by approximately

36% compared to the baseline. The increase would be almost 10% in the AM peak period. Table 2-7 and Table 2-8 present AM and PM Peak period throughput summaries for the seven key intersections.

Table 2-7: AM Peak Period Throughput Summary at Key Intersections – "Robust" Alternative (2030)

Intersection	EB Total	WB Total	NB Total	SB Total	Intersection Total Approach
Town Center Pkwy / Sunset Hills Rd					
AM Pk Pd Throughput	5,677	2,029	163	1,814	9,683
AM Pk Pd Demand	6,650	2,890	150	1,905	11,595
AM Pk Pd Throughput %	85.4%	70.2%	108.7%	95.2%	83.5%
Reston Pkwy / Sunset Hills Rd					
AM Pk Pd Throughput	4,256	1,432	3,931	5,494	15,113
AM Pk Pd Demand	4,690	3,175	8,565	6,190	22,620
AM Pk Pd Throughput %	90.7%	45.1%	45.9%	88.8%	66.8%
Isaac Newton Square / Sunset Hills Rd					
AM Pk Pd Throughput	4,018	3,243	622	520	8,403
AM Pk Pd Demand	4,015	4,875	1,680	555	11,125
AM Pk Pd Throughput %	100.1%	66.5%	37.0%	93.7%	75.5%
Wiehle Ave / Sunset Hills Rd					
AM Pk Pd Throughput	2,567	1,847	6,359	3,428	14,201
AM Pk Pd Demand	2,870	2,025	10,130	6,790	21,815
AM Pk Pd Throughput %	89.4%	91.2%	62.8%	50.5%	65.1%
Wiehle Ave / Sunrise Valley Dr					
AM Pk Pd Throughput	3,893	2,800		2,862	9,555
AM Pk Pd Demand	5,390	5,480		4,790	15,660
AM Pk Pd Throughput %	72.2%	51.1%		59.7%	61.0%
Soapstone Dr / Sunrise Valley Dr					
AM Pk Pd Throughput	4,177	1,337	2,033	426	7,973
AM Pk Pd Demand	4,555	3,595	2,365	430	10,945
AM Pk Pd Throughput %	91.7%	37.2%	86.0%	99.1%	72.8%
Reston Pkwy / Sunrise Valley Dr					
AM Pk Pd Throughput	1,486	1,341	3,937	5,063	11,827
AM Pk Pd Demand	2,150	3,400	6,875	7,801	20,226
AM Pk Pd Throughput %	69.1%	39.4%	57.3%	64.9%	58.5%
				Overall Throughput	76,755
				Overall Demand	113,986
				AM Peak Pd Throughput as % of Demand	67.3%

Note: Peak period traffic demand projections were based on MWCOG Cooperative Forecasts of Jobs and Housing and developed using the Fairfax County Travel Demand Model. Peak period throughput estimates were developed using the VISSIM traffic simulation model.

Table 2-8: PM Peak Period Throughput Summary at Key Intersections – "Robust" Alternative (2030)

Intersection	EB Total	WB Total	NB Total	SB Total	Intersection Total Approach
Town Center Pkwy / Sunset Hills Rd					
AM Pk Pd Throughput	1,250	2,314	146	827	4,537
AM Pk Pd Demand	4,865	5,700	365	2,515	13,445
AM Pk Pd Throughput %	25.7%	40.6%	40.0%	32.9%	33.7%
Reston Pkwy / Sunset Hills Rd					
AM Pk Pd Throughput	813	3,619	2,549	2,433	9,414
AM Pk Pd Demand	5,095	8,673	8,320	5,850	27,938
AM Pk Pd Throughput %	16.0%	41.7%	30.6%	41.6%	33.7%
Isaac Newton Square / Sunset Hills Rd					
AM Pk Pd Throughput	786	1,326	1,162	1,381	4,655
AM Pk Pd Demand	5,245	3,325	2,595	1,445	12,610
AM Pk Pd Throughput %	15.0%	39.9%	44.8%	95.6%	36.9%
Wiehle Ave / Sunset Hills Rd					
AM Pk Pd Throughput	1,174	1,362	4,167	2,251	8,954
AM Pk Pd Demand	5,265	4,595	6,040	6,580	22,480
AM Pk Pd Throughput %	22.3%	29.6%	69.0%	34.2%	39.8%
Wiehle Ave / Sunrise Valley Dr					
AM Pk Pd Throughput	2,640	3,387		2,241	8,268
AM Pk Pd Demand	3,175	4,415		5,730	13,320
AM Pk Pd Throughput %	83.1%	76.7%		39.1%	62.1%
Soapstone Dr / Sunrise Valley Dr					
AM Pk Pd Throughput	2,706	1,934	867	1,819	7,326
AM Pk Pd Demand	3,090	4,365	850	2,430	10,735
AM Pk Pd Throughput %	87.6%	44.3%	102.0%	74.9%	68.2%
Reston Pkwy / Sunrise Valley Dr					
AM Pk Pd Throughput	1,130	1,500	3,232	3,317	9,179
AM Pk Pd Demand	3270	4055	5230	9080	21635
AM Pk Pd Throughput %	34.6%	37.0%	61.8%	36.5%	42.4%
				Overall Throughput	52,333
				Overall Demand	122,163
				PM Peak Pd Throughput as % of Demand	42.8%

