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
Revised October 26, 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 has filed SPEX 2009-0008; 2009-0012; 2009-0013 and 2009-0014 requesting approval to develop a parish campus consisting of a parish center, church, school and/or convent/rectory on the property. The parish campus is proposed to be developed in phases as follows: Phase 1 (2012) consisting of a 335-seat interim church (approximately 16,200 S.F.) and accessory offices; Phase 2 (2015) consisting of the remainder of the 1,200-seat church including a parish center; a 200-student private school and/or convent/rectory. 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 Drive just to the east of Goshen Road. The driveways on Marrwood Drive would be aligned with the proposed driveways for the approved Marrwood residential development. Additionally, emergency access will be provided on Marrwood Drive along the northern property boundary.

The currently approved 19 residential units would generate 27 AM peak hour trips, 25 PM peak hour trips, 190 average daily trips on weekdays. The proposed phase 1 program (335-seat church) would generate 12 AM peak hour trips, 11 PM peak hour trips and 148 average daily trips on weekdays. It is noted that the proposed phase 1 trip totals represent a *reduction* when compared to the currently approved trip totals. On Sunday, the approved program (19 DU) would generate 21 peak hour trips and 158 daily trips. The 335-seat church would generate 216 trips (112 in and 104 out) during the mid-day peak hour and 513 average daily trips.

Under buildout conditions (phase 2, 2015), the church will be expanded to 1,200-seats with a parish center, a private school (200-students) and/or convent/rectory would be constructed. This program is anticipated to generate 218 AM peak hour trips and 168 PM peak hour trips and 1,024 average daily trips on weekdays. The 1,200-seat church is anticipated to generate 744 peak hour trips (387 inbound and 357 inbound) and 1,845 average daily trips on Sunday, while the private school and other uses are not anticipated to generate any trips on a typical Sunday.

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

The results of the future analyses for Sunday conditions indicate that all intersections would operate at acceptable levels of service when improvements planned by others are made. Phase 2 of the proposed development will not occur until improvements by others are made.

The southbound side-street approach on Fleetwood Road at the U.S. Route 50/Goshen Road/Fleetwood Road intersection is expected to operate beyond capacity during the Sunday peak hour in the near-term (2012) under stop sign control. However, the southbound volume (approximately 30 vehicles) is relatively low and the impact of church traffic is expected to be minimal during this period. Further, the

existing westbound left turn lane on U.S. Route 50 would adequately accommodate the peak hour traffic forecasts. Thus, no additional improvements to the U.S. Route 50/Goshen Road/Fleetwood Road intersection are proposed under near-term conditions.

Under buildout conditions in 2015, the improvements planned by others would accommodate the proposed development program. It is noted that the analyses for 2015 conditions are conservative since they do not assume the planned extension of Marrwood Drive to the east to North Star Boulevard (Relocated Route 659). 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 1 development program (interim church only) result in a slight increase in 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.

This traffic report presents a conservative condition for Phase 2 since it assumes the full buildout potential of the site. The proposed development is planned to be constructed at the option of the parish when financially feasible and at such point when improvements by others are made.

SECTION 1
INTRODUCTION

STUDY SCOPE

This report presents the results of an updated traffic impact study for the CDA Loudoun Property as part of a Special Exception application to permit the currently zoned TR1UBF property that allows 19 residential units to be modified to allow for the development of a 1,200-seat church including a parish center, a 200-student private school and/or convent/rectory. It serves as an update to the Catholic Diocese of Arlington, Loudoun Property Traffic Impact Study, dated February 24, 2009. 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.

The February 2009 study was the subject of referral comments provided by both the Loudoun County Office of Transportation Services (OTS) dated July 6, 2009 and the Virginia Department of Transportation (VDOT) dated June 18, 2009. Copies of these comments are contained in Appendix A.

A complete point-by-point response to these comments is provided under a separate cover by Bowman Consulting Group, and should be referenced for further information. Responses to OTS and VDOT only comments are contained in Appendix A.

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 1 (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 1) 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 (Boyd) School South Site Driveway/Marrwood Drive.

Figure 1-1 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 (Boyd) School. Goshen Road is also a very narrow, winding road with sharp curves in the site vicinity.

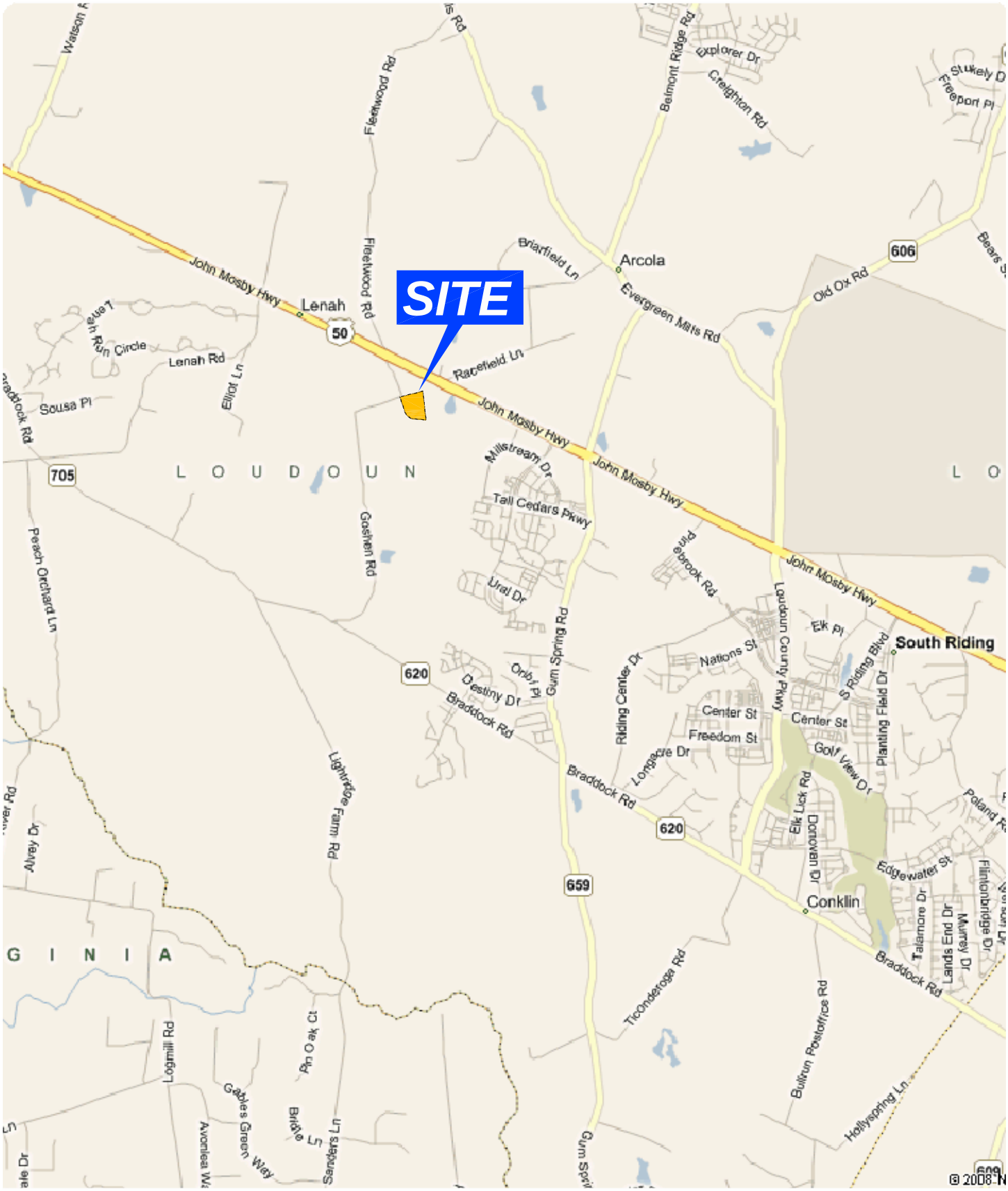

Figure 1–1
Study Area Limits

North

Catholic Diocese of Arlington
Loudoun County, Virginia

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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 a special exception (SPEX) to allow the development of a 1,200-seat (58,000 S.F.) church, a 200-student private school and convent/rectory. The development is proposed to be constructed in two phases. The first phase (2012) consists of a parish center that will serve as the interim church (335-seats) with the second phase (2015) constructing the remainder of a 1,200-seat church including a parish center, 200-student private school and/or convent/rectory. It should be noted that while phase 2 of the proposed development represents the buildout of all uses that may be developed on the site, construction and occupancy of the individual uses (church, school, and/or convent) will be undertaken as determined feasible by the parish (CDA). In addition, none of these uses will move forward prior to the improvements planned by others.

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 driveways on Marrwood Drive extended just to the east of Goshen Road. The driveways on Marrwood Drive would be aligned with the proposed driveways for the Marrwood development opposite Goshen Ridge Place and Ozark Way. The North Driveway and emergency access is anticipated to be built in phase 1. The South Driveway would be constructed in phase 2. Adequate sight distance is provided at both future driveways.

It is noted that Marrwood Drive would ultimately be extended to the east connecting to the future North Star Boulevard (Relocated Route 659). However, since this roadway is under the control of other entities, it was not assumed for purposes of this traffic study.

LOCATION WITHIN THE JURISDICTION AND REGION

The CDA Loudoun Property is located in the Dulles South planning area of Loudoun County, which 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.

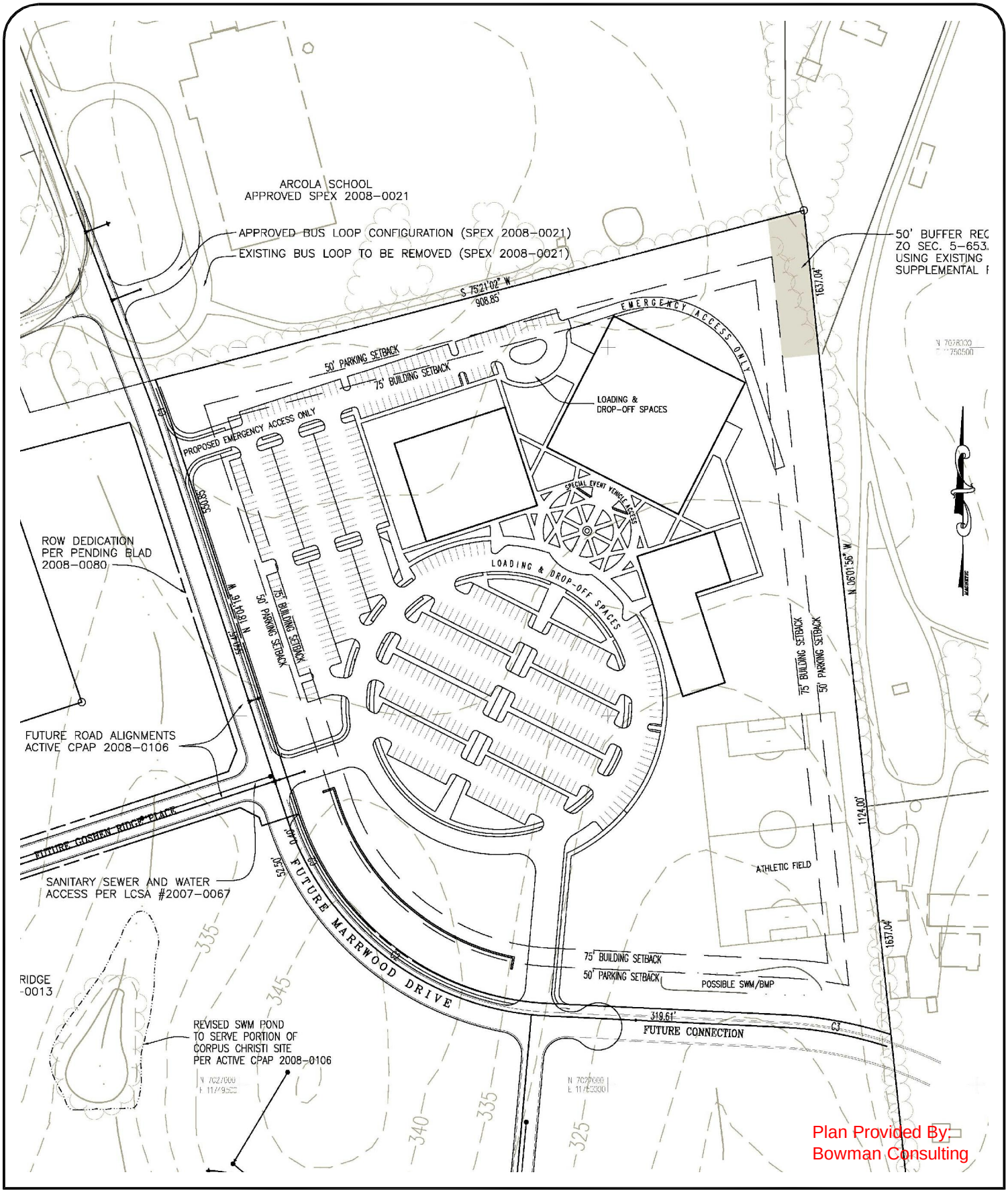

Figure 2-1
Generalized Development Plan

North

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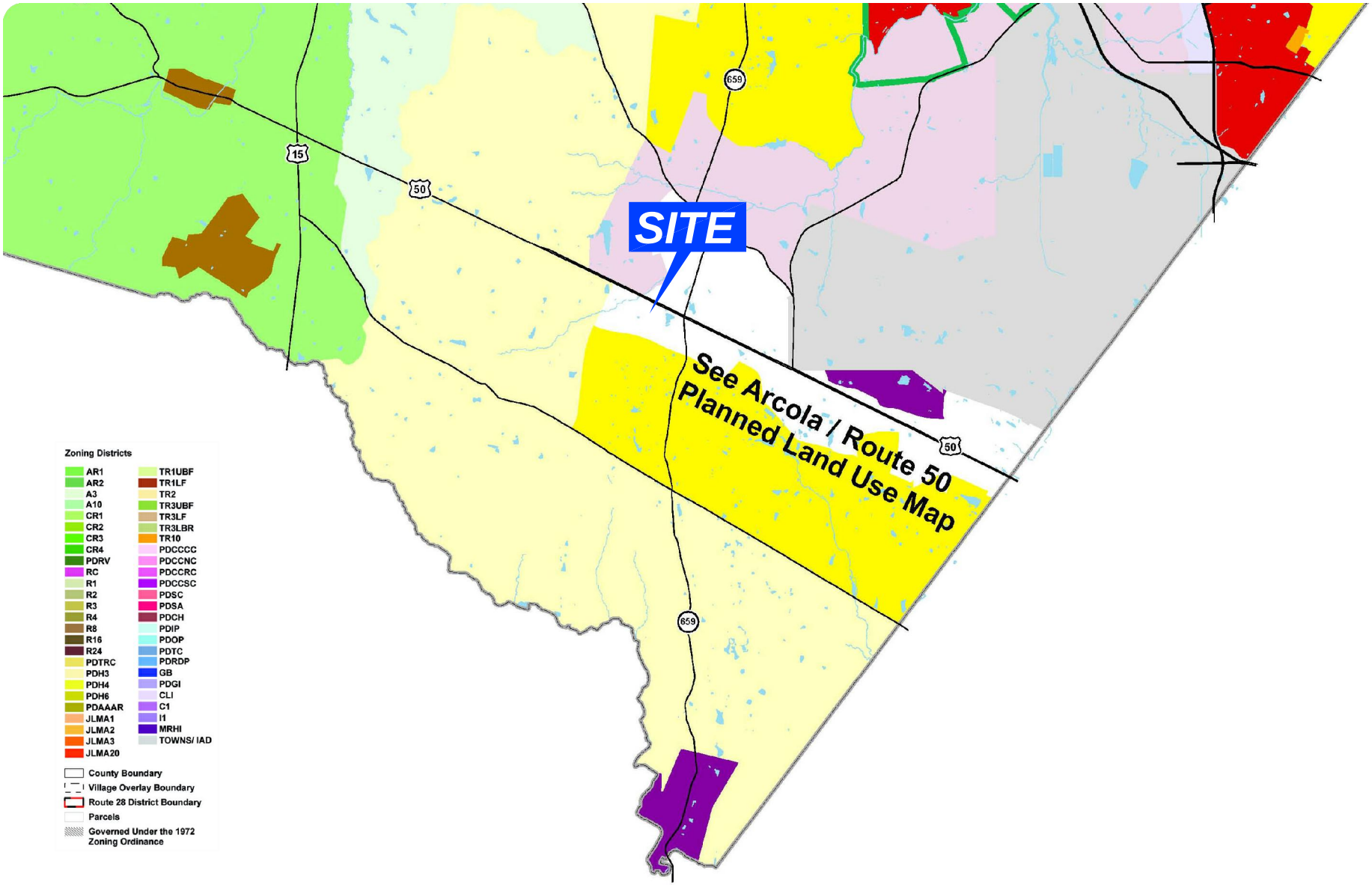

Figure 2–2
Comprehensive Plan Recommendations

North

Catholic Diocese of Arlington
Loudoun County, Virginia

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ZONING

The overall site is comprised of 17.9 acres and is zoned TR1UBF (Transitional Residential). The Catholic Diocese of Arlington proposes to file a special exception (SPEX) application to develop a 1,200-seat church including a parish center, a 200-student elementary school and/or convent/rectory in two phases. The first phase (2012) consists of a 335-seat church with the second phase (2015) providing for the remainder of a 1,200-seat church including a parish center, a 200-student private school and/or convent/rectory. The analyses contained in this report reflect the maximum buildout of the site. Construction of phase 2 will occur when determined feasible by the parish (CDA).

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 (Boyd) School South Site Driveway/Marrwood Drive.

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

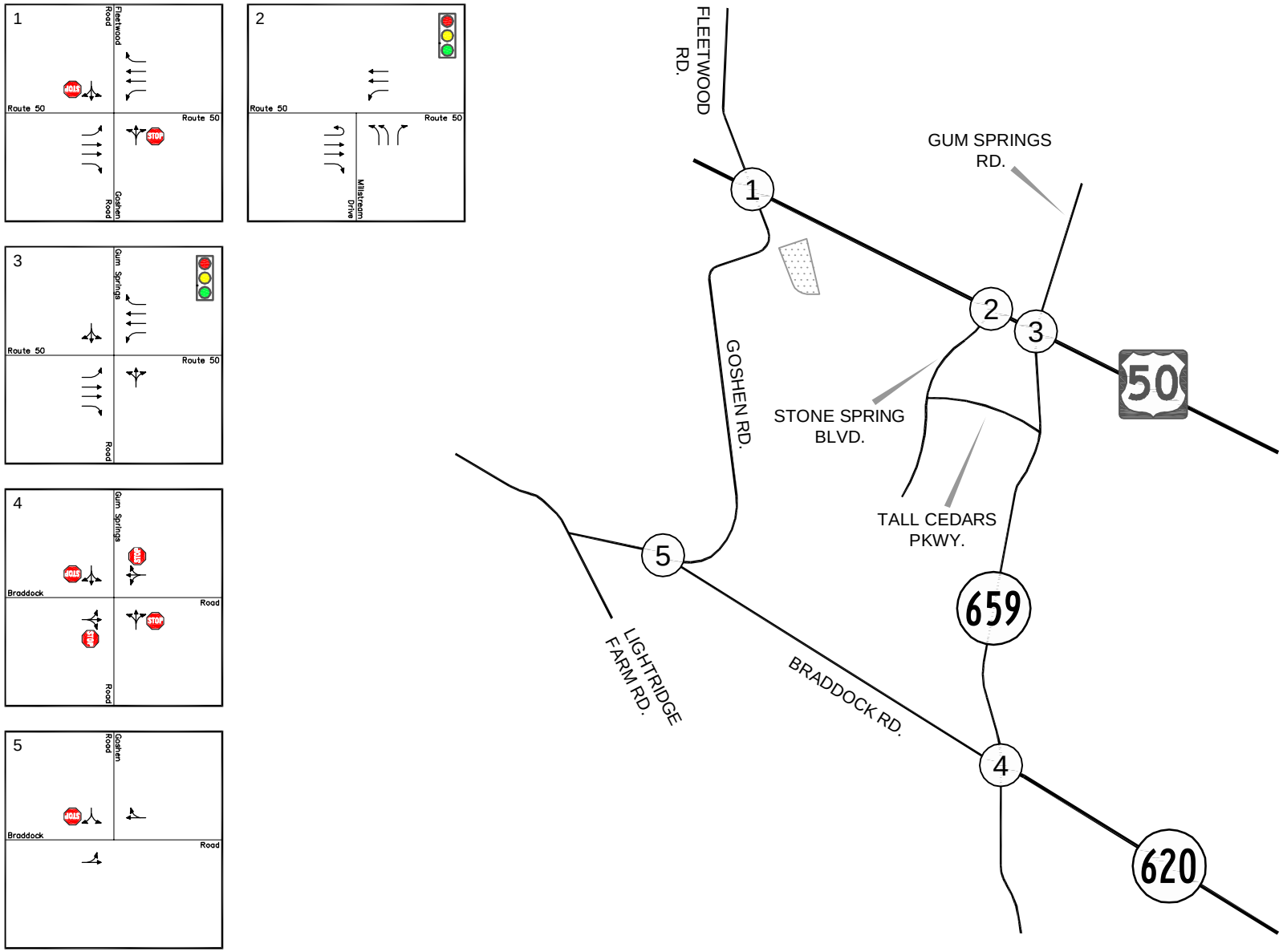

Figure 2–3
Existing Lane Use and Traffic Control

Represents One Travel Lane
Signalized Intersection
Stop Sign

North

Catholic Diocese of Arlington
Loudoun County, Virginia

Wells + Associates, Inc.

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 (some have been completed).

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 1) 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. It is noted that the phase 2 portion of the CDA property would not be occupied prior to implementation of these improvements.

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 Westport Boulevard (Goshen Road)/U.S. Route 50 intersection.

3. A northbound right turn lane is proposed to be installed by Westport at Westport Boulevard and U.S. Route 50. In addition to the northbound left turn lane, the existing westbound left and eastbound right turn lanes on U.S. Route 50 are planned to be extended to provide 300 feet and 400 feet of storage, respectively.

4. A southbound left turn lane on Westport Boulevard at the realigned Goshen Road is proposed to be installed by Westport in coordination with the recently approved Arcola (Boyd) School at realigned Goshen Road and future Westport Boulevard.

5. Additional improvements planned as part of the approved Arcola (Boyd) School per CPAP 2007-0018 (Goshen Road Improvement Plan). These include the following:

    a. Realignment of Goshen Road to eliminate the existing severe curve at the southwest corner of the Arcola (Boyd) School site.
    b. Realignment of the Arcola (Boyd) School's southern driveway to create a four-way intersection at Goshen Road/Marrwood Drive.

6. Extend Marrwood Drive to the south and east of Goshen Road initially to Goshen Ridge Place and ultimately to the second Marrwood entrance as part of the Marrwood Development.

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 North Star Boulevard (aka Route 659 Relocated). 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 southwest 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 north is currently occupied by the former Arcola Community Center that was recently approved 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 (Arcola (Boyd) School 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 is located directly west of the Arcola (Boyd) School property as shown on Figure 2-5.

Pipeline Developments. Pipeline project development projections were prepared for both 2012 (phase 1) 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 (Boyd) 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

North

Catholic Diocese of Arlington
Loudoun County, Virginia

Wells + Associates, Inc.

