

**CATHOLIC DIOCESE OF ARLINGTON
LOUDOUN PROPERTY
TRAFFIC IMPACT ANALYSIS
LOUDOUN COUNTY, VIRGINIA**

Submitted on behalf of:
Catholic Diocese of Arlington

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February 24, 2009

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EXECUTIVE SUMMARY

The Catholic Diocese of Arlington (CDA) Loudoun Property development consists of a 17.9 acre parcel located in the Dulles South region of Loudoun County, Virginia, just south of John Mosby Highway (U.S. Route 50) and east of Goshen Road (Route 616). The site is currently vacant and approved for a total of 19 single-family residential homes. The CDA proposes to file a special exception (SPEX) to allow the development of a 1,200-seat (58,000 S.F.) church and a 200-student private school to be developed in two phases, by 2012 (phase I/church only) and 2015 (buildout/church and school). The traffic study was prepared for both weekend (Sunday) conditions to satisfy VDOT 527 requirements and weekday conditions to satisfy Loudoun County requirements.

Access to the proposed site would be provided via two future driveways located on Marrwood Place just to the east of Goshen Road. The driveways on Marrwood Place would be aligned with the proposed driveways for the approved Marrwood residential development.

The currently approved 19 residential units would generate 27 AM peak hour trips, 25 PM peak hour trips, and 21 peak hour trips on Sunday. The proposed phase I program (1,200-seat church) would generate 42 AM peak hour trips and 38 PM peak hour trips on weekdays. The 1,200-seat church would generate 744 trips (387 in and 357 out) during the Sunday peak hour. (The private school is not anticipated to generate any trips on a typical Sunday). Under buildout conditions, the 1,200-seat church and private school program (200 students) would generate 218 AM peak hour trips and 168 PM peak hour trips on weekdays. The same number of peak hour trips (744 vehicles) would be generated on Sundays.

The traffic analyses indicate that currently all study intersections currently operate at acceptable levels of service during the peak commuter periods and on Sunday.

The results of the Sunday analyses indicate that minor signal timing improvements would be necessary at the U.S. Route 50/Gum Spring Road intersection to maintain acceptable levels of service. All of the remaining intersections would operate at acceptable levels of service, assuming improvements planned by others are made. The side-street movements on Goshen Road at the U.S. Route 50 intersection are expected to operate beyond capacity during the Sunday peak hour in the near-term under stop sign control. However, the aforementioned improvements by others would alleviate these delays.

An evaluation of the westbound left turn lane on U.S. Route 50 to southbound Goshen Road indicates that the existing geometry provides 130 feet of storage and 135 feet of taper. While this would need to be lengthened to meet current VDOT standards, the improvements planned by others would provide adequate storage for this maneuver. However, although capacity analyses indicate that the westbound left turn queue would not exceed the storage area, it is

recommended that temporary traffic control personnel be provided at the intersection during the Sunday service hours under near-term conditions to facilitate entering and exiting traffic. The need for traffic control personnel may be eliminated when the traffic signal and improvements by others are installed. It is noted that the analyses for 2015 conditions are conservative since they do not assume the planned extension of Marrwood Place to the east through Stone Ridge. This extension would reduce the amount of site-generated traffic that will utilize U.S. Route 50 and Goshen Road.

The results for weekday conditions indicate that the phase I development program (church only) result in a slight increase side-street delays at the U.S. Route 50/Goshen Road intersection, resulting in deficient levels of service on these approaches that operate under stop sign control. Although a traffic signal would be necessary to restore these movements to acceptable levels of service, signalization is not recommended due to the low side-street volume and the planned future improvements. Further, the existing westbound left turn lane on U.S. Route 50 would adequately accommodate the peak hour traffic forecasts. The long-term (2015) conditions analyses for weekdays indicate that the U.S. Route 50/Goshen Road intersection would operate at acceptable levels of service, assuming improvements by other adjacent development projects are installed that include a new traffic signal and turn lanes.

SECTION I INTRODUCTION

STUDY SCOPE

This report presents the results of a traffic impact study for the CDA Loudoun Property as part of a Special Exception application to permit the currently zoned TRIUBF property that allows 19 residential units to be modified to allow the development of a 1,200-seat church and a 200-student private school. This property meets 527 traffic study requirements under Sunday conditions. Thus, an analysis of these conditions is reflected in the following sections of this traffic report.

A supplemental analysis of weekday conditions is also included and reflects a limited scope since the project does not meet 527 requirements on average weekdays.

PURPOSE

The purpose of this traffic study is to evaluate the adequacy of the existing transportation network in conjunction with the proposed special exception application and to identify potential mitigation measures to off-set its traffic impacts under Sunday conditions. This study was conducted in accordance with the recently adopted 527 Traffic Impact Study Guidelines published by VDOT. The study area was determined with VDOT and County staff based on a traffic scoping meeting. The approved VDOT scoping form is included as Appendix A. Weekday impacts were also evaluated in a later section of this report.

The traffic impacts were evaluated at phase I (2012) and project buildout (2015). Per the scoping agreement, a buildout plus 10-year scenario was not required. It is noted that these assumptions are very conservative and that the actual pace of this development is subject to the success of the church.

TEN PERCENT RULE

In accordance with Loudoun County Facility Standards Manual (FSM), all intersections within the vicinity of the subject site in which site-generated trips account for 10 percent or more of the total intersection volume must be included in the traffic study. A graphical representation of this analysis is contained in Appendix B.

STUDY OBJECTIVES/METHODOLOGY

Tasks undertaken in this study included the following:

1. Review the proposed development plans, other traffic impact studies conducted in the immediate site vicinity, the Countywide Transportation Plan (CTP), and other background data.
2. A field reconnaissance of existing roadway and intersection geometrics, traffic controls, traffic signal phasings/timings, and speed limits.
3. Agreement with Loudoun County Office of Transportation Services (OTS) and Virginia Department of Transportation (VDOT) staff regarding the traffic study scope for both weekday and Sunday conditions.
4. Counts of existing traffic at six (6) key intersections.
5. Analysis of existing levels of service at these intersections.
6. Preparation of background future traffic forecasts for 2012 (phase I) and 2015 (buildout) conditions.
7. Calculation of background levels of service at key intersections based on background traffic forecasts, existing traffic controls, and existing/planned intersection geometrics.
8. Estimation of the number of Sunday peak hour and daily trips that would be generated by the proposed project based on Institute of Transportation Engineers (ITE) trip generation rates.
9. Preparation of total future traffic forecasts to reflect 2012 and 2015 conditions.
10. Calculation of total future levels of service at key intersections based on total future traffic forecasts, existing traffic controls, and existing/planned intersection geometrics.
11. Identification of the roadway improvements required to adequately accommodate the future traffic impacts of the project.
12. Supplemental analyses of average weekday conditions in accordance with Loudoun County requirements.

This analysis was undertaken in accordance with Loudoun County's Facilities Standards Manual (FSM) and the Virginia Department of Transportation's Traffic Impact Regulations (527 Report). Sources of data for this analysis included the Institute of Transportation Engineers (ITE), Loudoun County, the Virginia Department of Transportation (VDOT), The Catholic Diocese of Arlington, Bowman Consulting Group, and previous studies prepared by Wells + Associates.

STUDY AREA

Wells + Associates studied the following area intersections in accordance with Loudoun County and VDOT guidelines:

1. Goshen Road (VA Route 616)/Fleetwood Road/U.S. Route 50.
2. Stone Springs Boulevard/U.S. Route 50.
3. Gum Spring Road (VA Route 659)/U.S. Route 50.
4. Goshen Road (VA Route 616)/Braddock Road (VA Route 620).
5. Gum Spring Road (VA Route 659)/Braddock Road (VA Route 620).
6. Goshen Road (VA Route 616)/Arcola School South Site Driveway/Marrwood Place.

Figure I-1 shows the limits of the study area.

HAZARDOUS LOCATIONS

Based on a field evaluation, Goshen Road is a rural two-lane roadway with no shoulders in the vicinity of Arcola School. Goshen Road is also a very narrow, winding road with sharp curves in the site vicinity.

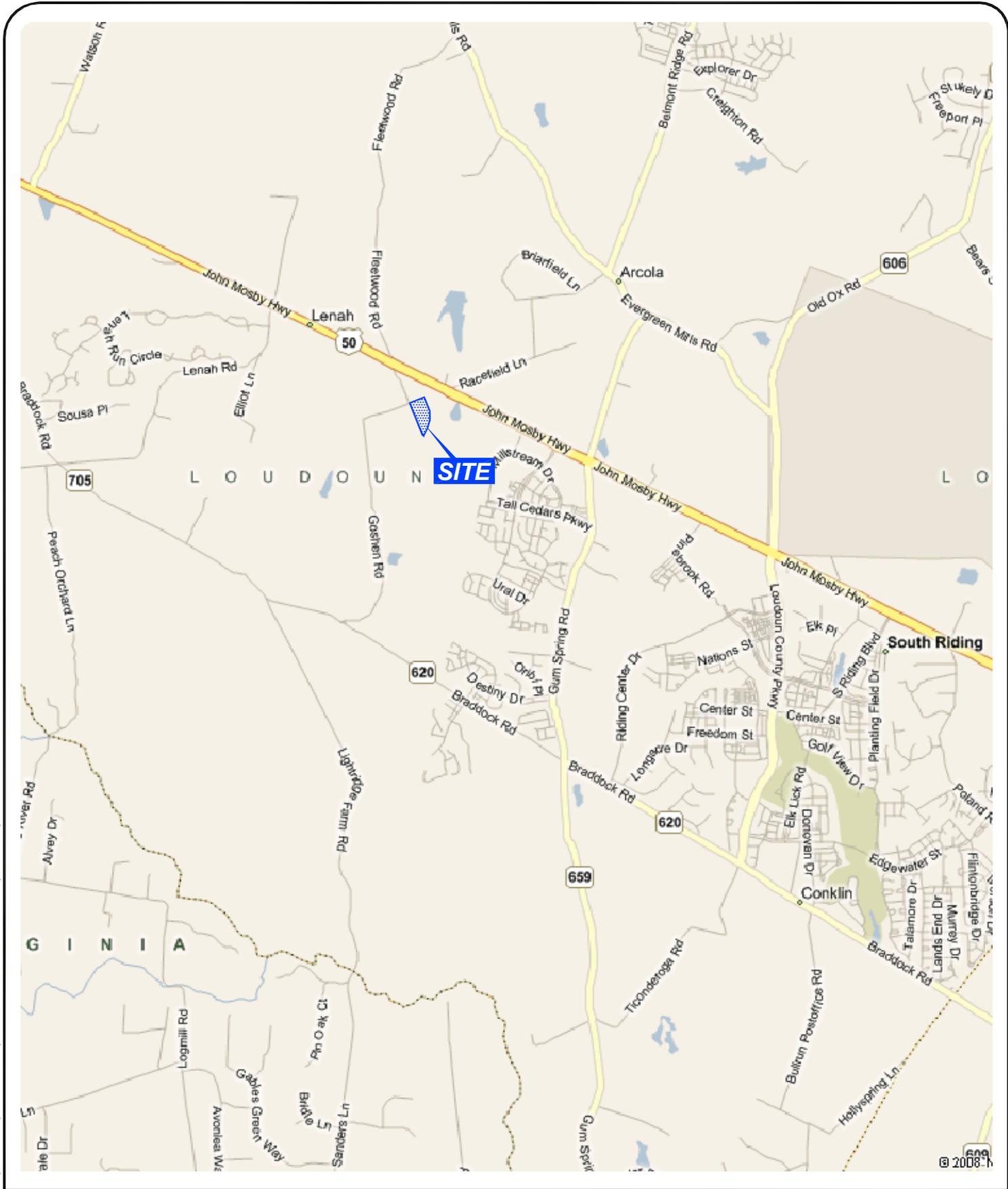


Figure 1-1
Study Area Limits



SECTION 2

BACKGROUND INFORMATION

DESCRIPTION OF PROPOSED DEVELOPMENT

The site is currently vacant and approved for a total of 19 single-family residential homes. The Catholic Diocese of Arlington proposes to file for a special exception (SPEX) to allow the development of a 1,200-seat (58,000 S.F.) church and a 200-student private school.

SITE LOCATION

The CDA Loudoun Property is located on the east side of Goshen Road (VA Route 616) and south of U.S. Route 50 in the Dulles South area of Loudoun County, Virginia.

SITE ACCESS

Access to the proposed site would be provided via two future driveway located on Marrwood Place just to the east of Goshen Road. The driveways on Marrwood Place would be aligned with the proposed driveways for the Marrwood development. It is noted that Marrwood Place would ultimately be extended to the east connecting to the Stone Ridge property. However, since portions of this roadway are under the control of other entities, it was not assumed for purposes of this traffic study. In addition, right-of-way for the future interchange at U.S. Route 50 and Relocated Route 659 borders the CDA Loudoun Property.

LOCATION WITHIN THE JURISDICTION AND REGION

The CDA Loudoun Property is located in the Dulles South planning area of Loudoun County. It is bordered by the Broad Run to the north and the Prince William County line to the south.

DESCRIPTION OF PARCEL

The CDA Loudoun Property application area is located on approximately 17.9 acres and identified as PIN # 247-49-1020

The proposed generalized development plan is shown on Figure 2-1.

GENERAL TERRAIN FEATURES

The area generally consists of level terrain.

COMPREHENSIVE PLAN RECOMMENDATIONS FOR PARCEL

This project is located within the Upper Broad Run of the Transition Policy Area. The Revised General Plan indicates that site is planned for transition area residential that allows one (1) dwelling unit per 40,000 S.F., as summarized on Figure 2-2.

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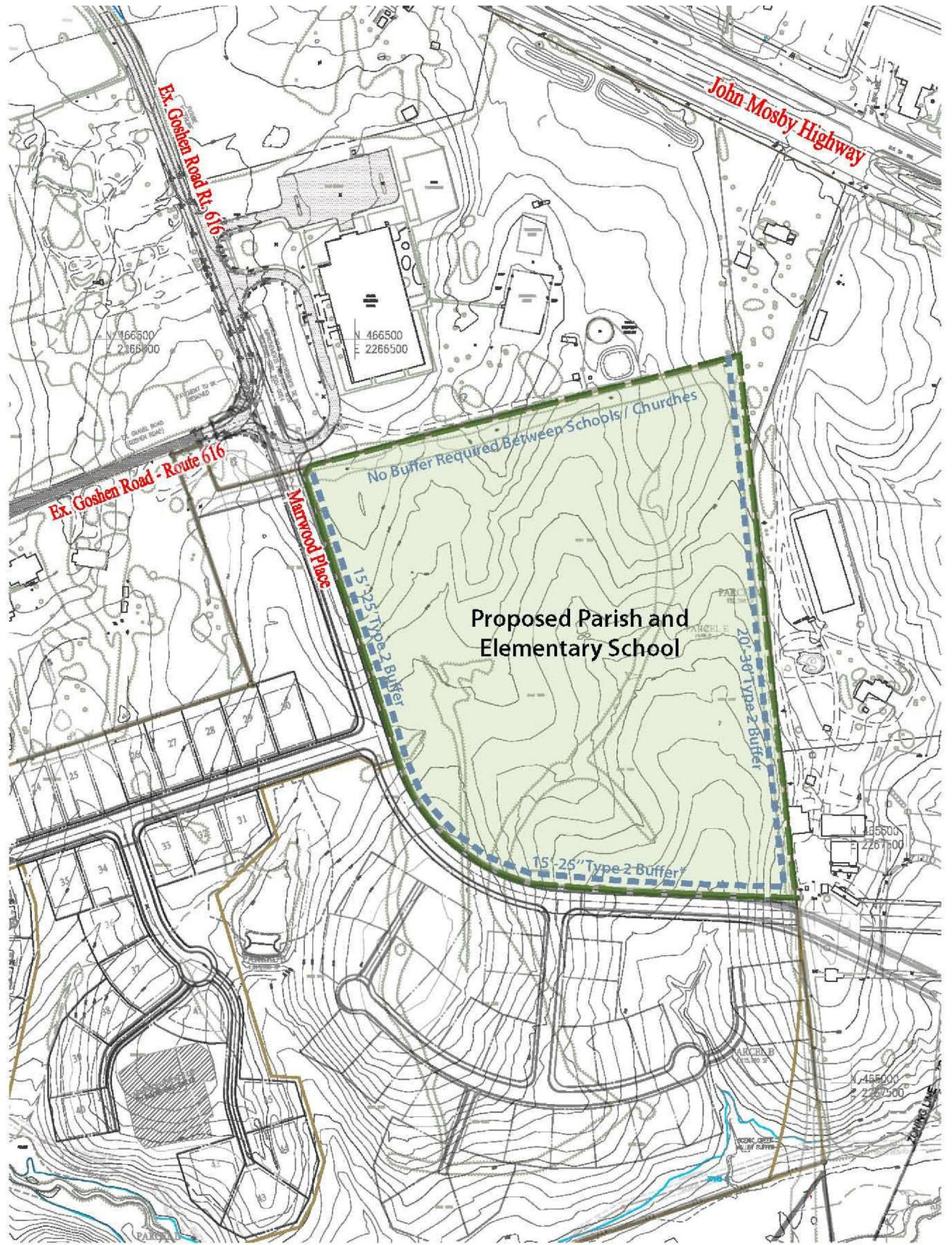


Figure 2-1
Generalized Development Plan



North

JCP

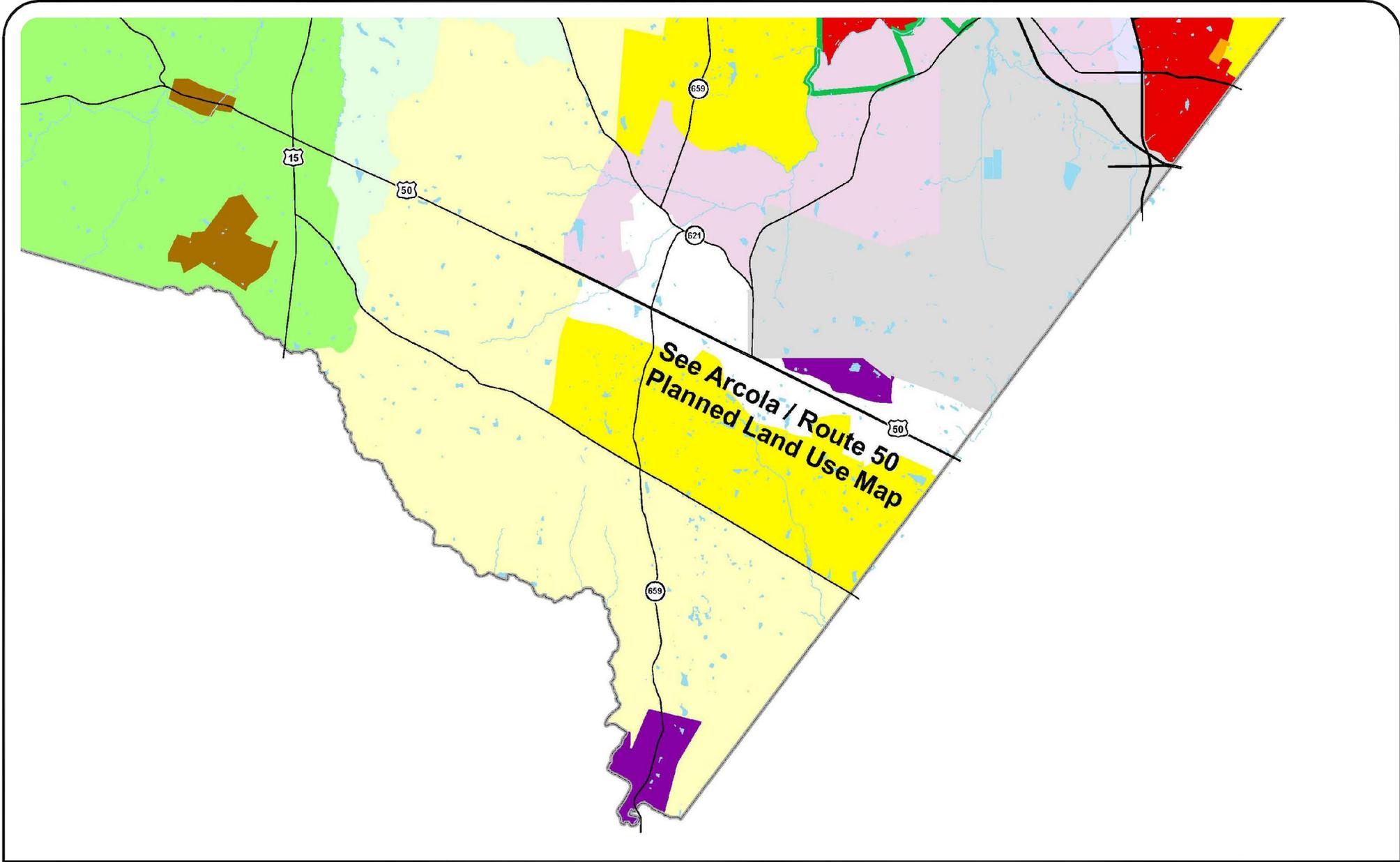


Figure 2-2
Comprehensive Plan Recommendations



ZONING

The overall site is comprised of 17.9 acres and is zoned TRIUBF (Transitional Residential). The Catholic Diocese of Arlington proposes to file a special exception (SPEX) application to develop a 1,200-seat church and a 200-student elementary school in two phases.

ROADWAY NETWORK

Existing Network. Regional access to the CDA Loudoun Property is provided by the U.S. Route 50 and Braddock Road. Local access is provided by Goshen Road.

John S. Mosby Highway (U.S. Route 50) is defined in the Countywide Transportation Plan (CTP) as a four-lane, median divided Minor Arterial roadway with a speed limit of 55 mph in the site vicinity. Left and right turn lanes are required at all intersections. Median crossover spacing and design speeds to be determined by VDOT.

Goshen Road/Fleetwood Road (Route 616) is a two-lane, undivided roadway with a speed limit of 35 mph in the site vicinity.

Braddock Road is a two-lane roadway with a posted speed limit of 45 mph in the vicinity of the Gum Spring Road intersection. Approximately one-quarter mile west of Gum Spring Road, Braddock Road becomes a two-lane gravel road.

Existing Roadway Conditions. The following study intersections currently operate under signal control:

1. Stone Springs Boulevard/U.S. Route 50.
2. Gum Spring Road (VA Route 659)/U.S. Route 50.

The following study intersections currently operate under stop sign control:

1. Goshen Road (VA Route 616)/U.S. Route 50.
2. Goshen Road (VA Route 616)/Braddock Road (VA Route 620).
3. Gum Spring Road (VA Route 659)/Braddock Road (VA Route 620) (all-way stop).
4. Goshen Road (VA Route 616)/Arcola School South Site Driveway/Marrwood Place.

The existing lane use and traffic control are shown on Figure 2-3.



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Figure 2-3
Existing Lane Use and Traffic Control

-  Represents One Travel Lane
-  Signalized Intersection
-  Stop Sign



Programmed Improvements. The following describes planned improvements to the roadway network as outlined in the Countywide Transportation Plan within the site vicinity. A copy of the CTP for this area is shown on Figure 2-4.

1. West Spine Road south of U.S. Route 50, connecting to existing Route 659, as a four-lane roadway.
2. Expansion of U.S. Route 50 from Stone Springs Boulevard to Loudoun County Parkway to six lanes.
3. Signalization at the West Spine Road at U.S. Route 50. Gum Spring Road will be realigned by 2015. Existing Gum Spring Road will be terminated south of U.S. Route 50, and the West Spine Road will connect to U.S. Route 50, east of existing Gum Spring Road. In 2015, this road will not continue to the north. The signalized intersection of U.S. Route 50 and the West Spine Road was analyzed for 2015 in lieu of U.S. Route 50 and Route 659, and it is analyzed as a T-intersection.
4. Signalization and expansion of Braddock Road/Gum Spring Road intersection.