Note: Peak period traffic demand projections were based on MWCOG Cooperative Forecasts of Jobs and Housing and developed using the Fairfax County Travel Demand Model. Peak period throughput estimates were developed using the VISSIM traffic simulation model.

The action that would have the greatest effect in the increase of throughput for the AM peak period is the new Soapstone Drive to Isaac Newton Square W connector. This connector would divert trips away from Wiehle Avenue, including those vehicles that would otherwise result in heavy volumes of left turning vehicles into the Metro Station access points. This connector also reduces the amount of traffic exiting from the proposed Wiehle Avenue Metrorail Station onto Wiehle Avenue, thereby reducing the demand as well as reducing the volume of traffic that is weaving from the Metro access and the DIAAH ramps. This connector would provide relief to the congestion that would otherwise likely be found on Wiehle Avenue.

The proposed Soapstone Connector also plays a key role as an addition to the bus network in Reston by providing direct access across the DIAAH and to the station without requiring travel on Wiehle Avenue. In order to ensure that this direct access is available to transit vehicles, dedicated bus lanes should be

included as part of this facility. As proposed, the facility would include pedestrian facilities and two travel lanes in each direction: one for general traffic and one dedicated lane for use by bicyclists and buses. This connection could significantly speed bus operations into and around the Wiehle Avenue station and should be considered in detail as redevelopment around the Wiehle Avenue station occurs.

Even with the Soapstone Connector in place, the forecasts suggest that heavy congestion along Wiehle Avenue will continue to exist. To reduce this congestion and resulting delay, it would be necessary to further widen roadways, or to encourage a larger shift to non-automobile modes. An aggressive program of Travel Demand Management (TDM) will help to encourage the modal shift that will be necessary to reduce traffic congestion in the station areas.

The other actions listed above do improve operations of the key intersections, though these actions would provide only marginal benefit. Additional testing was completed to see if any of the specific actions were not required. For example, additional testing showed that adding a second southbound right turn lane from Wiehle Avenue to westbound Sunrise Valley Drive action would not result in a significant benefit to traffic operations, but would make pedestrian travel more difficult at this intersection.

c. Dedicated Bus Facilities

The analysis has illustrated that traffic speeds in the area will be significantly slower in the future as traffic growth continues in the area. Cars and buses both will have to travel in the same traffic, and bus speeds are expected to be significantly slower in 2030 than they are in 2007. Without dedicated lanes, bus travel time will be no better than SOV and there will be a lower probability of promoting the desired shift from SOV into buses. This has the effect of requiring more vehicles and more drivers to operate a recommended level of service, increasing the cost of the system. One alternative that could relieve some of the increase in operating costs, driver staff and fleet requirements would be to implement bus-only lanes that allow for free flow traffic conditions for transit vehicles. These lanes could be used only during peak hours and would function as traditional travel lanes during the off-peak periods. These lanes would have the dual benefits of increasing bus speeds (and in turn significantly decreasing the operational costs and the number of new vehicles required) while simultaneously attracting more passengers to the transit system and away from their cars, thus alleviating traffic congestion.