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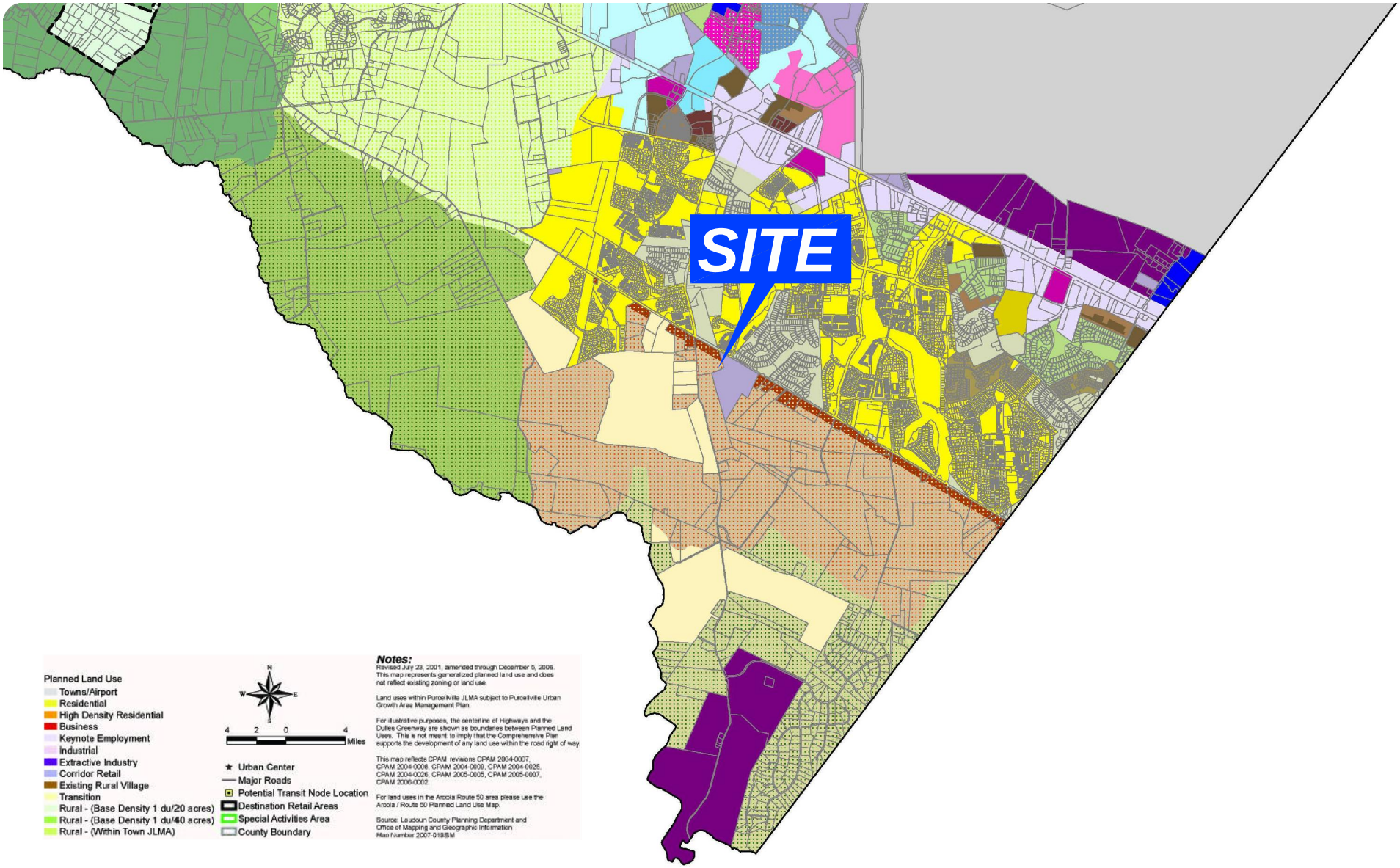

Figure 2–5
Map of Surrounding Land Use

North

Catholic Diocese of Arlington
Loudoun County, Virginia

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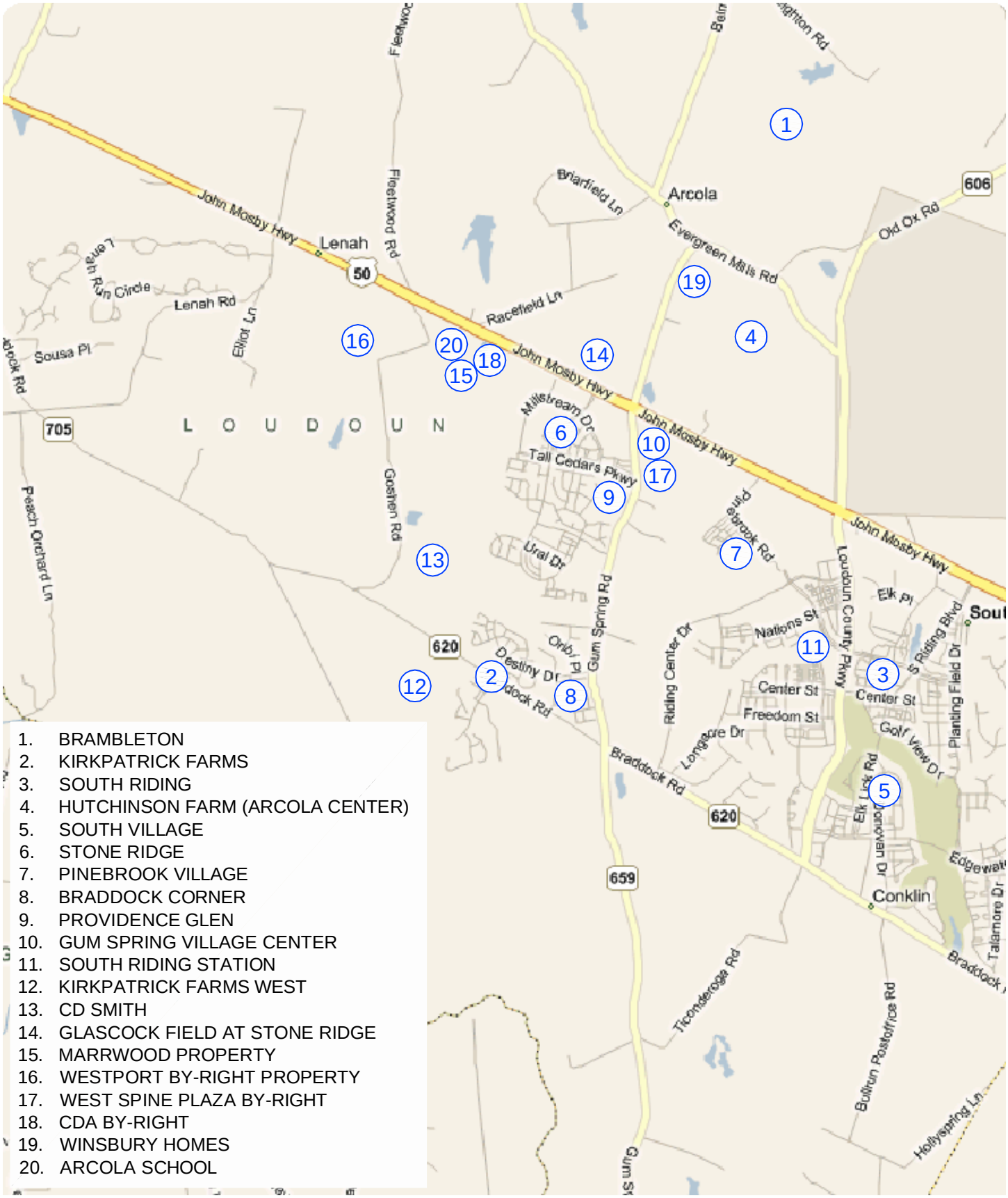

Figure 2–6
Location of Other Developments

North

Catholic Diocese of Arlington
Loudoun County, Virginia

Wells + Associates, Inc.

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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 (Boyd) School South Site Driveway/Marrwood Drive.

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 average daily traffic volumes for Sunday conditions have been excluded from the report. The accepted method for calculating the Average Daily Traffic (ADT) for weekday conditions applies a 10 percent "k" factor to the two-way, PM peak hour volume. Since existing ADT information for Sunday is not available, it is unknown if 10 percent would be the appropriate k factor to apply for the Sunday ADT calculation. Therefore, these volumes were excluded in the updated traffic report.

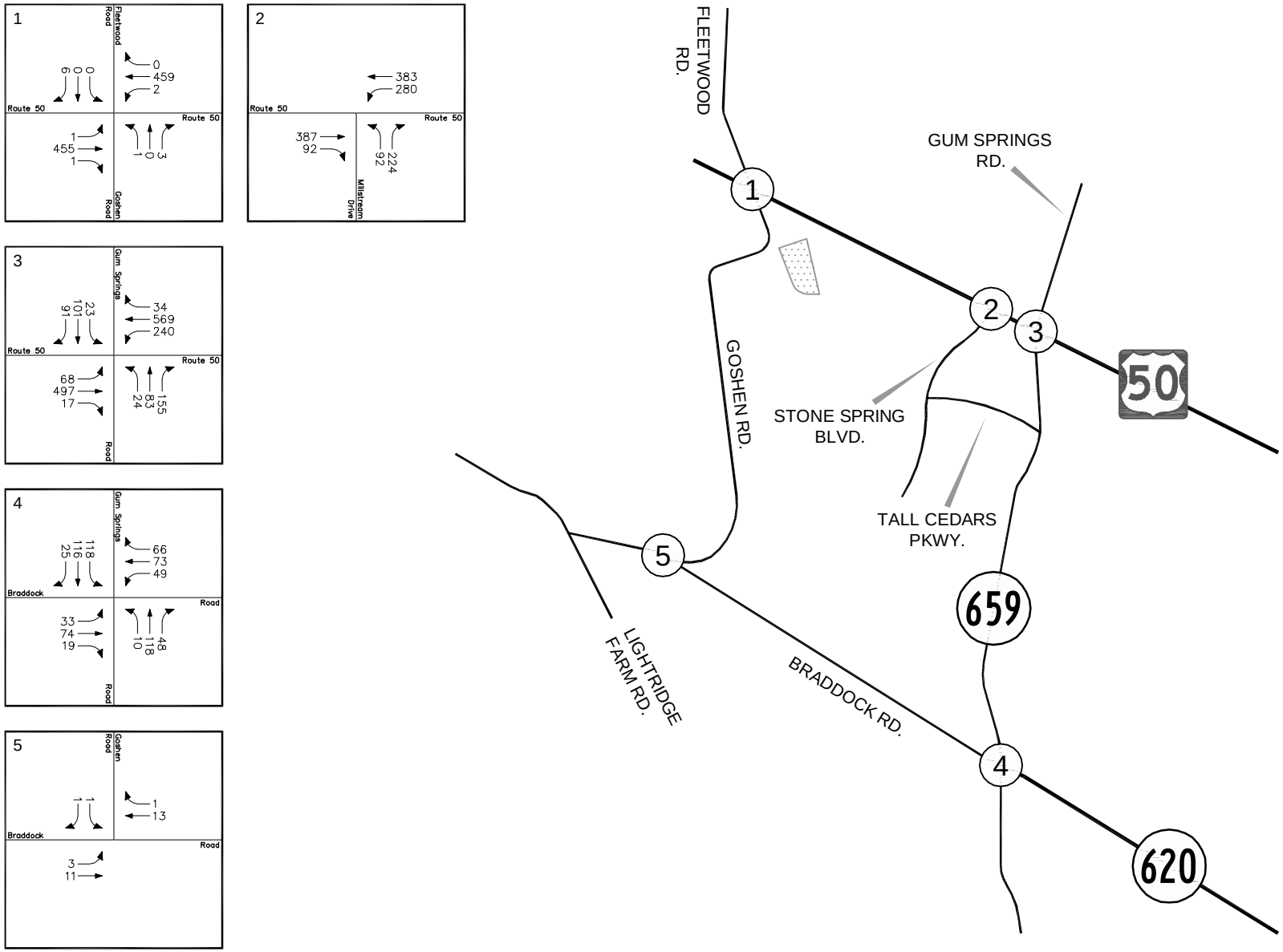

Figure 3–1
2008 Existing Peak Hour Traffic Volumes (Sunday)

SUN PEAK HOUR
000

North

Catholic Diocese of Arlington
Loudoun County, Virginia

Wells + Associates, Inc.

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

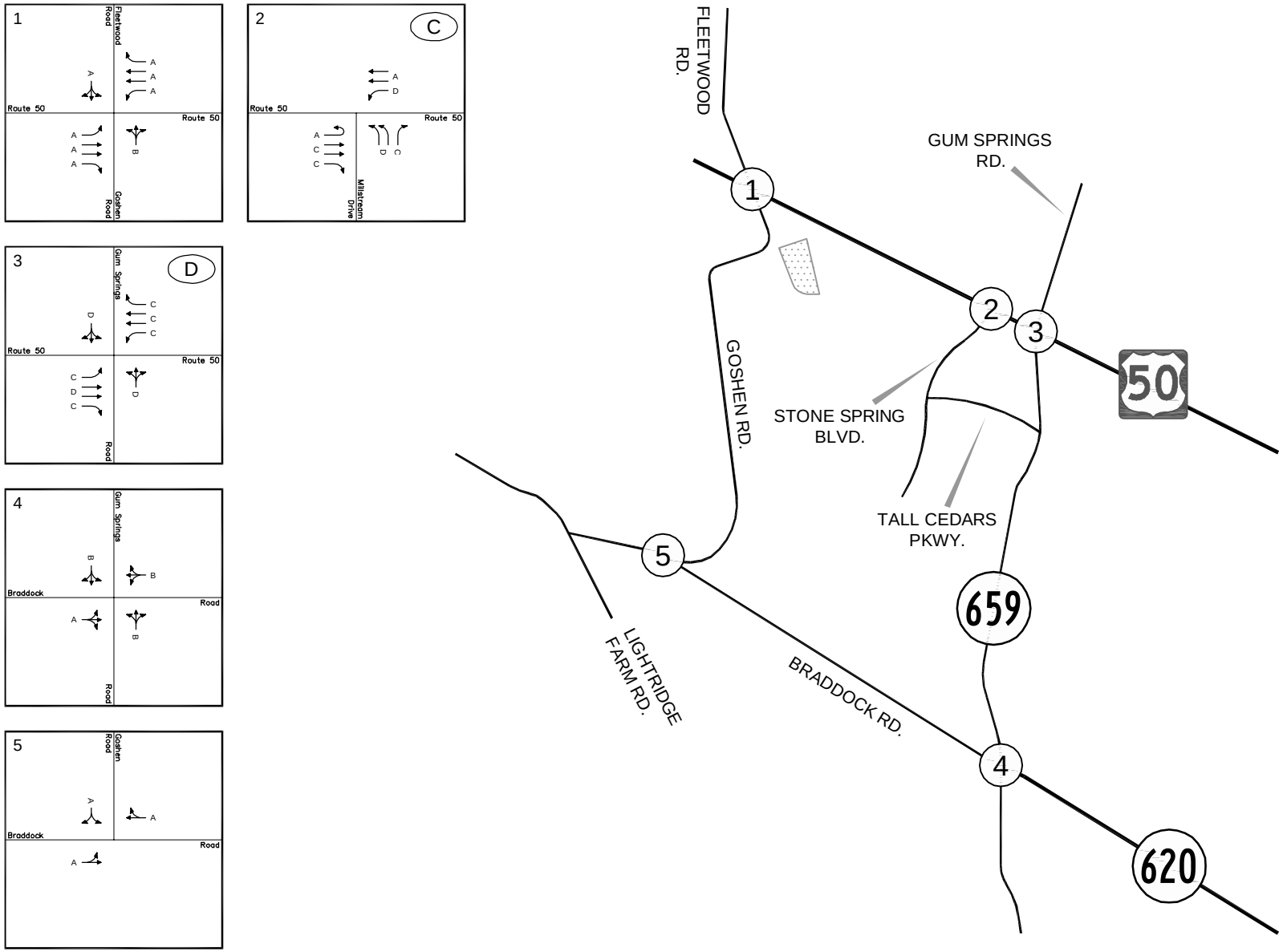

Figure 3–2
2008 Existing Levels of Service (Sunday)

X Levels of Service

(X) Overall Levels of Service

North

Catholic Diocese of Arlington
Loudoun County, Virginia

Wells + Associates, Inc.

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. 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 and Heavy Vehicles. Consistent with previously prepared traffic studies and as identified in the traffic scoping agreement, 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. A default of two (2) percent heavy vehicles was assumed for all movements due to low truck activity on Sundays.

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.

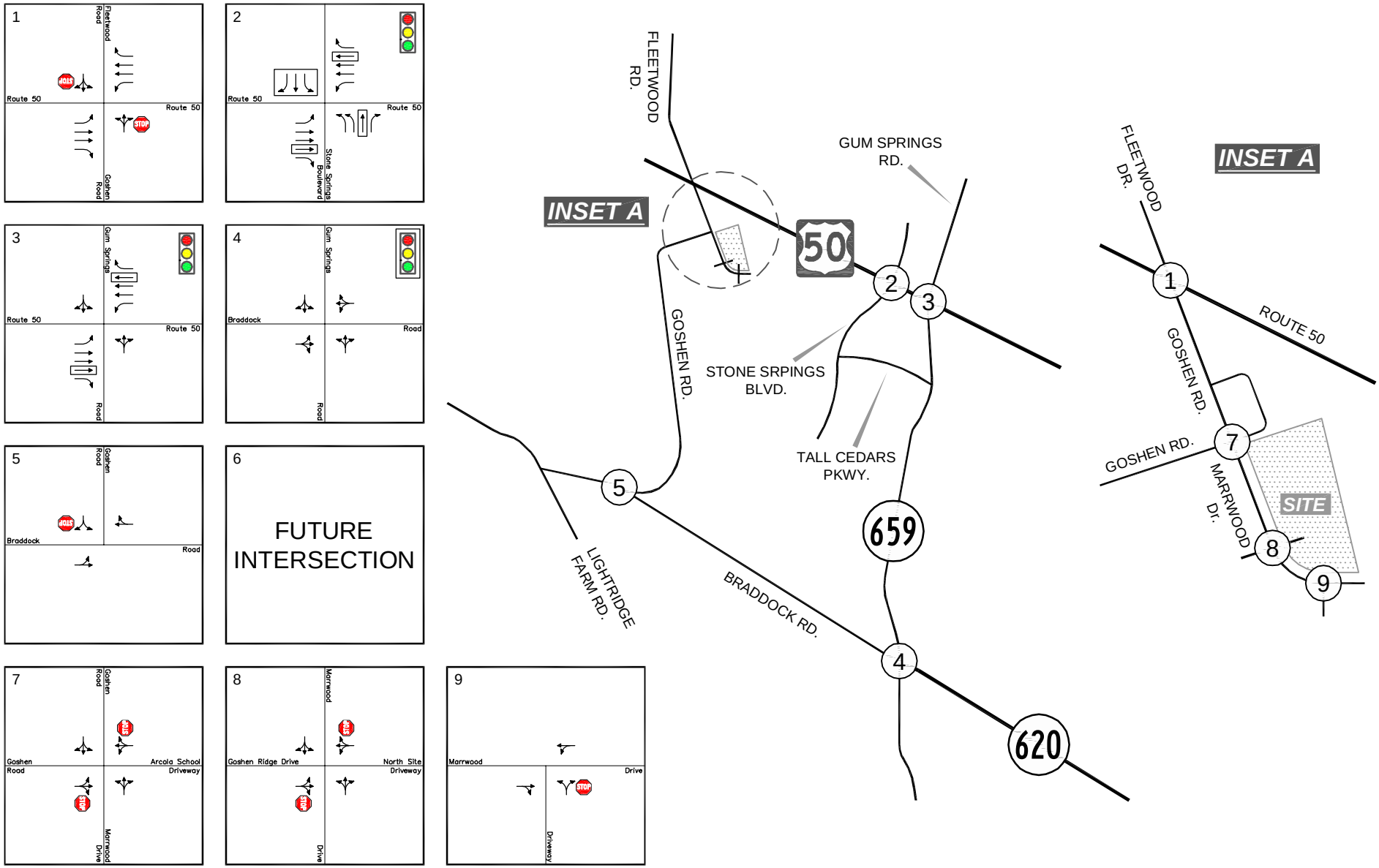

Figure 4–1
2012 Planned Lane Use and Traffic Control (Sunday)

Represents One Travel Lane
Signalized Intersection
Stop Sign
Background Improvement

North

Catholic Diocese of Arlington
Loudoun County, Virginia

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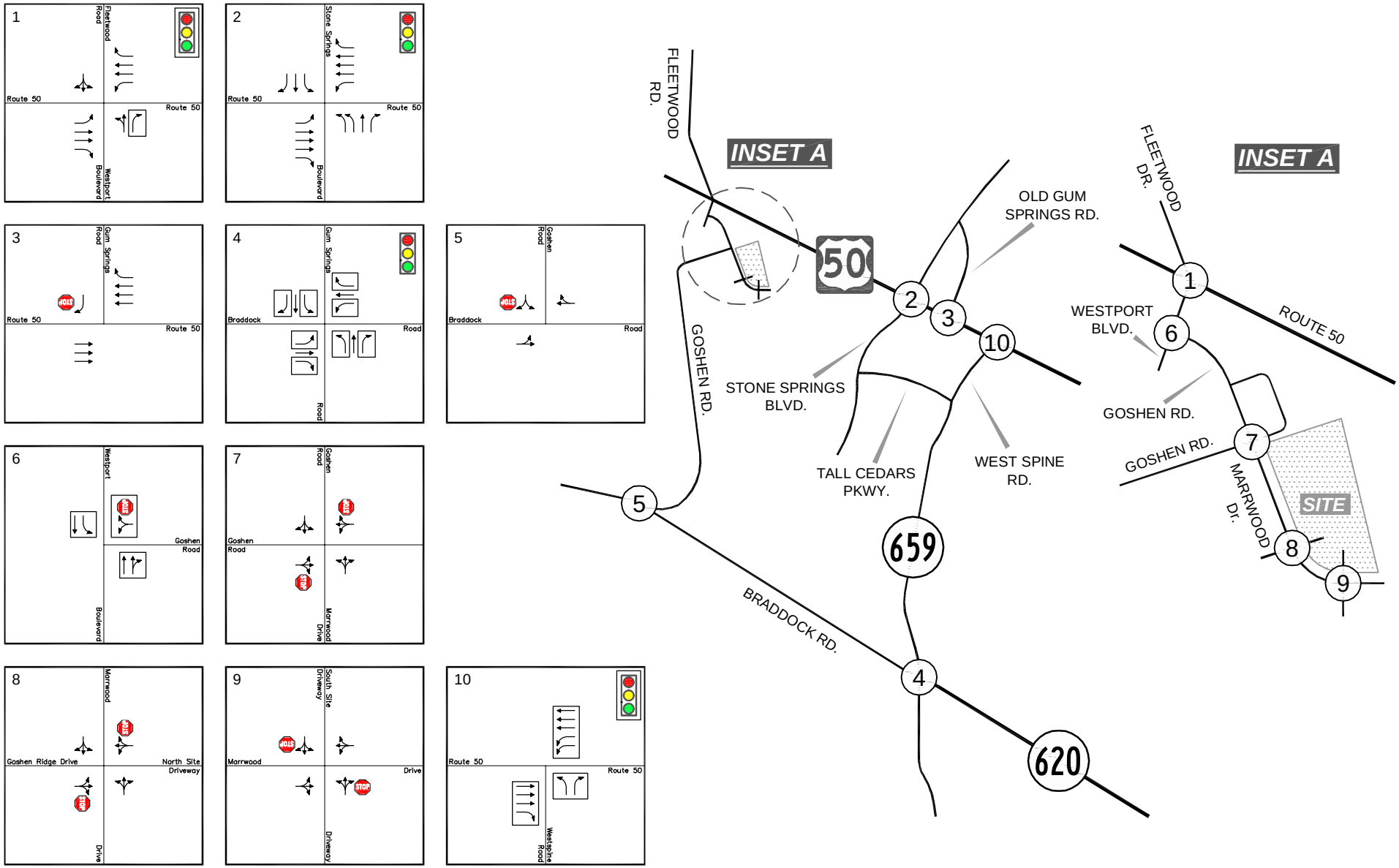

Figure 4–2
2015 Planned Lane Use and Traffic Control (Sunday)

Represents One Travel Lane
Signalized Intersection
Stop Sign
Background Improvement

North

Catholic Diocese of Arlington
Loudoun County, Virginia

Wells + Associates, Inc.