Other Long Term Improvements – Not assumed in this traffic study

1. The construction of roundabouts on U.S. Route 50 at Lenah Road, Watson Road, New Road, and U.S. Route 15 as part of the U.S. Route 50 Traffic Calming Plan.
2. North Star Boulevard (relocated Route 659) is ultimately planned as a six-lane roadway from south of U.S. Route 50 with a connection to Interstate 66. An interchange at North Star Boulevard and U.S. Route 50 will also be provided.
3. A new interchange would be constructed at the U.S. Route 50/West Spine Road. The northern leg of the West Spine Road will also connect to the North Collector Road (Arcola Parkway).

Proffered Improvements. The following describes planned improvements to the roadway network as part of other projects within the site vicinity and were assumed to be in place as part of this traffic study.

The 2012 (phase I) analysis assumed the existing road network. Improvements to Goshen Road and U.S. Route 50 are planned to be installed by Westport and assumed to be in place by 2015. These improvements include the following:

1. Realignment of Goshen Road south of U.S. Route 50 (Westport Boulevard). Existing Goshen Road would be truncated and intersect with Westport Boulevard approximately 450 feet south of the U.S. Route 50 intersection.
2. Install new traffic signal at the Goshen Road/U.S. Route 50 intersection. (It is noted that a traffic signal warrant study was prepared by Wells + Associates in conjunction with the Westport property and was submitted to Virginia Department of Transportation for review).

3. A northbound right turn lane is proposed to be installed by Westport at Westport Boulevard and U.S. Route 50.
4. A southbound left turn lane on Westport Boulevard is proposed to be installed by Westport in coordination with the recently approved Arcola School at realigned Goshen Road.
5. Additional improvements to Goshen Road are planned to be installed by Marrwood and assumed to be in place by 2012. These improvements include the following:
 - a. Realignment of Goshen Road to eliminate the existing severe curve at the southwest corner of the Arcola School site.
 - b. Realignment of the Arcola School's southern driveway to create a four-way intersection at Goshen Road/Marrwood Place.

Braddock Road (Route 620) is designated in the CTP as a four-lane roadway. Improvements to the Gum Spring Road (Route 659)/Braddock Road intersection were assumed in 2015 that include a new traffic signal and separate turn lanes.

Gum Spring Road (Route 659) is planned to be widened from two-lanes to four-lanes by other development in the area from south of Braddock Road to U.S. Route 50 by 2015.

Public Transit Service. U.S. Route 50 is designated as a "Transit Corridor" in the Countywide Transportation Plan from the Fairfax County Line west to Route 659 Relocated (Suburban Policy Area). Express bus service from the existing Park & Ride facility in Stone Ridge is provided with connections to Rosslyn, Crystal City, the Pentagon, and Washington, D.C. Route schedules/maps are provided in Appendix C.

SURROUNDING LAND USE

The land parcel east of the subject site is planned to be occupied by the Marrwood at Stone Ridge residential subdivision (SBPL 2007-0013) project. The land parcel to the west is currently occupied by the existing Arcola Community Center that is the subject of special exception that would allow for a day care facility of 200 children and for the addition of a private school use of 284 students ranging from grades Kindergarten through grade eight (SPEX 2008-0021). This project received Planning Commission approval in November 2008 and Loudoun County Board of Supervisors approval on December 8, 2008. The approved by-right Westport subdivision residential project (and active rezoning ZMAP 2005-0030) is located directly west of the Arcola School property as shown on Figure 2-5.

Pipeline Developments. Pipeline project development projections were prepared for both 2012 (phase I) and project buildout (2015) based on previously prepared and on-going traffic studies in the site vicinity. The development densities and programs reflect recent comments provided by Loudoun County and VDOT as part of other recently approved studies in the area. The approximate location of each pipeline development is shown on Figure 2-6.

The following projects were considered in this traffic study:

1. Brambleton.
2. Kirkpatrick Farms.
3. South Riding.
4. Hutchinson Farm (Arcola Center).
5. South Village.
6. Stone Ridge.
7. Pinebrook Village.
8. Braddock Corner.
9. Providence Glen.
10. Gum Spring Village Center.
11. South Riding Station.
12. Kirkpatrick Farms West.
13. CD Smith.
14. Glascock Field at Stone Ridge.
15. Marrwood Property
16. Westport By-Right Property.
17. West Spine Plaza By-Right.
18. CDA By-Right.
19. Winsbury Homes.
20. Arcola School.

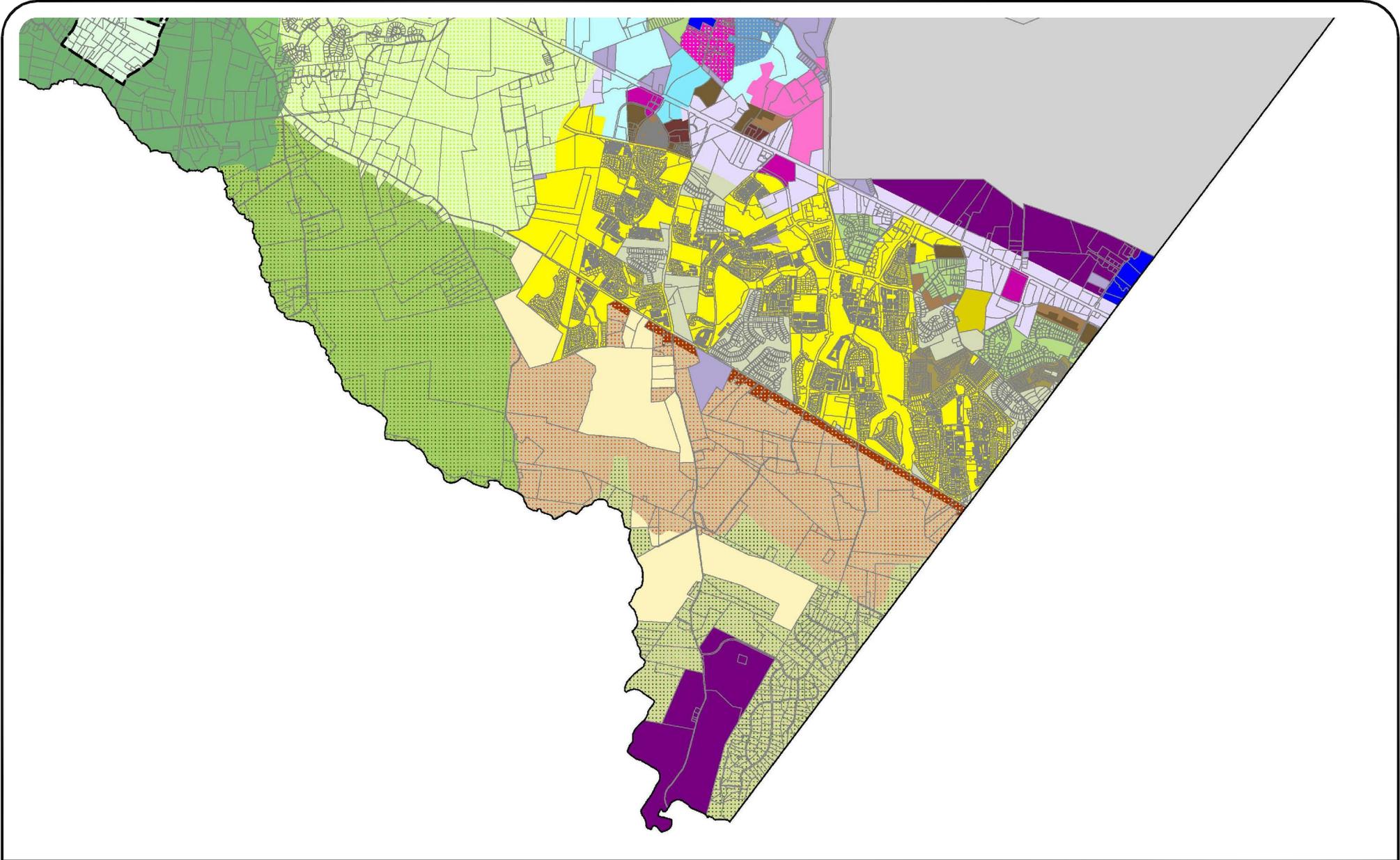
The level of development within each of the other approved projects listed above was estimated based on the ultimate approved development program, the projected pace of development in the study area as estimated in previous studies and updated information researched by Wells + Associates.

These project-by-project development forecasts were prepared for the sole purpose of reasonably estimating background traffic volumes in the study area. They do not constitute an independent economic forecast. Individual projects may develop at a faster or slower pace than forecasted here. The background traffic forecasts contained in this report will still pertain to the overall development levels and general distribution assumptions as described within the analyses.



Figure 2-4
County Wide Transportation Plan





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Figure 2-5
Map of Surrounding Land Use



North

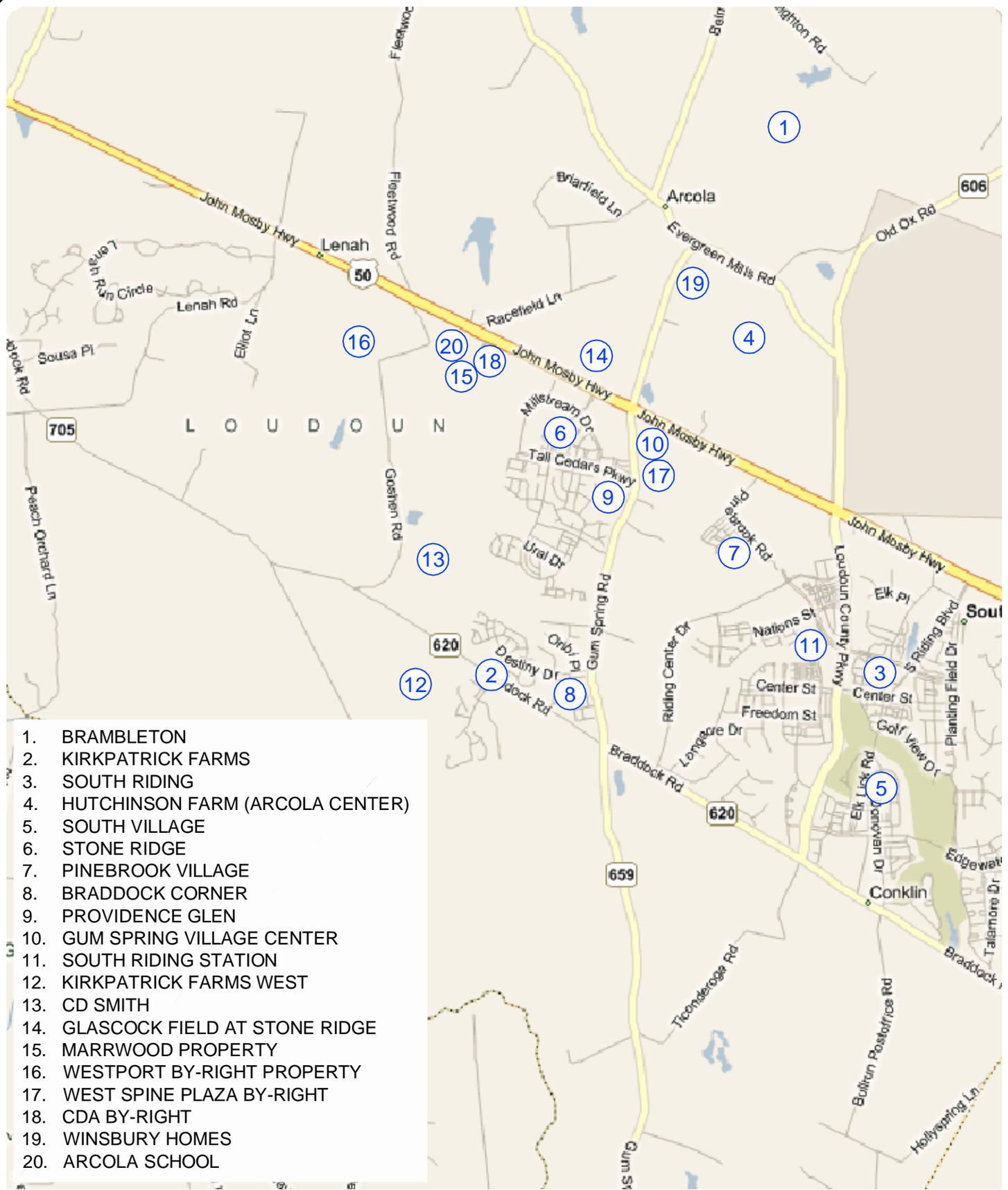


Figure 2-6
Location of Other Developments



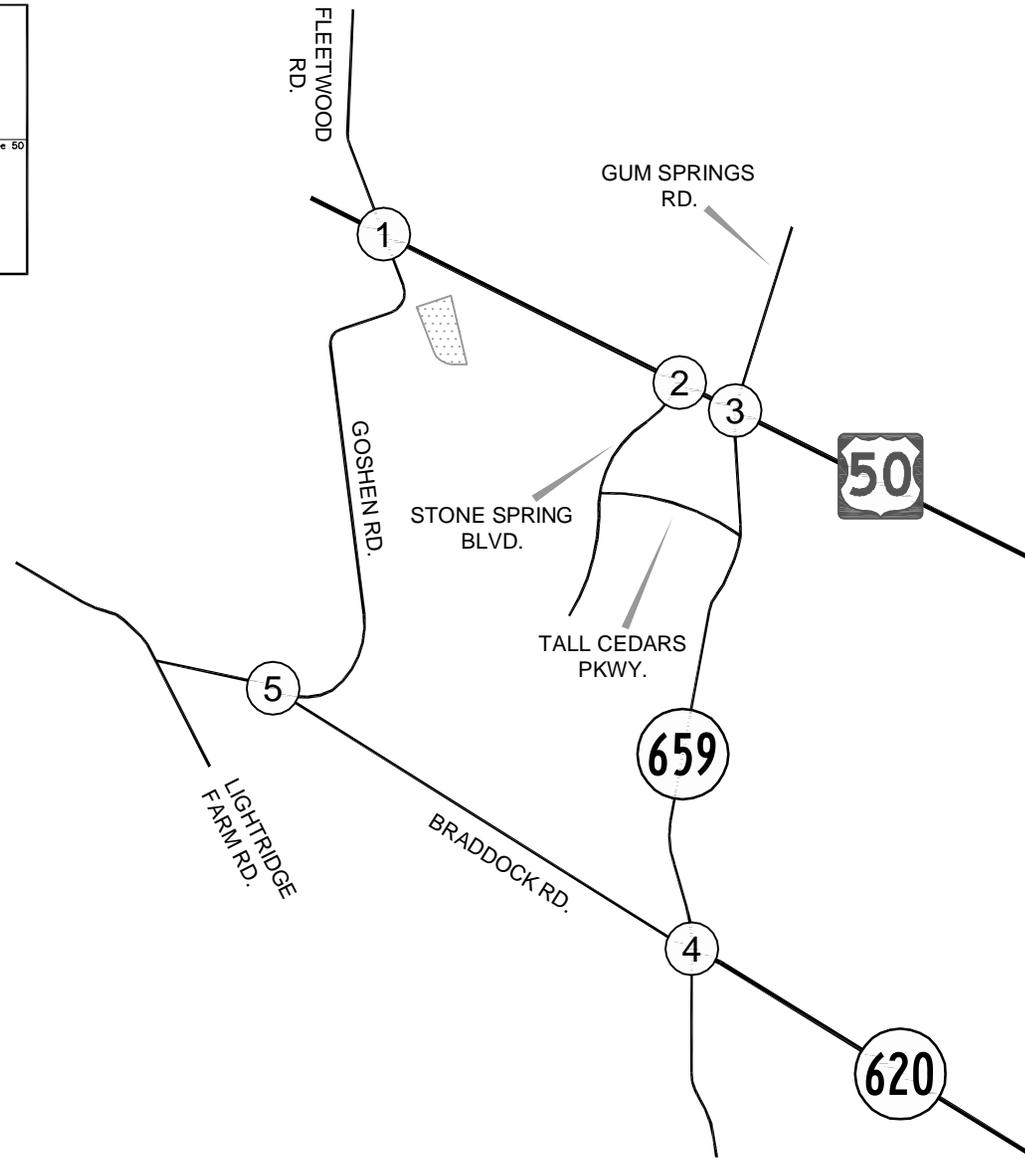
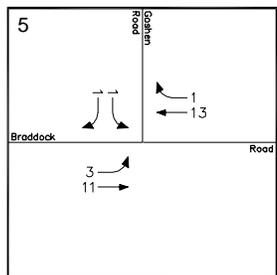
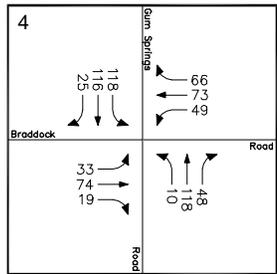
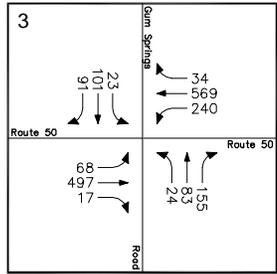
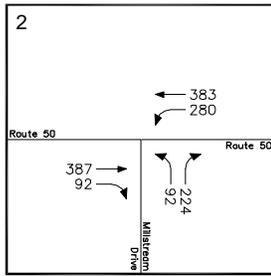
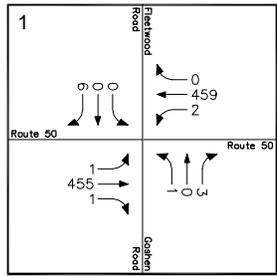
SECTION 3 ANALYSIS OF EXISTING CONDITIONS

TRAFFIC VOLUMES

Existing peak period traffic counts were conducted on Sunday, November 23, 2008 by Wells + Associates at the following intersections:

1. Goshen Road (VA Route 616)/U.S. Route 50.
2. Stone Springs Boulevard/U.S. Route 50.
3. Gum Spring Road (VA Route 659)/U.S. Route 50.
4. Goshen Road (VA Route 616)/Braddock Road (VA Route 620).
5. Gum Spring Road (VA Route 659)/Braddock Road (VA Route 620).
6. Goshen Road (VA Route 616)/Arcola School South Site Driveway/Marrwood Place.

The 2008 Sunday vehicular traffic volumes are shown on Figure 3-1. Traffic count worksheets are contained in Appendix D, and indicate that the peak hour generally occurred from 12:30 PM to 1:30 PM. It is noted that since calculating accurate average daily traffic volumes for Sunday conditions would be difficult, they have been excluded from the report.



20

Figure 3-1
2008 Existing Peak Hour Traffic Volumes (Sunday)

005 SUN PEAK HOUR



North

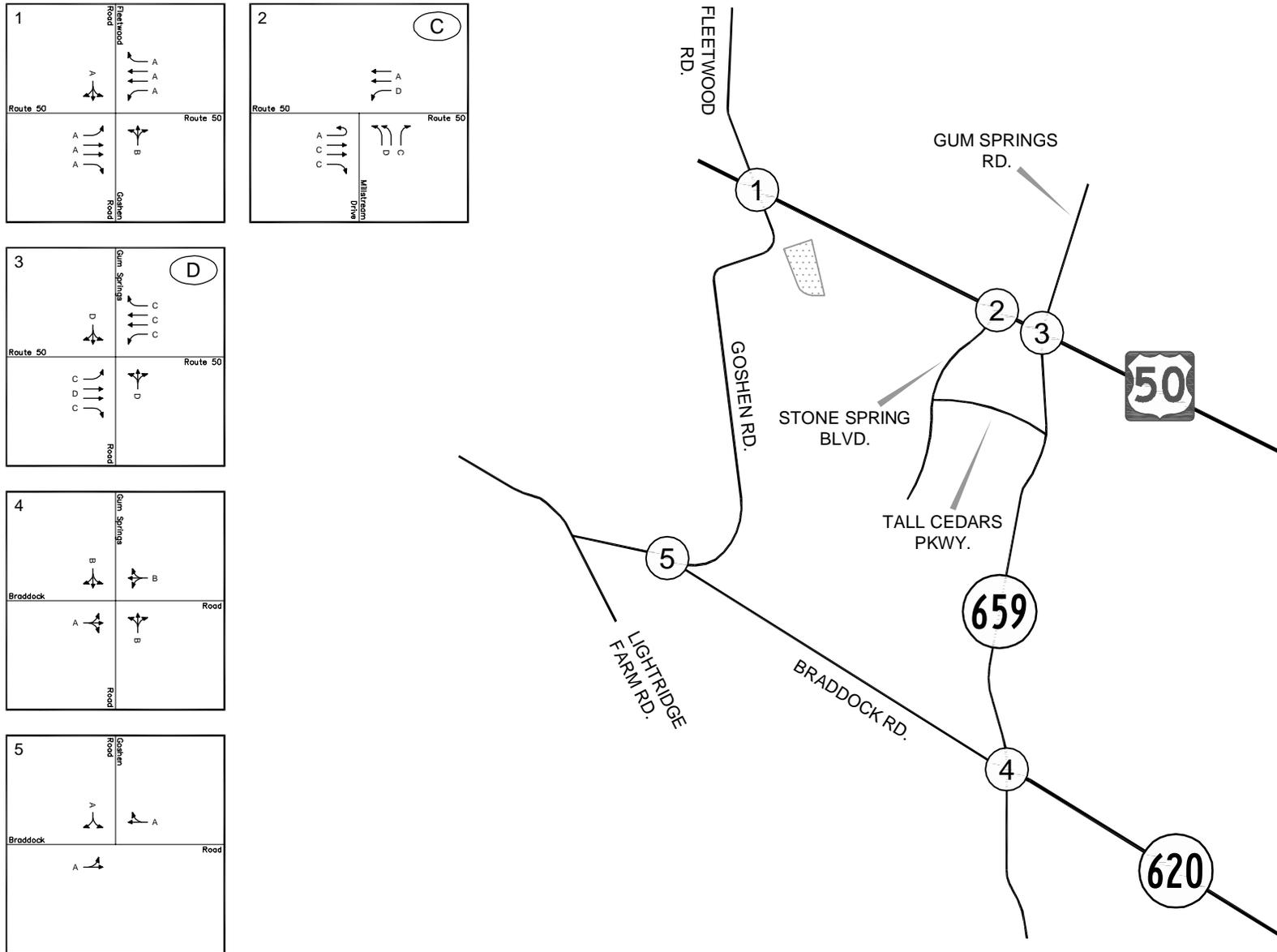
CAPACITY ANALYSIS

Existing peak hour levels of service were estimated at the key existing intersections in the study area based on the existing lane usage and traffic control, the existing traffic volumes, and the Highway Capacity Manual methodology (Synchro version 7). The results are presented in Appendix E and summarized in Table 3-1 and Figure 3-2, and indicate that all movements at the signalized intersections on U.S. Route 50 at Stone Springs Boulevard and Gum Spring Road currently operate at acceptable levels of service. In addition, all of the turning movements at the unsignalized intersections in the site vicinity currently operate at acceptable levels of service.