The roads expected to have the worst congestion problems in 2030 are Wiehle Avenue and Reston Parkway. Bus lanes on these roads, and potentially at major intersections with these roads (like Sunset Hills and Wiehle Ave) would probably have the most beneficial effects for transit riders. A careful study of the implications of bus lanes on these roads should be undertaken to determine if this solution would benefit the residents of Reston. Implementation of bus lanes in the immediate vicinity of either of the stations along these roadways would present many challenges in right-of-way acquisition, operations and enforcement and would require the reconstruction and expansion of the bridges across the DIAAH.

However, there are locations in Reston where bus lanes might be both possible and beneficial. Sunset Hills Rd is included as a six-lane facility in the Fairfax County Transportation Plan, and this expansion is included in the Fairfax County Comprehensive Long Range Plan (CLRP). The roadway expansion could be completed by constructing the additional lanes as peak-hour dedicated bus facilities between (at least) Old Reston Avenue and Wiehle Avenue. These facilities would provide a congestion-free east-west route in the heart of Reston for transit vehicles. Significant right-of-way acquisition and construction

costs would be associated with this project, however a detailed study would be necessary in order to determine the exact quantitative benefits of the bus lanes.

d. Internal Street Network

The transportation network around the Wiehle Avenue station is comprised primarily of major thoroughfares (i.e. Wiehle Avenue, Sunset Hills Road and Sunrise Valley Drive) and much smaller streets and driveways that provide access to individual buildings and developments. Because of this, most vehicles traveling in the area must use one of the major congested routes or intersections. The potential exists to develop additional roadway connections as a way for local travel to avoid the more congested major roadways.

Much of the infrastructure that would be necessary to develop this internal grid of streets already exists in the form of small access road and driveways. Some of these existing facilities could be expanded along with intersection improvements at the access points to ease traffic congestion and vehicle delays. These connector streets would have the added benefit of providing more direct connection to pedestrians and bicyclists, a subject that will be discussed further in Chapter 4.

The previously discussed Soapstone Connector would provide additional connections through the "back door" to the Wiehle Avenue station. Extending this roadway across Sunset Hills Road onto Isaac Newton Square W provides further connections. Likewise, Isaac Newton Square S/Roger Bacon Dr can provide an east-west connection north of Sunset Hills Rd. Other private driveways in the station area could also be upgraded to carry local through traffic.

E. Findings and Discussion of Needs

The analyses of the Baseline and "Robust" Alternatives provided insight into the roadway actions needed to handle the projected demand. The actions identified for the Baseline roadway should all be implemented, and a select few from the "Robust" Alternative should also be included. The listing of recommended projects, illustrated on Figure 2-20, is as follows:

A. New signal and turn lanes on Sunset Hills Road for access into the proposed Reston Parkway Metrorail station
B. New left turn lane for westbound left turning movement at the intersection of Sunset Hills Road/Isaac Newton Square W, this would replace the shared left-through lane by providing a dedicated turn lane.
C. Add a second left turn lane for northbound traffic at the intersection of Wiehle Avenue and Metro Access (between Sunset Hills Road and the DIAAH) and provide a second inbound lane
D. Add an additional left turn lane on the eastbound DIAAH off-ramp at Wiehle Avenue
E. Improve the existing right turn lane for the eastbound Sunset Hill Road leg at Wiehle Avenue
F. Improve the existing right turn lane for the westbound Sunrise Valley Drive approach at Wiehle Avenue leg
G. Add northbound through lane for the Reston Parkway at Sunrise Valley Drive, continuing the lane to the ramp for eastbound DIAAH
H. Improve the right turn lane for the southbound Reston Parkway leg at Sunrise Valley Drive
I. Provide a new connection over the DIAAH to connect the major east-west roadways: Sunset Hills Road and Sunrise Valley Drive. The connection would be between Soapstone Drive and Isaac Newton Square W and would include one shared bus/bike lane in each direction.

J. Expand Sunset Hills Road between Wiehle Avenue and Old Reston Avenue to six lanes. Additional lanes will be operated as dedicated bus lanes in peak periods.