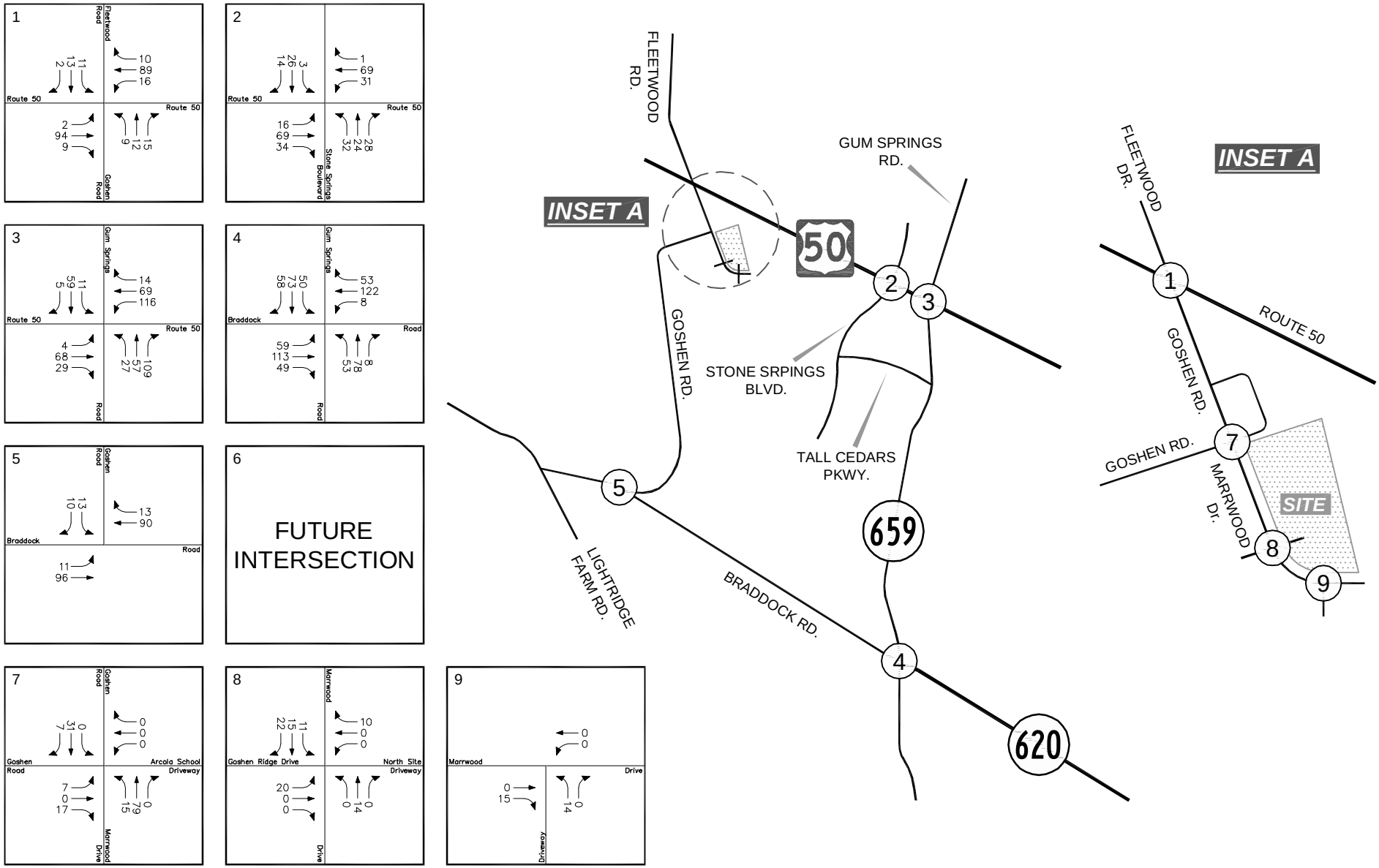

Figure 4–3
2012 Other Development Traffic Assignments (Sunday)

SUN PEAK HOUR
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North

Catholic Diocese of Arlington
Loudoun County, Virginia

Wells + Associates, Inc.

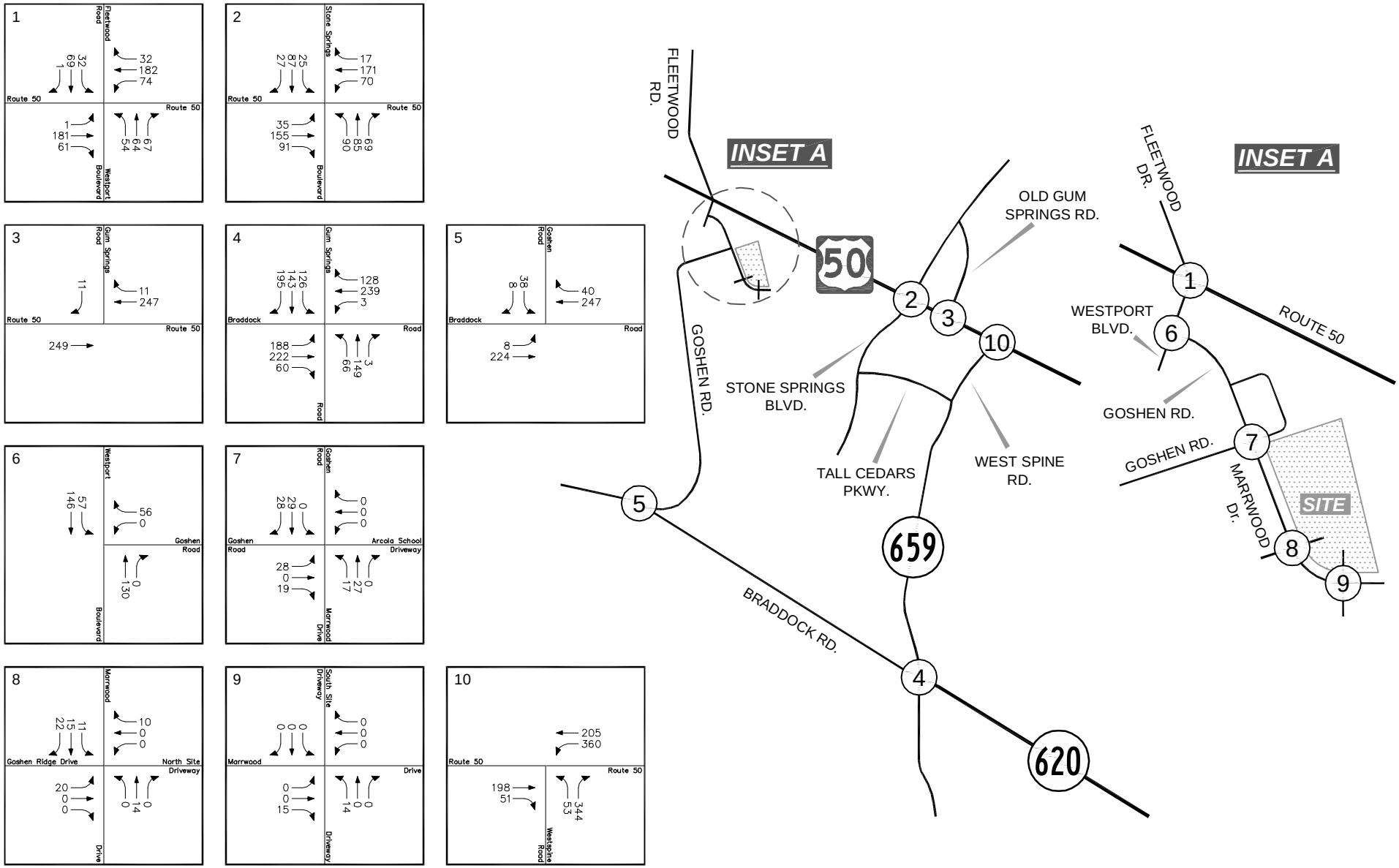

Figure 4–4
2015 Other Development Traffic Assignments (Sunday)

SUN PEAK HOUR
000

North

Catholic Diocese of Arlington
Loudoun County, Virginia

Wells + Associates, Inc.

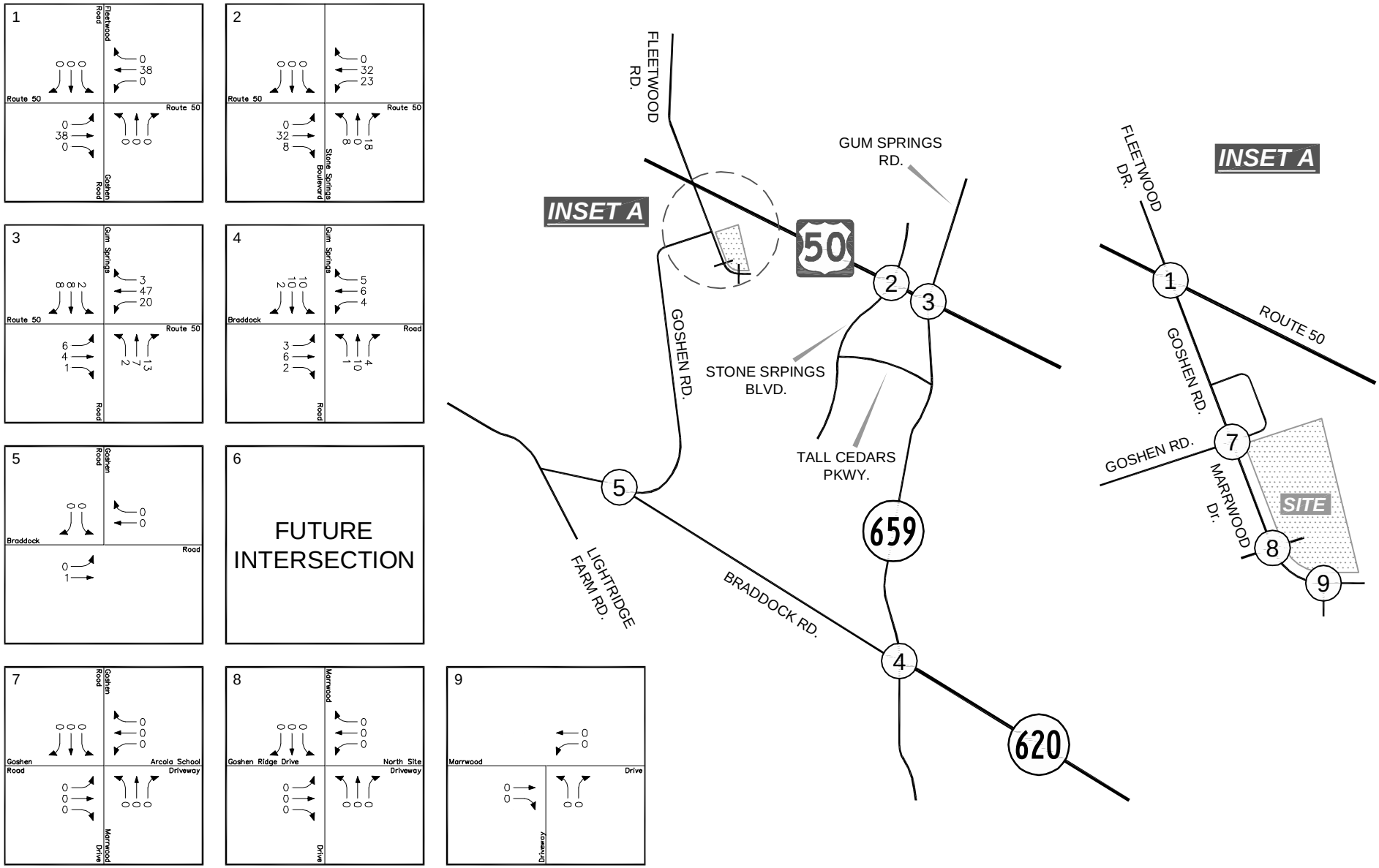

Figure 4–5
2012 Regional Growth (Sunday)

Catholic Diocese of Arlington
Loudoun County, Virginia

Wells + Associates, Inc.

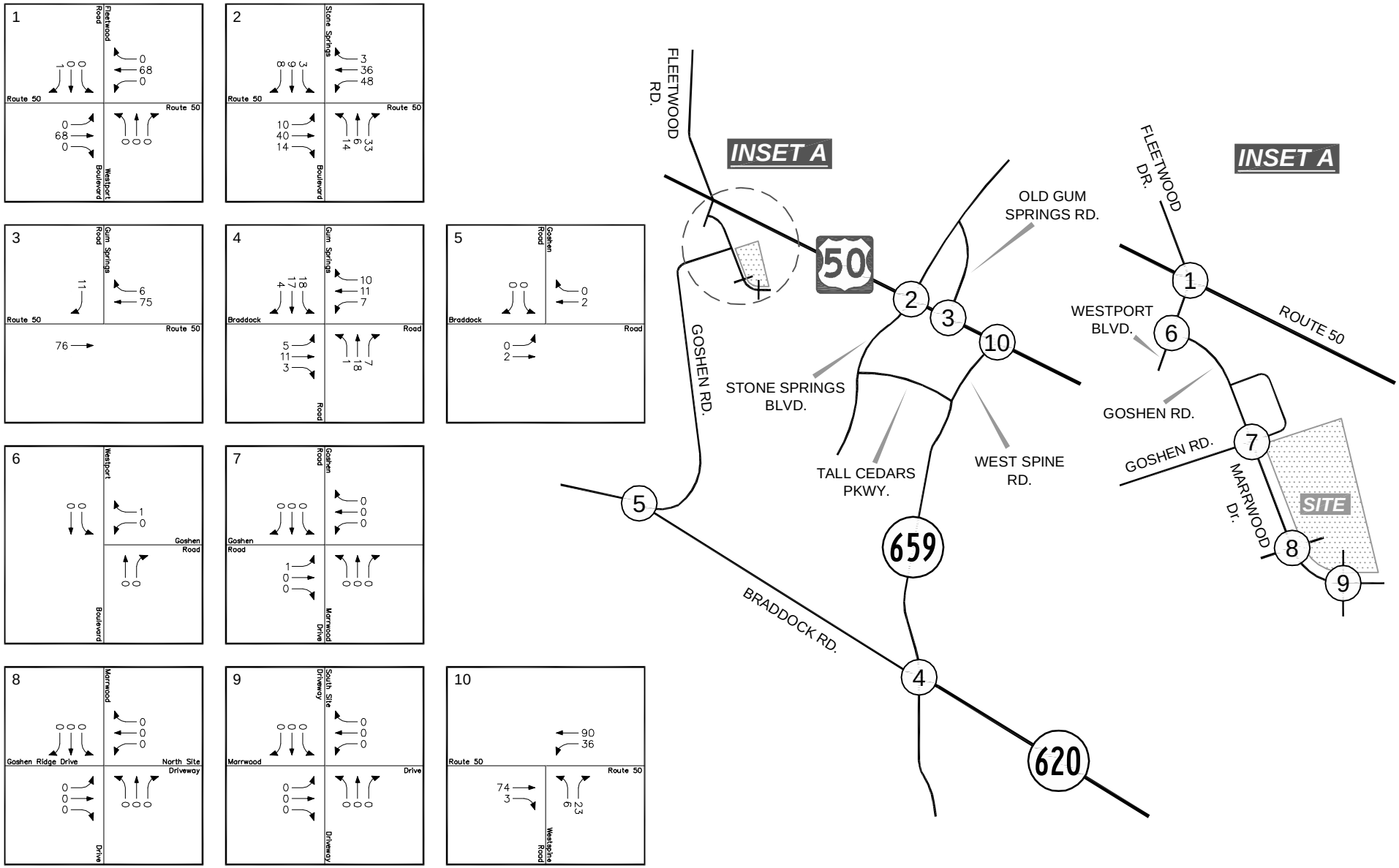

Figure 4–6
2015 Regional Growth (Sunday)

SUN PEAK HOUR
000

North

Catholic Diocese of Arlington
Loudoun County, Virginia

Wells + Associates, Inc.

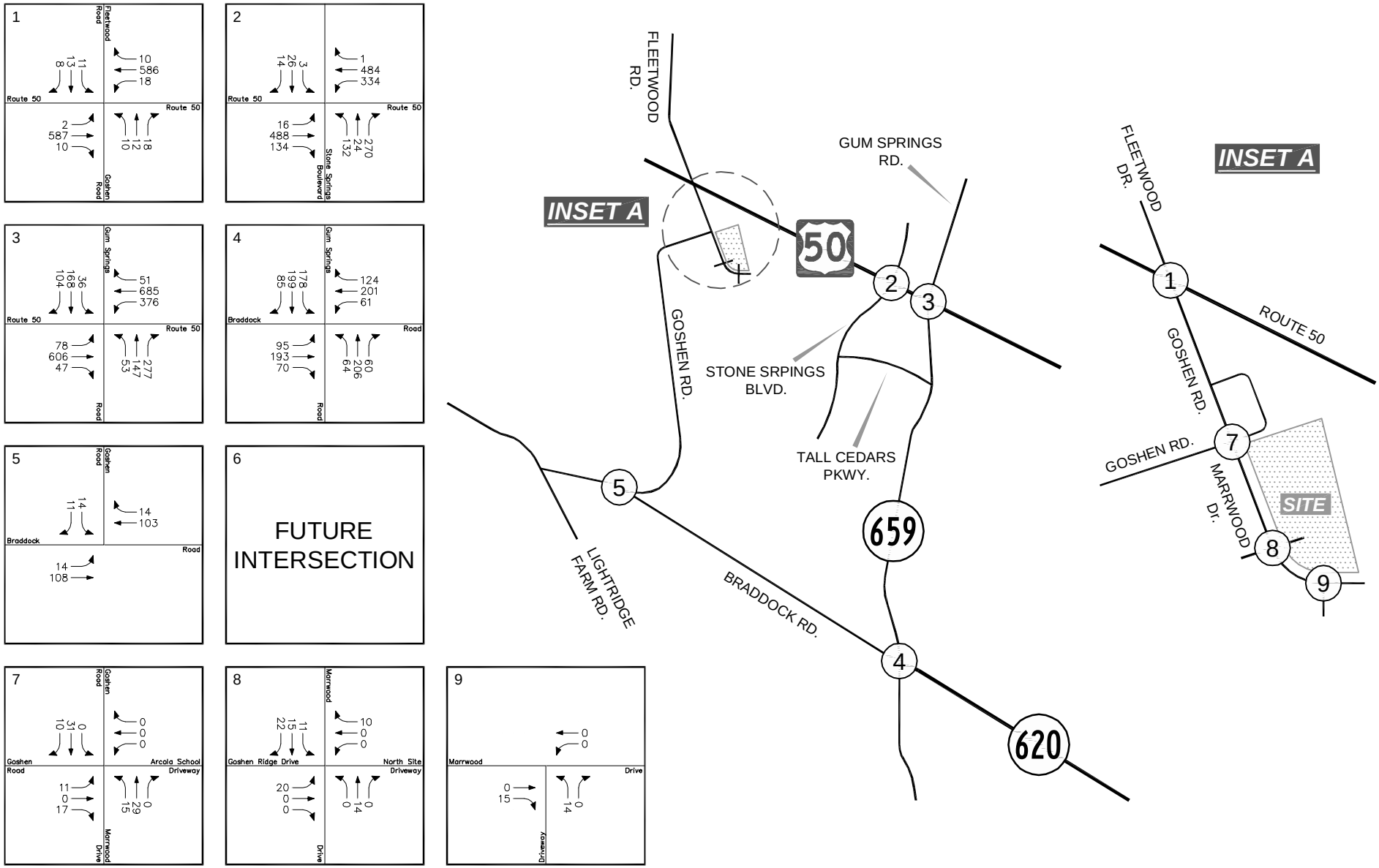

Figure 4–7
2012 Peak Hour Traffic Assignments without Special Exception Use (Sunday)

SUN PEAK HOUR
000

North

Catholic Diocese of Arlington
Loudoun County, Virginia

Wells + Associates, Inc.

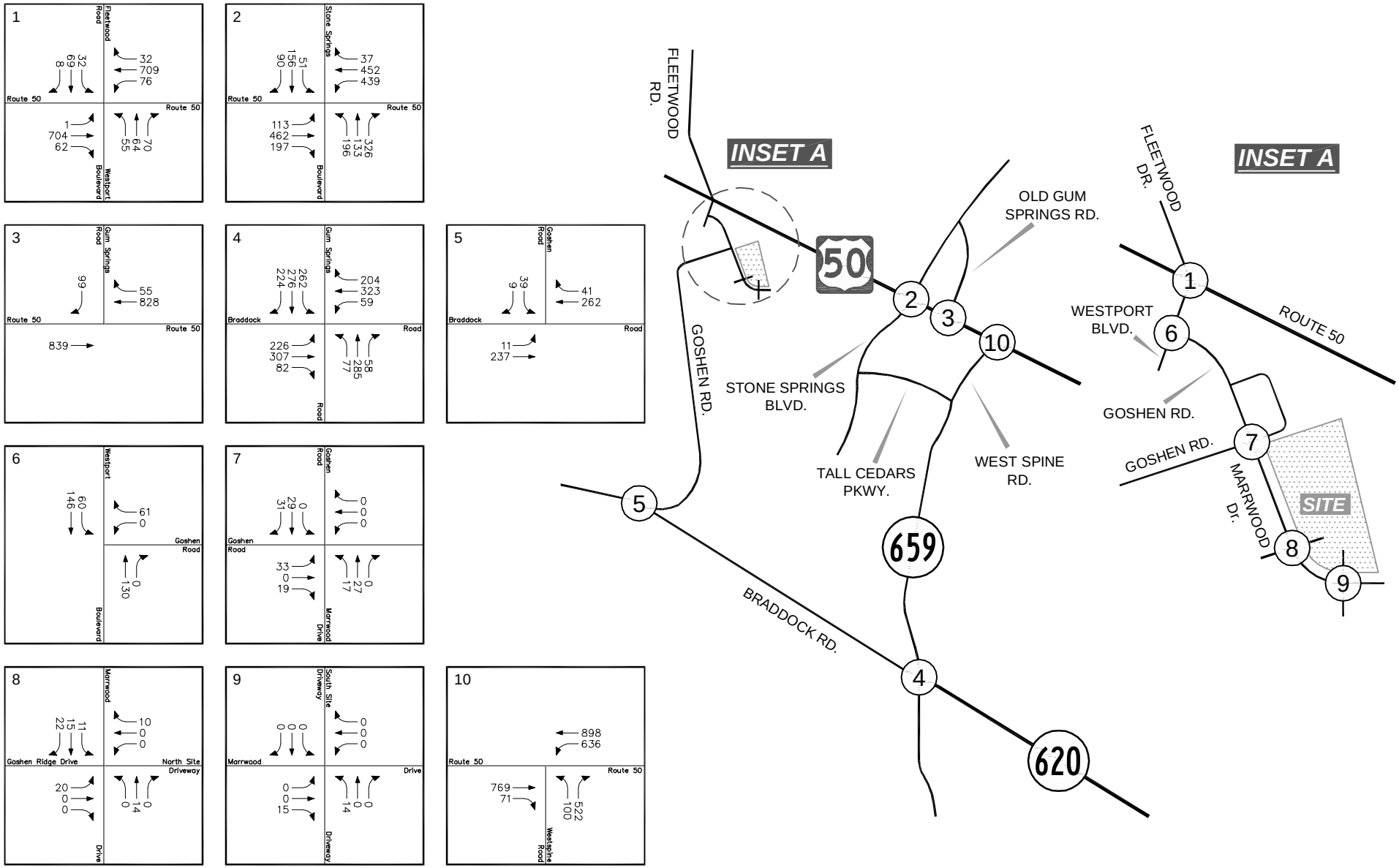

Figure 4–8
2015 Peak Hour Traffic Forecasts without Special Exception Use (Sunday)

SUN PEAK HOUR
000

North

Catholic Diocese of Arlington
Loudoun County, Virginia

Wells + Associates, Inc.