Table 3-1
Catholic Diocese of Arlington Loudoun Property
Sunday Intersection Level of Service

Intersection	Intersection Control	Critical Movement	2008
			Existing Sunday
1. John Mosby Highway (Route 50)/ Goshen Road (Route 616)/Fleetwood Road 2015 Background Improvement: Realign Goshen Road, Construct Westport Boulevard, Install Signal	Unsignalized	EBL WBL NBLTR SBLTR	A [8.4] A [8.4] B [11.9] A [9.9]
	Signalized	EBL EBT EBR WBL WBT WBR NBLT NBR SBLTR Overall	N/A
2. John Mosby Highway (Route 50)/ Stone Springs Boulevard 2012 Background Improvement: Construct SB Approach Add EB and WB Through Lanes, Optimize Timings	Signalized	EBT EBR SBL WBT NBL NBR Overall	C (33.0) C (29.4) D (47.4) A (9.0) D (44.1) C (21.0) C (28.1)
	Signalized	EBL EBT EBR WBL WBT WBR NBL NBT NBR SBL SBT SBR Overall	N/A
3. John Mosby Highway (Route 50)/ Gum Spring Road (Route 659) Background Improvements: Add EB and WB Through Lanes, Optimize Timings Total Future Improvements: Optimize Timings 2015 Improvement: Remove Northbound Leg, Remove signal, Convert to RIRO	Signalized	EBL EBT EBR WBL WBT WBR NBLTR SBLTR Overall	C (29.8) D (42.0) C (35.0) C (26.7) C (32.9) C (27.1) D (53.4) D (45.8) D (38.6)
	Signalized	EBL EBT EBR WBL WBT WBR NBLTR SBLTR Overall	N/A
	Signalized	EBL EBT EBR WBL WBT WBR NBLTR SBLTR Overall	N/A
	Unsignalized	SBR	N/A
4. Braddock Road (Route 620)/ Gum Spring Road (Route 659) 2012 Background Improvements: Install Signal 2015 Background Improvements: Add Separate Turn Lanes on all Approaches	Unsignalized	EBLTR WBLTR NBLTR SBLTR	A [10.0] B [10.5] B [10.1] B [11.7]
	Signalized	EBLTR WBLTR NBLTR SBLTR Overall	N/A
	Signalized	EBL EBT EBR WBL WBT WBR NBL NBT NBR SBL SBT SBR Overall	N/A
5. Braddock Road (Route 620)/ Goshen Road (Route 616)	Unsignalized	EBLT SBLR	A [1.6] A [8.5]

Notes:
Numbers in parentheses () represent delay at signalized intersections in seconds per vehicle.
Numbers in square brackets [] represent delay at unsignalized intersections in seconds per vehicle.
Asterisk (*) represents delay in excess of 999.9 seconds.



23

Figure 3-2
2008 Existing Levels of Service

X Levels of Service
 (X) Overall Levels of Service



SECTION 4 ANALYSIS OF FUTURE CONDITIONS WITHOUT SPECIAL EXCEPTION USES

TRAFFIC VOLUMES

For the purposes of this analysis, it was assumed that the proposed development would be constructed in two phases in 2012 and 2015. It is noted that the additional development planned in 2015 does not affect the Sunday analyses since the school would not be open during this period. Future traffic forecasts without the proposed special exception uses assuming the approved zoning (19 single-family homes) were derived through a composite of existing traffic, traffic associated with pipeline developments, and increases in traffic associated with regional growth were developed. As specified in the scoping agreement, a buildout plus 10-year condition was not required.

Methodology/Assumptions. The planned lane use and traffic control is shown on Figures 4-1 and 4-2 to include programmed/proffered improvements by others.

Pipeline Developments. Traffic generated by 20 other developments mentioned previously was included in this study.

The number of trips expected to be generated by the adjacent development projects was calculated using the standard rates and equations published in the Institute of Transportation Engineers Trip Generation, Seventh Edition. Development densities for each of the projects listed were derived from previous studies in the area obtained or prepared by Wells + Associates.

A summary of the background trip generation information is contained in Appendix F, and indicate that a total of 2,640 peak hour trips and 32,687 daily trips would be added to the existing roadway network in 2012 and 5,575 peak hour trips and 61,231 daily trips would be added to the existing roadway network in 2015.

Traffic generated by the pipeline developments were applied to the roadway network based on previous studies, where applicable. A composite of pipeline development trips are shown on Figures 4-3 and 4-4. Individual traffic assignments are contained in Appendix F.

Since the West Spine Road was assumed to be in place by 2012, the existing traffic using this section of roadway was re-assigned to existing Gum Spring Road. These adjustments to existing traffic are shown in Appendix G.

Regional Growth. Consistent with previously prepared traffic studies, an annual growth rate of 2.0 percent per year from 2008 to 2015 was applied to existing volumes. Regional traffic growth volumes are shown on Figures 4-5 and 4-6 for the years 2012 and 2015.

Future Traffic Volumes Without Development. Future traffic forecasts for 2012 and 2015 were developed by adding the existing traffic volumes (Figure 3-1) to traffic generated by pipeline developments (Figures 4-3 and 4-4) and regional growth rates (Figures 4-5 and 4-6). The resultant forecasts are summarized on Figures 4-7 and 4-8.

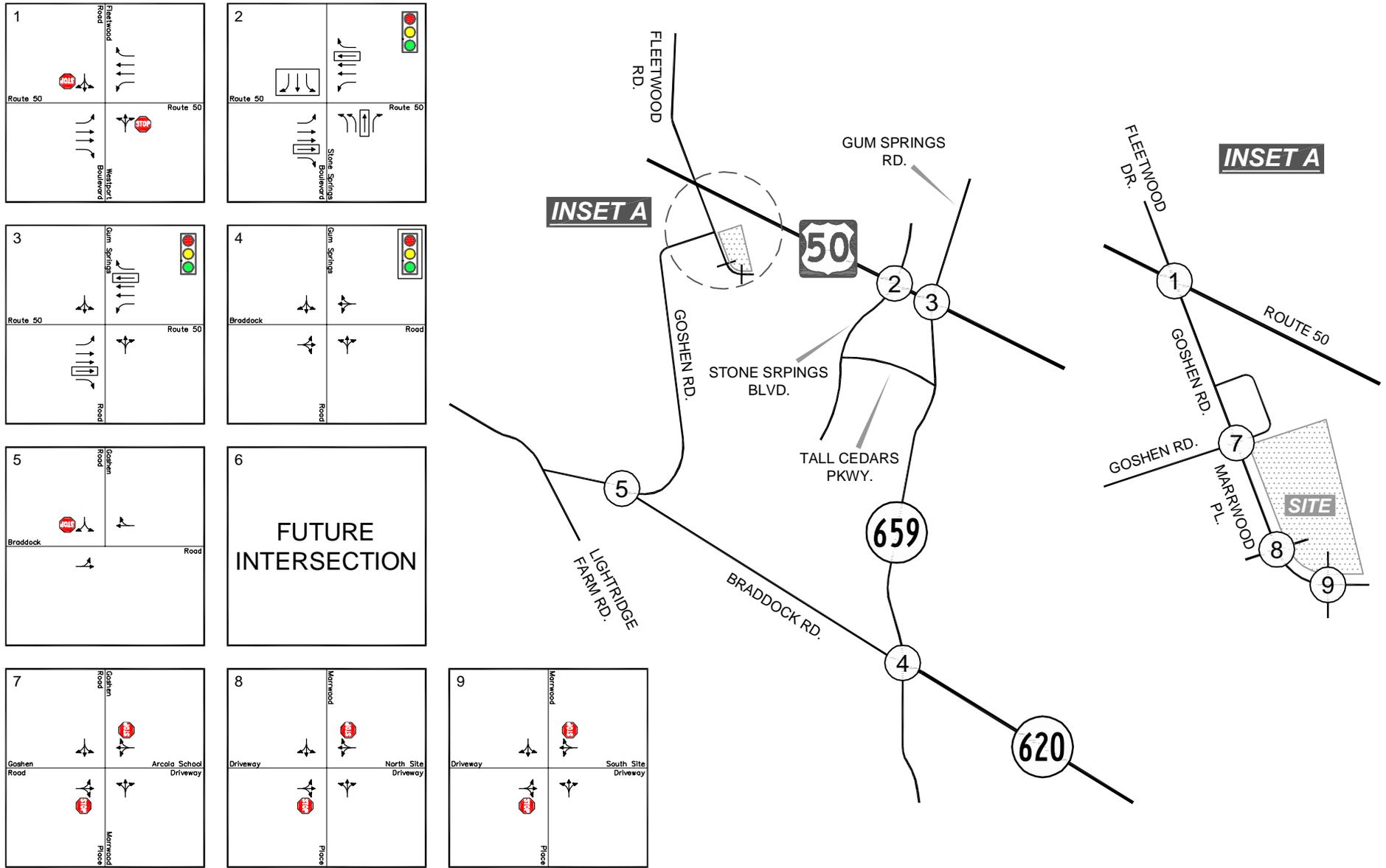


Figure 4-1
2012 Planned Lane Use and Traffic Control

- ← Represents One Travel Lane
- 🚦 Signalized Intersection
- 🛑 Stop Sign
- Background Improvement



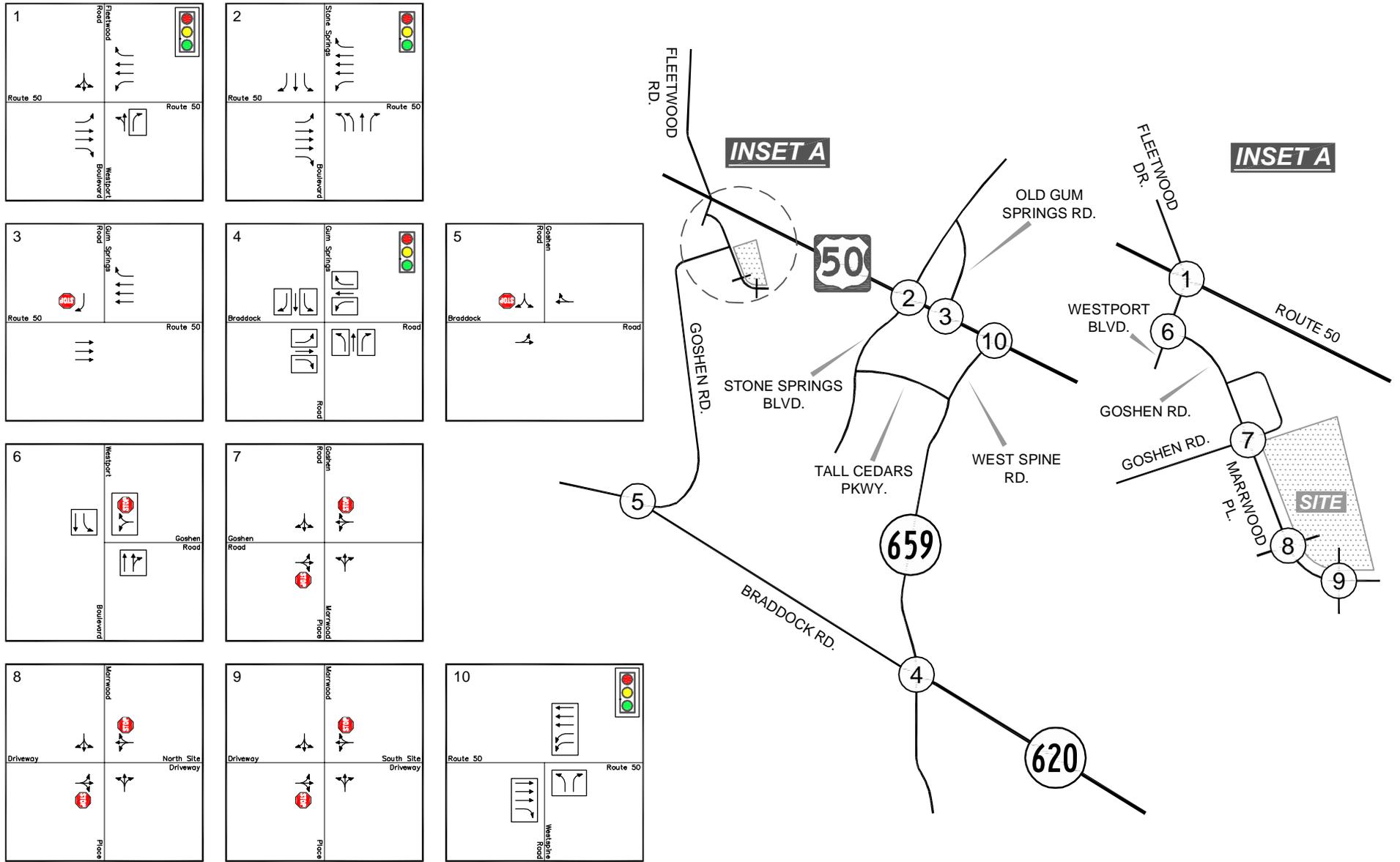


Figure 4-2
2015 Planned Lane Use and Traffic Control

- ← Represents One Travel Lane
- 🚦 Signalized Intersection
- 🛑 Stop Sign
- Background Improvement



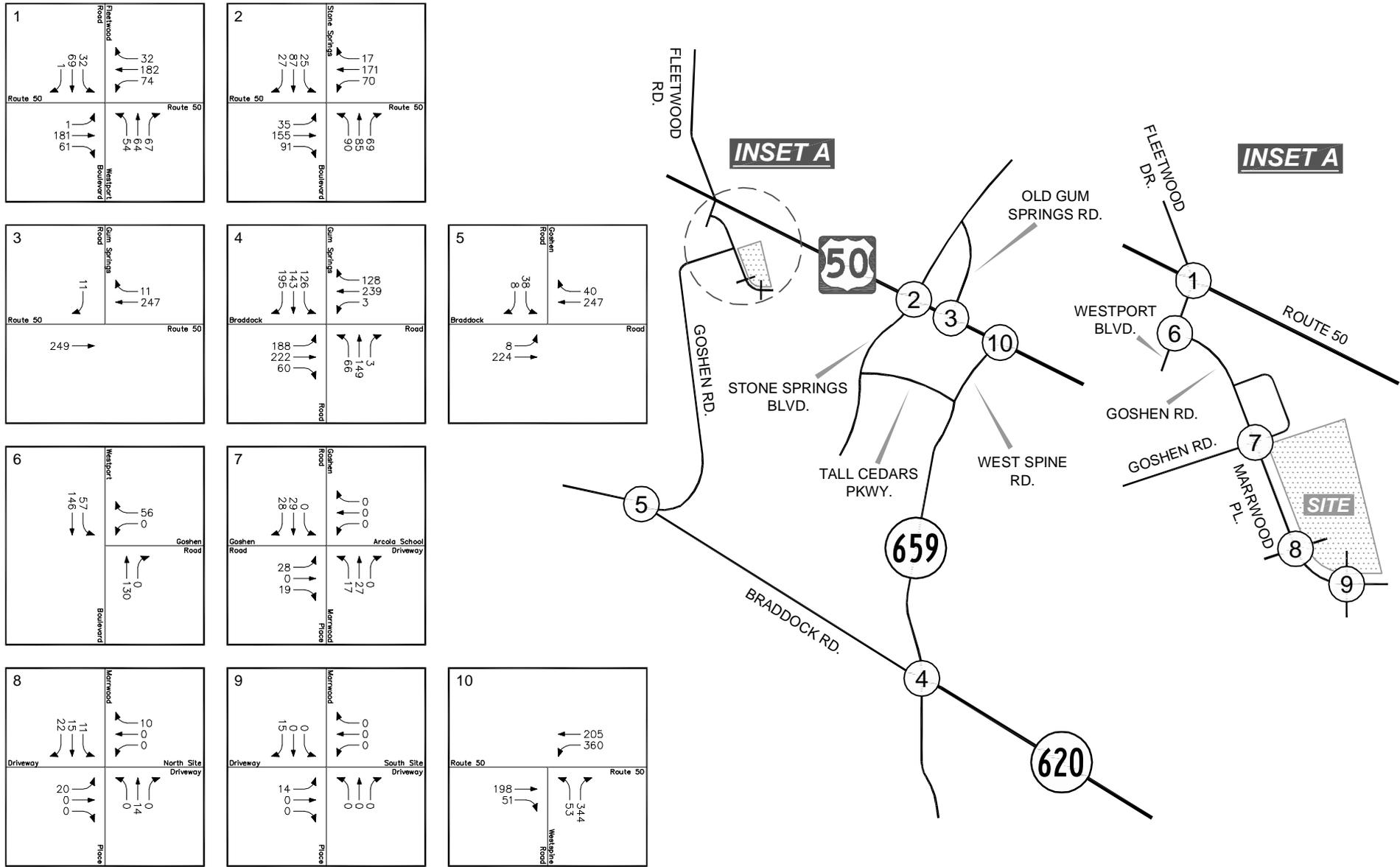
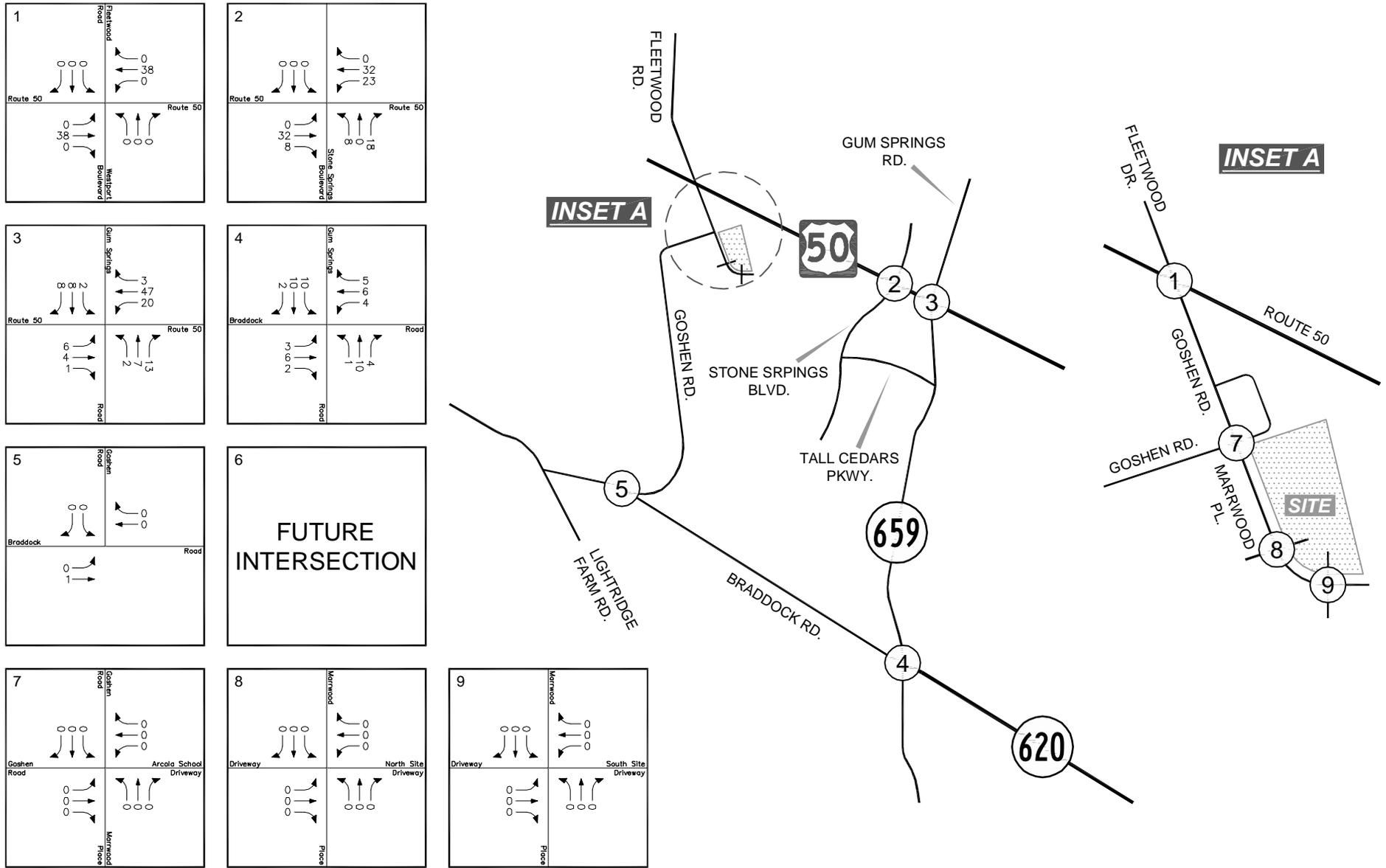


Figure 4-4
2015 Other Development Traffic Assignments (Sunday)

3:00 PM - 6:00 PM
SUN PEAK HOUR





29

Figure 4-5
2012 Regional Growth (Sunday)

000
3:00 PM PEAK HOUR



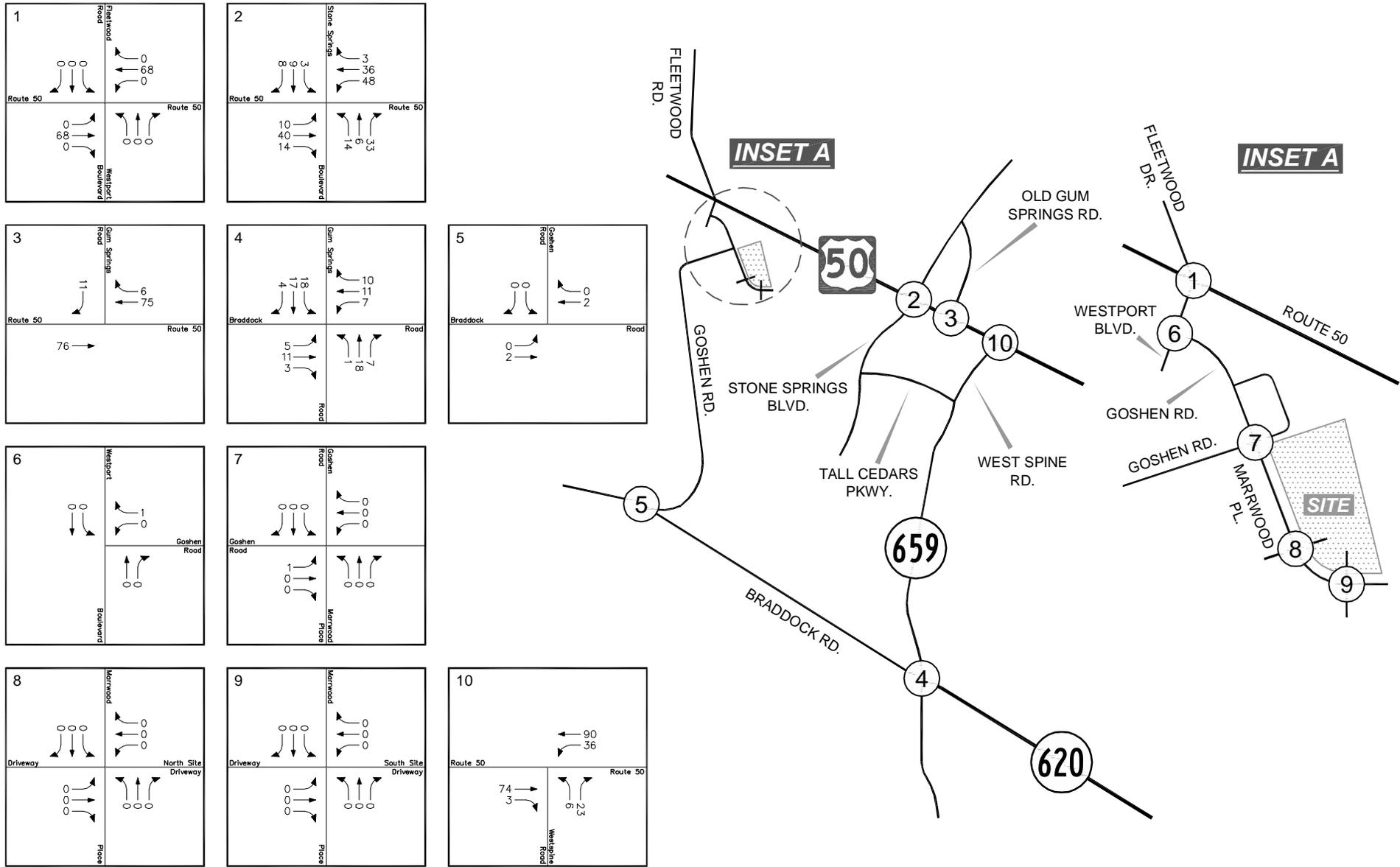


Figure 4-6
2015 Regional Growth (Sunday)