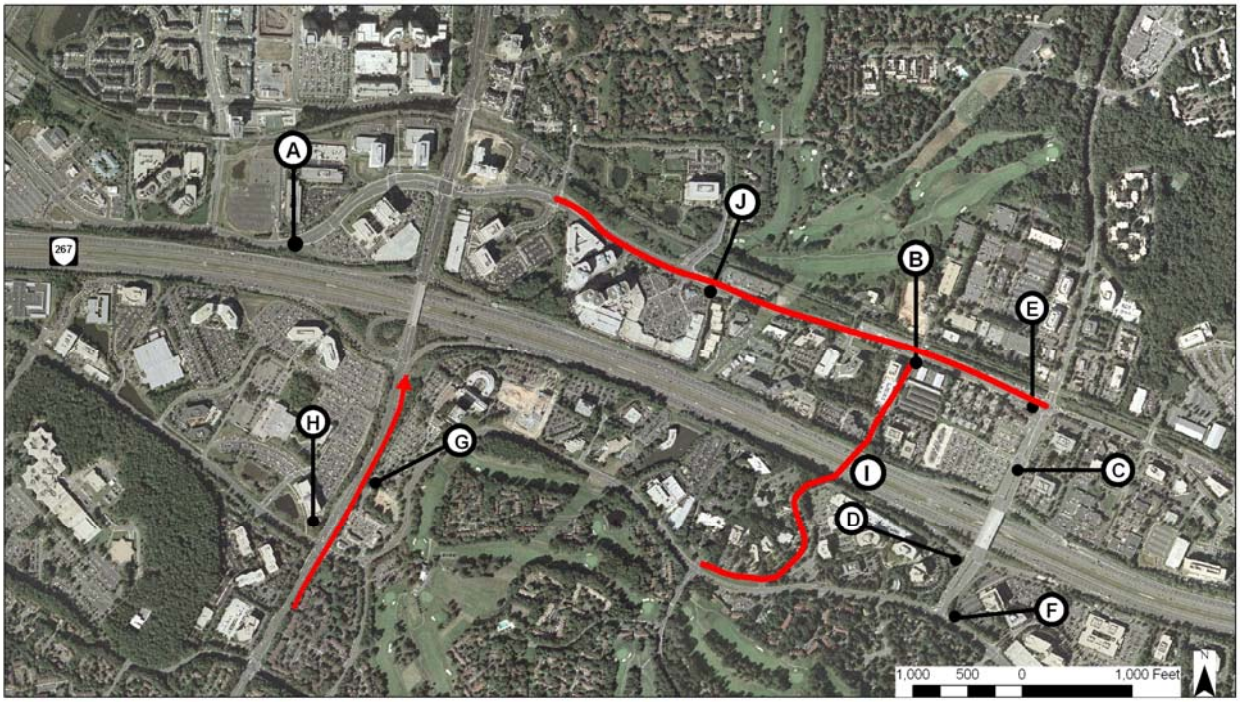


Figure 2-20: Locations of Recommended Roadway Actions

Actions 9, 10, 11 and 12 (i), previously identified for the "Robust" Alternative, are not recommended. These projects were as follows:

9. Adding a second right turn lane for the northbound Wiehle Avenue at Sunset Hills Road.
10. Adding a second right turn lane for the southbound Wiehle Avenue leg at Sunrise Valley Drive.
11. Add an additional left turn lane for the eastbound Sunrise Valley Drive leg at Wiehle Avenue.
12. (i) Providing a connection between Sunset Hills Road and Sunrise Valley Drive via Town Center Parkway and Edmund Halley Drive.

It should be noted that even with implementation of all the roadway actions, the peak period demand for both the AM and PM periods cannot be served within the three hour peak period. Lengthening of the peak period should be expected.

The north-south thoroughfares are heavily travelled, but the east-west routes are as important to overall mobility in the area. Currently, both Sunrise Valley Drive and Sunset Hills Road are considered minor arterials according to the Fairfax County Comprehensive Transportation Plan. The numbers of lanes on both facilities vary depending on location. For the most part, Sunrise Valley Drive is a 4-lane facility, except near Hunter Mill Road, where it is a 2-lane roadway. Sunset Hills Road varies between 2 to 6 lanes depending on the section. The major factor of impedance to east-west mobility is the conflict for green time with north-south arterials like Fairfax County Parkway, Reston Parkway and Wiehle Avenue. These north-south arterials carry more traffic than the former. If green time were increased for the east-west arterials where they cross the major north-south arterials, then it would come at the expense of north-south mobility.