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 reduced 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	2008 Existing Sunday	Background 2012 Sunday	Background 2015 Sunday
1. John Mosby Highway (Route 50)/	Unsignalized	EBL	A [8.4]	A [8.9]	
Goshen Road (Route 616)/Fleetwood Road		WBL	A [8.4]	A [9.0]	N/A
		NBLTR	B [11.9]	C [23.8]	
		SBLTR	A [9.9]	C [24.1]	
2015 Background Improvement:	Signalized	EBL			A (8.5)
Realign Goshen Road,		EBT			B (12.1)
Construct Westport Boulevard, Install Signal		EBR			A (9.2)
		WBL			A (5.6)
		WBT	N/A	N/A	A (9.0)
		WBR			A (6.9)
		NBLT			B (18.9)
		NBR			B (13.0)
		SBLTR			B (18.5)
		Overall			**B (11.3)**
2. John Mosby Highway (Route 50)/	Signalized	EBT	C (33.0)		
Stone Springs Boulevard		EBR	C (29.4)		
		WBL	D (47.4)		
		WBT	A (9.0)	N/A	N/A
		NBL	D (44.1)		
		NBR	C (21.0)		
		Overall	**C (28.1)**		
2012 Background Improvement:	Signalized	EBL		C (20.3)	D (38.2)
Construct SB Approach		EBT		C (22.2)	C (31.4)
Add EB and WB Through Lanes, Optimize Timings		EBR		C (20.2)	C (29.2)
		WBL		C (23.2)	D (35.2)
		WBT		A (8.2)	B (12.3)
		WBR		A (7.3)	B (11.3)
		NBL	N/A	C (25.6)	D (39.4)
		NBT		B (16.8)	C (21.6)
		NBR		A (9.5)	B (10.5)
		SBL		C (29.1)	D (35.7)
		SBT		C (30.6)	D (38.9)
		SBR		C (29.0)	C (33.8)
		Overall		**B (17.2)**	**C (26.8)**
3. John Mosby Highway (Route 50)/	Signalized	EBL	C (29.8)	D (36.8)	
Gum Spring Road (Route 659)		EBT	D (42.0)	E (57.3)	
		EBR	C (35.0)	D (43.0)	
		WBL	C (26.7)	F (100.4)	
		WBT	C (32.9)	D (40.1)	N/A
		WBR	C (27.1)	C (31.4)	
		NBLTR	D (53.4)	F (133.3)	
		SBLTR	D (45.8)	E (76.5)	
		Overall	**D (38.6)**	**E (73.7)**	
Background Improvements: Add EB and WB	Signalized	EBL		D (36.8)	
Through Lanes, Optimize Timings		EBT		D (50.4)	
		EBR		D (43.2)	
		WBL		D (44.9)	
		WBT	N/A	C (34.0)	N/A
		WBR		C (29.2)	
		NBLTR		C (28.2)	
		SBLTR		C (24.6)	
		Overall		**D (37.4)**	
2015 Improvement: Remove Northbound Leg,	Unsignalized	SBR	N/A	N/A	A [9.8]
Remove signal, Convert to RIRO					
4. Braddock Road (Route 620)/	Unsignalized	EBLTR	A [10.0]	F [81.8]	
Gum Spring Road (Route 659)		WBLTR	B [10.5]	F [101.5]	N/A
		NBLTR	B [10.1]	F [65.6]	
		SBLTR	B [11.7]	F [186.8]	
2012 Background Improvements: Install Signal	Signalized	EBLTR		C (24.9)	F (498.6)
		WBLTR		C (21.5)	E (71.0)
		NBLTR	N/A	B (12.8)	B (19.6)
		SBLTR		C (22.4)	F (187.0)
		Overall		**C (20.7)**	**F (209.4)**
2015 Background Improvements: Add Separate	Signalized	EBL			C (21.0)
Turn Lanes on all Approaches		EBT			C (22.6)
		EBR			B (16.0)
		WBL			C (23.5)
		WBT			D (36.9)
		WBR			B (16.9)
		NBL	N/A	N/A	C (24.4)
		NBT			D (36.2)
		NBR			C (23.7)
		SBL			C (24.2)
		SBT			C (23.6)
		SBR			B (12.9)
		Overall			**C (24.8)**
5. Braddock Road (Route 620)/	Unsignalized	EBLT	A [1.6]	A [0.9]	A [0.4]
Goshen Road (Route 616)		SBLR	A [8.5]	A [8.9]	B [13.0]
6. Westport Boulevard/	Unsignalized	WBLR	N/A	N/A	A [9.0]
Goshen Road (Route 616)		SBL			A [7.6]
7. Goshen Road (Route 616)/	Unsignalized	EBLTR	N/A	A [8.9]	A [9.2]
Arcola School Driveway/Marrwood Drive		WBLTR	N/A	A [0.0]	A [0.0]
		NBLTR	N/A	A [2.5]	A [2.9]
		SBLTR	N/A	A [0.0]	A [0.0]
8. Marrwood Drive/	Unsignalized	EBLTR			
North Site Driveway/Marrwood Driveway		WBLTR	N/A	N/A	N/A
		NBLTR			
9. Marrwood Drive/	Unsignalized	EBLTR			
South Site Driveway/Marrwood Driveway		WBLTR	N/A	N/A	N/A
		SBLTR			
10. John Mosby Highway (Route 50)/	Signalized	EBT			C (34.9)
West Spine Road		EBR			B (11.3)
		WBL			C (32.2)
		WBT	N/A	N/A	A (9.9)
		NBL			C (26.3)
		NBR			B (10.5)
		Overall			**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.

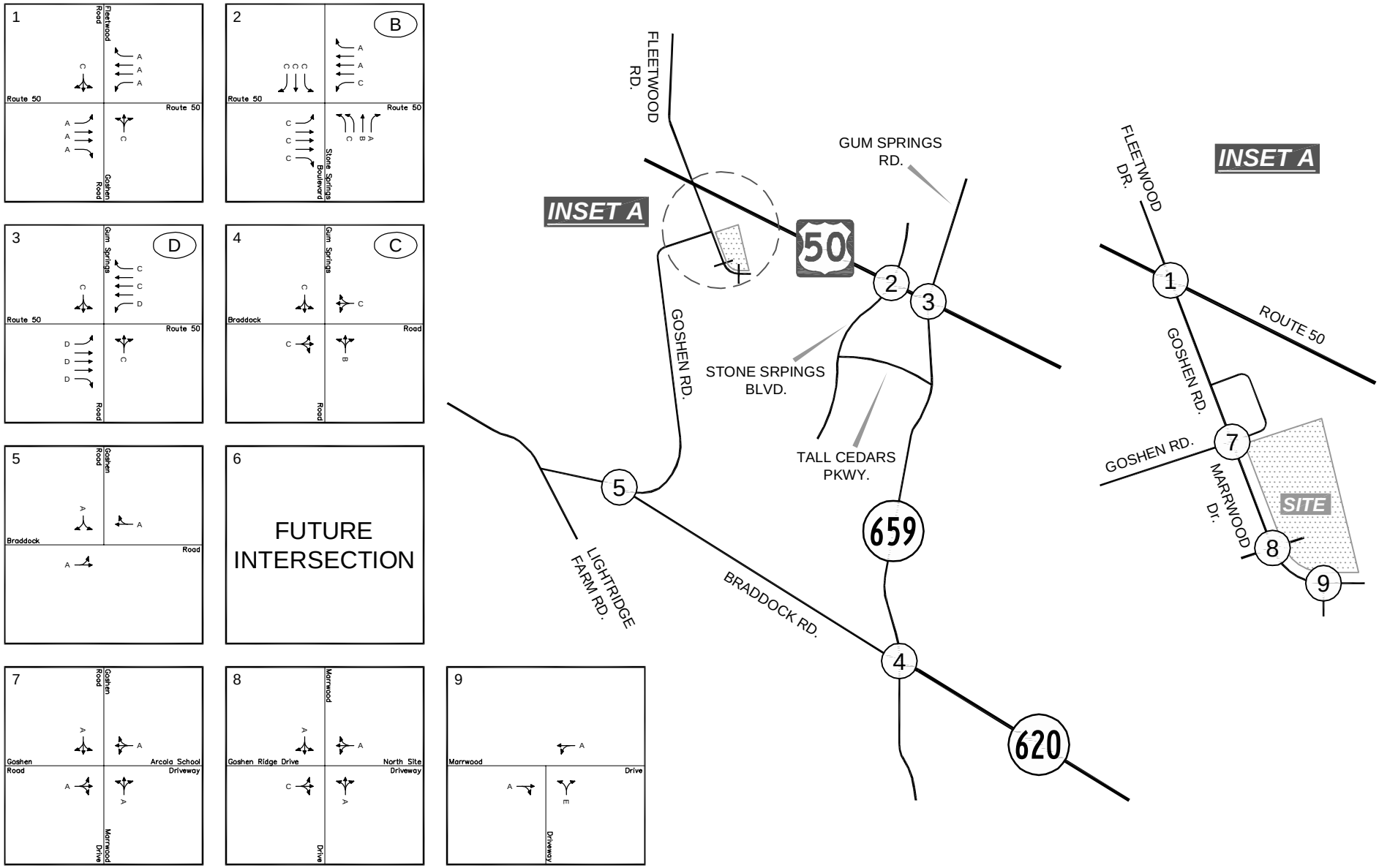

Figure 4–9
2012 Levels of Service without Special Exception Use (Sunday)

X Levels of Service

(X) Overall Levels of Service

North

Catholic Diocese of Arlington
Loudoun County, Virginia

Wells + Associates, Inc.

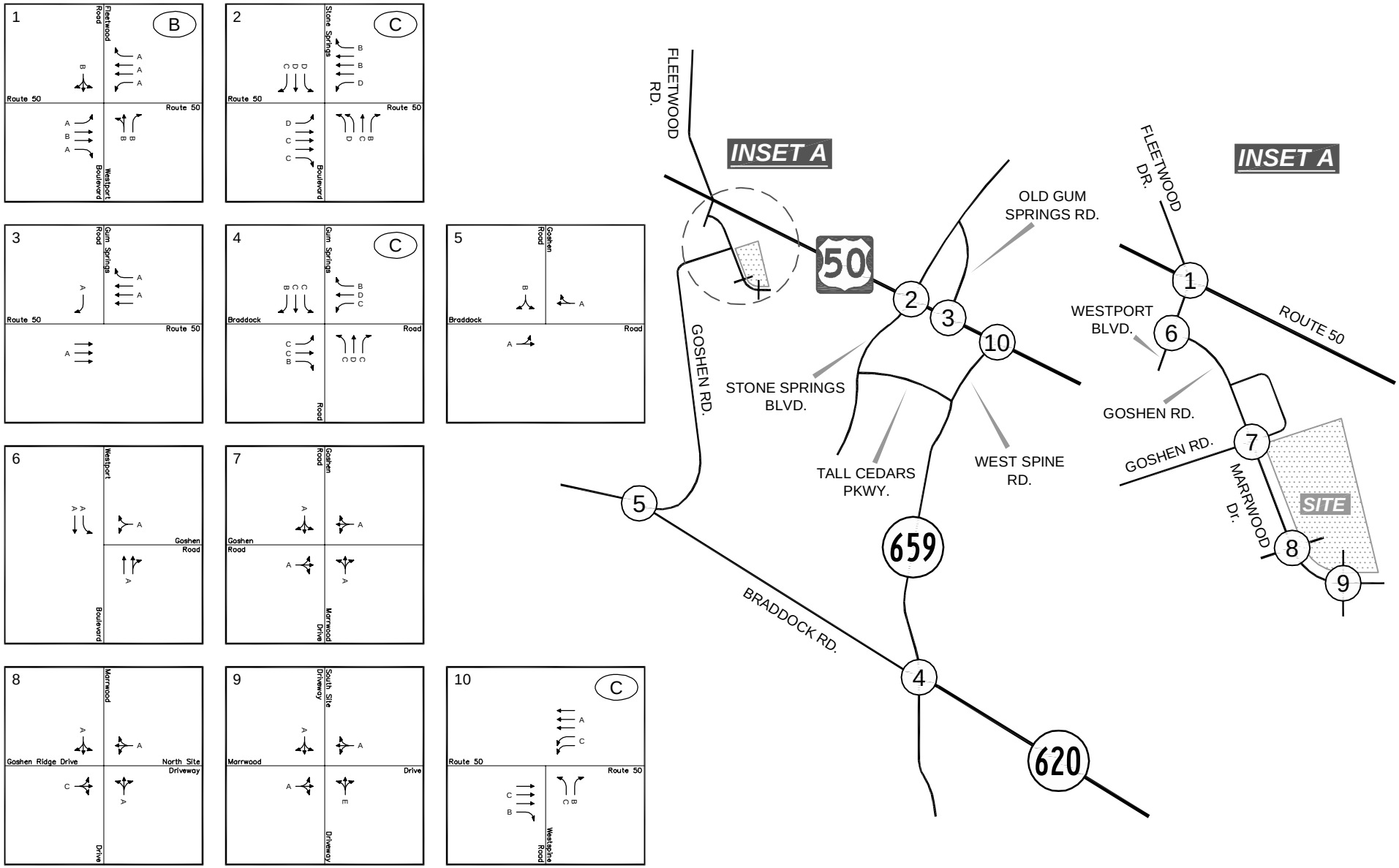

Figure 4–10
2015 Levels of Service without Special Exception Use (Sunday)

X Levels of Service

(X) Overall Levels of Service

North

Catholic Diocese of Arlington
Loudoun County, Virginia

Wells + Associates, Inc.

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 is planned to be constructed over two phases. The first phase (2012) consists of a 335-seat church (approximately 16,200 S.F.) with the second phase (2015) constructing the remainder of a 1,200-seat church including a parish center (approximately 58,000 S.F.), a 200-student private school and/or convent/rectory. The phase 1 special exception use (335-seat church) would generate 216 trips (112 in and 104 out) during the Sunday peak hour and 513 average daily trips on Sunday.

Under buildout conditions (phase 2, 2015), the church would be expanded to 1,200-seats including a parish center and a 200-student private school along with a convent/rectory is planned to be constructed. Phase 2 of the development is anticipated to generate 744 peak hour trips (387 inbound and 357 inbound) on Sunday and 1,845 average daily trips on Sunday.

Note that the convent/rectory is anticipated to contain three (3) to 10 rooms. While some residents are permitted to own private vehicles, they are unlikely to make peak hour trips. Therefore, only daily trips have been included in the trip generation analysis based on one (1) single-family detached dwelling. Further, the private school is not anticipated to generate any peak hour trips on a typical Sunday.

Based on this information, the proposed special exception uses would generate 723 *more* peak hour trips and 1,687 *more* daily trips than the currently approved density under buildout conditions.

SITE TRIP DISTIBUTION AND ASSIGNMENT

Trip distributions for the church were determined in conjunction with the CDA based on the current parish boundaries. The boundaries are generally defined as including the southwestern portion of Loudoun County beginning at New Rd. (Route 600) and Bull Run, then follow along Loudoun County Line southeast toward the Fairfax County line. Then north along Fairfax County Line, west along John S. Mosby Highway (U.S. Route 50), southwest on Lenah Road (Route 600), west on New Road (Route 600), returning to the Loudoun County Line and Bull Run junction.

Subsequent to a review of these boundaries, W+A used engineering judgment and knowledge of the area to determine the distributions of church based site generated traffic.

The following distributions were derived based on this data:

To/From	Percentage
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	2 percent
Total	100 percent

The traffic distributions outlined above were used to apply all of the site-generated trips to the North Driveway that is expected to be constructed in phase 1, along with the emergency access drive (refer to Figure 2-1). In phase 2, the South Driveway would be constructed, but the majority of traffic is expected to utilize the North Driveway that serves the main parking area serving the church. These assignments are shown on Figures 5-1 and 5-2.

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

Land Use	ITE Land Use Code	Size	Units	Sunday Peak Hour In	Out	Total	Sunday ADT
Approved Development							
Single Family Detached(2)	210	19	D.U.	11	10	21	158
Proposed Development							
Phase I							
Church(3)	560	335	Seats	112	104	216	513
PHASE I NET NEW TRIPS (Approved vs. Proposed)				**101**	**94**	**195**	**355**
Phase II							
Church(4)	560	1,200	Seats	387	357	744	1,836
Private School K-8	534	200	Students	-	-	-	-
Convent (Single Familty Detached)(5)	210	1	D.U.	-	-	-	9
Development Total				387	357	744	1,845
BUILDOUT NET NEW TRIPS (Approved vs. Proposed)				**376**	**347**	**723**	**1,687**

Notes:

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

(2) Peak Hour of Generator

(3) Based on Equivalent 16,200 SF Sanctuary.

(4) Based on Equivalent 58,000 SF Sanctuary.

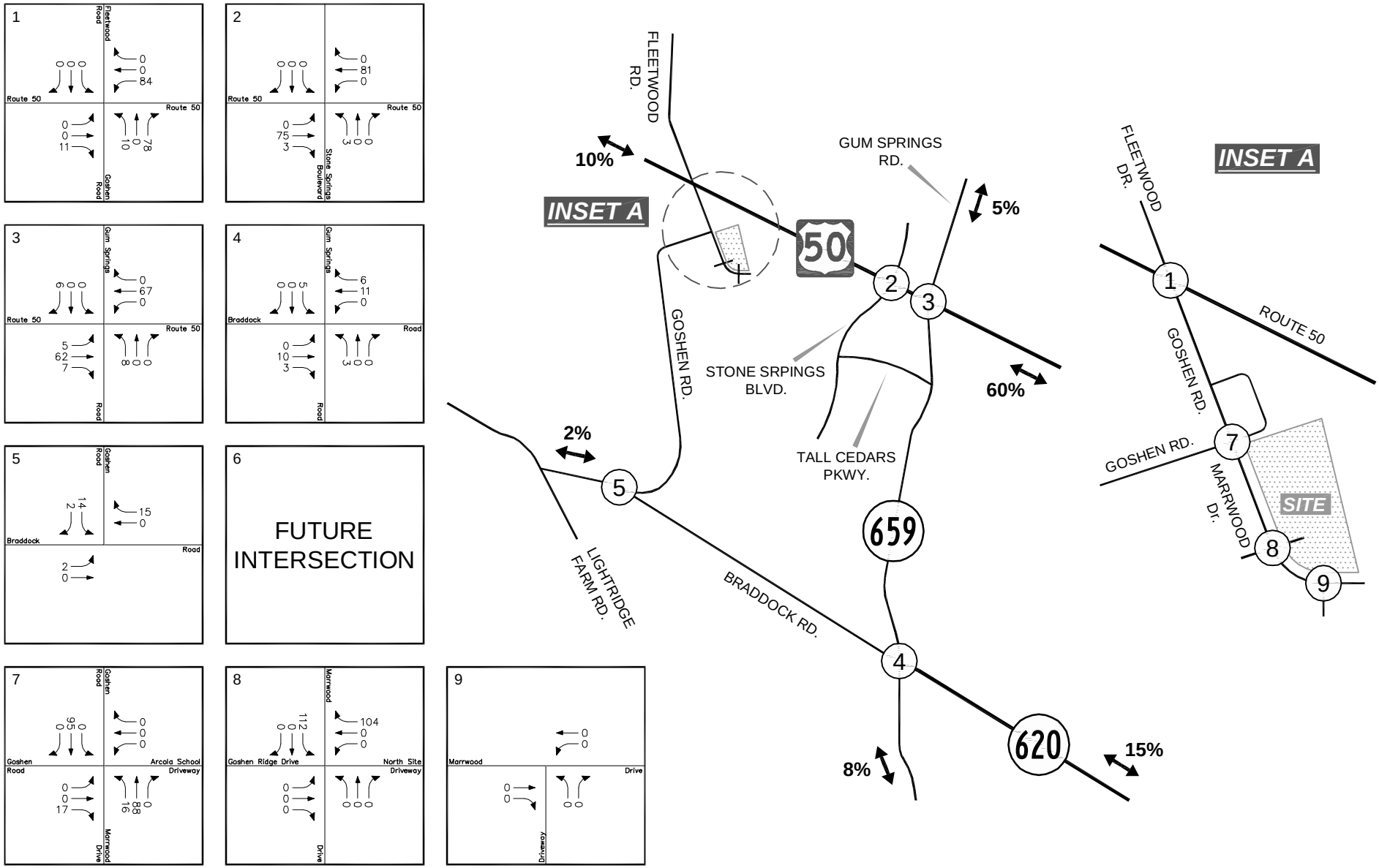

Figure 5–1
2012 Site Generated Traffic Assignments and Directional Distributions (Sunday)
335 Seat Church

XX% Directional Distribution

SUN PEAK HOUR
000

North

Catholic Diocese of Arlington
Loudoun County, Virginia

Wells + Associates, Inc.

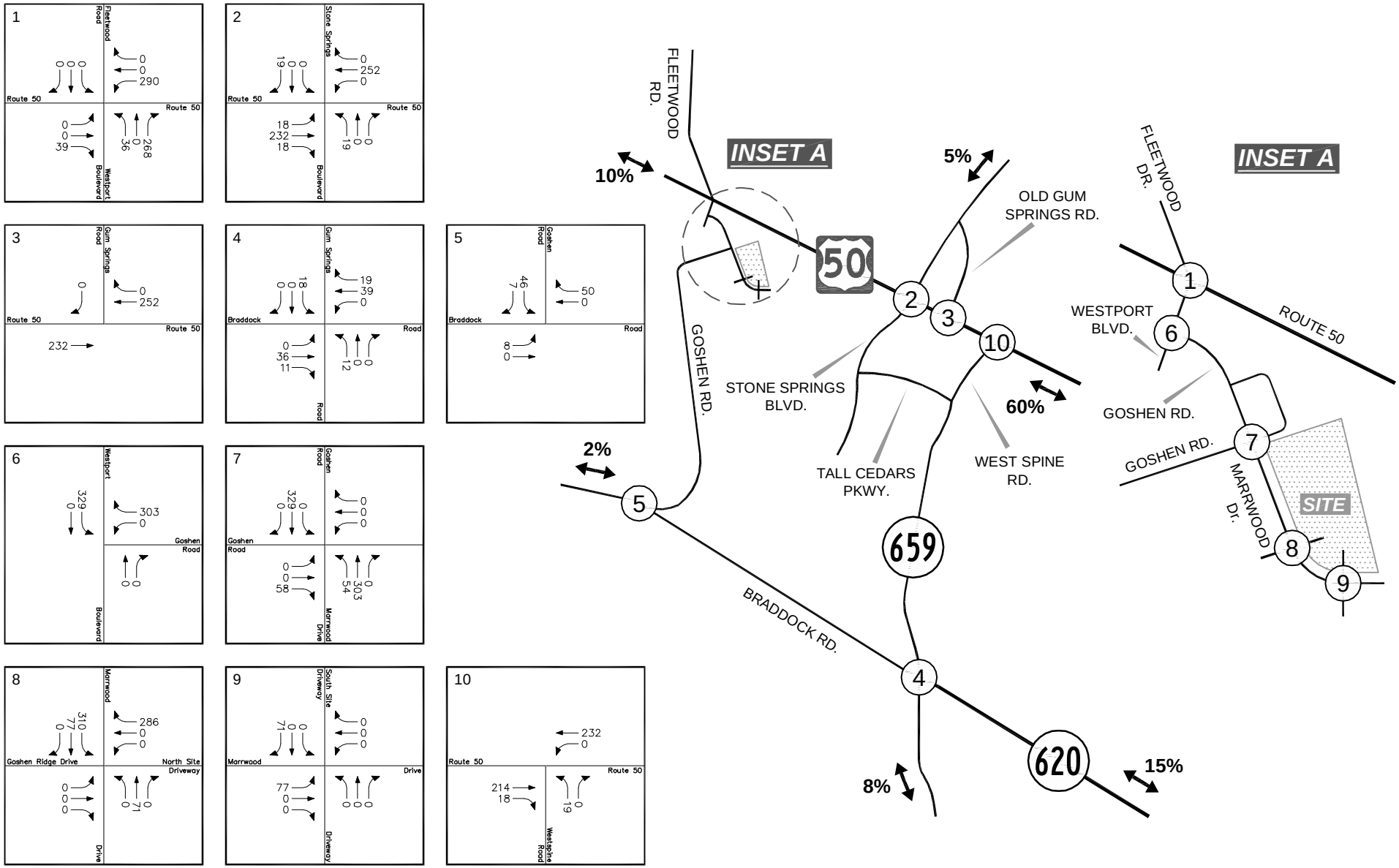

Figure 5–2
2015 Site Generated Traffic Assignments and Directional Distributions (Sunday)
1,200 Seat Church and 200 Student Private School

XX% Directional Distribution

SUN PEAK HOUR
000

North

Catholic Diocese of Arlington
Loudoun County, Virginia

Wells + Associates, Inc.

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. All of the movements at the Goshen Road/U.S. Route 50/Fleetwood Road intersection are expected to operate at acceptable levels of service under its current stop sign control with the exception of the southbound movement on Fleetwood Road. The southbound movement is anticipated to operate at LOS "E" during the Sunday peak hour, however, since the volume of traffic is minimal (approximately 30 vehicles) during this period, the expected delays are not anticipated to cause undue disruptions in traffic during this period. No roadway improvements are necessary based on the capacity analysis results.

2. All movements at the signalized U.S. Route 50/Stone Springs Boulevard and U.S. Route 50/Gum Spring Road intersections are expected to continue to operate at acceptable levels of service in the near-term, similar to background conditions.

3. All movements at the Braddock Road/Gum Spring Road intersection are expected to continue to operate at acceptable levels of service with the installation of a new traffic signal under near-term background conditions.