300
3 AM PEAK HOUR



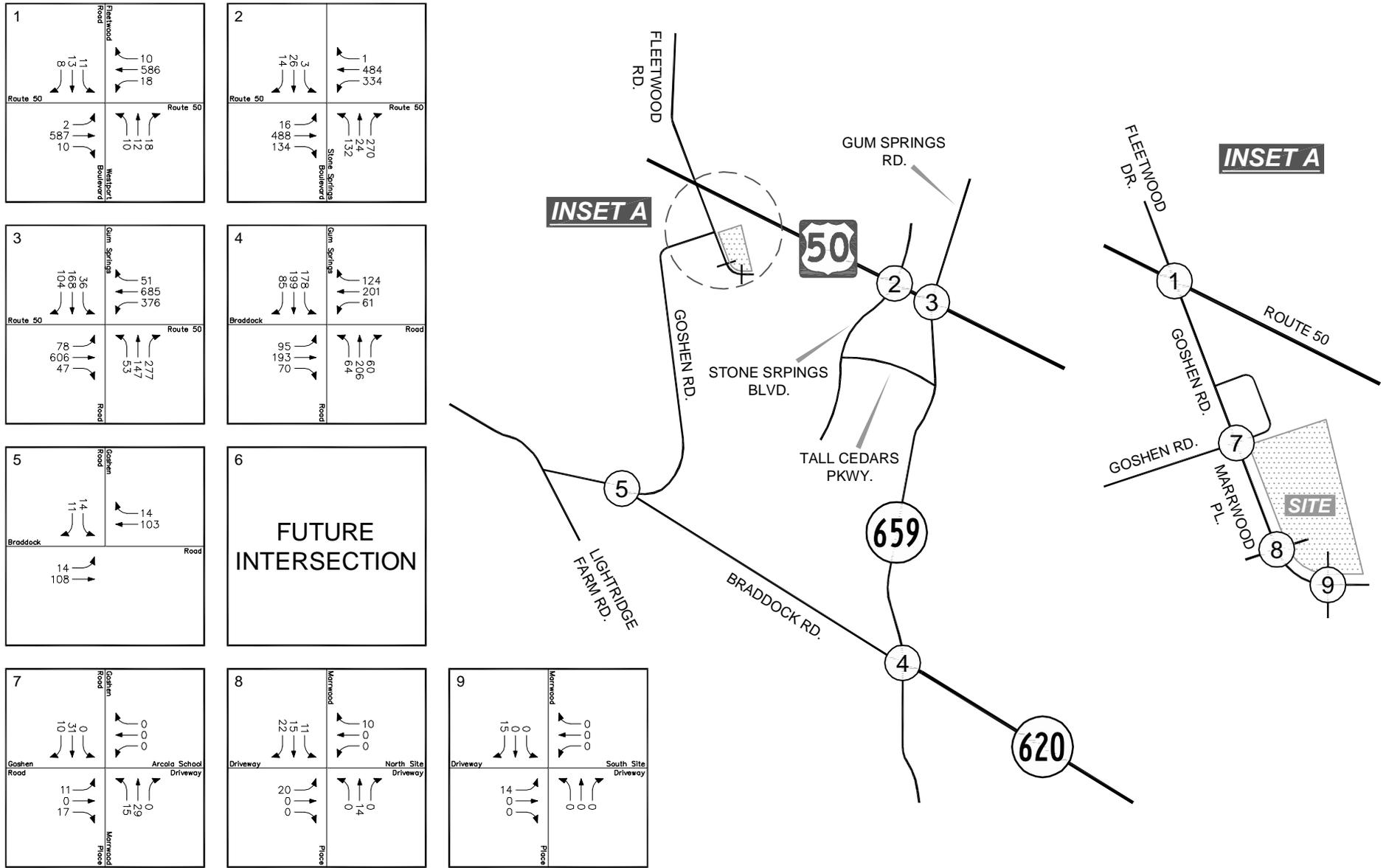


Figure 4-7
2012 Peak Hour Traffic Assignments without Special Exception Use (Sunday)

0.05 MILES
PEAK HOUR



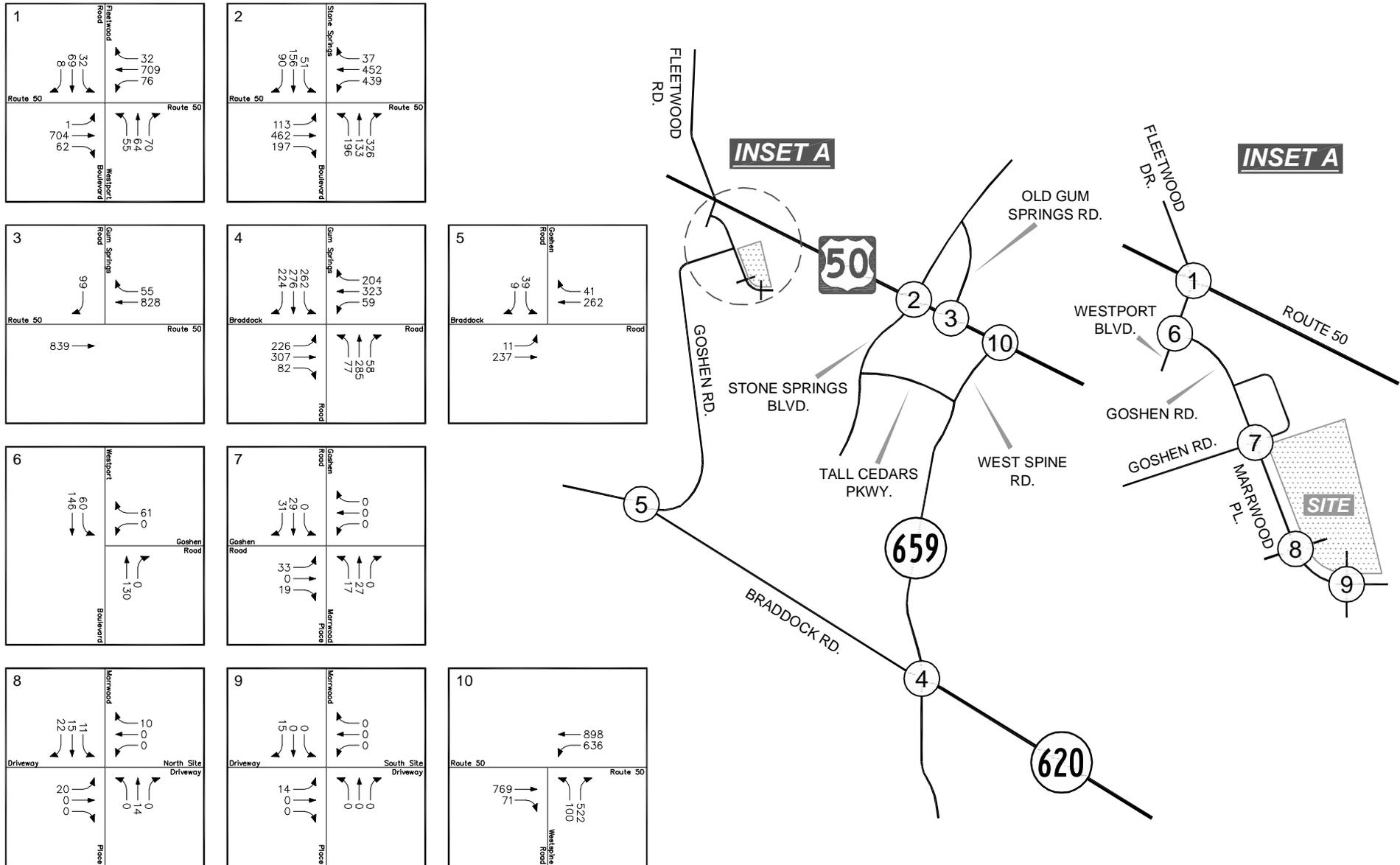


Figure 4-8
2015 Peak Hour Traffic Forecasts without Special Exception Use (Sunday)

3 PM PEAK HOUR
000



CAPACITY ANALYSIS

Future peak hour levels of service, without the proposed CDA Loudoun Property special exception uses, were calculated at all intersections in the study area for 2012 and 2015. The analyses are based on the future lane use and traffic control shown on Figures 4-1 and 4-2, the Synchro 7 software, in accordance with the FSM. The results are presented in Appendices H and I and are summarized in Table 4-1 and on Figures 4-9 and 4-10, and discussed below:

Near-term (2012)

1. The U.S. Route 50/Goshen Road intersection is anticipated to operate at acceptable levels of service under near-term (2012) conditions during the Sunday peak hour.
2. The U.S. Route 50/Stone Springs Boulevard intersection, modified to reflect the extension of this facility to existing Route 659 to the north, is anticipated to operate at acceptable levels of service.
3. The U.S. Route 50/Gum Spring Road intersection would operate at LOS “E” during the Sunday peak hour based on its current configuration. The overall delay at the intersection would be improved with the addition of a third through lane on U.S. Route 50 and would allow all movements to operate at acceptable levels of service.
4. All movements at the Braddock Road/Gum Spring Road intersection would operate beyond capacity at LOS “F” during the Sunday peak hour under the existing all-way stop operation. The planned traffic signal would mitigate this delay and provide adequate levels of service.
5. All intersections along Goshen Road are expected to operate at acceptable levels of service during the Sunday peak hour.

Long-term (2015)

1. The side streets at U.S. Route 50/Goshen Road are expected to operate at LOS “F” during the Sunday peak hour under stop sign control. The Westport property is proffered to install a new traffic signal and a northbound right turn lane at the intersection. This improvement is expected to reduce delay at the intersection. Thus, all movements would operate at acceptable levels of service.
2. The U.S. Route 50/Stone Springs Boulevard intersection will continue to operate at acceptable levels of service.
3. Under long-term (2015) conditions, the U.S. Route 50/Gum Spring Road intersection is planned to be cul-de-sac to the south of U.S. Route 50 and converted to right-in/right-out only to the north. Thus, all movements are expected to operate at acceptable levels of service.

4. The planned intersection of U.S. Route 50/West Spine Road is expected to operate at acceptable levels of service assuming the planned traffic signal is installed.
5. All movements at the Braddock Road/Gum Spring Road intersection would operate beyond capacity at LOS "F" during the Sunday peak hour. Assuming that a new traffic signal was installed under near-term (2012) conditions separate turn lanes at all approaches would be required for the intersection to operate at acceptable levels of service.
6. All intersections along Goshen Road are expected to operate at acceptable levels of service during the Sunday peak hour.

Table 4-1
Catholic Diocese of Arlington Loudoun Property
Sunday Intersection Level of Service

Intersection	Intersection Control	Critical Movement	Background		
			2008 Existing Sunday	2012 Sunday	2015 Sunday
1. John Mosby Highway (Route 50)/ Goshen Road (Route 616)/Fleetwood Road	Unsignalized	EBL WBL NBLTR SBLTR	A [8.4] A [8.4] B [11.9] A [9.9]	A [8.9] A [9.0] C [23.8] C [24.1]	N/A
	2015 Background Improvement: Realign Goshen Road, Construct Westport Boulevard, Install Signal	Signalized EBL EBT EBR WBL WBT WBR NBLT NBR SBLTR Overall	N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A	N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A	A (8.5) B (12.1) A (9.2) A (5.6) A (9.0) A (6.9) B (18.9) B (13.0) B (18.5) B (11.3)
2. John Mosby Highway (Route 50)/ Stone Springs Boulevard	Signalized	EBT EBR SBL WBT NBL NBR Overall	C (33.0) C (29.4) D (47.4) A (9.0) D (44.1) C (21.0) C (28.1)	N/A N/A N/A N/A N/A N/A N/A	N/A N/A N/A N/A N/A N/A N/A
	2012 Background Improvement: Construct SB Approach Add EB and WB Through Lanes, Optimize Timings	Signalized EBL EBT EBR WBL WBT WBR NBL NBT NBR SBL SBR Overall	N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A	C (20.3) C (22.2) C (20.2) C (23.2) A (8.2) A (7.3) C (25.4) B (16.8) A (9.5) C (29.1) C (30.6) C (29.0) B (17.2)	D (38.2) C (31.4) C (29.2) D (35.2) B (12.3) B (11.3) D (39.4) C (21.6) B (10.5) D (35.7) D (38.9) C (33.4) C (26.4)
3. John Mosby Highway (Route 50)/ Gum Spring Road (Route 659)	Signalized	EBL EBT EBR WBL WBT WBR NBLTR SBLTR Overall	C (29.8) D (42.0) C (35.0) C (26.7) C (32.9) C (27.1) D (53.4) D (45.8) D (38.6)	D (36.8) E (57.3) D (43.0) F (100.4) D (40.1) C (31.4) F (133.3) E (76.5) E (73.7)	N/A N/A N/A N/A N/A N/A N/A N/A N/A
	Background Improvements: Add EB and WB Through Lanes, Optimize Timings	Signalized EBL EBT EBR WBL WBT WBR NBLTR SBLTR Overall	N/A N/A N/A N/A N/A N/A N/A N/A N/A	D (36.8) D (50.4) D (43.2) D (44.9) C (34.0) C (29.2) C (38.2) C (24.6) D (37.4)	N/A N/A N/A N/A N/A N/A N/A N/A N/A
Total Future Improvements: Optimize Timings	Signalized	EBL EBT EBR WBL WBT WBR NBLTR SBLTR Overall	N/A N/A N/A N/A N/A N/A N/A N/A N/A	N/A N/A N/A N/A N/A N/A N/A N/A N/A	N/A N/A N/A N/A N/A N/A N/A N/A N/A
2015 Improvement: Remove Northbound Leg, Remove signal, Convert to RHO	Unsignalized	SBR	N/A	N/A	A [9.8]
4. Braddock Road (Route 620)/ Gum Spring Road (Route 659)	Unsignalized	EBLTR WBLTR NBLTR SBLTR	A [10.0] B [10.5] B [10.1] B [11.7]	F [81.8] F [101.5] F [65.6] F [186.8]	N/A N/A N/A N/A
	2012 Background Improvements: Install Signal	Signalized EBLTR WBLTR NBLTR SBLTR Overall	N/A N/A N/A N/A N/A	C (24.9) C (21.5) B (128) C (22.4) C (20.7)	F (498.6) E (71.0) B (19.6) F (182.0) F (209.4)
2015 Background Improvements: Add Separate Turn Lanes on all Approaches	Signalized EBL EBT EBR WBL WBT WBR NBL NBT NBR SBL SBR Overall	N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A	N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A	C (21.0) C (22.6) B (16.0) C (23.5) D (26.9) B (16.9) C (24.4) D (36.2) C (23.7) C (24.2) C (23.6) B (12.9) C (24.8)	
5. Braddock Road (Route 620)/ Goshen Road (Route 616)	Unsignalized	EBLT SBLR	A [1.6] A [8.5]	A [0.9] A [8.9]	A [0.4] B [13.0]
6. Westport Boulevard/ Goshen Road (Route 616)	Unsignalized	WBLR SBL	N/A N/A	N/A N/A	A [9.0] A [7.6]
7. Goshen Road (Route 616)/ Arcola School Driveway/Marrwood Place	Unsignalized	EBLTR WBLTR NBLTR SBLTR	N/A N/A N/A N/A	A [8.9] A [0.0] A [2.5] A [0.0]	A [9.2] A [0.0] A [2.9] A [0.0]
8. Marrwood Place/ North Site Driveway/Marrwood Driveway	Unsignalized	EBLTR WBLTR NBLTR	N/A N/A N/A	N/A N/A N/A	N/A N/A N/A
9. Marrwood Place/ South Site Driveway/Marrwood Driveway	Unsignalized	EBLTR WBLTR SBLTR	N/A N/A N/A	N/A N/A N/A	N/A N/A N/A
10. John Mosby Highway (Route 50)/ West Spine Road	Signalized	EBT EBR WBL WBT NBL NBR Overall	N/A N/A N/A N/A N/A N/A N/A	N/A N/A N/A N/A N/A N/A N/A	C (34.9) B (11.3) C (32.2) A (9.9) C (26.3) B (10.5) C (21.7)

Notes:
Numbers in parentheses () represent delay at signalized intersections in seconds per vehicle.
Numbers in square brackets [] represent delay at unsignalized intersections in seconds per vehicle.
Asterisk [*] represents delay in excess of 999.9 seconds.

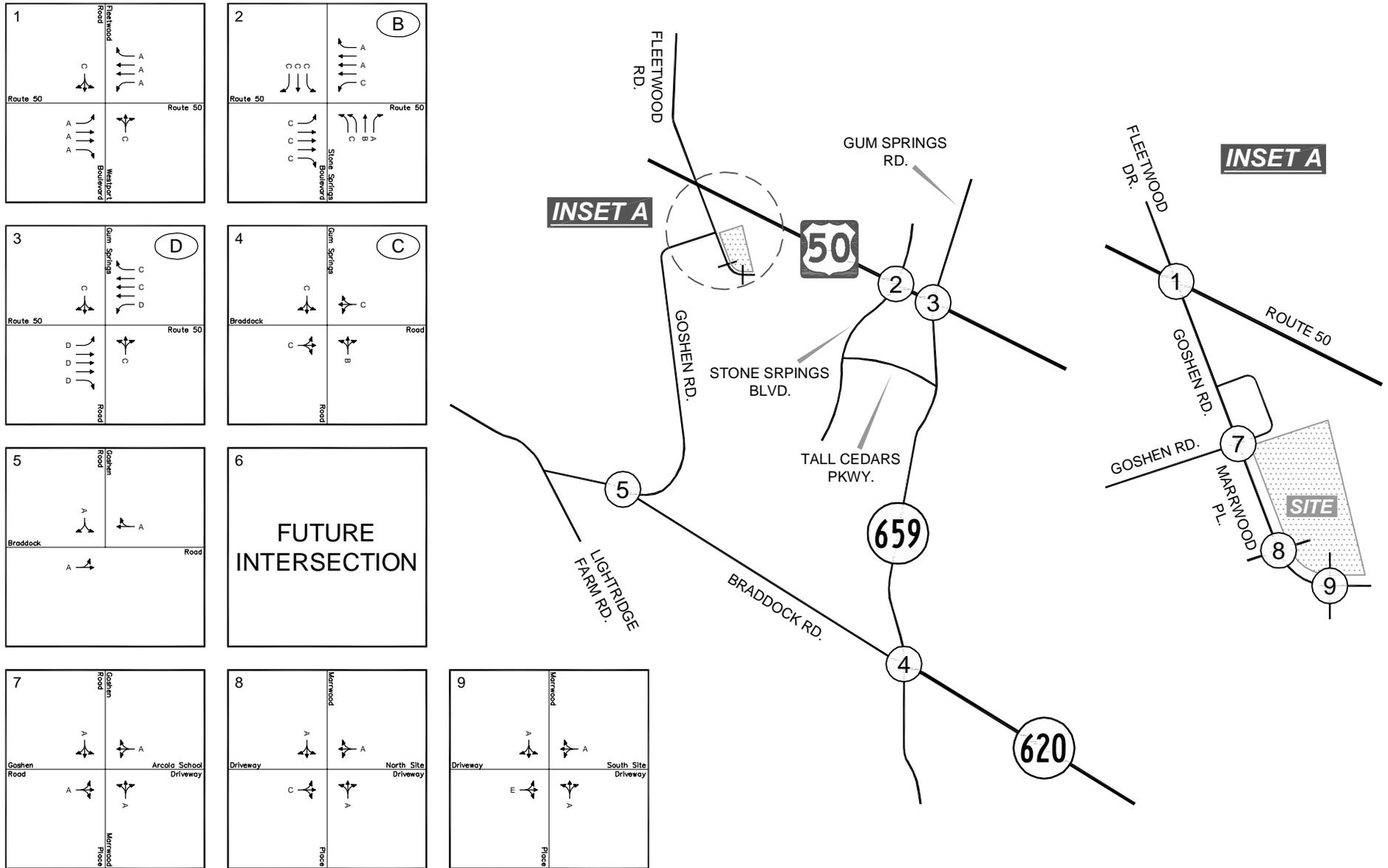
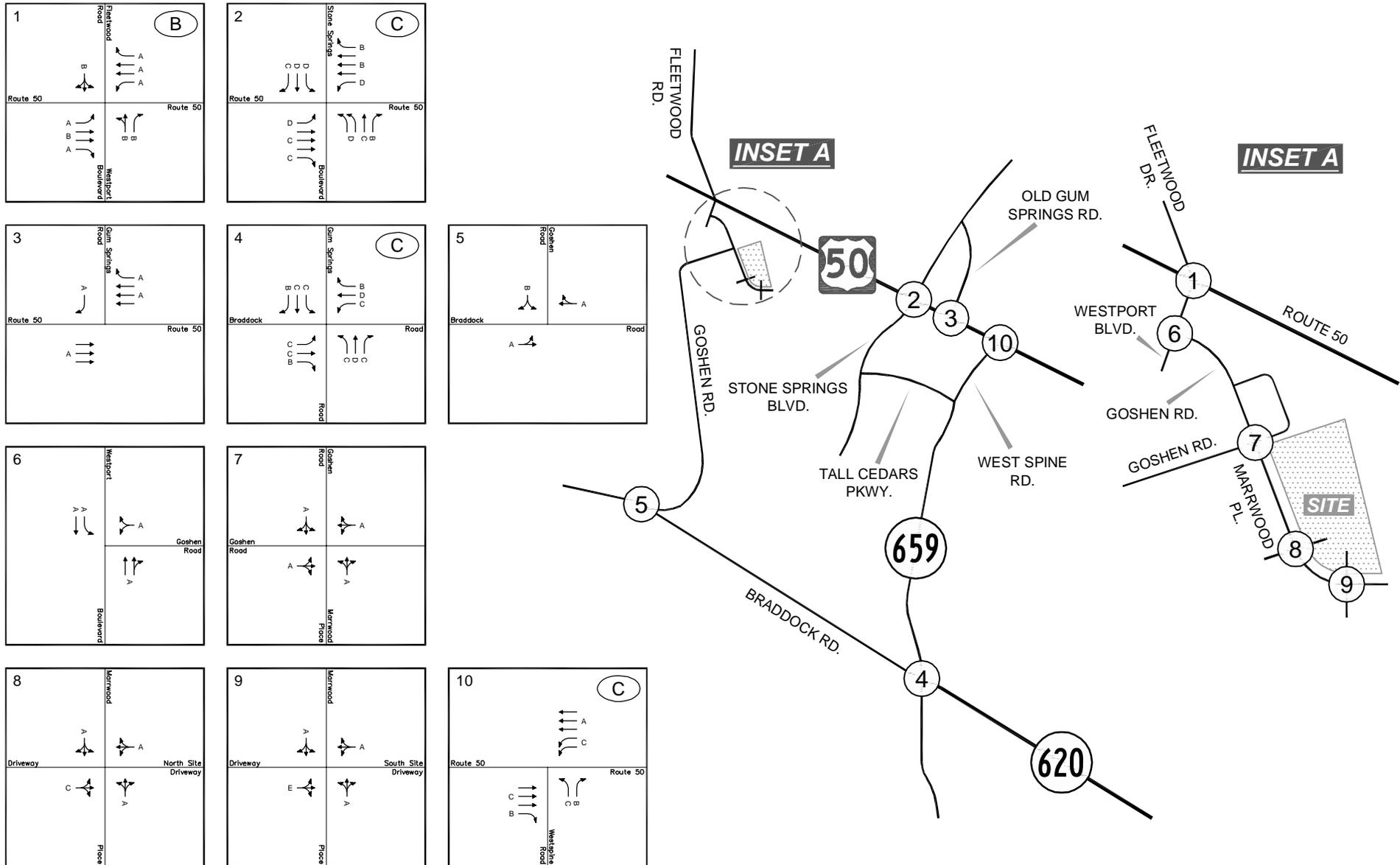


Figure 4-9
2012 Levels of Service without Special Exception Use

X Levels of Service
(X) Overall Levels of Service





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Figure 4-10
2015 Levels of Service without Special Exception Use

X Levels of Service
 (X) Overall Levels of Service



SECTION 5 TRIP GENERATION, DISTRIBUTION AND ASSIGNMENT

TRIP GENERATION

The volume of trips generated by the proposed CDA Loudoun Property special exception uses was calculated using the standard rates and equations published in the Institute of Transportation Engineers Trip Generation, Seventh Edition.

The results are summarized on Table 5-1, and indicate that the currently approved 19 residential units would generate 21 trips (11 in and 10 out) during the Sunday peak hour and 158 daily (24-hour) trips.