The other means to improve east-west mobility in this area is to provide more travel lanes east-west. However, there is limited potential to implement this option due to the right-of-way constraints that exist at some segments along the roadway. The County's Comprehensive Transportation Plan shows Sunset Hills Road as a complete 6-lane facility from Fairfax County Parkway to Wiehle Avenue, and a 4-lane facility to Hunter Mill Road. The latter would likely require improvements to Hunter Mill Road at the DIAAH interchange. This would improve traffic operations, but would not be able to satisfy the demand for this facility. There are not currently any plans to widen Sunrise Valley Drive, however the addition of peak-period dedicated bus lanes is recommended as a long term solution to congestion. Intersection improvements along this Sunrise Valley Drive, such as adding or lengthening turn bays, would provide more storage to accommodate turning traffic that would not block the through lanes.

Another project that could occur on the edge of the Study Area is a traffic calming project on Hunter Mill Road. The Hunter Mill Road Traffic Calming Study, a study conducted by the Northern Virginia Regional Commission, "offers a number of innovative approaches to improve safety along Hunter Mill Road, provide for the high volume of traffic, all the while improving the level of service". The report outlines "context sensitive solutions" such as roundabouts and splitter islands at a cost lower than or equal to traditional expansion of highways.

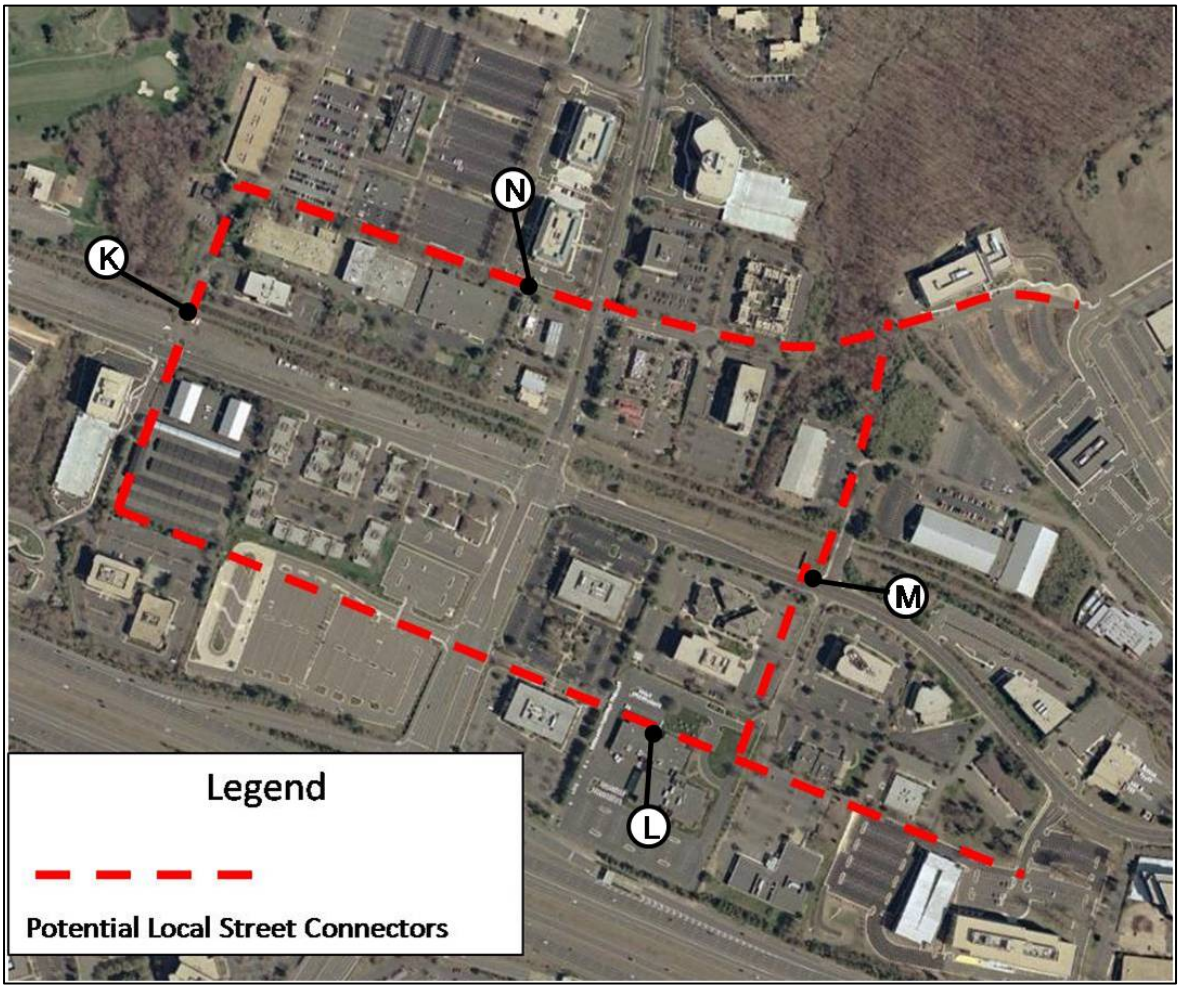
Other means of improving circulation within the station influence area would be to improve private parcel access (ingress and egress) driveways by combining these access points at locations with signalized intersections. By providing separate turn lanes for the left turn and right turn movement on these driveways, rather than a single lane, it would reduce the necessary green-time for the minor legs, which in turn provides for more green-time for the main thoroughfare. An example would be the north leg of Isaac Newton Square W at the intersection with Sunset Hills Road.