4. All intersections along Goshen Road are expected to operate at acceptable levels of service during the Sunday peak hour.

5. All of the turning movements at the North site driveway along future Marrwood Drive are anticipated to operate at acceptable levels of service in the near-term. A review of the left turn lane warrants indicates that a separate left turn lane at the north driveway is not met under near-term conditions (see Appendix L).

Long-term (2015)

1. The realignment of Westport Boulevard (Goshen Road)/U.S. Route 50 by the Westport property and the installation of a new traffic signal, and the addition of a northbound right turn lane and extension of auxiliary lanes would allow all movements 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 (Boyd) School.

8. All of the turning movements at the North Driveway on Marrwood Drive are expected to operate at acceptable levels of service with the exception of the eastbound side-street approach. This movement serves the Marrwood development, and carries a minimal number of peak hour trips (20 vehicles). In addition, a review of the left turn lane warrants indicates that a separate left turn lane on Marrwood Drive at the north driveway is not warranted under long-term conditions (see Appendix L).

9. The South Driveway on future Marrwood Drive is anticipated to operate at acceptable levels of service in 2015 with the buildout of the project.

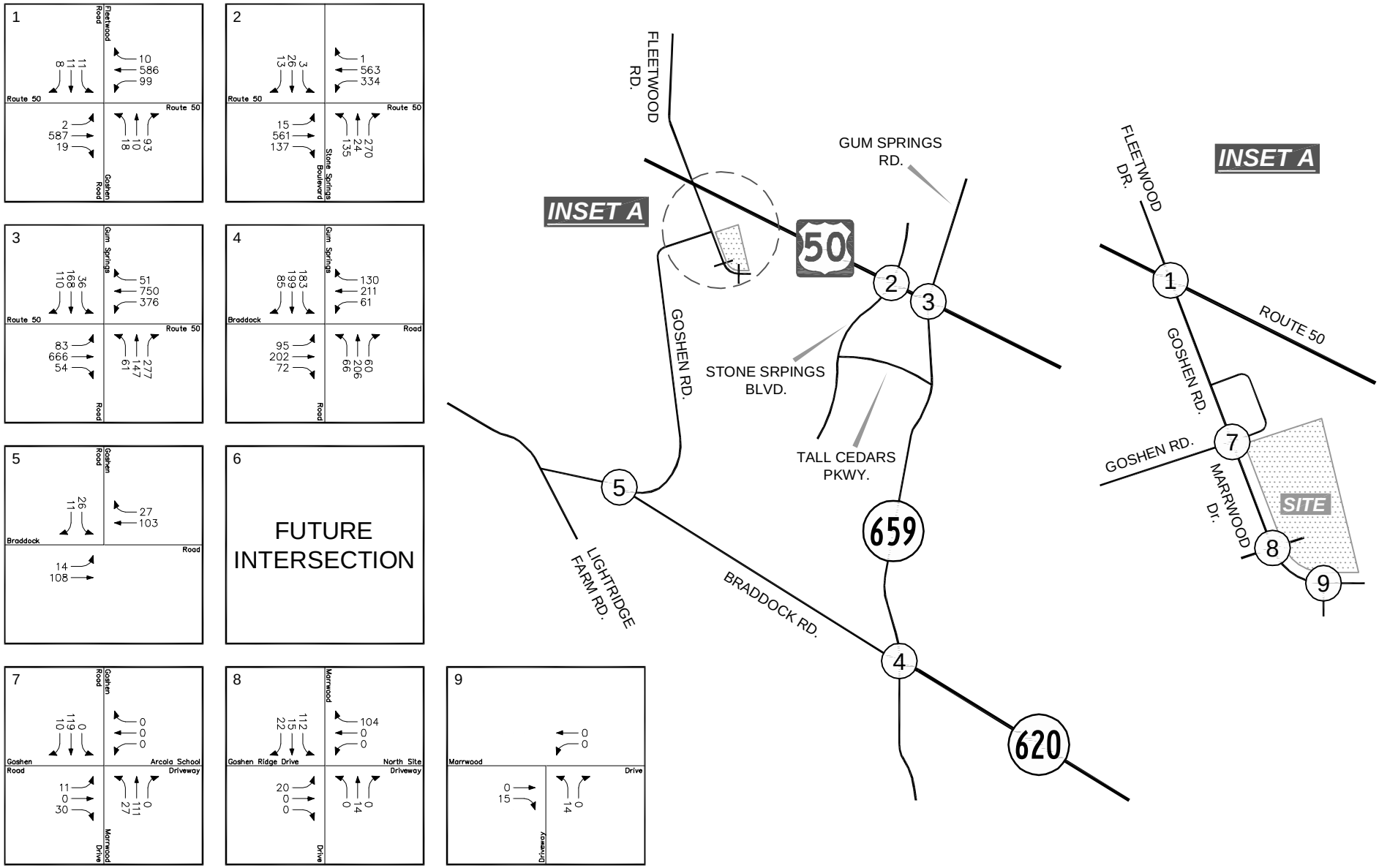

Figure 6–1
2012 Peak Hour Traffic Assignments with Special Exception Use (Sunday)

SUN PEAK HOUR
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North

Catholic Diocese of Arlington
Loudoun County, Virginia

Wells + Associates, Inc.

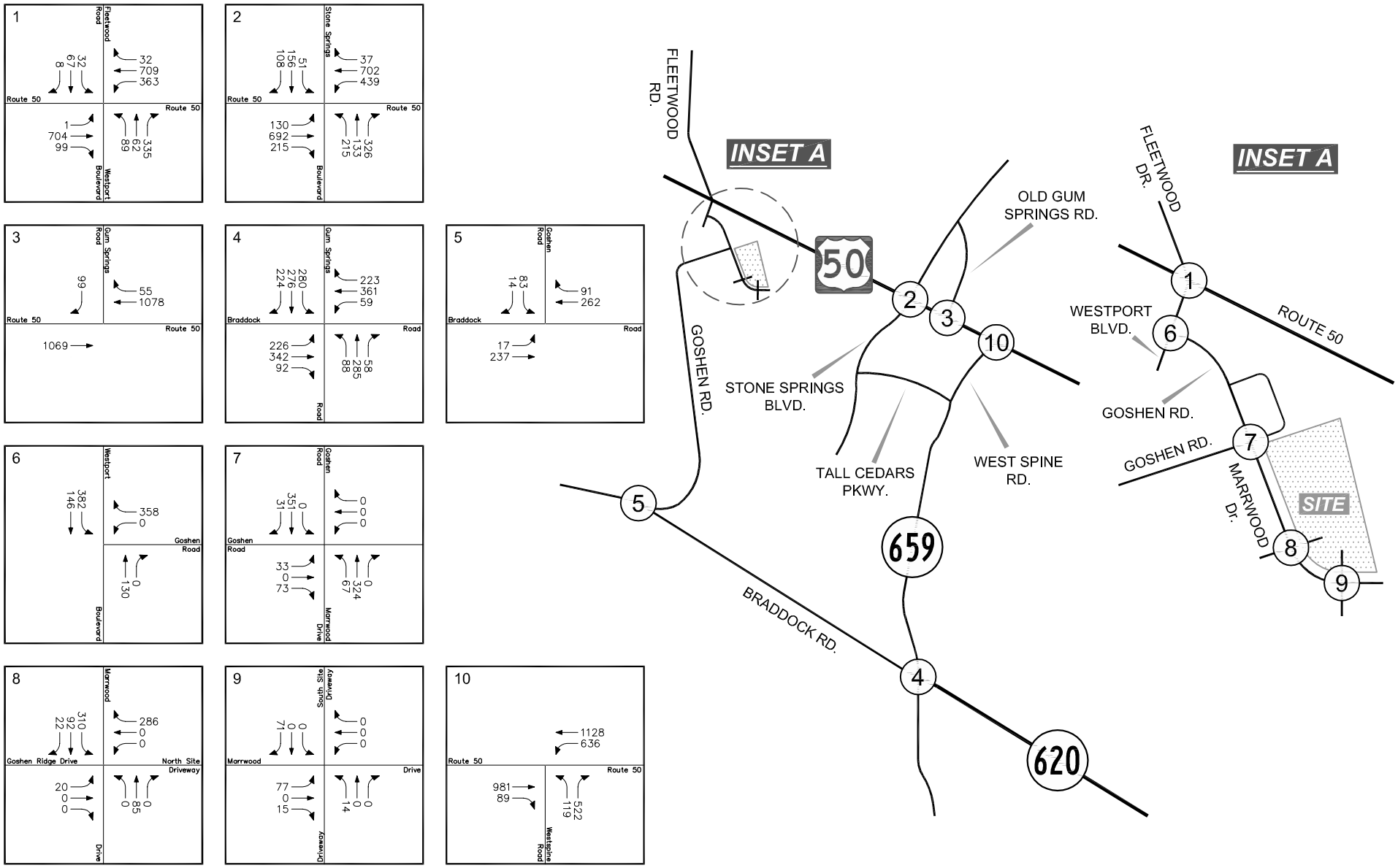

Figure 6–2
2015 Peak Hour Traffic Forecasts with Special Exception Use (Sunday)

SUN PEAK HOUR
000

North

Catholic Diocese of Arlington
Loudoun County, Virginia

Wells + Associates, Inc.

Table 6-1
Catholic Diocese of Arlington Loudoun Property
Sunday Intersection Level of Service

Intersection	Intersection Control	Critical Movement	2008 Existing Sunday	Background 2012 Sunday	Background 2015 Sunday	Total Future 2012 Sunday	Total Future 2015 Sunday
1. John Mosby Highway (Route 50)/ Goshen Road (Route 616)/Fleetwood Road	Unsignalized	EBL	A [8.4]	A [8.9]	N/A	A [8.9]	N/A
		WBL	A [8.4]	A [9.0]		A [9.8]	
		NBLTR	B [11.9]	C [23.8]		D [27.1]	
		SBLTR	A [9.9]	C [24.1]		E [49.7]	
2015 Background Improvement (Westport): Realign Goshen Road, Construct Westport Boulevard, Install Signal	Signalized	EBL	N/A	N/A	A (8.5)	N/A	B (12.6)
		EBT			B (12.1)		B (17.6)
		EBR			A (9.2)		B (13.6)
		WBL			A (5.6)		B (15.1)
		WBT			A (9.0)		A (8.6)
		WBR			A (6.9)		A (6.7)
		NBLT			B (18.9)		C (26.8)
		NBR			B (13.0)		B (15.5)
		SBLTR			B (18.5)		C (23.9)
		Overall			**B (11.3)**		**B (14.9)**
2. John Mosby Highway (Route 50)/ Stone Springs Boulevard	Signalized	EBT	N/A	N/A	N/A	N/A	N/A
		EBR					
		WBL					
		WBT					
		NBL					
		NBR					
		Overall	**C (28.1)**				
2012 Background Improvement: Construct SB Approach Add EB and WB Through Lanes, Optimize Timings	Signalized	EBL	N/A	C (20.3)	D (38.2)	C (20.1)	D (46.2)
		EBT		C (22.2)	C (31.4)	C (22.4)	C (32.2)
		EBR		C (20.2)	C (29.2)	C (20.0)	C (28.6)
		WBL		C (23.2)	D (35.2)	C (24.1)	D (43.2)
		WBT		A (8.2)	B (12.3)	A (8.2)	B (12.6)
		WBR		A (7.3)	B (11.3)	A (7.2)	B (10.8)
		NBL		C (25.6)	D (39.4)	C (26.7)	D (47.4)
		NBT		B (16.8)	C (21.6)	B (17.7)	C (27.6)
		NBR		A (9.5)	B (10.5)	B (10.3)	B (15.2)
		SBL		C (29.1)	D (35.7)	C (30.2)	D (43.2)
		SBT		C (30.6)	D (38.9)	C (31.8)	D (48.3)
		SBR		C (29.0)	C (33.8)	C (30.1)	D (41.0)
		Overall		**B (17.2)**	**C (26.8)**	**B (17.5)**	**C (29.8)**
3. John Mosby Highway (Route 50)/ Gum Spring Road (Route 659)	Signalized	EBL	N/A	N/A	N/A	N/A	N/A
		EBT					
		EBR					
		WBL					
		WBT					
		WBR					
		NBLTR					
		SBLTR					
		Overall	**D (38.6)**	**E (73.7)**			
Background Improvements: Add EB and WB Through Lanes, Optimize Timings	Signalized	EBL	N/A	D (36.8)	N/A	D (37.0)	N/A
		EBT		D (50.4)		D (51.2)	
		EBR		D (43.2)		D (43.2)	
		WBL		D (44.9)		D (49.2)	
		WBT		C (34.0)		C (34.2)	
		WBR		C (29.2)		C (28.9)	
		NBLTR		C (28.2)		C (30.1)	
		SBLTR		C (24.6)		C (25.6)	
		Overall		**D (37.4)**		**D (38.7)**	
2015 Improvement: Remove Northbound Leg, Remove signal, Convert to RIRO	Unsignalized	SBR	N/A	N/A	A [9.8]	N/A	A [9.1]
4. Braddock Road (Route 620)/ Gum Spring Road (Route 659)	Unsignalized	EBLTR	A [10.0]	F [81.8]	N/A	N/A	N/A
		WBLTR	B [10.5]	F [101.5]			
		NBLTR	B [10.1]	F [65.6]			
		SBLTR	B [11.7]	F [186.8]			
2012 Background Improvements: Install Signal	Signalized	EBLTR	N/A	C (24.9)	F (498.6)	C (26.7)	N/A
		WBLTR		C (21.5)	E (71.0)	C (22.8)	
		NBLTR		B (12.8)	B (19.6)	B (13.3)	
		SBLTR		C (22.4)	F (187.0)	C (23.9)	
		Overall		**C (20.7)**	**F (209.4)**	**C (22.1)**	
2015 Background Improvements: Add Separate Turn Lanes on all Approaches	Signalized	EBL	N/A	N/A	C (21.0)	N/A	C (22.1)
		EBT			C (22.6)		C (22.6)
		EBR			B (16.0)		B (14.8)
		WBL			C (23.5)		C (22.9)
		WBT			D (36.9)		D (38.7)
		WBR			B (16.9)		B (16.3)
		NBL			C (24.4)		C (25.2)
		NBT			D (36.2)		D (40.9)
		NBR			C (23.7)		C (25.2)
		SBL			C (24.2)		C (30.3)
		SBT			C (23.6)		C (26.0)
		SBR			B (12.9)		B (14.4)
		Overall			**C (24.8)**		**C (26.8)**
5. Braddock Road (Route 620)/ Goshen Road (Route 616)	Unsignalized	EBLT	A [1.6]	A [0.9]	A [0.4]	A [0.9]	A [0.7]
		SBLR	A [8.5]	A [8.9]	B [13.0]	B [10.0]	C [15.0]
6. Westport Boulevard/ Goshen Road (Route 616)	Unsignalized	WBLR	N/A	N/A	A [9.0]	N/A	B [11.1]
		SBL			A [7.6]		A [7.6]
7. Goshen Road (Route 616)/ Arcola School Driveway/Marrwood Drive	Unsignalized	EBLTR	N/A	A [8.9]	A [9.2]	A [9.7]	C [16.3]
		WBLTR	N/A	A [0.0]	A [0.0]	A [0.0]	A [0.0]
		NBLTR	N/A	A [2.5]	A [2.9]	A [1.6]	A [2.0]
		SBLTR	N/A	A [0.0]	A [0.0]	A [0.0]	A [0.0]
8. Marrwood Drive/ North Site Driveway/Goshen Ridge Place	Unsignalized	EBLTR	N/A	N/A	N/A	B [13.0]	F [55.6]
		WBLTR				A [8.8]	B [10.5]
		NBLTR				A [5.7]	A [6.4]
9. Marrwood Drive/ South Site Driveway/Marrwood Driveway *Note: South Site Driveway Constructed in 2015.*	Unsignalized	EBLTR	N/A	N/A	N/A	A [8.6]	B [10.9]
		WBLTR				A [0.0]	A [8.6]
		SBLTR				A [0.0]	A [6.2]
10. John Mosby Highway (Route 50)/ West Spine Road	Signalized	EBT	N/A	N/A	C (34.9)	N/A	D (38.6)
		EBR			B (11.3)		B (11.1)
		WBL			C (32.2)		D (35.5)
		WBT			A (9.9)		B (10.8)
		NBL			C (26.3)		C (28.3)
		NBR			B (10.5)		B (12.1)
		Overall			**C (21.7)**		**C (24.0)**

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.

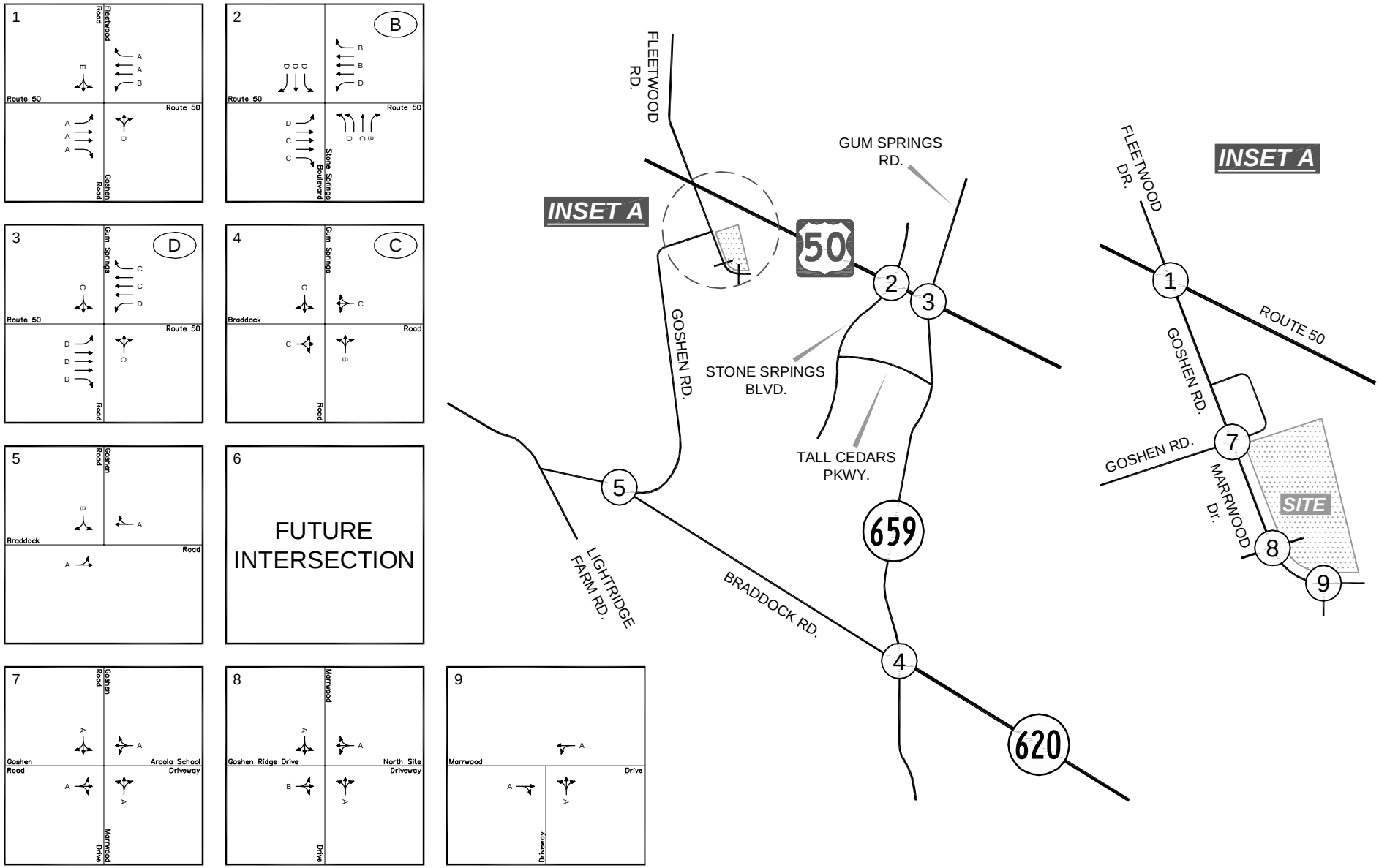

Figure 6–3
2012 Levels of Service with Special Exception Use (Sunday)

X Levels of Service

(X) Overall Levels of Service

North

Catholic Diocese of Arlington
Loudoun County, Virginia

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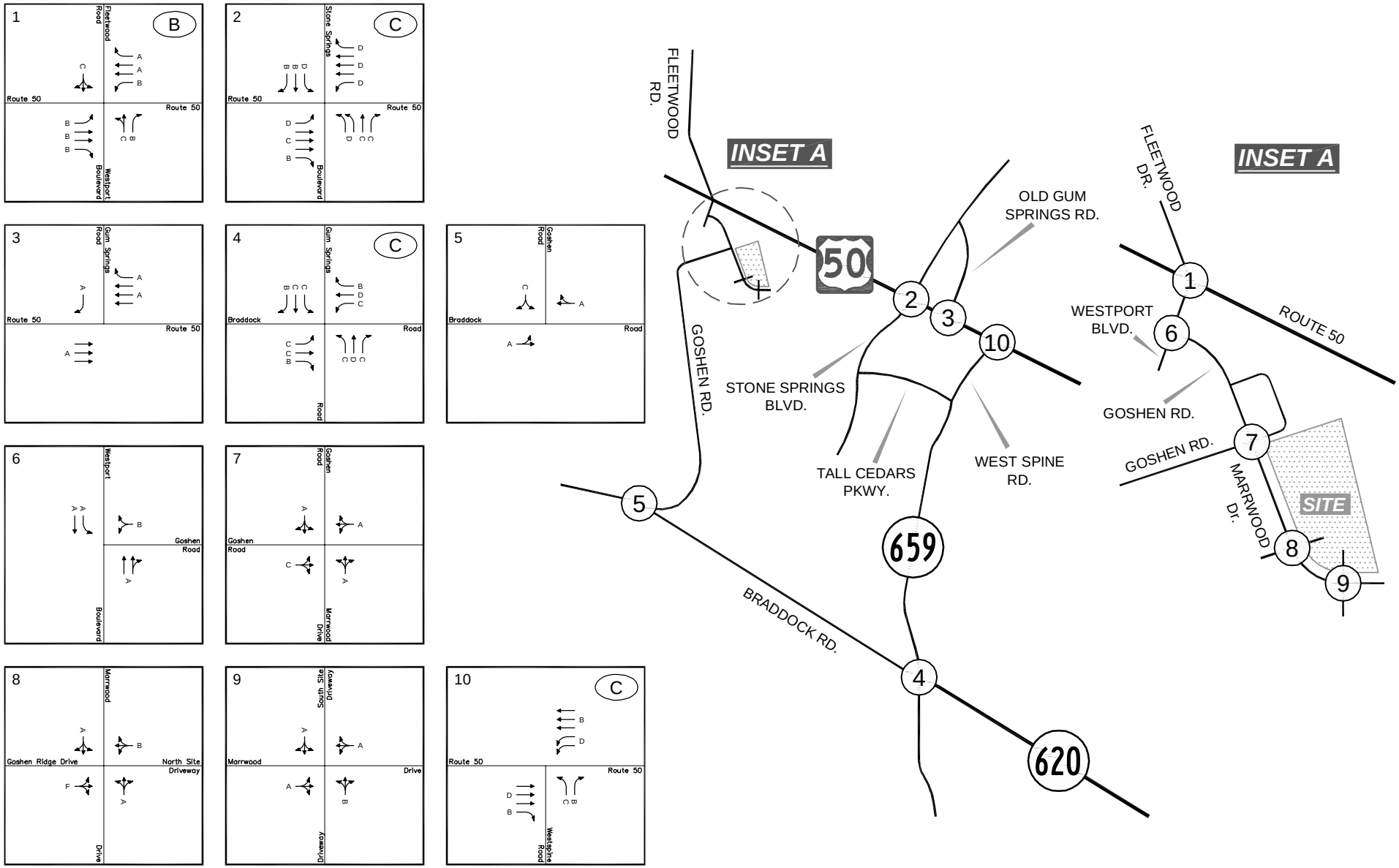

Figure 6–4
2015 Levels of Service with Special Exception Use (Sunday)

X Levels of Service

(X) Overall Levels of Service

North

Catholic Diocese of Arlington
Loudoun County, Virginia

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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. The driveways serving the church should provide single lanes for inbound and outbound traffic and be aligned with the planned access to the Marrwood property. The North Driveway is anticipated to be built in phase 1 in conjunction with the improvements to Goshen Road by Arcola (Boyd) School and the extension of Marrwood Drive (by Marrwood) to Goshen Ridge Place and are assumed to be in place by 2012. These improvements include the following and provide for adequate levels of service:

    a. Realignment of Goshen Road to eliminate the existing severe curve at the southwest corner of the Arcola (Boyd) School site.
    b. Realignment of the Arcola (Boyd) School's southern driveway to create a four-way intersection at Goshen Road/Marrwood Drive.
    c. Extension of Marrwood Drive to the South Driveway (Goshen Ridge Place) by Marrwood.