The proposed special exception uses (1,200-seat church) would generate 744 trips (387 in and 357 out) during the Sunday peak hour and 1,836 daily (24-hour) trips. Thus, the proposed special exception uses would generate 723 more peak hour trips and 1,678 more daily trips than the currently approved density. The private school is not anticipated to generate any trips on a typical Sunday.

SITE TRIP DISTRIBUTION AND ASSIGNMENT

The distribution of peak hour trips generated by the CDA Loudoun Property was determined based on information provided by the Catholic Diocese of Arlington related to the service area of the church and congregation. The following distributions were derived based on this data:

<u>To/From</u>	<u>Percentage</u>
West via U.S. Route 50	10 percent
North on existing Gum Spring Road	5 percent
East on U.S. Route 50	60 percent
East via Braddock Road	15 percent
South via existing Gum Spring Road	8 percent
West via Braddock Road	<u>2 percent</u>
Total	100 percent

The resulting traffic assignments and directional distributions are shown on Figures 5-1 and 5-2.

Table 5-1
 Catholic Diocese of Arlington - Loudoun Property
 Site Trip Generation Analysis(1)

Land Use	ITE Land Use Code	Size	Units	Sunday Peak Hour			Sunday ADT
				In	Out	Total	
Approved Development							
Single Family Detached(2)	210	19	D.U.	11	10	21	158
Proposed Development							
<u>Phase I</u>							
Church(3)	560	58,000	SF	387	357	744	1,836
PHASE I NET NEW TRIPS (Approved vs. Proposed)				376	347	723	1,678
<u>Phase II</u>							
Private School K-8	534	200	Students	-	-	-	-
Development Total				387	357	744	1,836
BUILDOUT NET NEW TRIPS (Approved vs. Proposed)				376	347	723	1,678

Notes:

- (1) Traffic estimates based on Institute of Transportation Engineers (ITE) Trip Generation, Seventh Edition.
- (2) Peak Hour of Generator
- (2) Based on Equivalent 1,200-seat Parish.

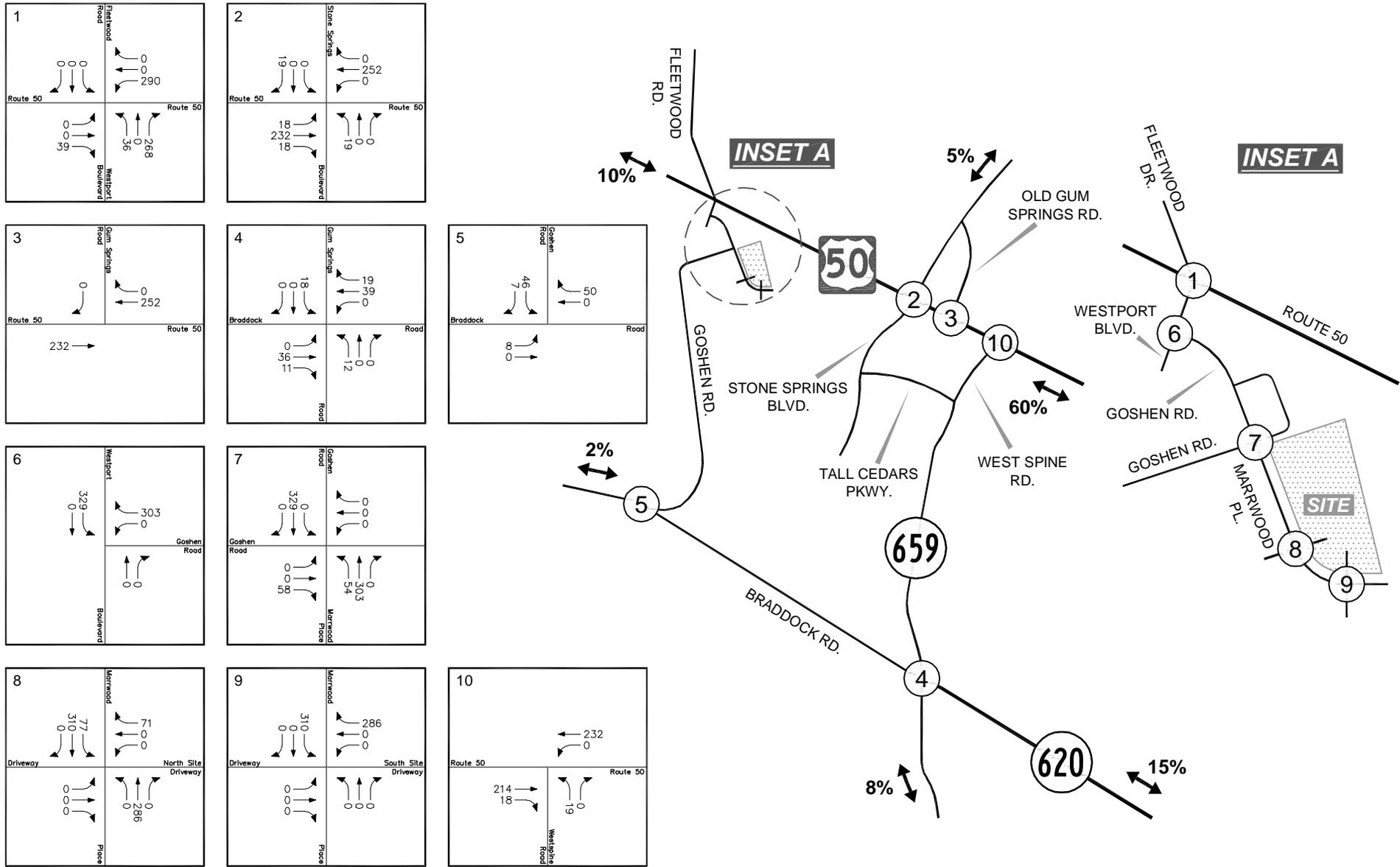


Figure 5-2
2015 Site Generated Traffic Assignments and Directional Distributions (Sunday)

XX% Directional Distribution

000 3000 PEAK HOUR



SECTION 6 ANALYSIS OF FUTURE CONDITIONS WITH SPECIAL EXCEPTION USES

TRAFFIC VOLUMES

Future traffic forecasts were developed by adding the existing traffic volumes, traffic generated by adjacent developments, and the traffic generated by the proposed special exception uses, and are summarized on Figures 6-1 and 6-2.

CAPACITY ANALYSIS

Future peak hour levels of service with the CDA Loudoun Property were estimated at the key intersections in the study area based on the total future traffic forecasts are shown on Figures 6-1 and 6-2, the future lane usage and traffic controls shown on Figures 4-1 and 4-2, and the Synchro 7 software, in accordance with the FSM. The results are presented in Appendices J and K, summarized in Table 6-1 and Figures 6-3 and 6-4, and discussed below.

Near-term (2012)

1. The side-street movements on Goshen Road at the U.S. Route 50 intersection are anticipated to operate beyond capacity at LOS "F" during the Sunday peak hour under stop sign control. This is primarily due to the large influx of trips generated by the church during morning service.
2. All movements at the U.S. Route 50/Stone Springs Boulevard intersection are expected to continue to operate at acceptable levels of service in the near-term, similar to background conditions.
3. Individual movements at the U.S. Route 50/Gum Spring Road intersection would operate at LOS "E" during the Sunday peak hour. In order for these and all other movements to reflect satisfactory levels of service, traffic signal optimization will need to be conducted on Sundays during the peak hour in order to mitigate the volume of traffic utilizing the intersection.
4. All movements at the Braddock Road/Gum Spring Road intersection are expected to continue to operate at acceptable levels of service assuming the installation of a new traffic signal under near-term background conditions.
5. All intersections along Goshen Road are expected to operate at acceptable levels of service during the Sunday peak hour.
6. Most of the site driveways along future Marrwood Place are anticipated to operate at acceptable levels of service in the near-term. The eastbound approach of the southern

driveway is expected to operate at LOS “E”. This movement serves the Marrwood development.

Long-term (2015)

1. Assuming the realignment by the Westport property and the installation of a new traffic signal and a northbound right turn lane at the intersection, all movements are expected to continue to operate at acceptable levels of service.
2. The U.S. Route 50/Stone Springs Boulevard intersection will continue to operate at acceptable levels of service.
3. Under long-term (2015) conditions, the U.S. Route 50/Gum Spring Road intersection is planned to be cul-de-sac to the south of U.S. Route 50 and converted to right-in/right-out only to the north. Thus, all movements are expected to operate at acceptable levels of service.
4. The planned intersection of U.S. Route 50/West Spine Road is expected to operate at acceptable levels of service assuming the background improvements are installed.
5. All movements at the Braddock Road/Gum Spring Road intersection are anticipated to operate at acceptable levels of service during the Sunday peak hour. This assumes the prior installation of a new traffic signal and separate turn lanes at all approaches under background conditions.
6. All intersections along Goshen Road are expected to operate at acceptable levels of service during the Sunday peak hour.
7. The planned intersection of Westport Boulevard and realigned Goshen Road is expected to operate at acceptable levels of service. It is noted that the southbound lefts would benefit from the separate left turn lane as coordinated between Westport and Arcola School.
8. Most of the site driveways along future Marrwood Place are anticipated to operate at acceptable levels of service in the near-term. The eastbound approach of the southern driveway is expected to operate at LOS “E”. This movement serves the Marrwood development.

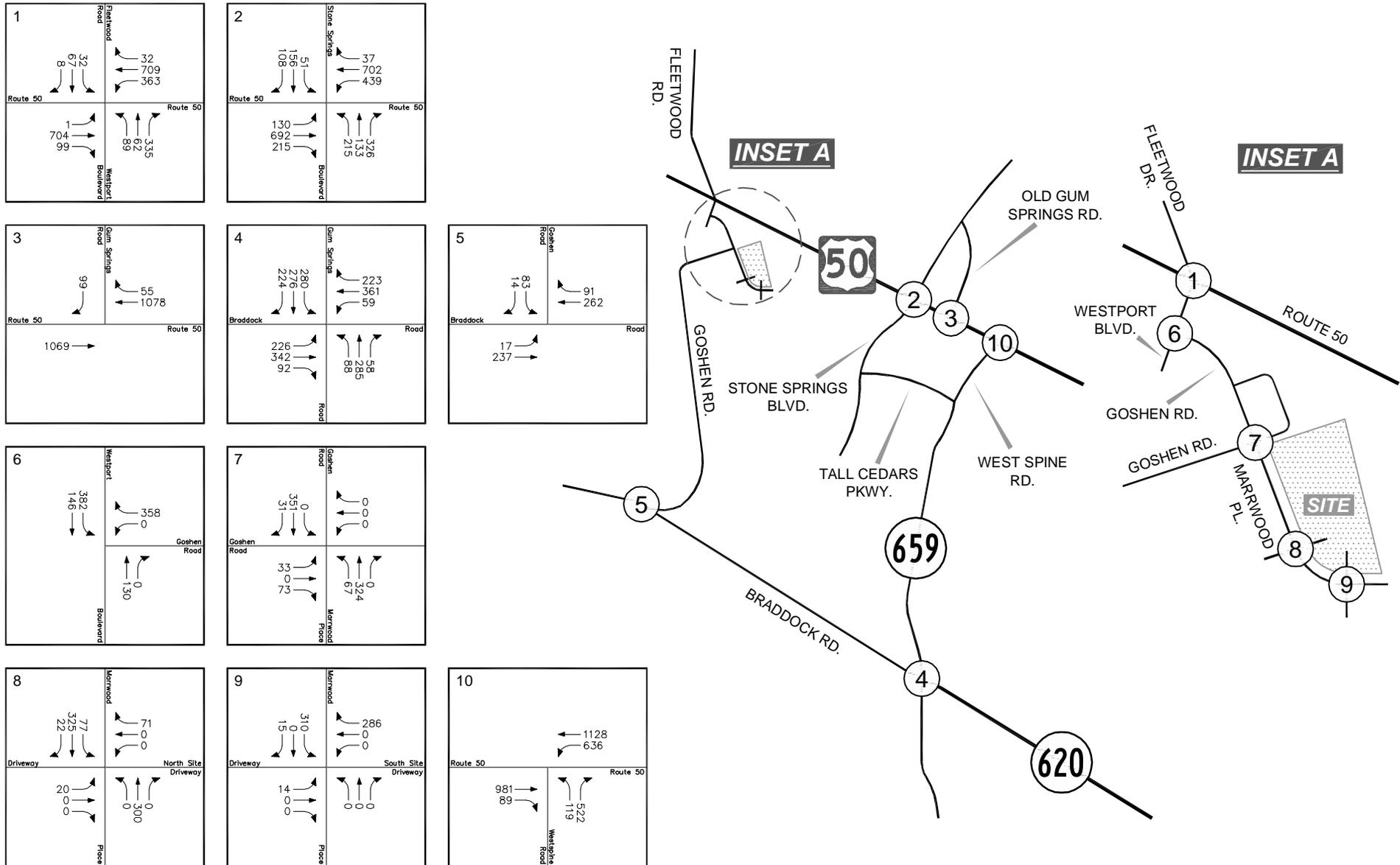


Figure 6-2
2015 Peak Hour Traffic Forecasts with Special Exception Use (Sunday)

3:00 PM PEAK HOUR



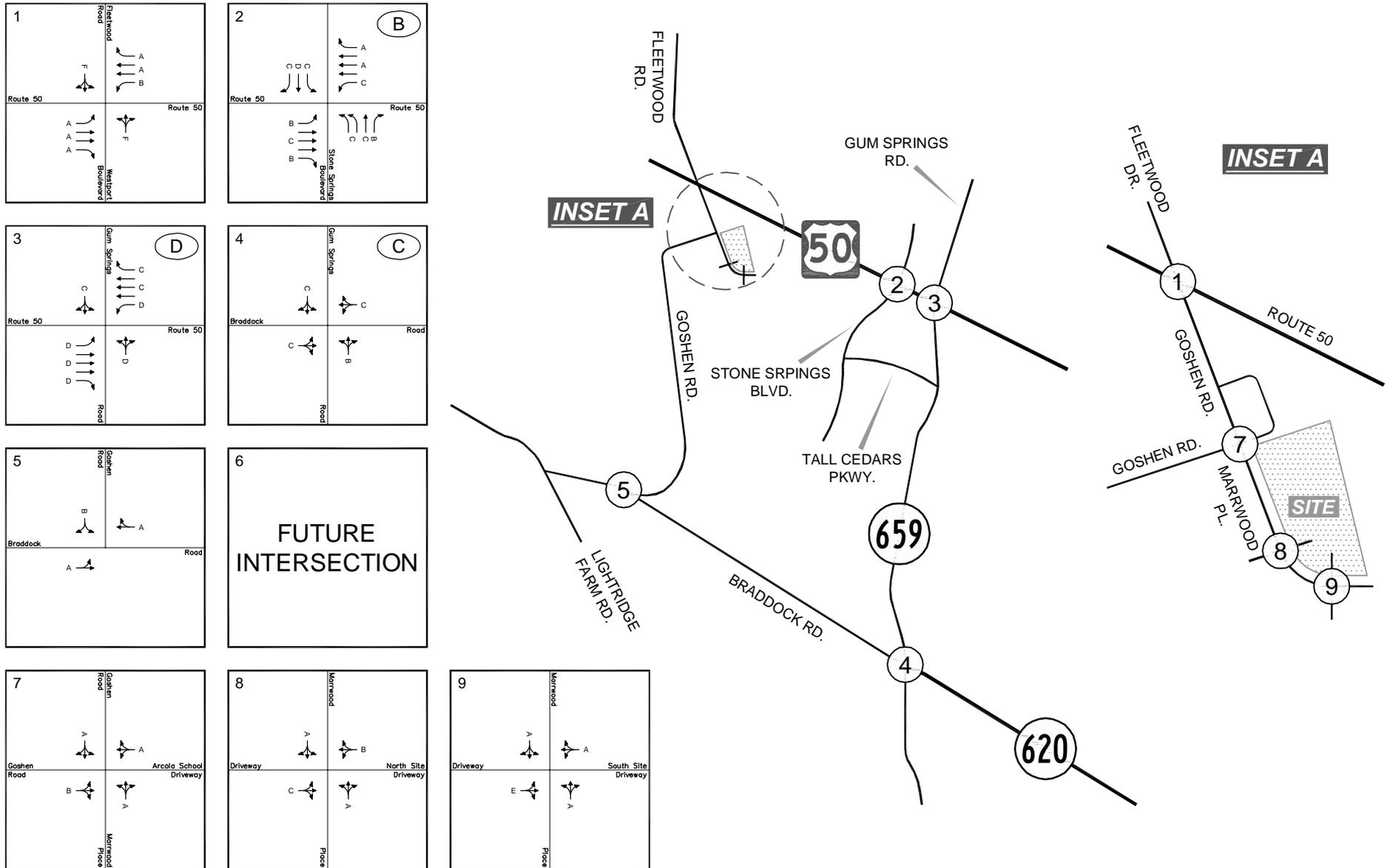


Figure 6-3
2012 Levels of Service with Special Exception Use

X Levels of Service
O Overall Levels of Service



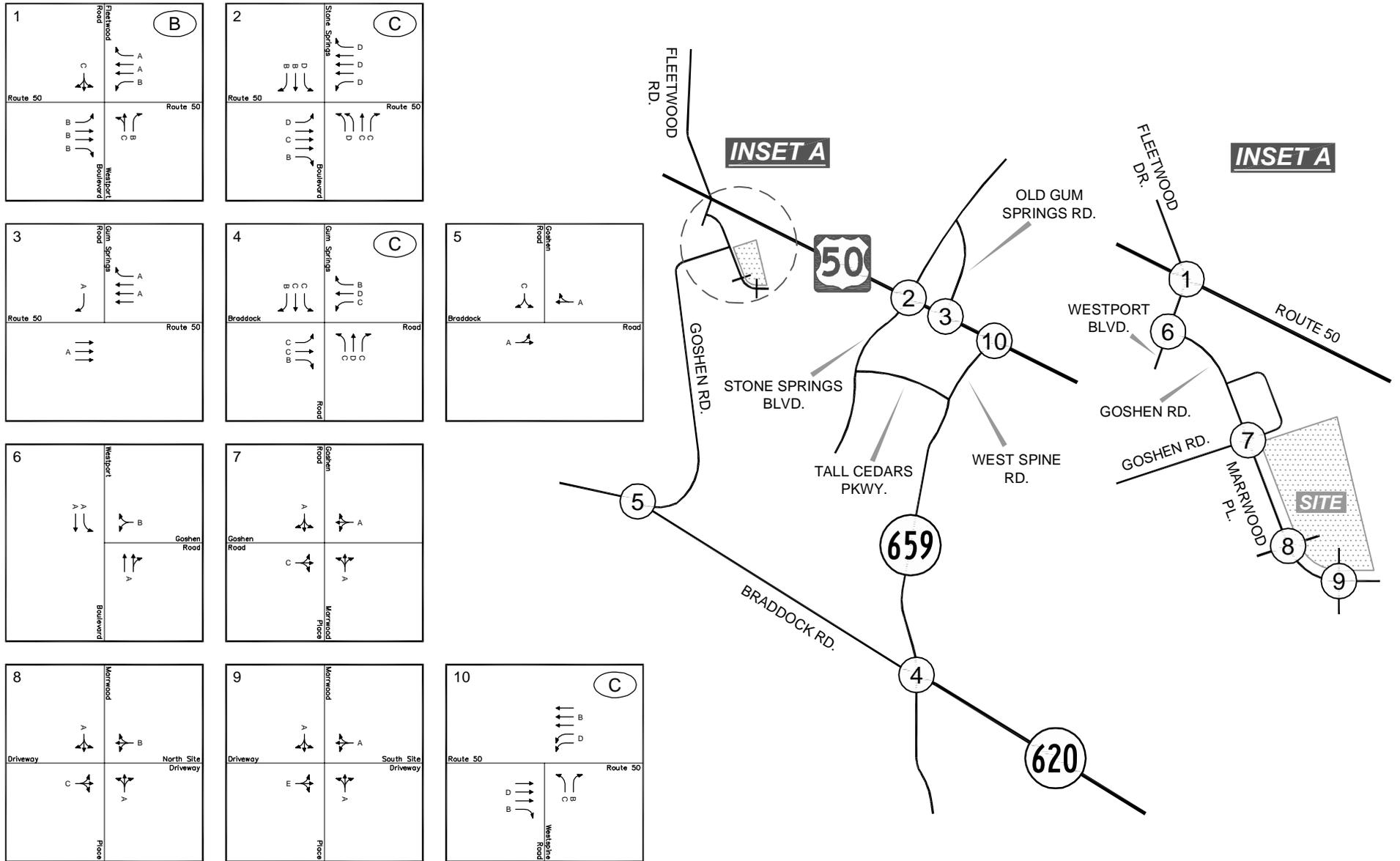


Figure 6-4
2015 Levels of Service with Special Exception Use

X Levels of Service
⊗ Overall Levels of Service



SECTION 7 RECOMMENDED IMPROVEMENTS

LIST OF IMPROVEMENTS

Capacity analyses were prepared for future 2012 and 2015 conditions to identify the roadway improvements required beyond those specified without the proposed special exception uses. The additional improvements specifically associated with the proposed development include the following (refer to Figures 6-3 and 6-4):

1. Under near-term (2012) conditions with the proposed development, it is expected that traffic signal optimization would need to be conducted in order to maintain satisfactory levels of service at the U.S. Route 50/Gum Spring Road intersection. No further mitigation is necessary at this intersection, due to the construction of West Spine Road and the ultimate removal of full access at the U.S. Route 50/Gum Spring Road intersection.
2. The driveways serving the church should provide single lanes for inbound and outbound traffic. They should be aligned with the planned access to the Marrwood property.
3. Although the side-street movements on Goshen Road at the U.S. Route 50 intersection are expected to operate beyond capacity during the Sunday peak hour in the near-term, no additional improvements are recommended. Further, an evaluation of the westbound left turn lane indicates that the existing geometry provides 130 feet of storage and 135 feet of taper. This would need to be lengthened to meet current VDOT standards. However, the improvements planned by Westport would provide adequate storage at the intersection. Thus, although capacity analyses indicate that the westbound left turn queue would not exceed the storage area, it is recommended that temporary traffic control personnel be provided at the intersection during the Sunday service hours under near-term conditions to ensure adequate operations and eliminate any potential for queuing of westbound traffic. It will also facilitate exiting traffic on Goshen Road. The need for traffic control personnel may be eliminated in 2015 when the traffic signal and improvements by others are installed. The analyses presented for 2015 conditions are conservative since they do not assume the planned extension of Marrwood Place to the east through Stone Ridge. This extension would reduce the amount of site-generated traffic that will utilize U.S. Route 50 and Goshen Road.

No other improvements are recommended due to the overall low impact on the surrounding area in either development year.

SECTION 8 CONCLUSIONS AND RECOMMENDATIONS – SUNDAY CONDITIONS

The conclusions of this study for Sunday conditions are as follows:

1. All of the existing intersections currently operate at acceptable levels of service during the midday peak hour on Sunday. All of the approaches and turning movements at both signalized and unsignalized locations currently operate at LOS “D” or better.
2. The CDA Loudoun Property is currently approved for 19 single-family homes. The proposed special exception would allow for the development of a 1,200-seat church and 200-student private school. This change in use and density would generate 744 peak hour trips and 1,836 daily (24-hour) trips on a typical Sunday. This represents 723 *more* peak hour trips and 1,678 *more* daily trips than the currently approved density.
3. The results of the capacity analyses indicate that the all of the intersections would continue to operate at acceptable levels of service on Sunday with the special exception uses. The existing lane use configuration at the Goshen Road/U.S. Route 50 intersection would adequately serve the site under 2012 conditions assuming traffic control personnel are provided during Sunday service hours. The improvements planned by others in 2015 would continue to provide adequate levels of service with full development of the site and may eliminate the need for traffic control personnel.
4. The planned construction of Marrwood Place and driveways serving the site would adequately accommodate the special exception uses under both 2012 and 2015 conditions. No further road improvements beyond those currently planned are required.