Finally, it is recommended that as redevelopment occurs in the Wiehle station area, local street connectors be provided as a way for local travel to avoid the more congested major roadways. Four connectors of this type are recommended to help create an internal grid of streets around the Wiehle Avenue station as illustrated in Figure 2-21. The four connectors include:

K. Isaac Newton Square West from Isaac Newton Square South to the station as an extension of the proposed Soapstone Connector.
L. The Station Entrance (already planned for improvements as part of station construction) should be extended across Wiehle Avenue to the Private Driveway as far east as Samuel Morse Dr.
M. Michael Faraday Court extension from the new roadway described in (L) north to the extended Roger Bacon Dr described in (N)
N. Extension/improvements to Isaac Newton Square South from Isaac Newton Square West to Wildlife Center Drive.

It may be possible to construct or expand several of these new connectors as part of the development process as the area surrounding the Wiehle Avenue station redevelops. Proffers and other development tools can be used to minimize the expense to the County of these facilities. Depending on the scale and pattern of redevelopment in the area, the sections of completely new roadway that would connect to Wildlife Center Drive may still require a significant County investment.

Figure 2-21: Potential Local Connectors



F. Suggested Policies and Programs

As the Study Area continues to grow, actions to the roadway network will be needed to help accommodate the projected growth. The fourteen (14) roadway actions identified in the previous section are recommended, as well as the pedestrian improvements indentified in Chapter III and the bus service enhancements described in Chapter IV. The full set of improvements will help to improve mobility for all travelers in the station areas regardless of their mode of travel. Improvements to the pedestrian, bicycle and transit networks are necessary to help divert trips away from SOVs to other modes. To support this mode choice shift, this section recommends some policies that should be encouraged in the vicinity, including Travel Demand Management and Intelligent Transportation Systems.

a. Travel Demand Management

By 2030, congestion in the Reston area will be a significant problem. Roadway expansion and improvement projects will not be able to provide the capacity to accommodate all of the vehicle demand during the peak periods. Travel Demand Management (TDM) strategies are programs and

policies established with the goal of reducing the number of vehicle trips made during the peak periods. TDM strategies have been implemented successfully in areas throughout the Washington region, including the newly revitalized urban area around Silver Spring, MD. Successful TDM actions will encourage the traveler to take one or more of the following actions:

- Change time of travel.
- Change path of travel, such that trips not destined to the area find other routes and avoid the congestion.
- Change mode of travel, some travelers will choose to use transit, share a ride or walk/bike.
- Not make the trip at all.

The increased congestion expected in the Reston area by 2030 will force many commuters to carefully consider their transportation options to find the best solution for them. It is necessary to provide a wide array of transportation options so that each individual can find the solution that works best for them while simultaneously reducing the level of congestion experienced during the peak periods. Transit, bicycling and walking must be made viable options wherever possible, as detailed in Chapters 3 and 4. TDM policies and programs supported by Fairfax County and local interests in Reston may include any of the following:

- Transit fare subsidies;
- Parking fees at office buildings;
- Preferential parking for carpools;
- Flexible work schedules;
- Telecommuting opportunities;
- On-site sales of transit fare media;
- Guaranteed Ride Home programs;
- Ride-matching programs;
- Transit information on-site;
- On-site TDM coordinator;
- Car-sharing;
- Vanpool Support; and
- On-site shower facilities for bicyclists.