    These improvements would provide for acceptable levels of service with the site development under both phase 1 and buildout conditions.

2. The Phase 1 analyses indicate that all movements and approaches at the Goshen Road/U.S. Route 50/Fleetwood Road would operate at acceptable levels with the exception of the southbound Fleetwood Road approach that is expected to operate at LOS "E" during the Sunday peak hour. However, given the relatively low volume on this approach, no additional improvements are recommended or proposed. The capacity analyses indicate that the westbound left turn movement would experience minimal delay (LOS "A") and queuing (one (1) to two (2) vehicles). Therefore, this turn lane would adequately serve the phase 1 program.

3. Phase 2 of the CDA property (1,200-seat church including a parish center, 200-student private school, and/or convent/rectory) would not be occupied prior to the improvements planned and installed by the Westport development and/or others to provide for adequate levels of service. Additionally, the construction and occupancy of the phase 2 uses would at the discretion of the parish (CDA) when deemed feasible to develop.

4. The buildout analyses for 2015 at the Westport Boulevard (Goshen Road)/U.S. Route 50/Fleetwood Road intersection indicate that all movements would continue to operate at acceptable levels of service predicated on improvements by others.

5. The analyses presented for 2015 conditions are conservative since they do not assume the planned extension of Marrwood Drive to the east connecting to future North Star Boulevard (Relocated Route 659). 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 335-seat church in phase 1 (2012) and 1,200-seat church including a parish center, 200-student private school and/or convent/rectory by 2015. This change in use and density would generate 216 peak hour trips and 513 daily trips on a typical Sunday in 2012, and 744 peak hour trips and 1,845 daily (24-hour) trips on Sunday in 2015. This represents 195 more Sunday peak hour trips and 355 more average daily trips on Sunday for phase 1. Similarly, the change in density results in 723 more Sunday peak hour trips and 1,687 average daily trips on Sunday than the currently approved density.

3. The capacity analyses for 2012 indicate that the all of the intersections would continue to operate at acceptable levels of service on Sunday with the special exception uses, with the exception of the southbound Fleetwood Road approach. This approach carries only a minor volume of peak hour trips on Sunday, and is not expected to be significantly impacted by church related traffic. The existing lane use configuration at the Goshen Road/U.S. Route 50 intersection would adequately serve the site under 2012 conditions.

4. The improvements planned by others in 2015 would continue to provide adequate levels of service with full development of the site. The CDA would not occupy the future phase 2 buildings until such time as the improvements planned and installed by others are made to ensure integrity of the road network is maintained.

5. The planned construction of Marrwood Drive 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 two phase development. Phase 1 (2012) of the development consists of a 335-seat church (approximately 16,200 S.F.). The second phase (2015) of the development includes an addition to the church (1,200-seat total/58,000 S.F.) including a parish center, a 200-student private school and/or convent/rectory. The following analyses review 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 M.

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

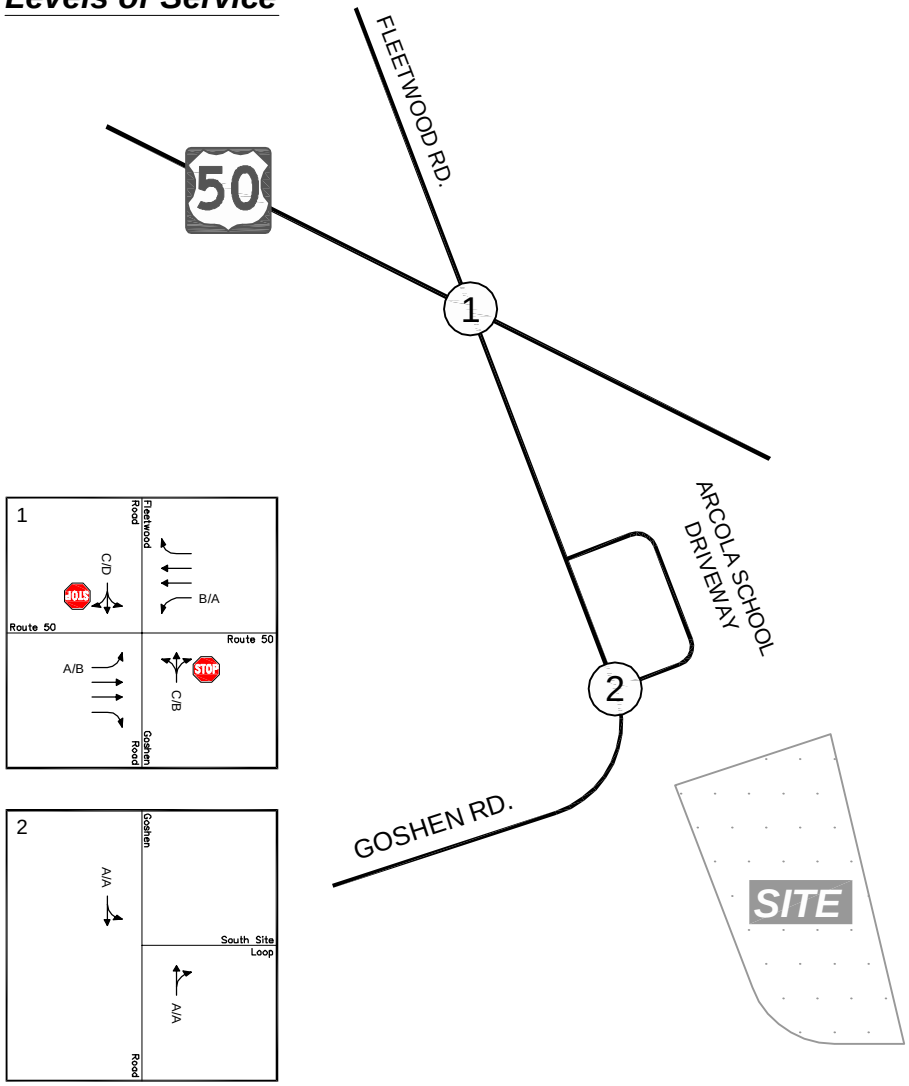
As required by Loudoun County, the following intersections were included in the weekday analysis:

1. Goshen Road (VA Route 616)/Fleetwood Road/U.S. Route 50.
2. Goshen Road (VA Route 616)/Arcola (Boyd) School South Site Driveway/Marrwood Drive.
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 N.

Existing Lane Use and Traffic Control, and Levels of Service



Existing Peak Hour Traffic Counts and ADT

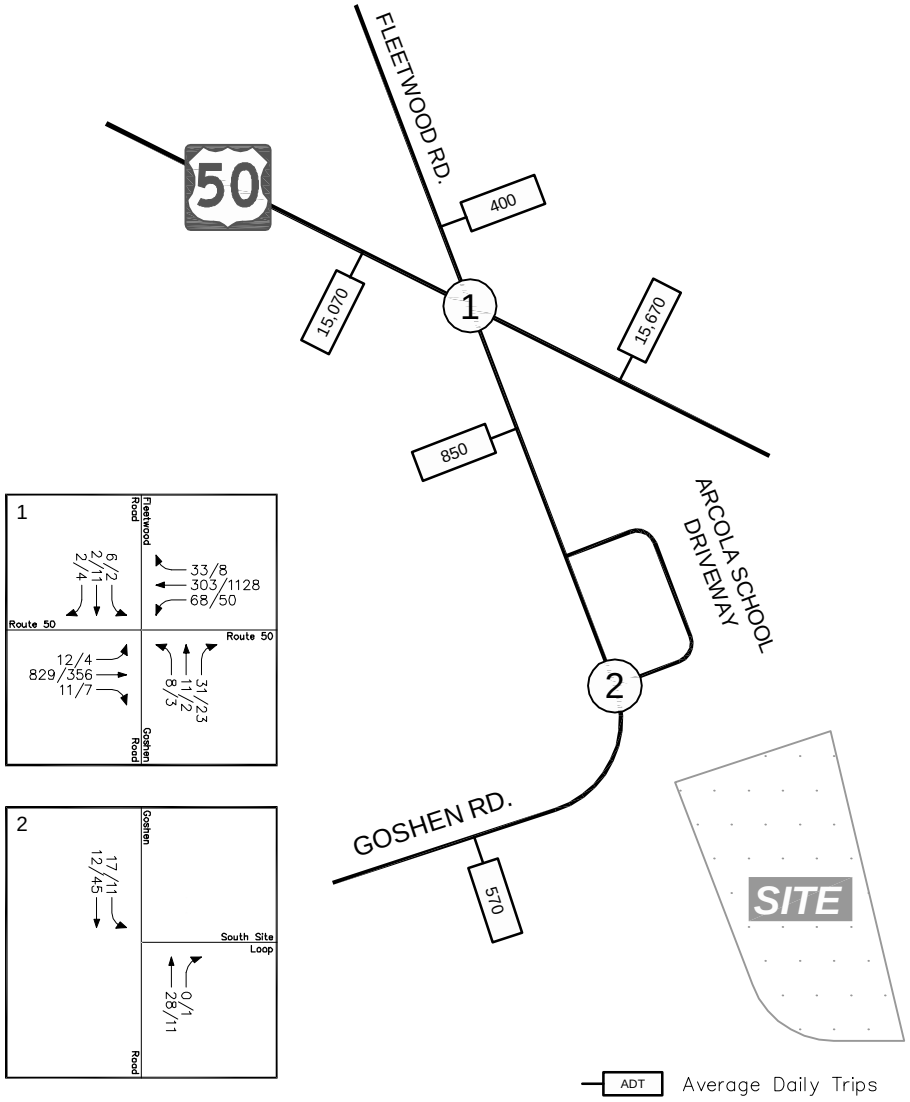


Figure 9–1
Existing Weekday Peak Hour Traffic Volumes, Levels of Service and Existing Lane Use and Traffic Control

x/x Levels of Service
(x/x) Overall Levels of Service
Represents One Travel Lane
Signalized Intersection
STOP Stop Sign
AM PEAK HOUR
PM PEAK HOUR
000/000
North

Catholic Diocese of Arlington
Loudoun County, Virginia

Wells + Associates, Inc.

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 O 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 (Boyd) 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 P.

Growth Rate and Heavy Vehicles

Based on previously prepared studies, 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, this 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. The growth rate is in addition to the 20 background developments considered in the area. This rate was used for both conditions (2012 and 2015). The annually compounded growth is depicted on Figure 9-3.

Based on data provided by VDOT, a 15 percent heavy vehicle factor was applied to the through traffic movements on U.S. Route 50 for weekday conditions and is reflected in all of the capacity analyses in this traffic report.

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 Drive just to the east of Goshen Road. Under phase 1 (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

			2008		2012				2015			
	Intersection	Critical	Existing		Background Future		Total Future		Background Future		Total Future	
Intersection	Control	Movement	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
1. John Mosby Highway (Route 50)/	Unsignalized	EBL	A [8.1]	B [11.7]	A [8.5]	B [13.5]	A [8.5]	B [13.5]				
Goshen Road (Route 616)/Fleetwood Road		WBL	B [10.5]	A [8.3]	B [13.5]	A [9.7]	B [13.6]	A [9.7]	N/A		N/A	
		NBLTR	C [17.2]	B [12.3]	F [186.2]	F [135.3]	F [172.3]	F [113.5]				
		SBLTR	C [18.3]	D [27.6]	F [206.6]	F [186.9]	F [206.6]	F [176.6]				
2015 Background Improvement:	Signalized	EBL							B (13.1)	B (15.1)	B (15.5)	B (15.4)
Realign Goshen Road,		EBT							C (25.2)	B (16.0)	C (30.2)	B (16.2)
Construct Westport Boulevard, Install Signal		EBR							B (14.2)	B (12.8)	B (17.1)	B (13.4)
		WBL							B (17.7)	A (8.7)	C (34.3)	A (9.8)
		WBT	N/A		N/A		N/A		B (10.9)	C (22.7)	B (11.9)	C (22.7)
		WBR							A (9.0)	A (7.8)	A (9.8)	A (7.8)
		NBLT							D (42.1)	D (36.7)	D (51.1)	D (44.3)
		NBR							C (23.3)	C (22.0)	C (24.2)	C (21.5)
		SBLTR							C (30.5)	C (32.7)	C (33.1)	C (32.8)
		Overall							**C (22.4)**	**C (20.9)**	**C (27.4)**	**C (21.5)**
2. Goshen Road (Route 616)/	Unsignalized	WBLR	N/A		N/A		N/A		B [11.4]	B [10.2]	B [13.7]	B [11.4]
Westport Boulevard		SBL							A [8.4]	A [8.0]	A [8.7]	A [8.2]
3. Goshen Road (Route 616)/	Unsignalized	EBLTR	A [0.0]	A [0.0]	B [11.8]	B [10.3]	B [10.5]	B [10.4]	B [13.9]	B [11.3]	C [20.6]	B [13.4]
Arcola School Driveway/Marrwood Drive		WBLTR	A [0.0]	A [0.0]	A [9.7]	A [9.5]	A [9.6]	A [9.6]	B [11.2]	B [10.5]	B [13.9]	B [12.0]
		NBLTR	N/A	N/A	A [2.4]	A [2.6]	A [2.2]	A [2.5]	A [2.9]	A [3.1]	A [2.3]	A [2.2]
		SBLTR	A [4.3]	A [1.5]	A [4.9]	A [2.3]	A [4.8]	A [2.3]	A [4.3]	A [2.1]	A [3.0]	A [1.8]
4. Marrwood Drive/	Unsignalized	EBLTR			A [9.1]	A [9.2]	A [9.0]	A [9.0]	A [9.1]	A [9.2]	B [11.8]	B [10.9]
North Site Driveway/Goshen Ridge Place		WBLTR	N/A		A [8.5]	A [8.4]	A [8.4]	A [8.4]	A [8.5]	A [8.4]	A [8.7]	A [8.7]
		SBLTR			A [2.1]	A [1.7]	A [2.1]	A [0.8]	A [2.1]	A [1.7]	A [5.4]	A [3.5]
5. Marrwood Drive/	Unsignalized	EBLTR	N/A		A [7.2]	A [7.2]	A [8.6]	A [8.6]	A [7.2]	A [7.2]	A [7.3]	A [7.3]
South Site Driveway/Marrwood Driveway		SBLTR			A [8.3]	A [8.4]	A [0.0]	A [0.0]	A [8.3]	A [8.4]	A [9.8]	A [8.6]

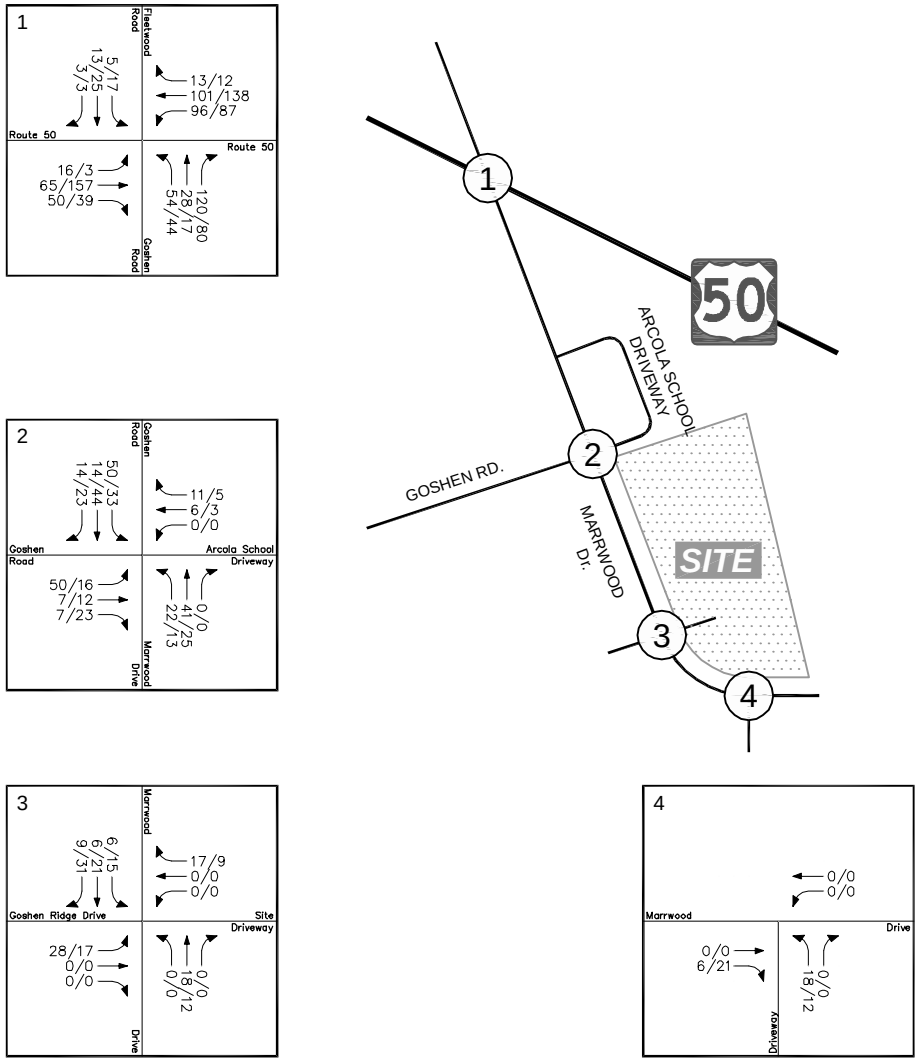
Notes:

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

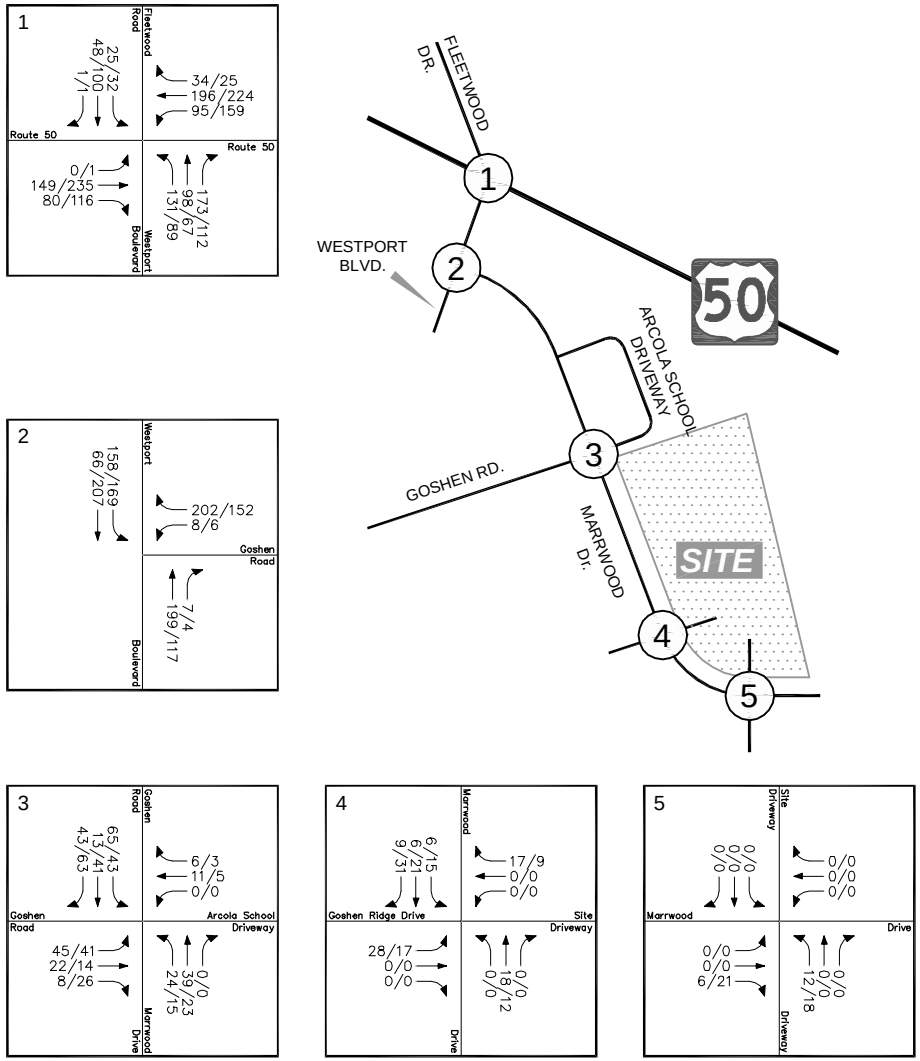


Figure 9–2
Other Development Traffic Assignments (Weekday)

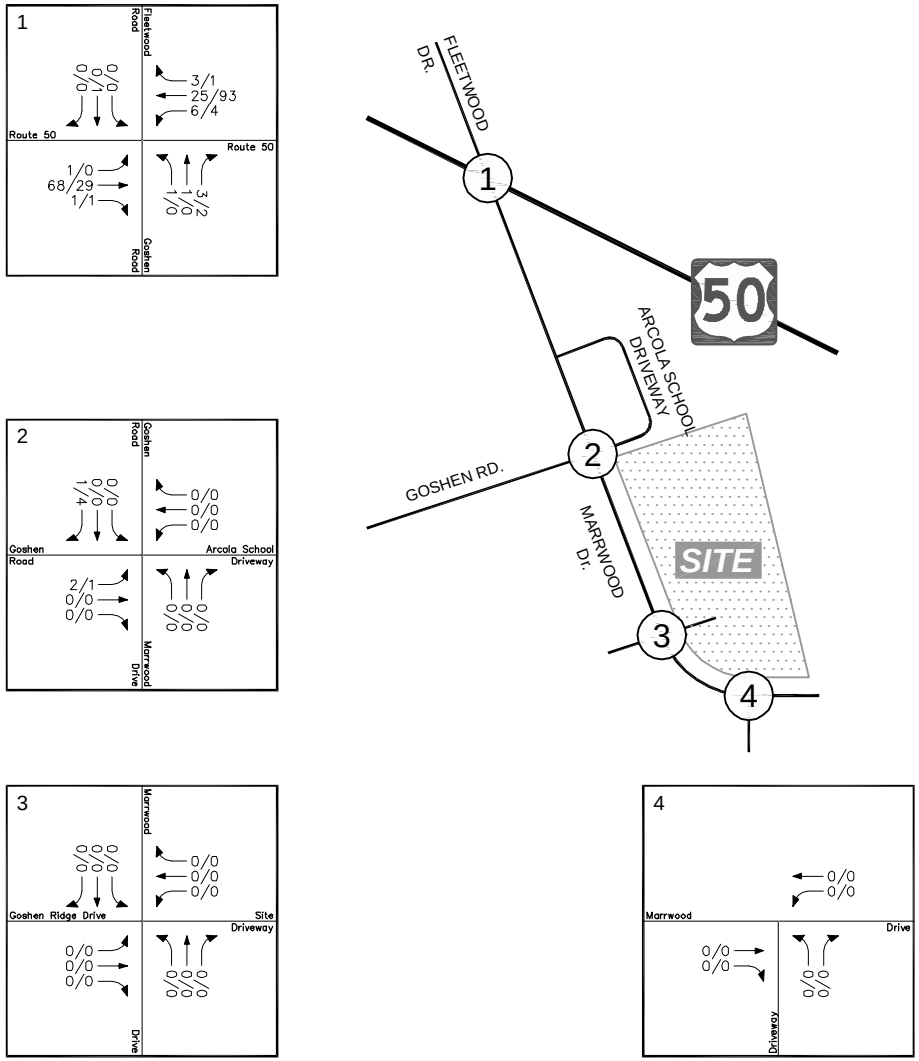
AM PEAK HOUR
PM PEAK HOUR
000/000

North

Catholic Diocese of Arlington
Loudoun County, Virginia

Wells + Associates, Inc.