SECTION 9 AVERAGE WEEKDAY TRAFFIC IMPACT ANALYSIS

INTRODUCTION

This section presents a traffic impact analysis for the CDA Loudoun Property Special Exception for the proposed 1,200-seat church (phase I) and 200-student private school (phase II). The following analysis reviews the impacts associated with both phases of the proposed development under average weekday AM and PM peak hours with a limited study scope, since the proposed development does not meet VDOT 527 requirements. The site is located on the east side of Goshen Road (VA Route 616) and south of U.S. Route 50 in the Dulles South area of Loudoun County, Virginia. The previously prepared sections of this document should be referenced for general background information, study area, site access and other features.

This weekday analysis has been prepared in coordination with the Loudoun County Office of Transportation Services (OTS) and the Virginia Department of Transportation (VDOT) related to the traffic study scope. The weekday analyses were prepared to reflect the study scope outlined with OTS since the project would not meet Virginia Chapter 527 conditions. As specified in the agreement, a buildout plus 10-year condition was not required, as outlined in Appendix A. A compliance package for weekday conditions is contained in Appendix L.

Compliance with VDOT Chapter 527 Guidelines

This traffic report is accompanied by a compliance package for weekday conditions, as required by 24 VAC 30-155. Implementation of the new regulations has been phased statewide over 18 months (July 01, 2007 to January 01, 2009). Implementation in the Northern Virginia District of VDOT began on July 01, 2007. As of January 1, 2008, site plans for commercial sites generating less than 250 peak hour trips and 2,500 daily trips are exempt from Chapter 527 Guidelines. The proposed special exception church and private school use is estimated to generate less than the 250 peak hour trips and 2,500 daily trip thresholds and would be exempt from 527 Guidelines on weekdays. It is noted that the 1,200-seat church exceeds the 250 peak hour trip threshold during the Sunday peak hour and was addressed in the previously presented sections of this report.

Study Area

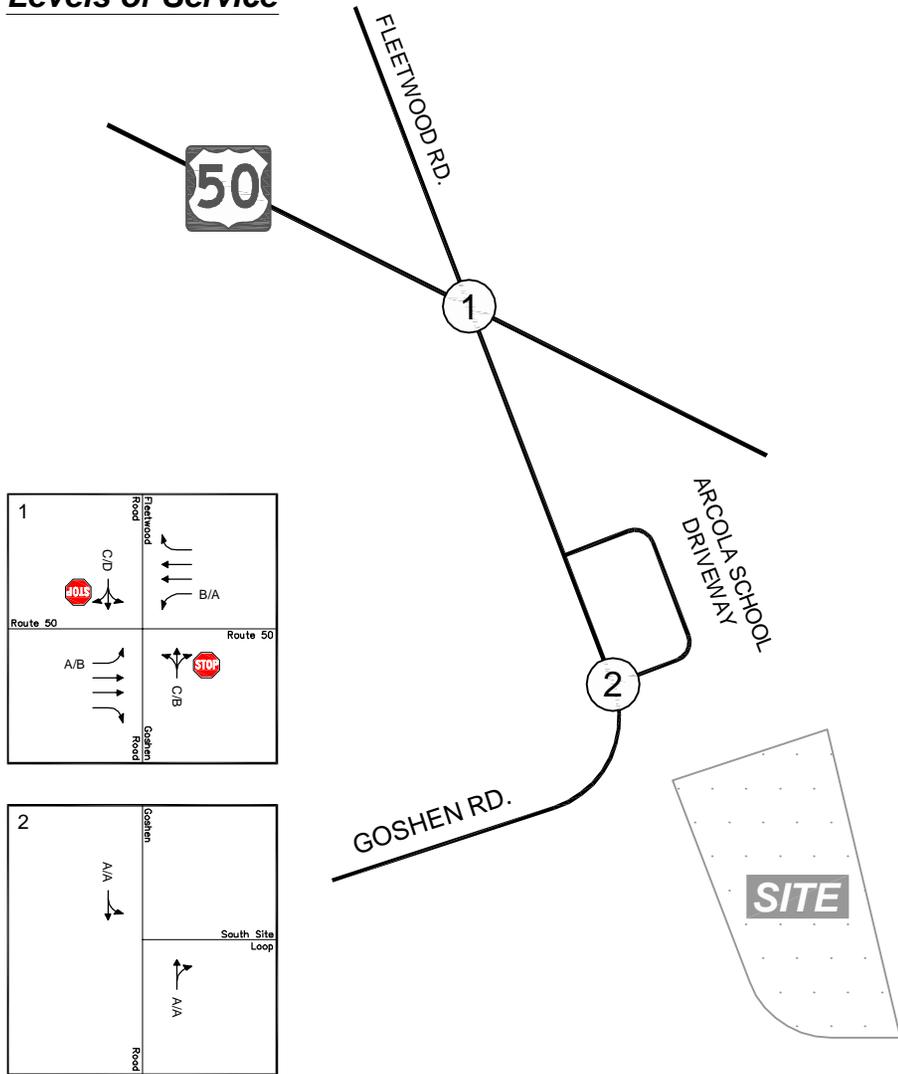
As required by Loudoun County, the following intersections were included in the weekday analysis:

1. Goshen Road (VA Route 616)/Fleetwood Road/U.S. Route 50.
2. Goshen Road (VA Route 616)/Arcola School South Site Driveway/Marrwood Place.
3. All proposed site driveways.

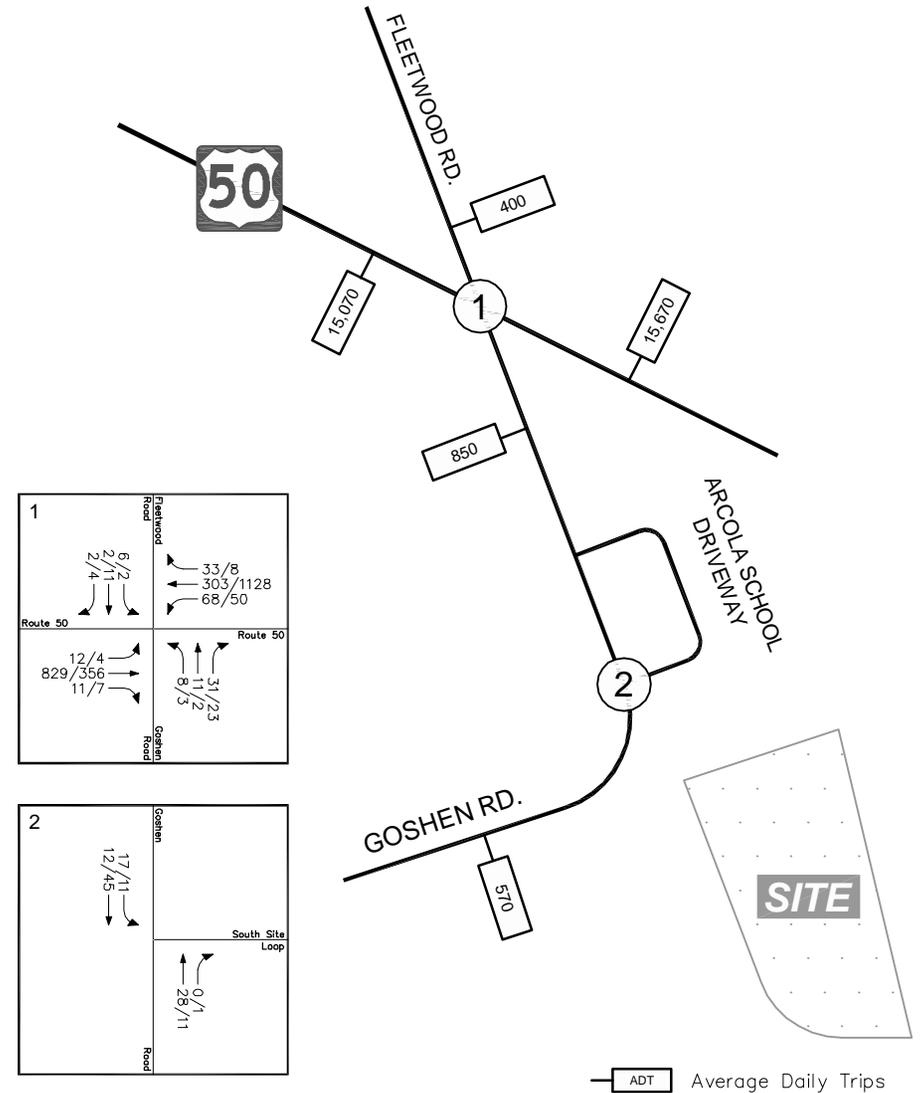
Existing Traffic Counts

Wells + Associates conducted peak hour traffic counts at the aforementioned intersections on a typical weekday in February 2008. These counts were reasonably balanced between intersections to better reflect the flow of traffic on the network. The results are shown on Figure 9-1 along with lane use and traffic control and average daily traffic estimates. This information is also contained in Appendix M.

Existing Lane Use and Traffic Control, and Levels of Service



Existing Peak Hour Traffic Counts and ADT



53

Figure 9-1 Existing Weekday Peak Hour Traffic Volumes, Levels of Service and Existing Lane Use and Traffic Control

xx Levels of Service
 (X) Overall Levels of Service

← Represents One Travel Lane
 Signalized Intersection
 Stop Sign

AM PEAK HOUR
 PM PEAK HOUR
 000/000



Existing Levels of Service

Existing peak hour levels of service were estimated at the two key existing intersections in the study area based on the existing lane usage and traffic control and existing traffic volumes shown on Figure 9-1, and the Highway Capacity Manual methodology (Synchro version 7). The results are presented in Appendix N and summarized in Table 9-1, and indicates that all of the turning movements at the Goshen Road/U.S. Route 50 intersection and the Goshen Road/Arcola School South Site Entrance on Goshen Road currently operate at acceptable levels of service during both the AM and PM peak hours under stop sign control.

Other Approved Development Trip Assignments

The traffic anticipated to be generated by the other developments including the approved development program for the CDA Loudoun Property (19 SFDU) were assigned to the study network according to distributions from previous studies, existing travel patterns and traffic counts, and local knowledge.

Trip assignments generated by all other approved developments for 2012 and 2015 are shown on Figure 9-2. Trip generation estimates and isolated traffic assignments for background development are contained in Appendix O.

Growth Rate

Based on recent conversations with VDOT, a regional growth rate of 2.0 percent per year compounded was applied to the through traffic on U.S. Route 50. To remain conservative a 2.0 percent growth rate was also used on all turning movements at the Goshen Road/U.S. Route 50 intersection and on the through traffic movements on Goshen Road. This rate was used for both conditions (2012 and 2015). The annually compounded growth is depicted on Figure 9-3.

Future Lane Use and Traffic Control

As discussed in the previous sections of this report, access to the proposed site would be provided via two future driveways located on Marrwood Place just to the east of Goshen Road. Under phase I (2012) conditions, no major road improvements are planned within the immediate site vicinity. By 2015, improvements planned by others were assumed as shown on Figure 9-4.

Table 9-1
Catholic Diocese of Arlington Loudoun Property
Weekday Intersection Level of Service

Intersection	Intersection Control	Critical Movement	2008		2012				2015				
			Existing		Background Future		Total Future		Background Future		Total Future		
			AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	
1. John Mosby Highway (Route 50)/ Goshen Road (Route 616)/Fleetwood Road	Unsignalized	EBL	A [8.1]	B [11.7]	A [8.5]	B [13.5]	A [8.5]	B [13.5]	N/A	N/A	N/A	N/A	
		WBL	B [10.5]	A [8.3]	B [13.5]	A [9.7]	B [13.9]	A [9.7]					
		NBLTR	C [17.2]	B [12.3]	F [186.2]	F [135.3]	F [199.4]	F [136.9]					
		SBLTR	C [18.3]	D [27.6]	F [206.6]	F [186.9]	F [269.9]	F [194.7]					
	2015 Background Improvement: Realign Goshen Road, Construct Westport Boulevard, Install Signal	Signalized	EBL	N/A	N/A	N/A	N/A	N/A	N/A	B (13.2)	B (16.4)	B (15.6)	B [16.8]
			EBT							C (22.9)	B (17.1)	C (27.0)	B [17.8]
			EBR							B (14.3)	B (14.0)	B (17.1)	B [14.7]
			WBL							B (17.8)	A (9.7)	C (34.6)	B [11.1]
			WBT							B (10.9)	C (20.4)	B (11.8)	C [20.4]
			WBR							A (9.1)	A (8.6)	A (9.8)	A [8.6]
NBLT	D (38.5)	C (29.3)	D (47.1)	C (33.3)									
NBR	C (21.2)	B (17.7)	C (22.1)	B (17.3)									
SBLTR	C (28.2)	C (27.5)	C (30.9)	C (27.6)									
Overall								C (20.8)	B (19.2)	C (25.4)	B (19.6)		
2. Goshen Road (Route 616)/ Westport Boulevard	Unsignalized	WBLR SBL	N/A	N/A	N/A	N/A	N/A	B [11.4] A [8.4]	B [10.2] A [8.0]	B [13.7] A [8.7]	B [11.4] A [8.2]		
3. Goshen Road (Route 616)/ Arcola School Driveway/Marrwood Place	Unsignalized	EBLTR WBLTR NBLTR SBLTR	A [0.0] A [0.0] N/A A [4.3]	A [0.0] A [0.0] N/A A [1.5]	B [11.8] A [9.7] A [2.4] A [4.9]	B [10.3] A [9.5] A [2.6] A [2.3]	B [11.9] A [9.7] A [2.0] A [4.4]	B [10.5] A [9.7] A [2.2] A [2.1]	B [13.9] B [11.2] A [2.9] A [4.3]	B [11.3] B [10.5] A [3.1] A [2.1]	C [20.6] B [13.9] A [2.3] A [3.0]	B [13.4] B [12.0] A [2.2] A [1.8]	
4. Marrwood Place/ North Site Driveway/Marrwood Driveway	Unsignalized	EBLTR WBLTR SBLTR	N/A	N/A	A [9.1] A [8.5] A [2.1]	A [9.2] A [8.4] A [1.7]	A [9.1] A [8.5] A [1.0]	A [9.5] A [8.5] A [0.3]	A [9.1] A [8.5] A [2.1]	A [9.2] A [8.4] A [1.7]	B [11.0] A [8.9] A [1.4]	B [10.4] A [8.8] A [1.0]	
5. Marrwood Place/ South Site Driveway/Marrwood Driveway	Unsignalized	EBLTR SBLTR	N/A	N/A	A [7.2] A [8.3]	A [7.2] A [8.4]	A [7.3] A [8.8]	A [7.3] A [8.7]	A [7.2] A [8.3]	A [7.2] A [8.4]	A [7.4] A [9.5]	A [7.4] A [9.2]	

Notes:
Numbers in parentheses () represent delay at signalized intersections in seconds per vehicle.
Numbers in square brackets [] represent delay at unsignalized intersections in seconds per vehicle.
Asterisk [*] represents delay in excess of 999.9 seconds.

2012 - Other Development Assignments

2015 - Other Development Assignments

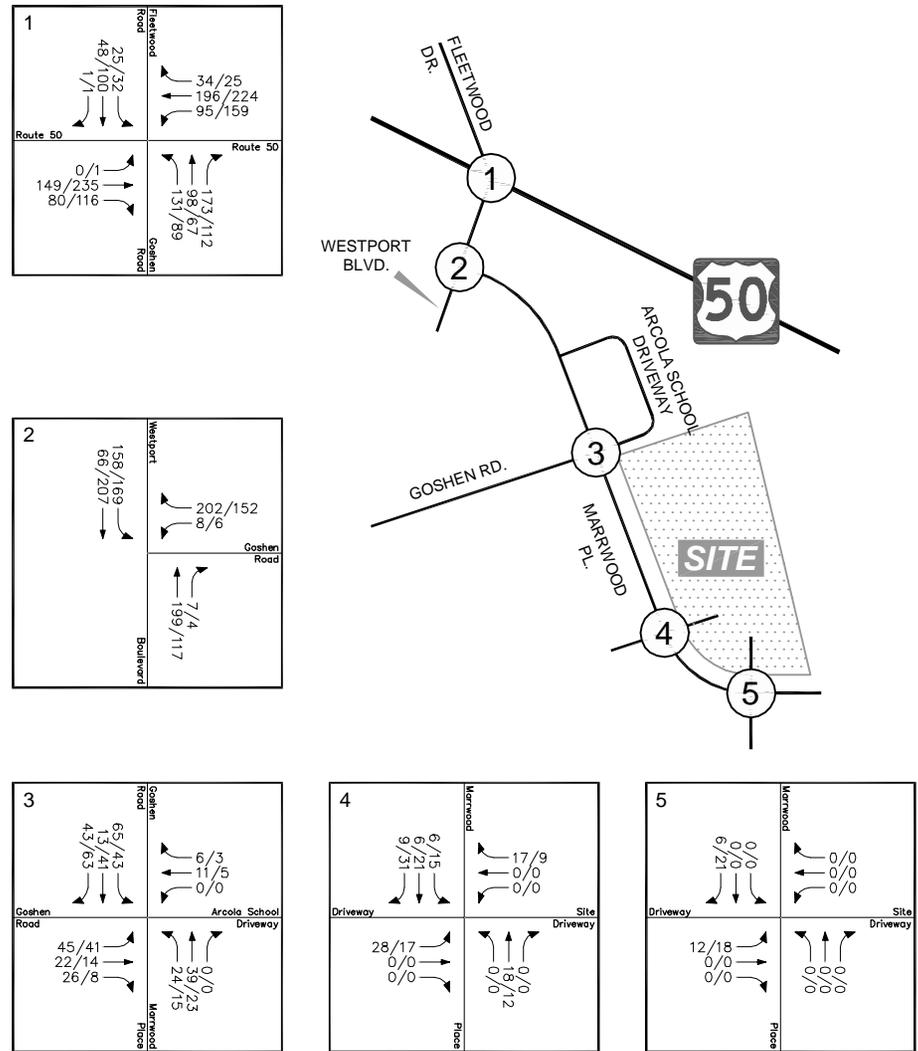
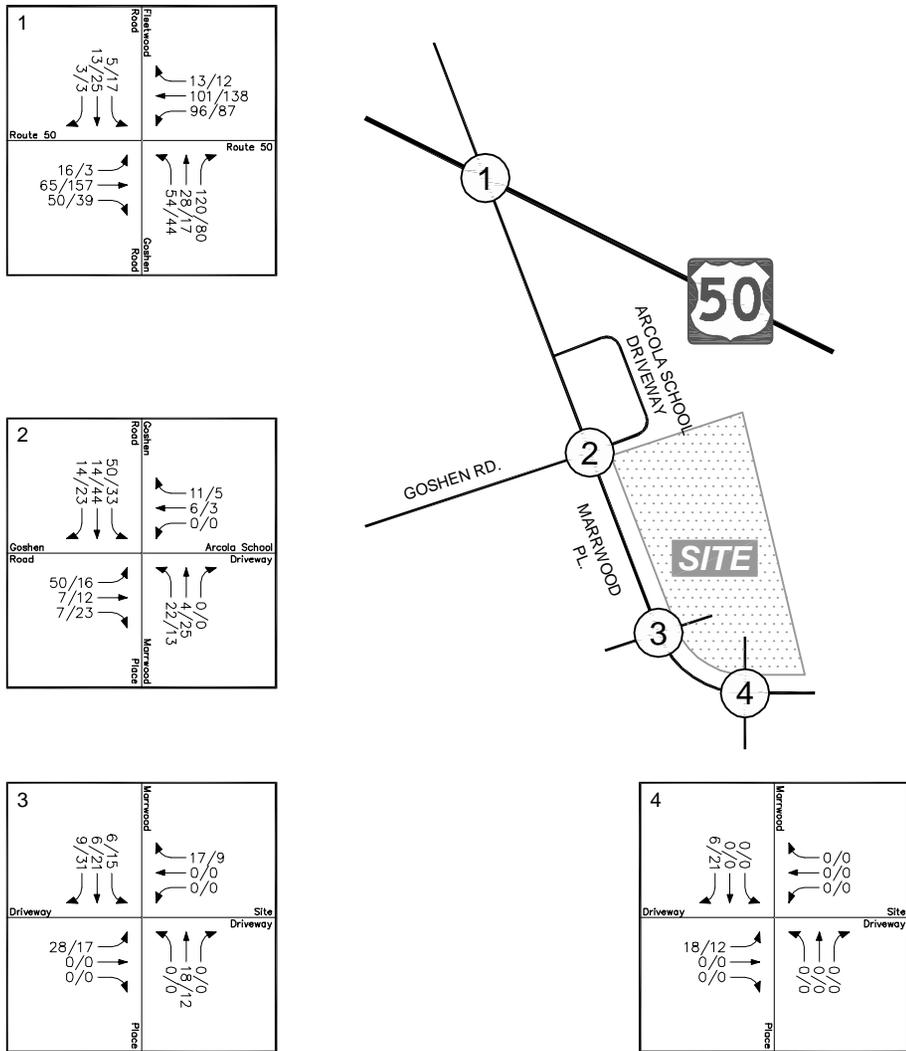
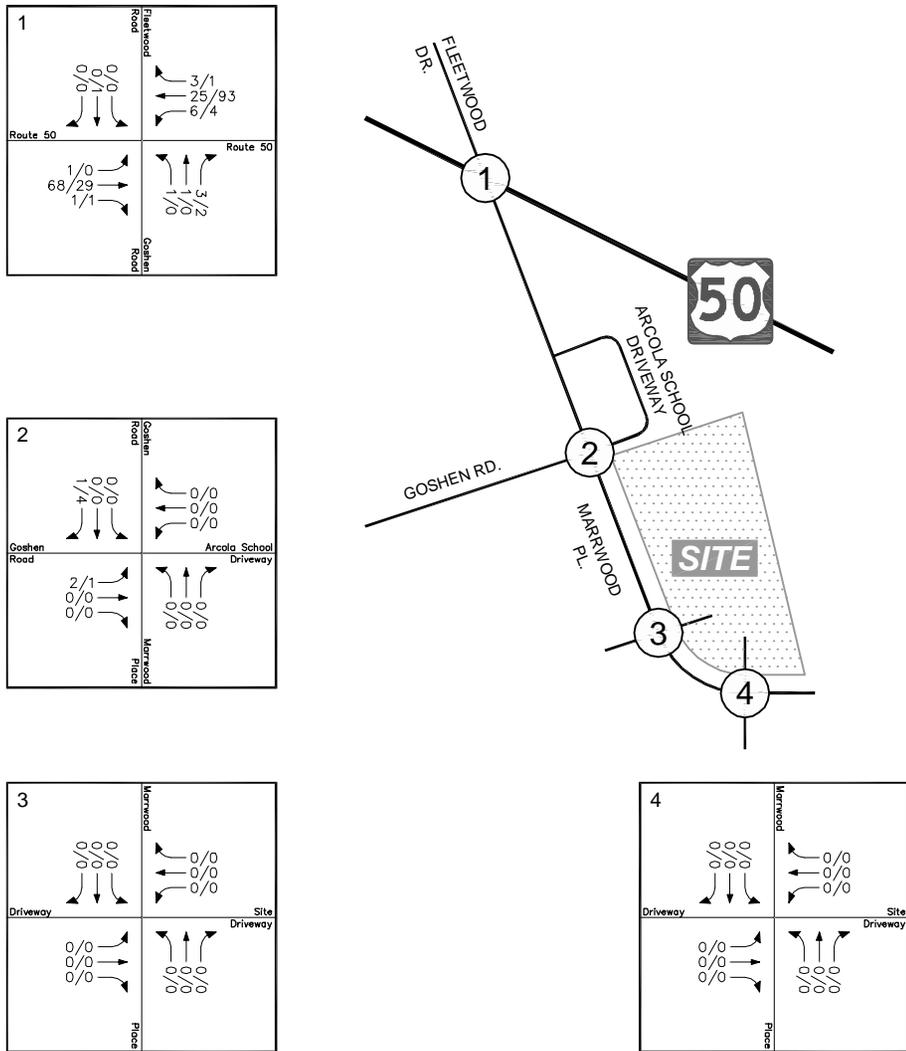