When marketed and administered appropriately, the combined effects of all of these programs can have a significant impact on the number of SOV trips that are made during a peak period. For example, in studies recently conducted for the Tysons Corner area[4], it has been estimated that an aggressive TDM program will be important in achieving a non-SOV mode share of 20% in the area.

b. Intelligent Transportation Systems

Intelligent Transportation Systems (ITS) use technology to improve the travel experience by providing additional information, removing delays or creating a more comfortable environment for the trip. The full range of applications of ITS is still being developed and may change significantly by 2030. However, some applications that will be useful in the Reston community may include the following:

- Real time bus locators;
- Real time bus arrival information for transit passengers;

[4] *Fairfax County Comprehensive Plan, 2007 Edition.* <http://www.fairfaxcounty.gov/dpz/comprehensiveplan/area2/tysons1.pdf>

- Signal priority for transit vehicles; and
- Real time traffic information.

An additional study would be necessary to determine the best applications and locations for these and other forthcoming technologies.

G. Implementation

This chapter has detailed many projects and policies that are recommended for the areas surrounding the Wiehle Avenue and Reston Parkway Metrorail stations. These actions will help ease traffic congestion in the area, improve circulation for all modes of travel and provide easier access and egress to the stations themselves. Each of these projects must compete with each other and with the other improvements recommended in later chapters of this report for scarce resources, including time and funding. Detailed engineering analysis has not been performed on any of the recommended projects, however planning level cost estimates have been developed based on similar projects that have been completed in the area.

Timing will be a key issue in implementation of these recommended actions, as there is a lot of work to be done in a limited timeframe. Based on the phased opening of the two stations in this study, some of the improvements will be necessary for access to the Wiehle Avenue station (scheduled to open first) and others will be required for the opening of the Reston Parkway station. Still other projects will be necessary in the long run to ease expected congestion in the area. The sections below provide cost estimates for each of the proposed actions and a list of priorities for the roadway projects. Integrated priorities between all of the different modes can be found in Chapter 5.

a. Cost

Fourteen roadway improvement projects have been identified in this chapter that will improve accessibility around the proposed Wiehle Avenue and Reston Parkway Metrorail stations. Cost will play an important role in the implementation of these projects, as funding must be assured before any design or construction can begin. Potential funding sources for projects recommended throughout this report can be found in Chapter 5. Rough cost estimates have been developed for each of the recommended projects in this chapter. These estimates are in 2007 dollars and prices are expected to increase annually.

Table 2-9 shows the estimated cost for each type of roadway improvement, the quantity of each recommended in the study area and the total estimated construction cost. These costs include the construction costs for each item and a substantial contingency for right-of-way costs, engineering work and other potential expenses, however actual costs may be more or less depending on the circumstances encountered at each location. Major utility relocation is not included, as information on existing utilities is not known. Utility relocation can be expensive. Annual costs for maintenance and operation have not been included in these estimates.

If all of the recommended projects were constructed in 2007, the total cost would be approximately $70 million dollars. Almost half of that total (49%) is associated with the various contingencies and right-of-way costs that cannot be ascertained at this time. By far the most expensive item in the recommended roadway program is the construction of the Soapstone Connector over the DIAAH, with a total estimated cost of $32 million for the bridge itself and an additional $10 million for other roadway construction, which is more than half of the total program cost. The roadway widening associated with

the internal street grid is estimated to cost an additional $11 million, while the bus lanes on Sunset Hills Rd are expected to cost approximately $8.1 million.

Table 2-9: Estimated Roadway Improvement Costs

Road Actions	Units	Quantity	Unit Cost	Contingency Per Unit	TOTAL
New Signal Installation	EA.	4	$319,500	$431,300	$3,003,200
Install new, or improve existing turn bay	EA.	8	$213,000	$287,600	$4,004,800
New travel lane on Reston Parkway	mile	0.38	$1,863,800	$2,516,100	$1,659,100
Add internal roadway links	mile	1.28	$3,727,500	$5,032,100	$11,212,300
Improve/Widen roadway from 2 to 4 lanes	mile	0.66	$8,413,500	$6,478,400	$9,871,500
New bridge over DIAAH	sq ft	56,000	$320	$250	$31,920,000
Bus Lanes on Sunset Hills Rd	mile	1.86	$1,863,800	$2,516,100	$8,146,600
TOTAL					**$69,817,500**