2012 - Regional Growth



2015 - Regional Growth

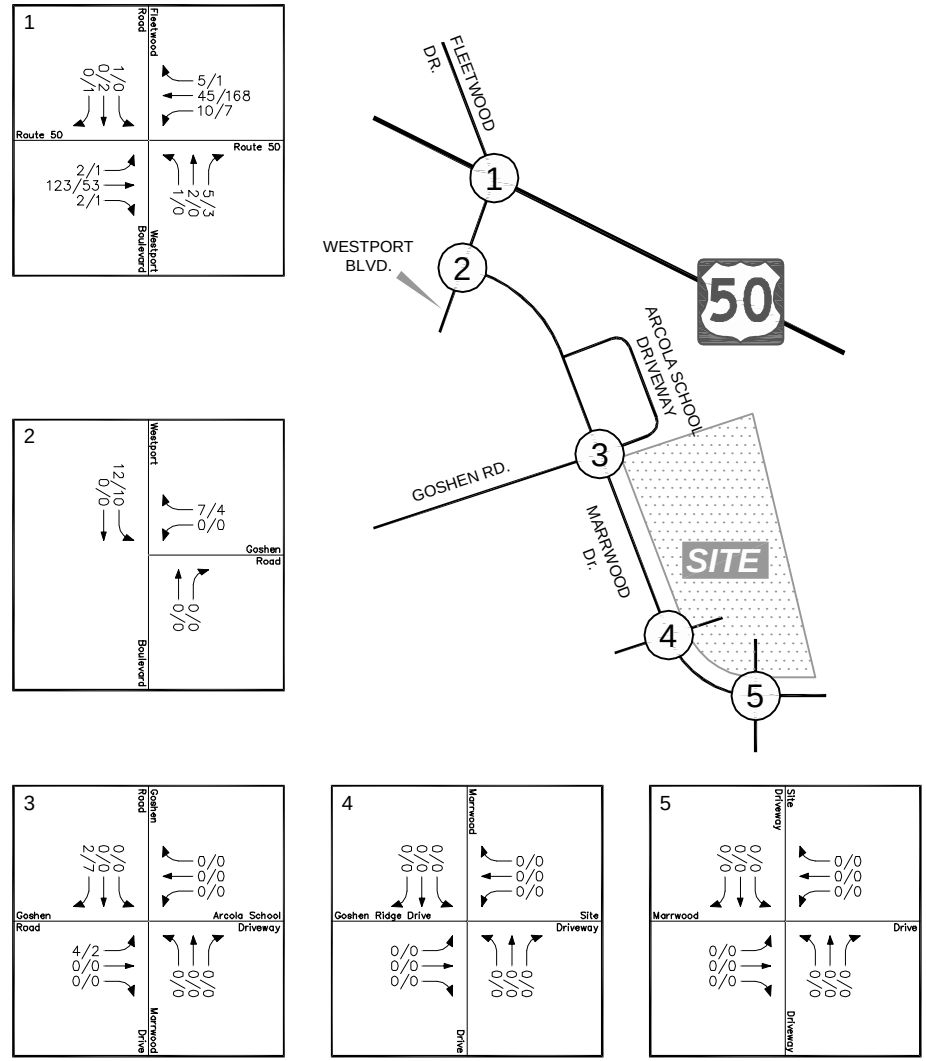


Figure 9–3
Regional Growth (Weekday)

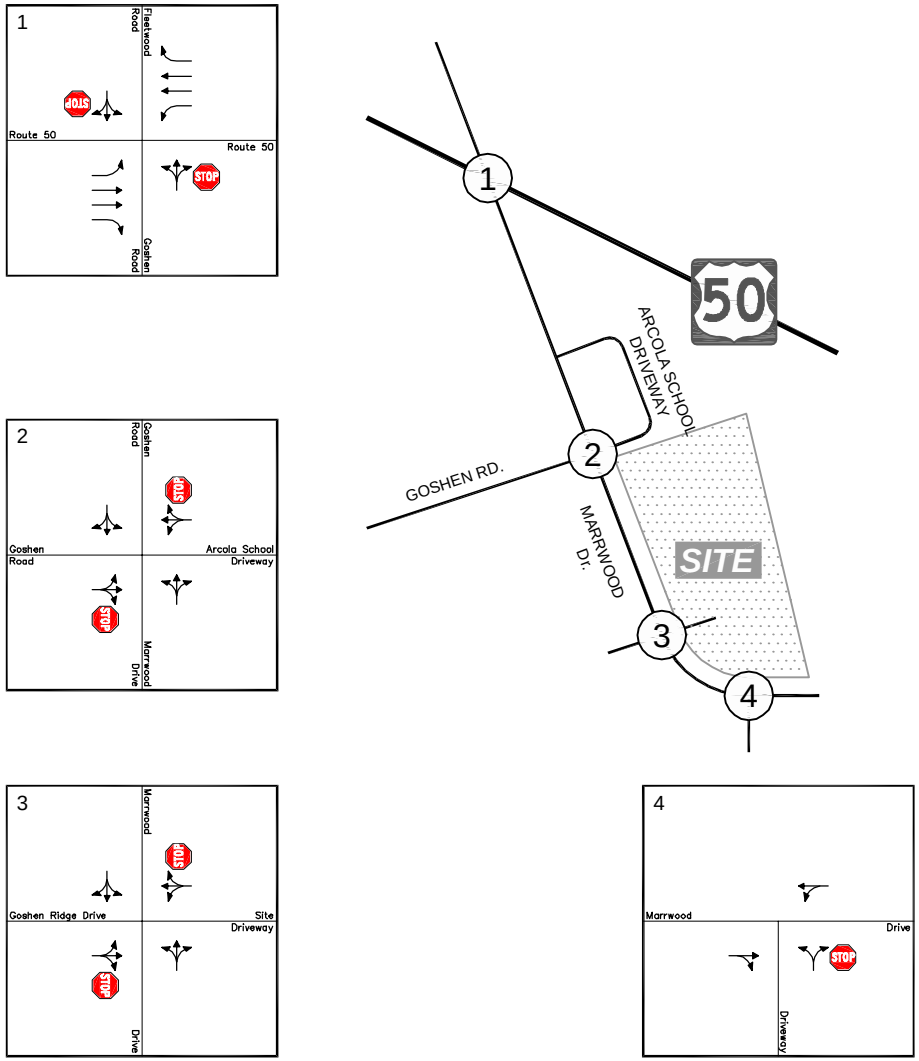
AM PEAK HOUR
PM PEAK HOUR
000/000

North

Catholic Diocese of Arlington
Loudoun County, Virginia

Wells + Associates, Inc.

2012 - Phase I (Church)



2015 - Phase II (Church and School)

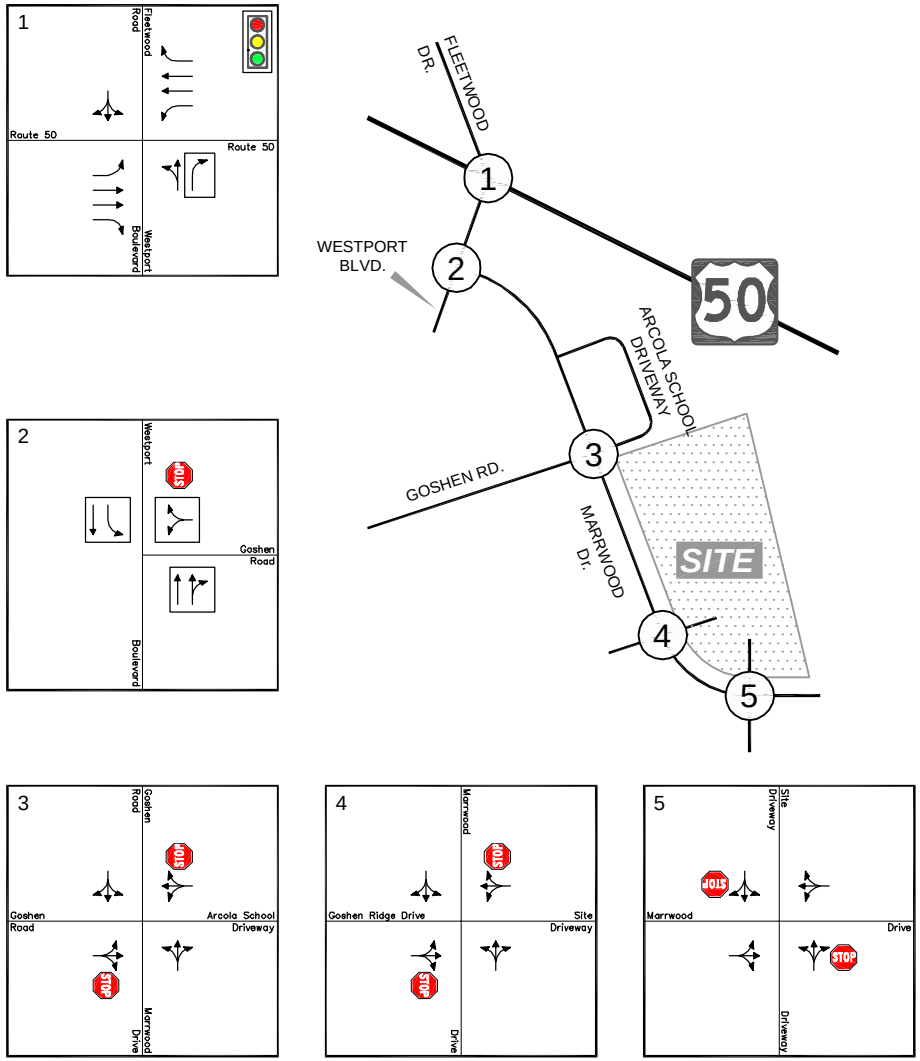


Figure 9–4
Future Lane Use and Traffic Control (Weekday)

Represents One Travel Lane
Signalized Intersection
Stop Sign
Improvements

North

Catholic Diocese of Arlington
Loudoun County, Virginia

Wells + Associates, Inc.

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 Q and R 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 on Goshen Road 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 S.

2. All of the turning movements at the northern site entrance would continue to operate at acceptable levels of service during both the AM and PM peak hours under stop sign control.

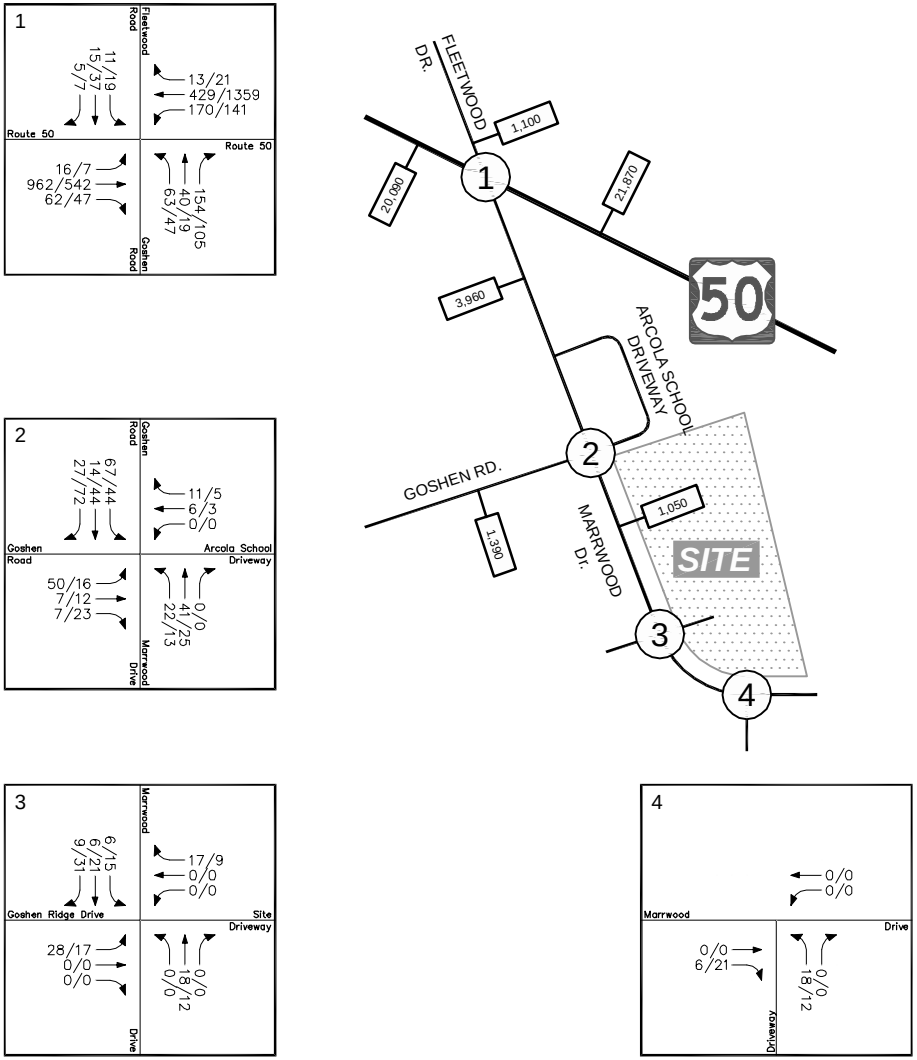
Long-term (2015)

1. The Westport Boulevard (Goshen Road)/U.S. Route 50 intersection would operate at acceptable levels of service during both the AM and PM peak hours with the improvements to be made by the Westport development as described previously. These improvements include the realignment of Westport Boulevard (Goshen Road) by the Westport property and the installation of a new traffic signal, addition of a northbound right turn lane and extension of auxiliary lanes.

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

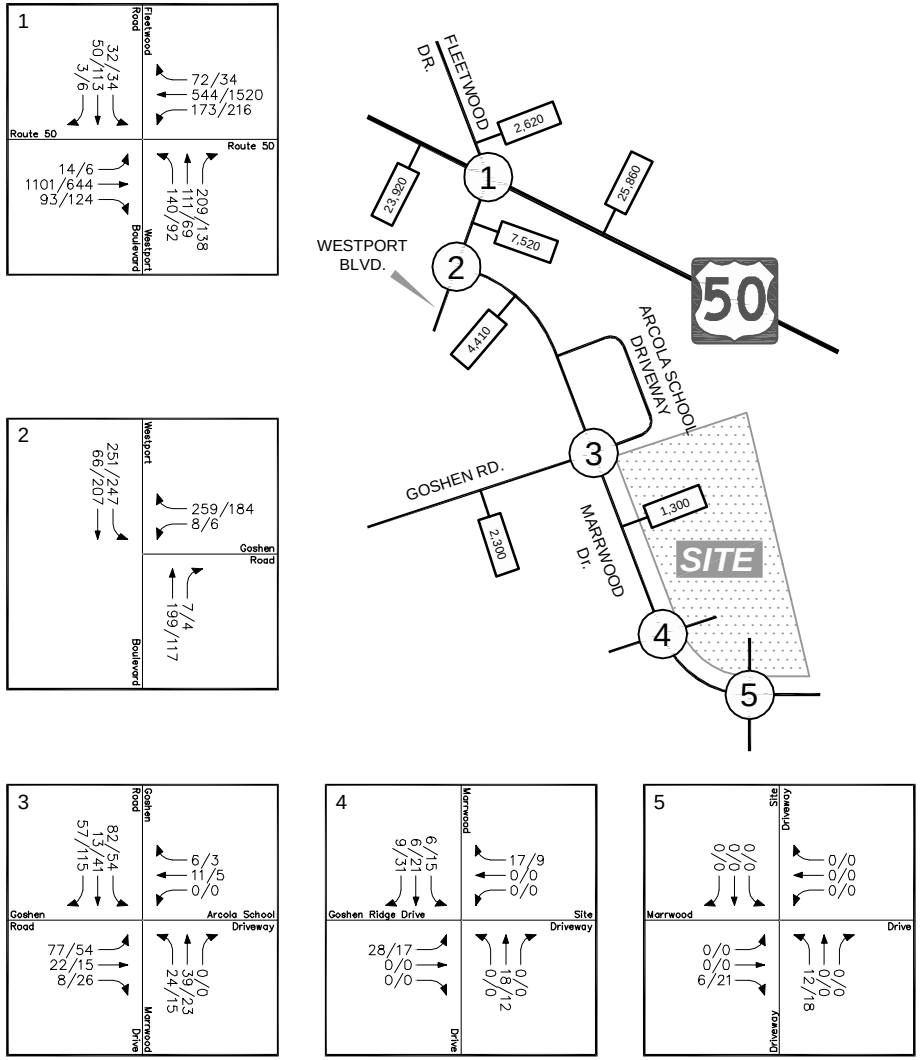


Figure 9–5
Peak Hour Traffic Forecasts with Approved Development Program (Weekday)

ADT Average Daily Trips

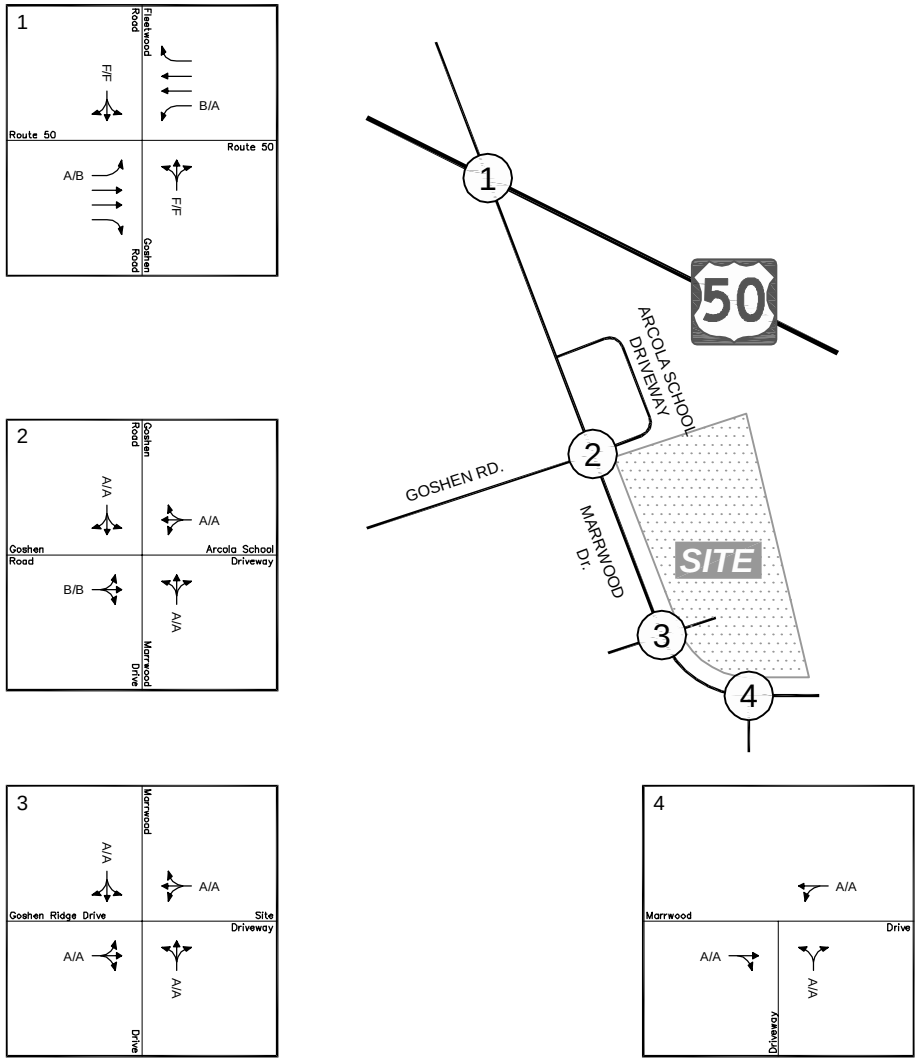
AM PEAK HOUR
PM PEAK HOUR
000/000

North

Catholic Diocese of Arlington
Loudoun County, Virginia

Wells + Associates, Inc.

2012 - Phase I (Church)



2015 - Phase II (Church and School)

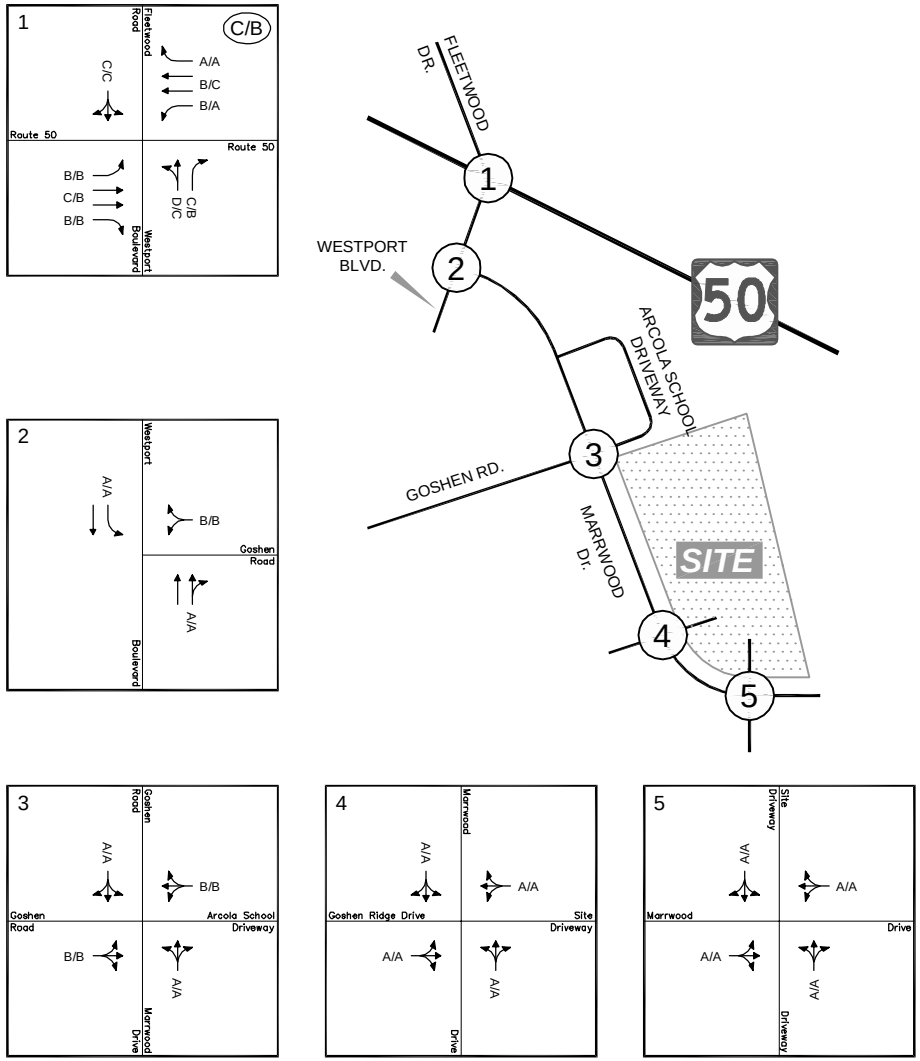


Figure 9–6
Future Levels of Service with Approved Development Program (Weekday)

x/x Levels of Service

(x/x) Overall Levels of Service

North

Catholic Diocese of Arlington
Loudoun County, Virginia

Wells + Associates, Inc.

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, 25 PM peak hour trips and 113 daily trips.

The proposed phase 1 program (335-seat church) would generate 12 AM peak hour trips, 11 PM peak hour trips and 148 daily trips. Thus, the proposed phase 1 program would generate 15 *fewer* AM peak hour trips, 14 *fewer* PM peak hour trips and 42 *fewer* daily trips than the currently approved program.

Under buildout conditions, the remaining portion of the church (1,200-seat total) including a parish center, a private school (200 students) and/or associated convent/rectory would generate 218 AM peak hour trips, 168 PM peak hour trips and 528 daily trips.

As noted in Section 5 under Sunday conditions, the convent/rectory use associated with the church is anticipated to contain three (3) to 10 rooms. While some residents are permitted to own private vehicles, they are unlikely to make peak hour trips. Tenants of the convent/rectory would typically work on the parish campus and therefore not generate any peak hour trips. Therefore, only daily trips have been included in the trip generation analysis based on one (1) single-family detached dwelling. As shown on Table 9-2, it is assumed that the convent/rectory (single family dwelling unit) would generate 10 average daily trips on a typical weekday, but no peak hour trips.