Figure 9-2
Other Development Traffic Assignments (Weekday)

AM PEAK HOUR
PM PEAK HOUR
000/000



2012 - Regional Growth



2015 - Regional Growth

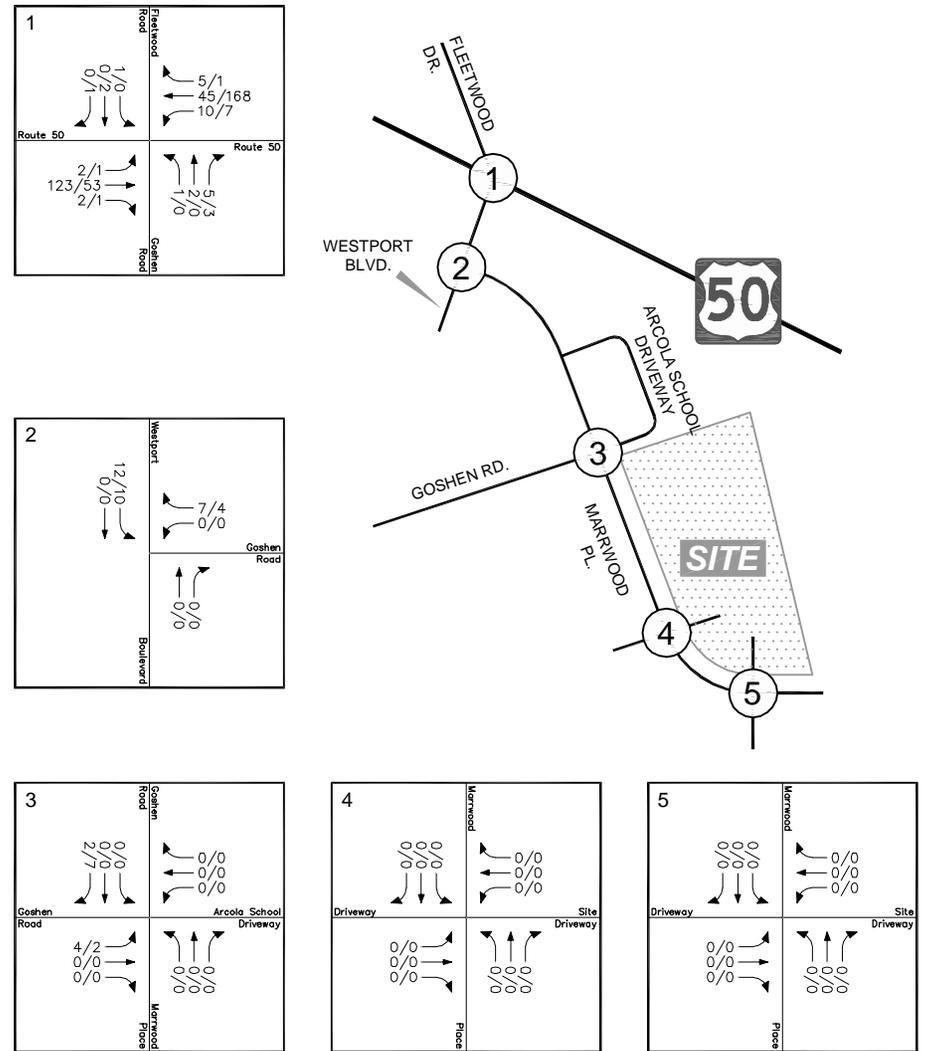


Figure 9-3
Regional Growth

AM PEAK HOUR
PM PEAK HOUR
000/000



2012 - Phase I (Church)

2015 - Phase II (Church and School)

58

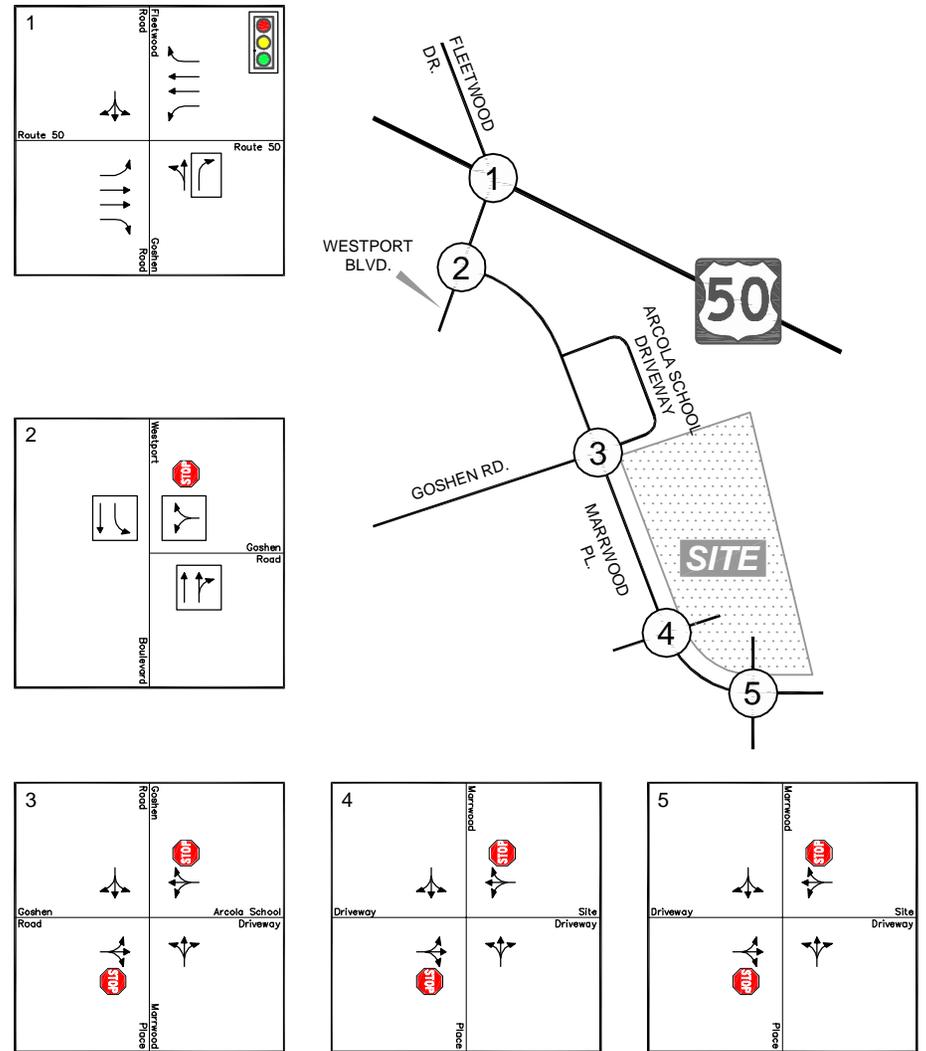
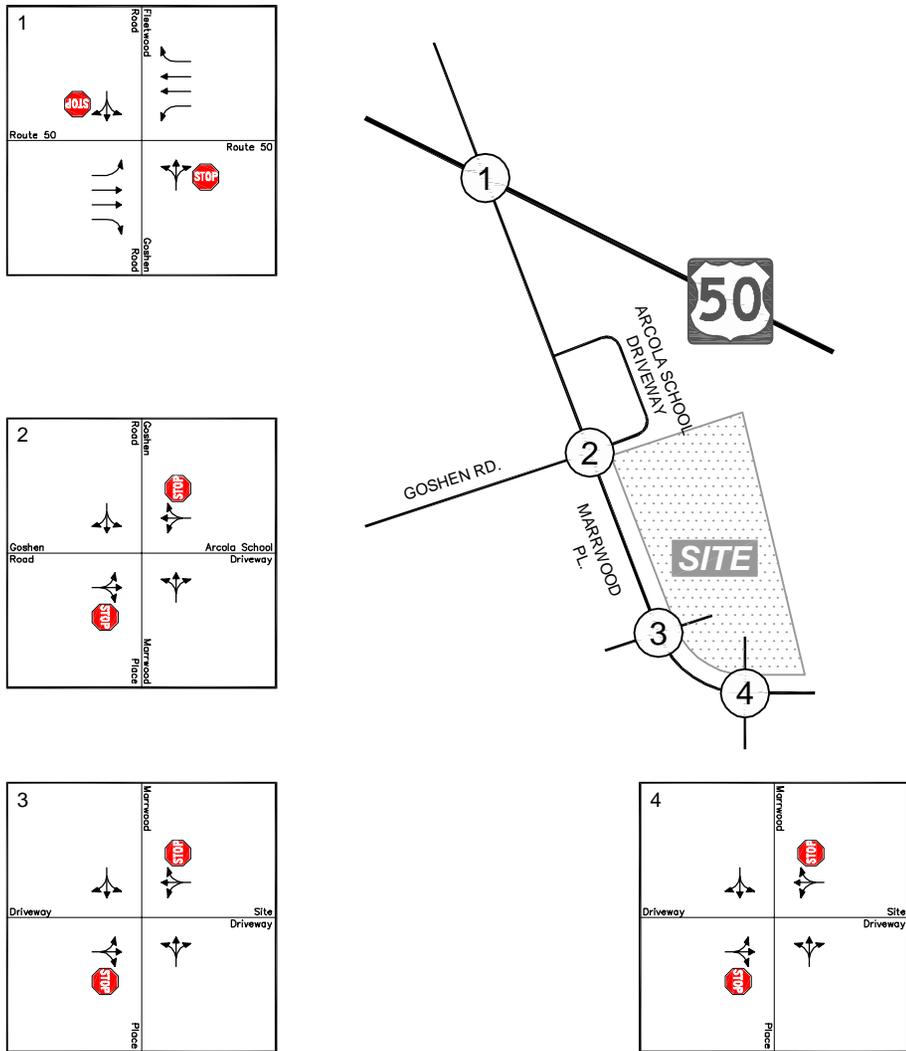


Figure 9-4
Future Lane Use and Traffic Control (Weekday)

- ← Represents One Travel Lane
- Signalized Intersection
- Stop Sign
- Improvements



Future Traffic Forecasts with Approved Development Program

Future traffic forecasts for 2012 and 2015 with the approved development program were developed based on the existing traffic counts, applied growth rate, and traffic generated by other approved developments. These forecasts assume the development of 19 single-family homes on the property. The results are summarized on Figure 9-5 and include average daily traffic estimates.

Future Levels of Service with Approved Development Program

Peak hour levels of service under approved conditions were estimated at the study intersections based on the future lane use and traffic control shown on Figure 9-4, the approved traffic volumes shown on Figure 9-5, and the Highway Capacity Manual methodology (Synchro version 7). The results are presented on Figure 9-6 and in Appendices P and Q and indicate the following:

Near-term (2012)

1. All of the turning movements on U.S. Route 50 at the unsignalized Goshen Road/U.S. Route 50 intersection would continue to operate at acceptable levels of service. However, side street delays are anticipated to operate beyond capacity at LOS "F" during the AM and PM peak hours. It is noted that a review of the traffic signal warrants for this intersection indicated that only Warrant 1B (interruption of continuous traffic) would be met based on average daily traffic estimates. However, meeting this warrant does not constitute the need for a traffic signal at this location and is not recommended due to the relatively low side street volume. Signal warrant information is contained in Appendix R.
2. All of the turning movements at the site driveways would continue to operate at acceptable levels of service during both the AM and PM peak hours under stop sign control.

Long-term (2015)

1. The Westport Boulevard (old Goshen Road)/U.S. Route 50 intersection would operate at acceptable levels of service during both the AM and PM peak hours, assuming the improvements by Westport as described previously which include the installation of a new traffic signal and northbound right turn lane are installed.
2. All of the turning movements at the site driveways would continue to operate at acceptable levels of service during both the AM and PM peak hours under stop control.
3. All of the turning movements at the Westport Boulevard/Goshen Road intersection would operate at acceptable levels of service during peak periods under stop sign control.

2012 - Traffic Forecasts with Approved Program

2015 - Traffic Forecasts with Approved Program

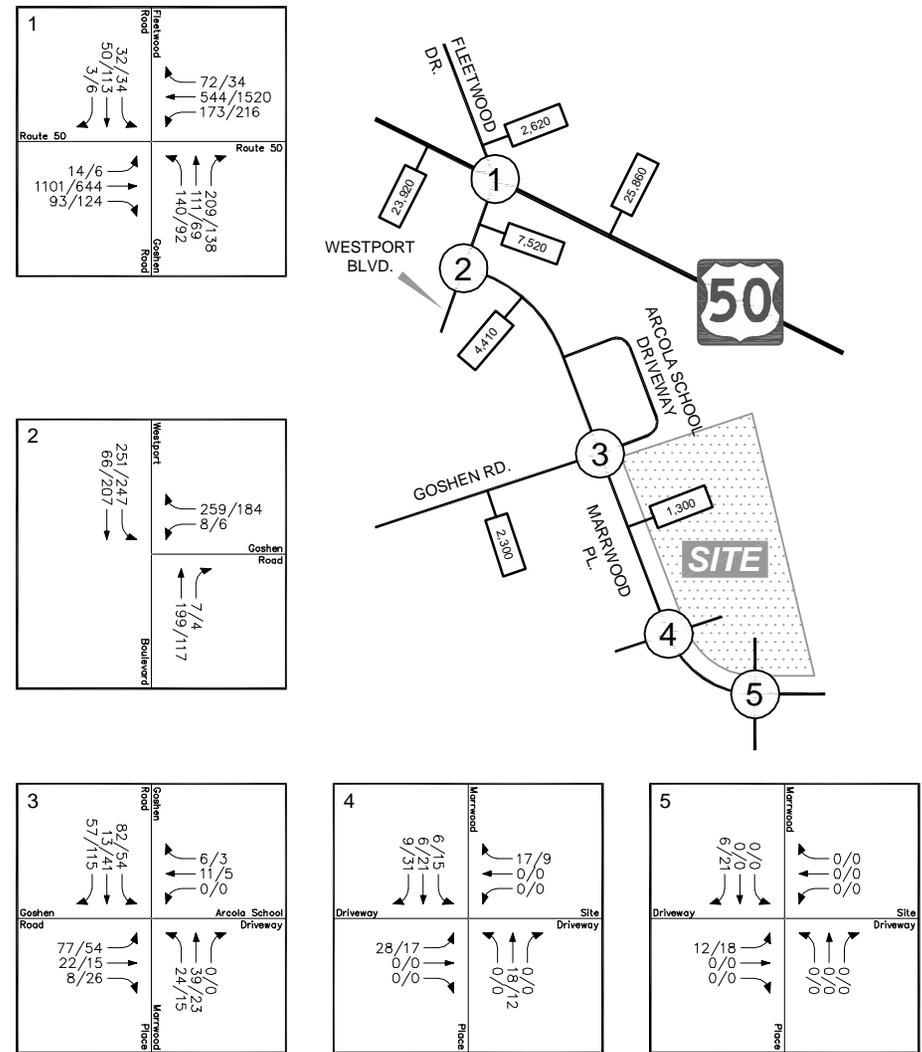
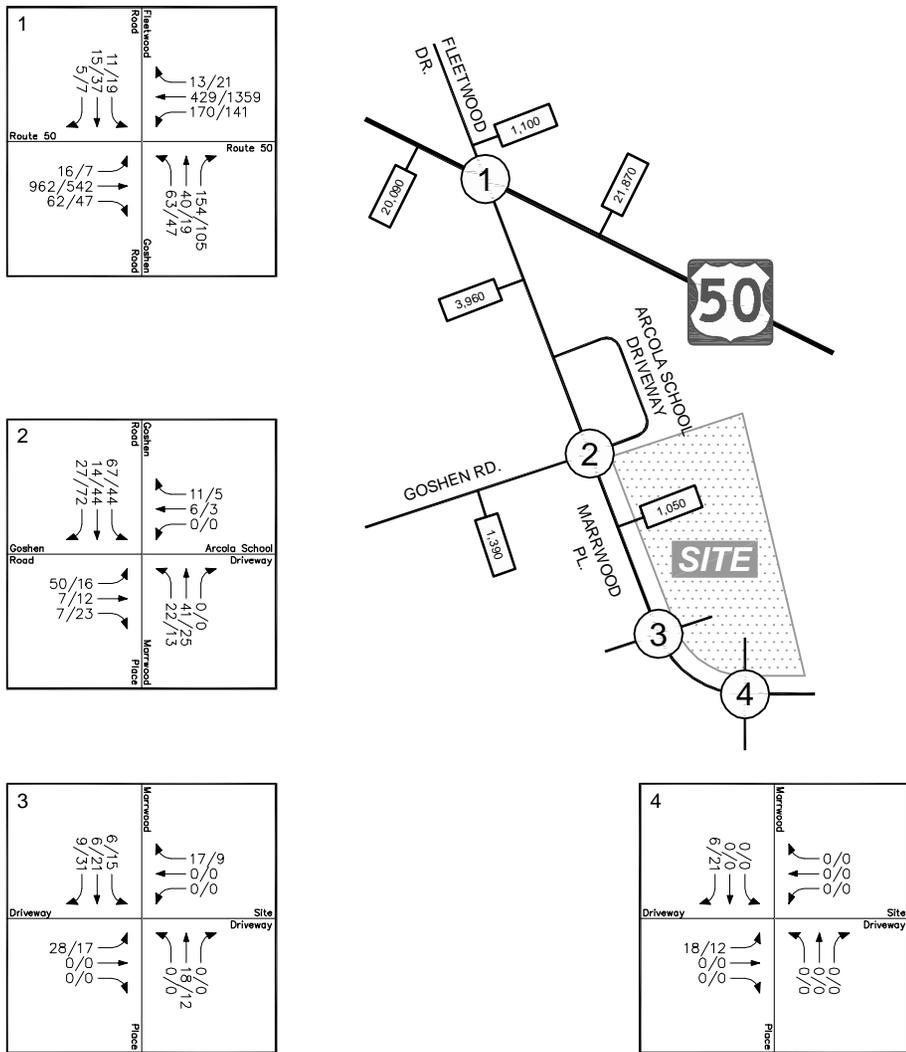
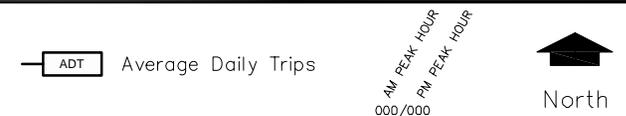


Figure 9-5
Peak Hour Traffic Forecasts with Approved Development Program (Weekday)



2012 - Phase I (Church)

2015 - Phase II (Church and School)

61

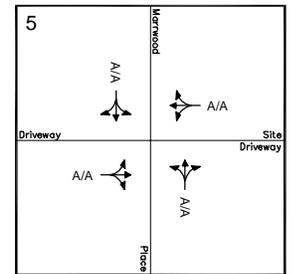
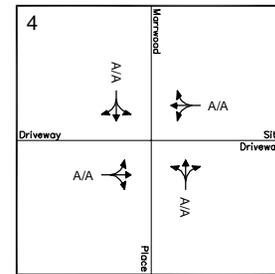
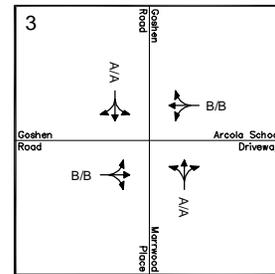
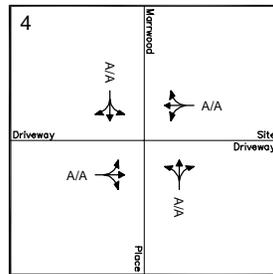
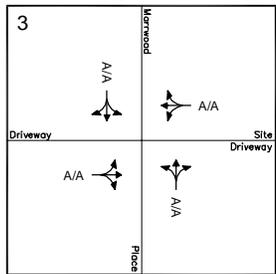
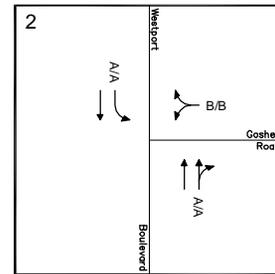
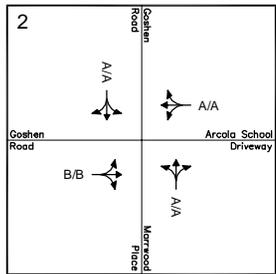
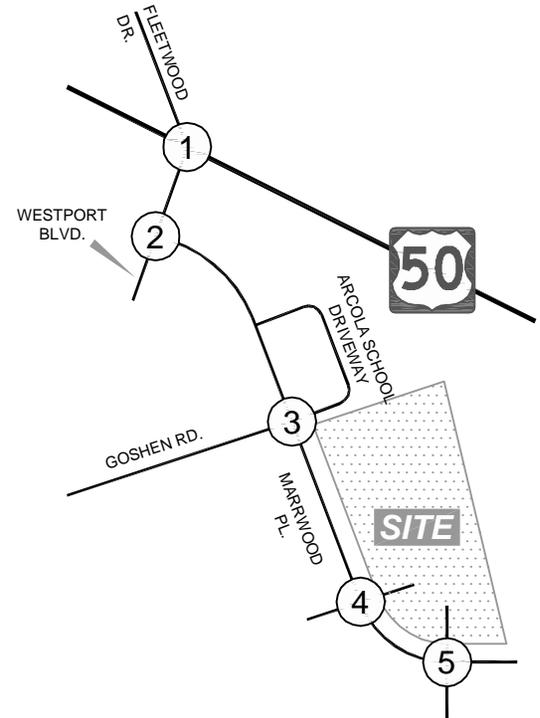
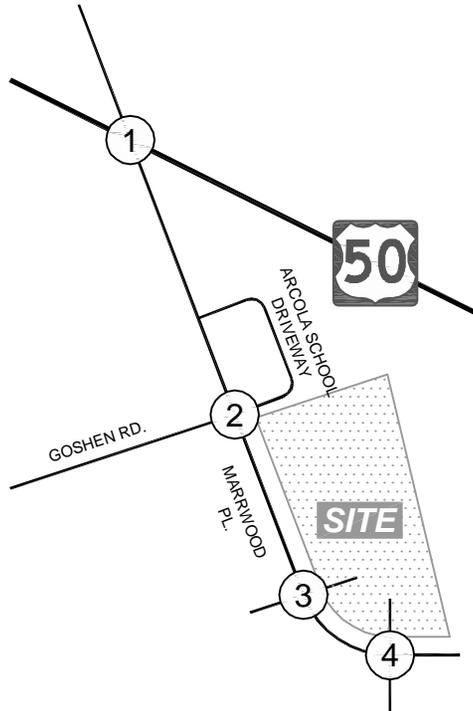
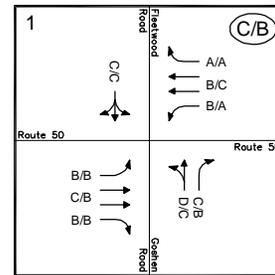
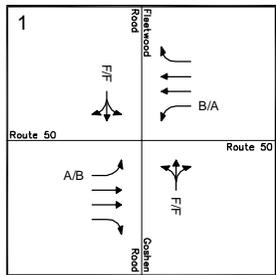


Figure 9-6
Future Levels of Service with Approved Development Program

xx Levels of Service

(xx) Overall Levels of Service



North

Site Trip Generation

The number of trips generated by both the existing (approved) and proposed development programs for the CDA Loudoun Property was calculated using the Institute of Transportation Engineers Trip Generation, 7th Edition trip rates and equations. The results are summarized on Table 9-2, and indicate that the residential uses would generate 27 AM peak hour trips and 25 PM peak hour trips.

The proposed phase I program (1,200-seat church) would generate 42 AM peak hour trips and 38 PM peak hour trips. Thus, the proposed program would generate 15 more AM peak hour trips and 13 more PM peak hour trips than the currently approved program.