Appendix A includes the total estimated cost for each of the fourteen improvements (A-N) recommended in this chapter.

b. Prioritization

Each of the roadway projects that are recommended in this chapter is important in order to provide the best possible access to the Wiehle Avenue and Reston Parkway Metrorail stations. Some improvements provide a greater increase in accessibility than others, and are therefore prioritized more heavily. Additionally, as the rail line is scheduled to be opened in Reston in two phases, the first priority must be placed on providing access to the Wiehle Avenue station, which will be opening in the first phase. Table 2-10 below shows the fourteen recommended roadway projects according to the priority for providing improved accessibility in the immediate station vicinities. This prioritization table recognizes that importance does not always match with ease of implementation and that some of the very important, high priority projects (such as the Soapstone Connector) are large scale projects that will take significantly longer than smaller projects to plan, engineer and construct. Still others may be lower priority small projects, or projects that can be completed in association with redevelopment projects in the area. When opportunities arise to implement these actions they should not be passed by simply because they are lower on the priority listing.

Table 2-10: Roadway Improvement Priorities

	Project	Priority	Included in Record Of Decision	Comments
B	New left turn lane for westbound left turning movement at Sunset Hills Rd & Isaac Newton Sq. This would replace the shared left-through lane by providing a dedicated turn lane.	1st Priority	Yes	
C	Add a second left turn lane for northbound traffic at Wiehle Ave & Metro Access (between Sunset Hills Rd & DIAAH) and provide a second inbound lane.	1st Priority	Yes	
D	Add an additional left turn lane on the eastbound DIAAH ramp at Wiehle Ave	1st Priority	Yes	
E	Improve the existing right turn lane on eastbound Sunset Hills Rd at Wiehle Ave	1st Priority	Yes	

	Project	Priority	Included in Record Of Decision	Comments
F	Improve the existing right turn lane for westbound Sunrise Valley Dr at Wiehle Ave	1st Priority	Yes	
I	Provide a new connection over the DIAAH between Soapstone Rd and Isaac Newton Sq W, to connect the major east-west roadways: Sunset Hills Rd & Sunrise Valley Dr.	1st Priority	No	Long-term improvement
K	Isaac Newton Square West from Isaac Newton Square South to the station as an extension of the proposed Soapstone Connector.	1st Priority	No	
A	New signal and turn lanes on Sunset Hills Rd for access into the proposed Reston Parkway Metrorail station	2nd Priority	Yes	
G	Add northbound though lane on Reston Parkway at Sunrise Valley Dr, continuing the lane to the ramp for eastbound DIAAH	2nd Priority	Yes	
H	Improve the right turn lane for southbound Reston Parkway at Sunrise Valley Dr	2nd Priority	Yes	
J	Provide bus lanes on Sunset Hills Rd from Wiehle Ave to Old Reston Ave	3rd Priority	No	Long-term improvement
L	The Station Entrance (already planned for improvements as part of station construction) should be extended across Wiehle Avenue to the Private Driveway as far east as Samuel Morse Dr.	3rd Priority	No	To be constructed (if possible) in association with redevelopment
M	Michael Faraday Court extension from the new roadway described in (L) north to the extended Roger Bacon Dr described in (N)	3rd Priority	No	To be constructed (if possible) in association with redevelopment
N	Extension/improvements to Isaac Newton Square South from Isaac Newton Square West to Wildlife Center Drive.	3rd Priority	No	To be constructed (if possible) in association with redevelopment

All of the recommended projects that were included in the Record of Decision (ROD) are mitigation efforts required as part of the construction of the rail project. These projects will not be paid for by Fairfax County and should all be constructed in conjunction with Phase I of the rail project. Based on this study, those ROD projects that are directly adjacent to the Wiehle Avenue station are designated as first priority because this station will open first. In addition, the Soapstone Connector and its extension across Sunset Hills Rd to Isaac Newton Square are also ranked as 1st priority project for the same reasons. Second priority projects are those which improve access primarily to the Reston Parkway station. The third priority grouping is reserved for projects that will help relieve some of the congestion that is expected on a long-term basis in the station areas.

A multi-modal priority listing that incorporates the above priorities and also includes all of the modes studied in this plan is the main subject of Chapter 5.