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 (Boyd) School property and the derivation of this rate is contained in Appendix T. Buses were not assumed to serve private school students. Further,

Based on the buildout program for the site, the CDA Loudoun Property would generate 191 *more* AM peak hour trips, 143 *more* PM peak hour trips and 834 *more* daily 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, parish boundaries, and engineering judgment. The current parish boundaries are generally defined as including the southwestern portion of Loudoun County beginning at New Rd. (Route 600) and Bull Run, then follow along Loudoun County Line southeast toward the Fairfax County line. Then north along Fairfax County Line, west along John S.

Mosby Highway (U.S. Route 50), southwest on Lenah Road (Route 600), west on New Road (Route 600), returning to the Loudoun County Line and Bull Run junction.

After a review of these boundaries, W+A used engineering judgment and knowledge of the area to determine the distributions of church based site generated traffic. The distributions for the school reflect those presented in the approved Arcola (Boyd) School and more closely reflect existing travel patterns.

The following distributions were used for the proposed development:

To/From	335/1,200-Seat Church	200-Student School
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	0 percent	5 percent
Totals	100 percent	100 percent

The traffic distributions outlined above were applied to the site driveways based on the current site plan shown on Figure 2-1. The North Driveway would serve the site in phase 1 with the South Driveway added in phase 2. As previously discussed, the majority of traffic is expected to use the northern most entrance to access the parking area serving the church. A minimal portion of this traffic would use the south entrance, as shown on Figure 9-7.

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

Land Use	ITE Land Use Code	Size	Units	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total	Weekday ADT
Approved Development										
Single Family Detached(2)	210	19	D.U.	7	20	27	16	9	25	190
Proposed Development										
Phase I										
Church(3)	560	16,200	S.F.	6	6	12	6	5	11	148
PHASE I NET NEW TRIPS (Approved vs. Proposed)				**(1)**	**(14)**	**(15)**	**(10)**	**(4)**	**(14)**	**(42)**
Phase II										
Church(4)	560	58,000	S.F.	23	19	42	20	18	38	528
Private School K-8 (5)	534	200	Students	97	79	176	61	69	130	496
Convent (Single Familty Detached)(6)	210	1	D.U.	-	-	-	-	-	-	10
Development Total				120	98	218	81	87	168	1,024
BUILDOUT NET NEW TRIPS (Approved vs. Proposed)				**113**	**78**	**191**	**65**	**78**	**143**	**834**

Notes:

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

(2) Peak Hour of Generator

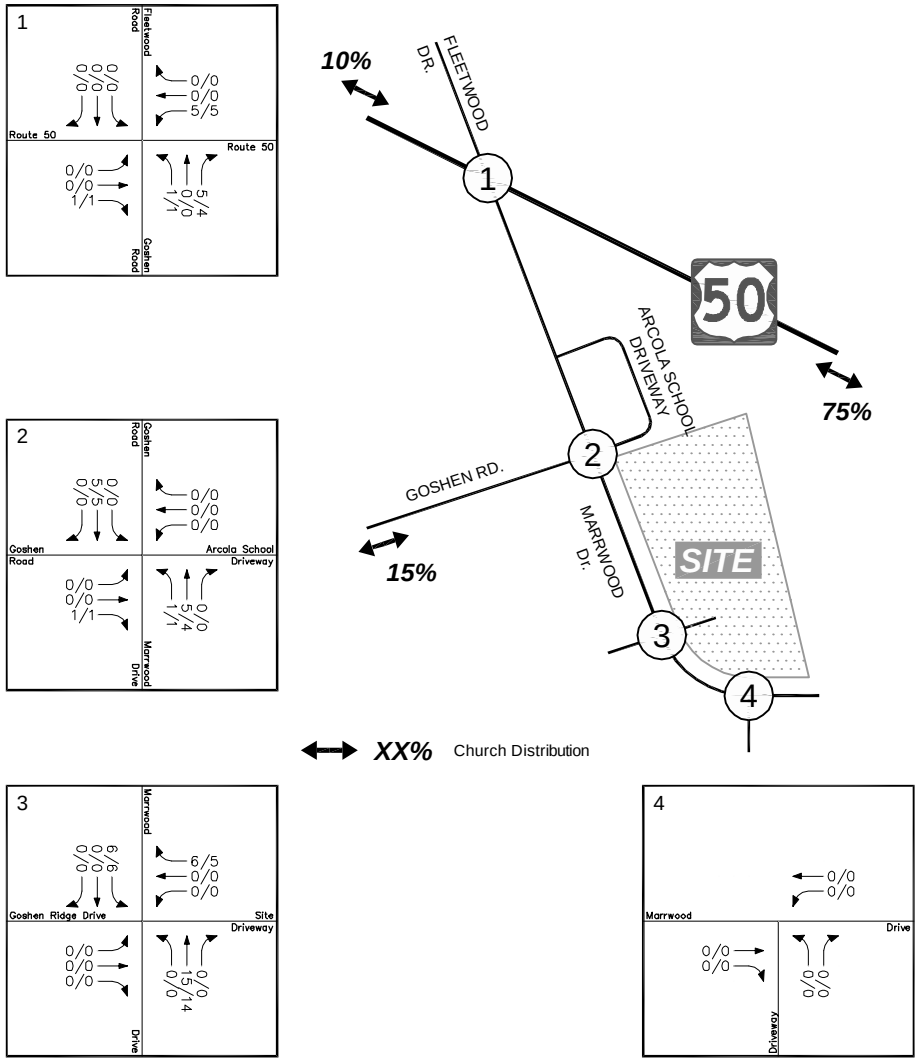
(3) Based on Equivalent 335-seat Sanctuary.

(4) Based on Equivalent 1,200-seat Sanctuary.

(5) PM Peak Hour of Adjacent Street was derived comparing Peak Hour of Generator, similar uses, and counts collected by W+A .
ADT assumed ITE Land Use Code 535, K-12 private school.

(6) Convent consisting of 3-10 rooms was assumed to be Single Family Detached Housing Unit, generating no Peak Hour Trips.

2012 - Site Trips (335 Seat Church)



2015 - Site Trips (1,200 Seat Church & 200 Student School)

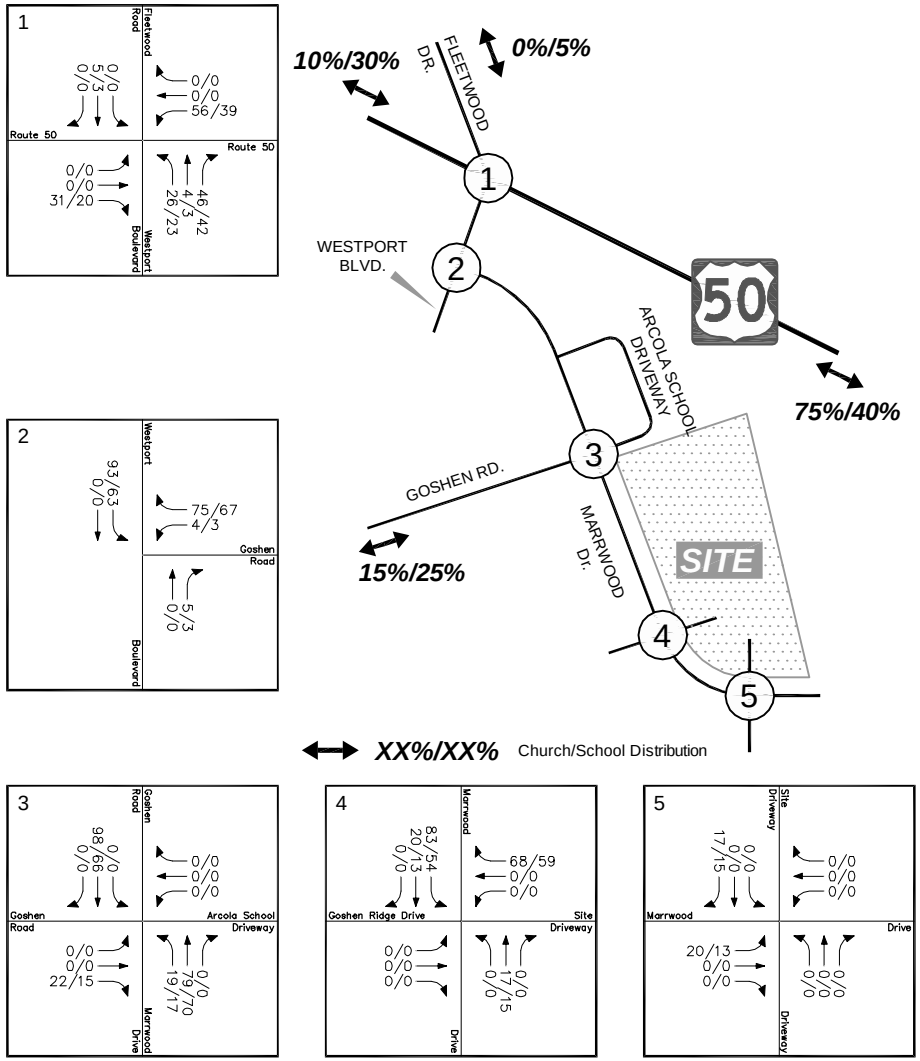


Figure 9–7
Site Generated Traffic Assignments and Directional Distributions (Weekday)

AM PEAK HOUR
PM PEAK HOUR
000/000

North

Catholic Diocese of Arlington
Loudoun County, Virginia

Wells + Associates, Inc.

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 335-seat church (phase 1) and the expansion of the church (1,200-seat total) including a parish center, a 200-student private school and/or convent/rectory in 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 U and V, and indicate the following:

<u>Near-term (2012 - church only)</u>

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 W. 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 (34 feet during the AM and 15 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. In addition, a review of the left turn lane warrants indicates that a separate left turn lane at the north driveway is not met under near-term conditions (see Appendix X).

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 (335-seat church only) program generates only a minor volume of weekday peak hour trips and have little impact on intersection operations. It is noted that the proposed Phase 1 program would have a lesser impact on the road network than the currently approved program (19 residential units) since in would generate fewer trips. Since ultimately the U.S. Route 50/Goshen Road intersection is planned to be improved and signalized by others, no additional improvements are proposed.

Long-term (2015 – church and school)

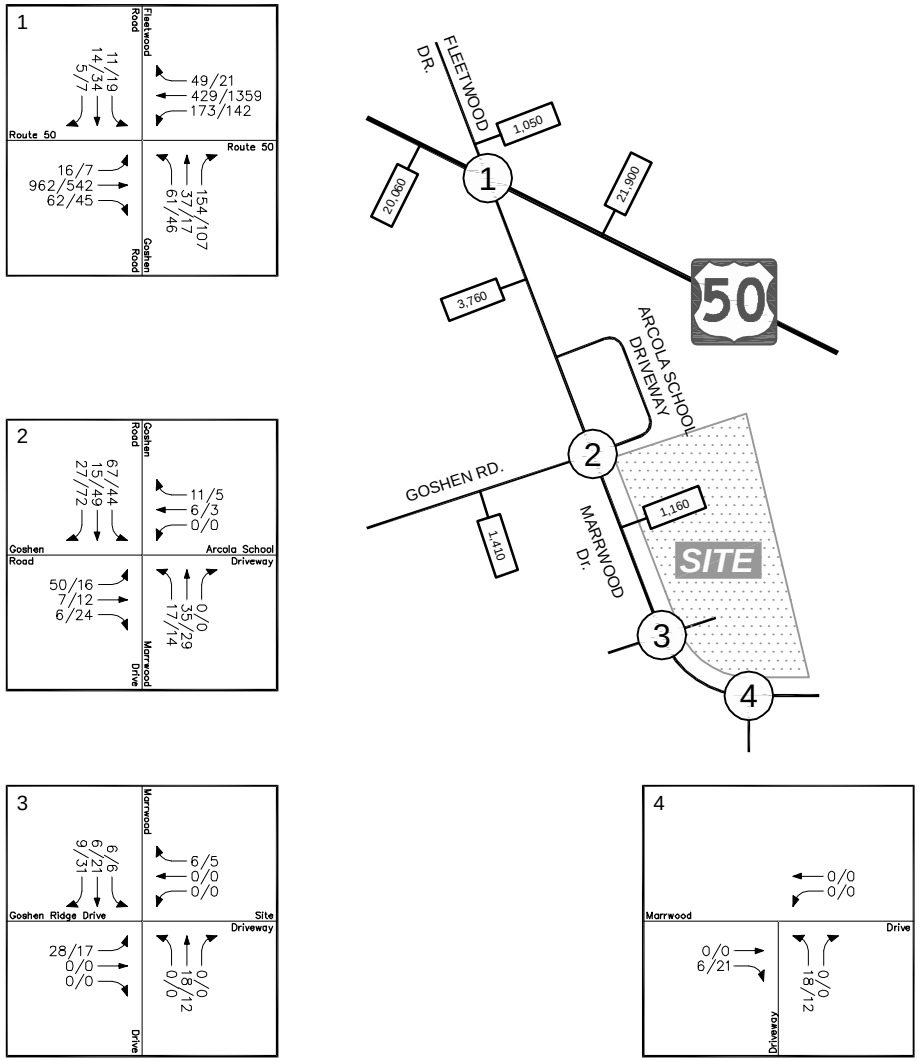
1. The realigned Westport Boulevard/U.S. Route 50 intersection would operate at overall acceptable levels of service in 2015 (LOS "C") with the road improvements mentioned previously are installed.

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. In addition, a review of the left turn lane warrants indicates that a separate left turn lane at the north driveway is not met under near-term conditions (see Appendix X).

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 the future North Star Boulevard (Relocated Route 659) 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

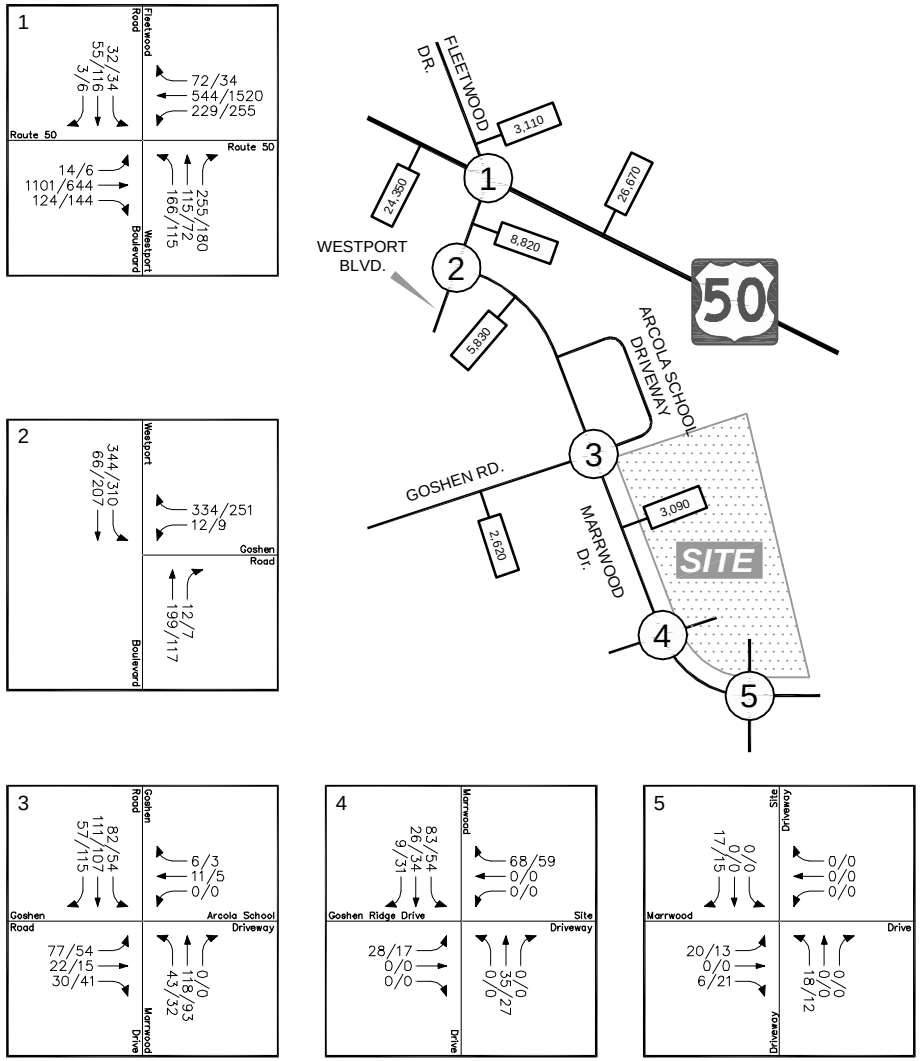


Figure 9–8
Peak Hour Traffic Forecasts with Proposed Development Program (Weekday)

ADT Average Daily Trips

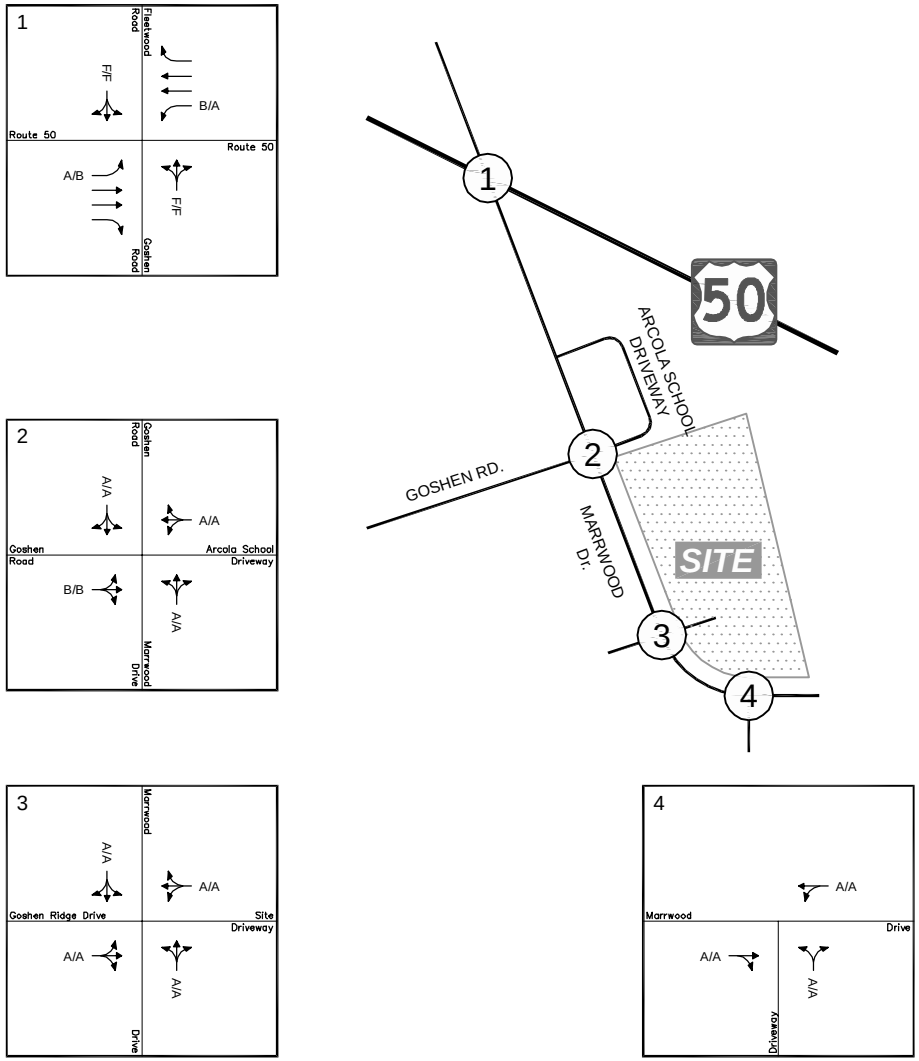
AM PEAK HOUR
PM PEAK HOUR
000/000

North

Catholic Diocese of Arlington
Loudoun County, Virginia

Wells + Associates, Inc.

2012 - Phase I (335 Seat Church)



2015 - Phase II (1,200 Seat Church and 200 Student School)

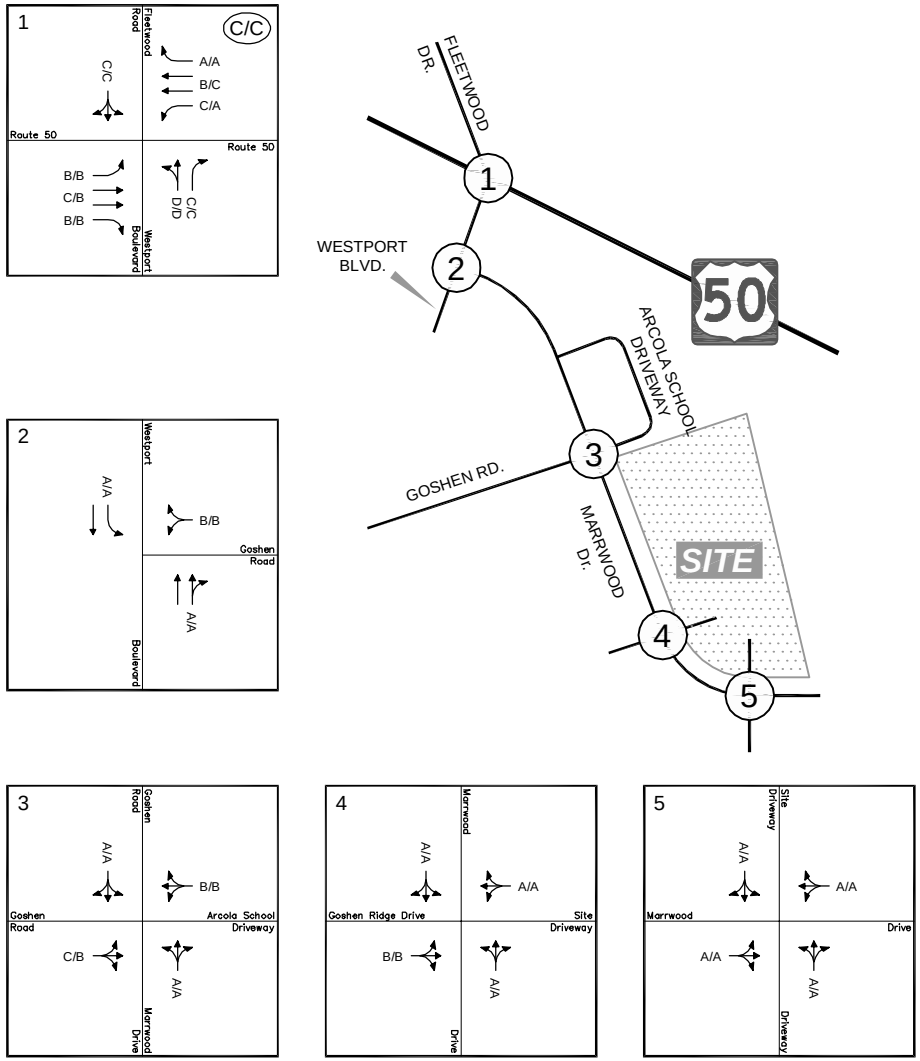


Figure 9–9
Future Levels of Service with Proposed Development Program (Weekday)

x/x Levels of Service

(x/x) Overall Levels of Service

North

Catholic Diocese of Arlington
Loudoun County, Virginia

Wells + Associates, Inc.

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 an interim 335-seat church in 2012; and then an addition to the church (1,200-seats total) including a parish center, a 200-student private school and/or convent/rectory by 2015. The Phase 1 program would generate 15 *fewer* AM peak hour trips, 14 *fewer* PM peak hour trips, and 42 *fewer* daily trips than the approved program. The Phase 2 development program is anticipated to generate 191 *more* AM peak hour trips, 143 *more* PM peak hour trips and 834 *more* daily trips than the approved program.

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 Goshen Road 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 (fewer than 15 peak hour trips) 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. It is also noted that the Phase 1 development program would have less impact to the road network than the currently approved program.

4. The long-term (2015) conditions analyses indicate that the U.S. Route 50/Goshen Road (Future Westport Boulevard) intersection would operate at acceptable levels of service with the improvements planned by other adjacent development projects. These improvements include the realignment of Westport Boulevard (Goshen Road) by the Westport property and the installation of a new traffic signal, addition of a northbound right turn lane and extension of auxiliary lanes.

5. This traffic report presents a conservative condition for Phase 2 since it assumes the full buildout potential of the site. The proposed development is planned to be constructed at the option of the parish when financially feasible and at such point when improvements by others are made.