Under buildout conditions, the 1,200-seat church and private school program (200 students) would generate 218 AM peak hour trips and 168 PM peak hour trips. It is noted that the PM peak hour of generator rate was modified to reflect the PM peak commuter hour since ITE does not provide a rate for the trips generated by a K-8 school during the peak hour of adjacent street traffic. An adjustment factor of 53 percent was derived using rates provided in the ITE manual for other school uses and independent data collected by Wells + Associates. This methodology is identical to that used for the recently approved Arcola School property with detailed information contained in Appendix S. It is noted that buses were not assumed to serve private school students.

Based on the buildout program for the site, the CDA Loudoun Property would generate 191 more AM peak hour trips and 143 more PM peak hour trips than the currently approved program.

Site Generated Traffic Assignments

The new vehicle trips discussed above were applied to the road network based on previous traffic studies, future travel patterns, existing traffic counts, and engineering judgment. Distributions were established for the 1,200-seat church based on parish boundaries. Similar distributions were established for the school based in existing traffic data and knowledge of the area. The following distributions were used for the proposed development:

<u>To/From</u>	<u>1,200-Seat Church</u>	<u>200-Student School</u>
West on U.S. Route 50	10 percent	30 percent
East on U.S. Route 50	75 percent	40 percent
South on Goshen Road	15 percent	25 percent
North on Fleetwood Road	<u>0 percent</u>	<u>5 percent</u>
Totals	100 percent	100 percent

These site generated traffic assignments phases 1 and 2 are shown on Figure 9-7.

Table 9-2
 Catholic Diocese of Arlington - Loudoun Property
 Site Trip Generation Analysis(1)

Land Use	ITE Land Use Code	Size	Units	AM Peak Hour			PM Peak Hour			Sunday Peak Hour			Sunday ADT
				In	Out	Total	In	Out	Total	In	Out	Total	
Approved Development													
Single Family Detached(2)	210	19	D.U.	7	20	27	16	9	25	11	10	21	158
Proposed Development													
<u>Phase I</u>													
Church(3)	560	58,000	SF	23	19	42	20	18	38	387	357	744	1,836
PHASE I NET NEW TRIPS (Approved vs. Proposed)				16	(1)	15	4	9	13	376	347	723	1,678
<u>Phase II</u>													
Private School K-8	534	200	Students	97	79	176	61	69	130	-	-	-	-
Development Total				120	98	218	81	87	168	387	357	744	1,836
BUILDOUT NET NEW TRIPS (Approved vs. Proposed)				113	78	191	65	78	143	376	347	723	1,678

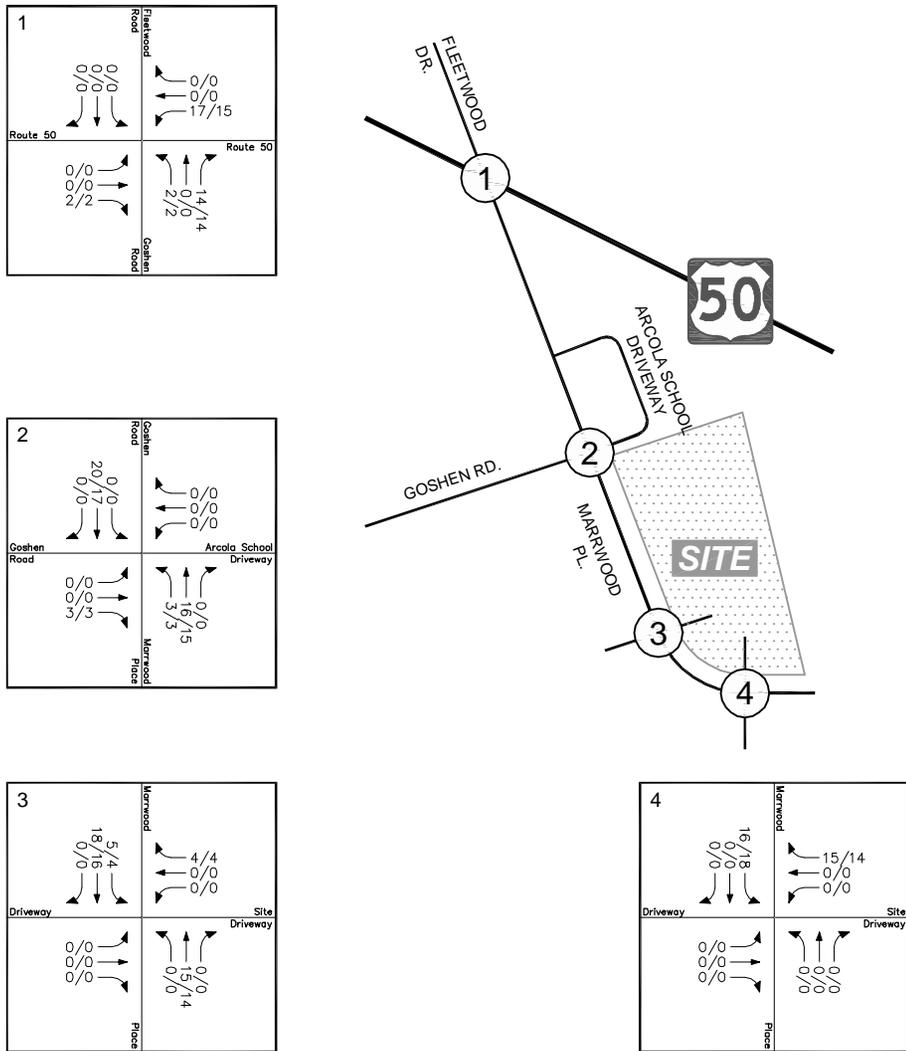
Notes:

(1) Traffic estimates based on Institute of Transportation Engineers (ITE) Trip Generation, Seventh Edition.

(2) Peak Hour of Generator

(2) Based on Equivalent 1,200-seat Parish.

2012 - Site Trips (Church)



2015 - Site Trips (Church & School)

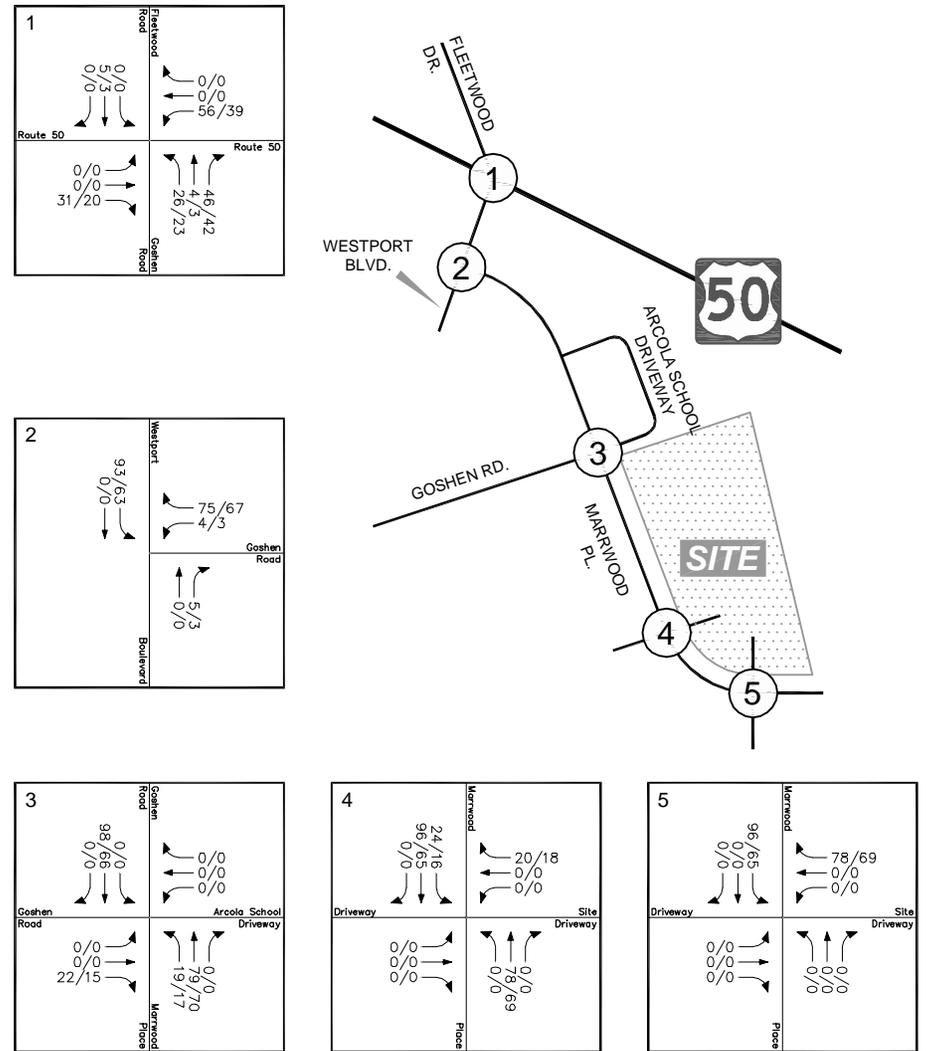


Figure 9-7
Site Generated Traffic Assignments (Weekday)

AM PEAK HOUR
PM PEAK HOUR
000/000



Future Traffic Forecasts with Proposed Development Program

Future traffic forecasts with the proposed development program for 2012 and 2015 were prepared based on the approved traffic forecasts mentioned previously. Traffic generated by the existing property was modified to reflect the proposed 1,200-seat church (phase 1) and the 200-student private school (phase 2). The resulting traffic forecasts are shown on Figure 9-8 and include average daily traffic estimates.

Total Future Levels of Service with Proposed Development Program

Capacity analyses were prepared for total future conditions with the proposed program. They are based on the future lane use and traffic control shown on Figure 9-4, the proposed traffic volumes shown on Figure 9-8, and are summarized in Table 9-1. The analyses include a comparison of the existing versus proposed programs and are graphically shown on Figure 9-9. Capacity analysis worksheets are contained in Appendices T and U, and indicate the following:

Near-term (2012 - church only)

1. The side-street turning movements from Goshen Road at the U.S. Route 50 intersection continue to operate beyond capacity (at LOS "F") during both the AM and PM peak hours, under stop sign control. While a traffic signal would be necessary to restore this intersection to acceptable levels, a review of the warrants for signalization indicates that only Warrant 1B (interruption of continuous traffic) would be met (based on average daily traffic estimates) due to the relatively low side-street volume as outlined under approved conditions. Signal warrant information is contained in Appendix V. In addition, the existing westbound left turn lane on U.S. Route 50 that currently provides a total of 265 feet (130 feet of storage/135 feet) is expected to adequately manage the queue (37 feet during the AM and 17 feet during the PM) during both peak periods. Thus, no additional improvements are necessary at the intersection.
2. All of the turning movements at the site driveways are forecasted to operate at acceptable levels of service during both the AM and PM peak hours under stop sign control.

The results of the capacity analyses indicate that while the proposed development program would slightly increase side-street delays at the U.S. Route 50/Goshen Road intersection, the phase 1 (church only) program generates a minor volume of peak hour trips and have little impact to the intersection operations. Since ultimately this intersection is planned to be improved and signalized by others, no additional improvements are necessary.

Long-term (2015 – church and school)

1. The Westport Boulevard/U.S. Route 50 intersection would operate at overall acceptable levels of service in 2015 assuming the road improvements mentioned previously are installed.
2. All of the turning movements at the site driveways would continue to operate at acceptable levels of service during both the AM and PM peak hours.
3. All of the turning movements at the Westport Boulevard/Goshen Road intersection would operate at acceptable levels of service during peak periods under stop sign control.

It is noted that the analyses are conservative since they do not assume the future extension of Marrwood Drive to Stone Ridge to the east. The traffic demands on U.S. Route 50 and Goshen Road would be somewhat alleviated in the future when this facility is constructed.

2012 - Traffic Forecasts with Proposed Program

2015 - Traffic Forecasts with Proposed Program

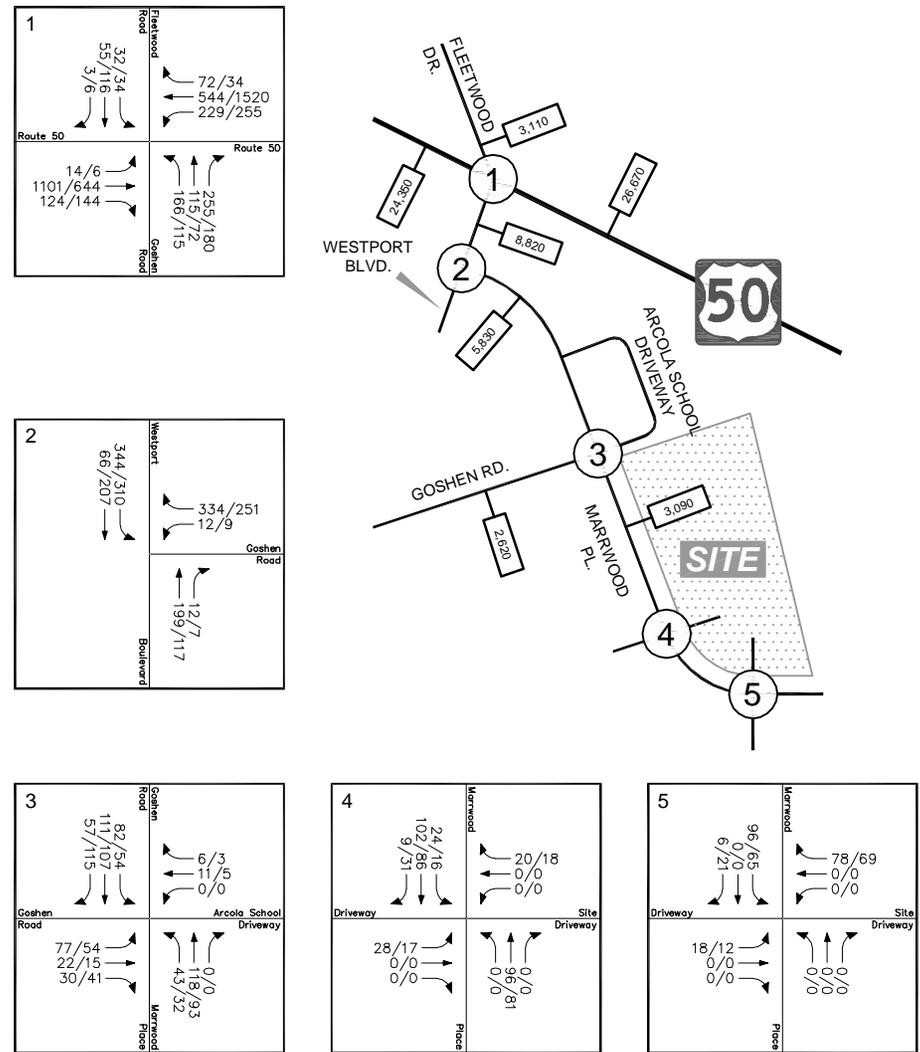
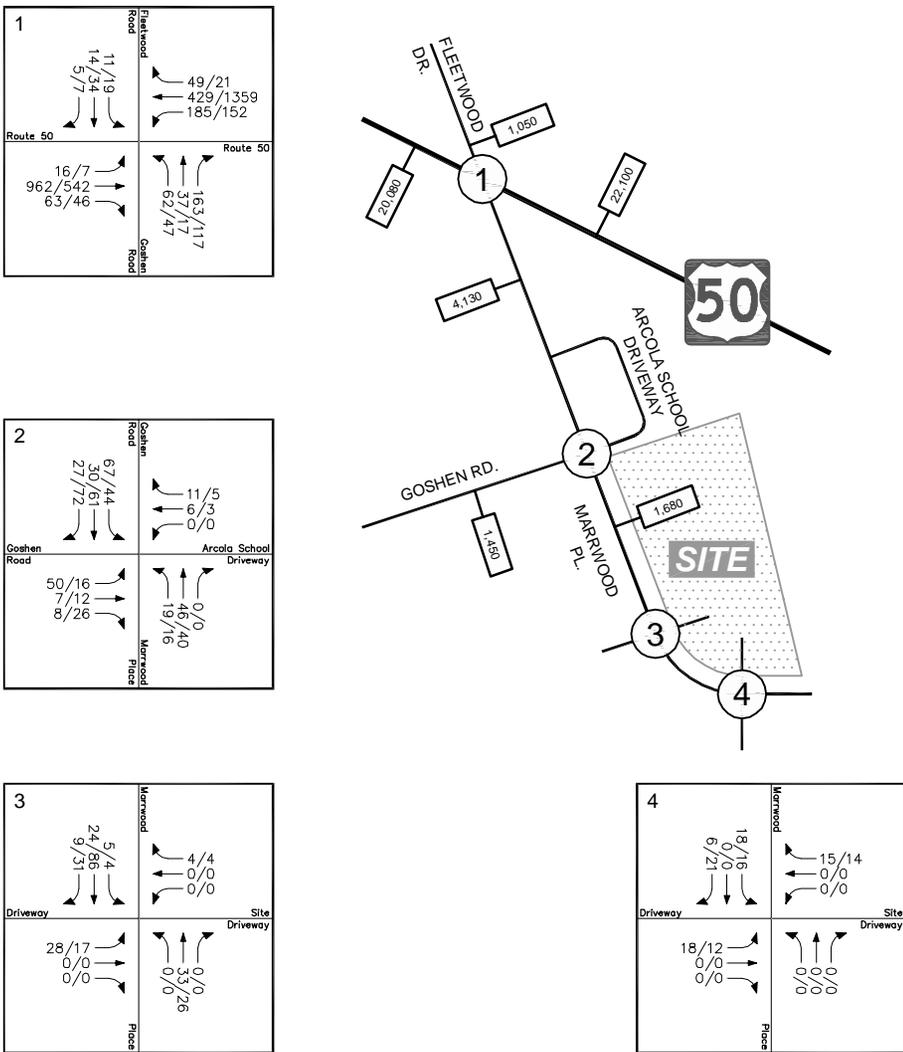


Figure 9-8
Peak Hour Traffic Forecasts with Proposed Development Program (Weekday)

ADT Average Daily Trips

AM PEAK HOUR
PM PEAK HOUR
000/000



2012 - Phase I (Church)

2015 - Phase II (Church and School)

56

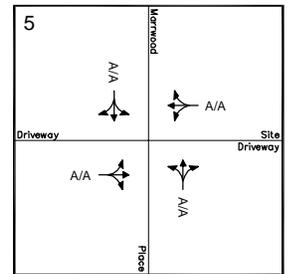
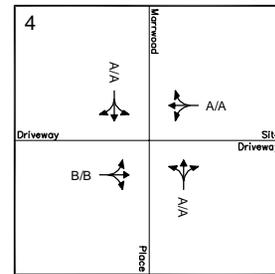
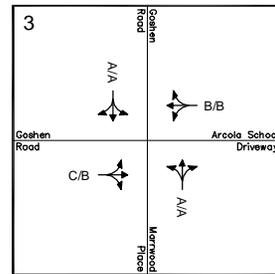
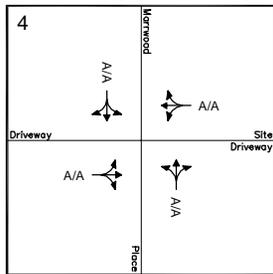
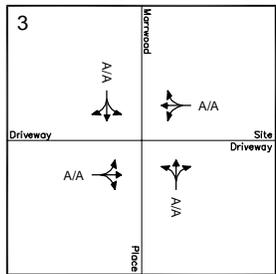
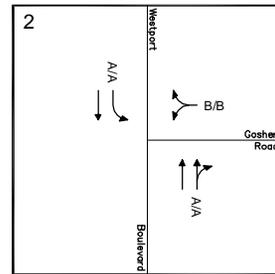
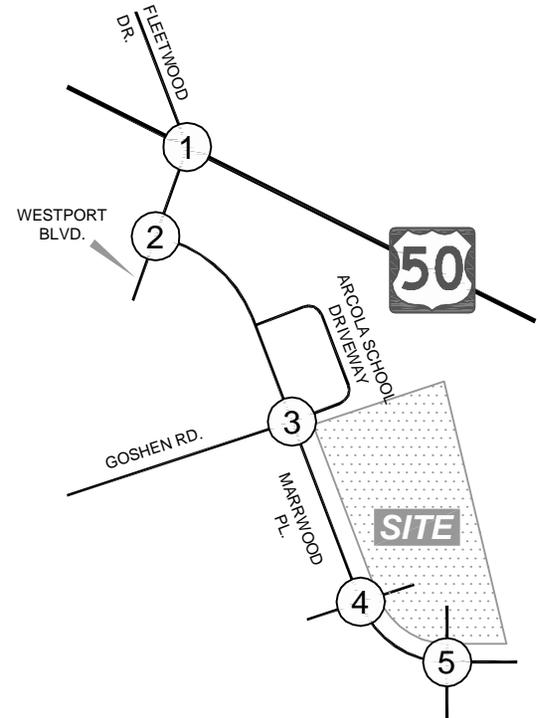
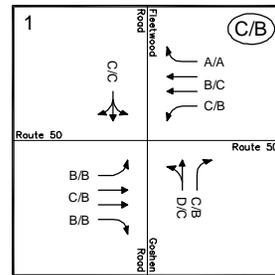
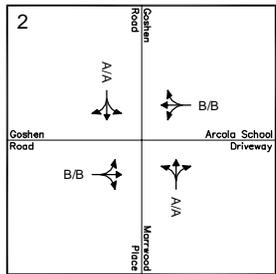
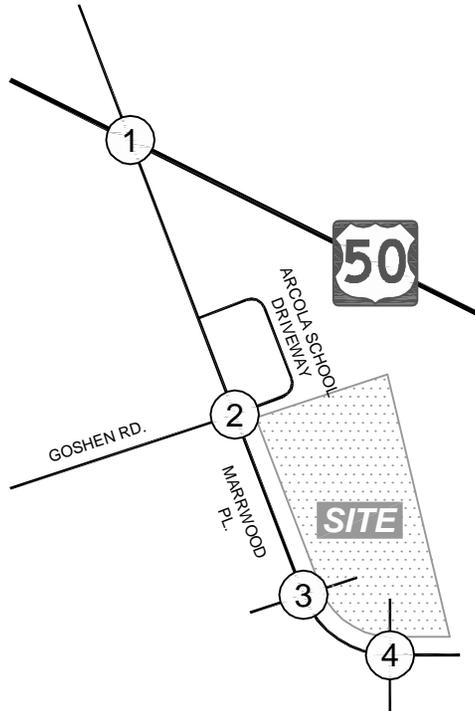
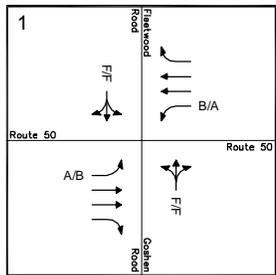


Figure 9-9
Future Levels of Service with Proposed Development Program

xx Levels of Service

(xx) Overall Levels of Service



North

Conclusions and Recommendations – Weekday Conditions

The conclusions of this traffic impact analysis for weekday conditions are as follows:

1. The approved development program for the subject property allows 19 single-family dwelling units. The special exception application proposes to develop the parcel with 1,200-seat church in 2012 and the addition of a 200-student private school by 2015. The overall development is anticipated to generate 191 *more* AM peak hour trips and 143 *more* PM peak hour trips.
2. All of the site access driveways would operate at acceptable levels under both the approved or proposed conditions.
3. The primary impact to the road network would be realized at the Goshen Road/U.S. Route 50 intersection under near-term (2012) conditions. The proposed development program would result in a slight increase side-street delays, resulting in deficient levels of service on these approaches that operate under stop sign control. Although a traffic signal would be necessary to restore these movements to acceptable levels of service, signalization is not recommended due to the low side-street volume and the planned future improvements. Further, the existing westbound left turn lane on U.S. Route 50 would adequately accommodate the peak hour traffic forecasts.
4. The long-term (2015) conditions analyses indicate that the U.S. Route 50/Goshen Road intersection would operate at acceptable levels of service assuming improvements by other adjacent development projects are installed that include a new traffic signal and turn lanes.