County of Loudoun

Office of Transportation Services

MEMORANDUM

DATE: July 6, 2009

TO: Nicole Steele, Project Manager
Department of Planning

FROM: Lou Mosurak, AICP, Senior Transportation Planner LM

SUBJECT: **SPEX 2009-0008—Corpus Christi Parish**
SPEX 2009-0012—Corpus Christi Parish School
SPEX 2009-0013—Corpus Christi Parish Convent
SPEX 2009-0014—Corpus Christi Parish Public Road Access
First Referral

Background

The subject special exception (SPEX) applications request approval to construct a 1,200-seat religious assembly (church/parish) and related uses, a 200-student private school (grades K-8), and a 10-resident group living facility (convent). SPEX review and approval is also requested regarding public road access standards (per Zoning Ordinance Section 5-654) as the proposed uses generate more than 600 vehicle trips per day. The 17.9-acre site is zoned Transitional Residential-1 (TR-1) and is located on the east side of future Marrwood Place, south of John Mosby Highway (U.S. Route 50) and west of future Northstar Boulevard (Route 659 Relocated). A vicinity map is provided as *Attachment 1*, and a more detailed location map of the proposed site is provided as *Attachment* 2. Access is proposed from U.S. Route 50 via Goshen Road (Route 616) and future Marrwood Place. In the future (in conjunction with the approved Westport subdivision), Goshen Road is anticipated to be realigned (and its former alignment abandoned) between the site and U.S. Route 50; this would result in long-term access to the subject site from Route 50 via future Westport Boulevard and Marrwood Place.

In its consideration of these applications, the Office of Transportation Services (OTS) reviewed materials received from the Department of Planning on April 29, 2009, including (1) a statement of justification prepared by the Applicant, dated April 1, 2009; (2) a traffic impact study prepared by Wells & Associates, Inc., dated February 24, 2009; and (3) a special exception plat (plan set) prepared by Bowman Consulting Group, Ltd., dated February 27, 2009 and revised through April 1, 2009.

Existing, Planned and Programmed Transportation Facilities

The site is located near the eastern edge of the Transition Policy Area, south of U.S. Route 50 and west of future Northstar Boulevard (Route 659 Relocated). Major roadways serving the site are described below. OTS review of existing and planned transportation facilities is

based on the *2001 Revised Countywide Transportation Plan (2001 Revised CTP)* and the *2003 Bicycle & Pedestrian Mobility Master Plan (2003 Bike & Ped Plan)*.

John Mosby Highway (U.S. Route 50) (segment from approximately 2,000 feet west of the Route 50/Goshen Road intersection east to Loudoun County Parkway) is currently a four-lane median divided (U4M) minor arterial, largely with controlled access. Currently, a median crossover is in place at the Goshen Road/Fleetwood Road (Route 616) intersection, with stop signs in place on the side streets. The *2001 Revised CTP* designates the ultimate condition of the segment of Route 50 (from a point west of the Goshen Road/Fleetwood Road intersection east to Route 659 Relocated) as a four-lane divided (R4M) controlled access minor arterial. Signalization and turn lane improvements at the Goshen Road (future Westport Boulevard) intersection are proposed to be included with the development of the Westport subdivision, which has received preliminary approval (SBPL 2006-0040). East of Route 659 Relocated, the *2001 Revised CTP* designates the ultimate condition Route 50 as a six-lane divided (R6M) limited access principal arterial. Grade-separated interchanges are planned at three (3) locations along this segment of Route 50: (1) Route 659 Relocated; (2) West Spine Road (Route 606 Extended), and (3) Loudoun County Parkway. East of Route 659 Relocated, all at-grade access is ultimately planned to be terminated.

The *2003 Bike & Ped Plan* categorizes Route 50 as a "baseline connecting roadway" along which bicycle and pedestrian facilities are envisioned in the future. There are currently no bicycle/pedestrian facilities along Route 50 in the vicinity of the Goshen Road/Fleetwood Road intersection. It is noted that east of Route 659 relocated, Route 50 is ultimately planned to be a limited access freeway. The *2003 Bike & Ped Plan* does not envision bicycle and pedestrian facilities on limited access roadways *(2003 Bike & Ped Plan, Roadway Planning and Design Policy 1, pg. 26)*; such facilities are more appropriately located along parallel roads (e.g., Tall Cedars Parkway) within the Route 50 corridor.

Route 659 Relocated *(also referred to as* ***Northstar Boulevard****)* is a planned new roadway corridor that would run from Existing Route 659 (Belmont Ridge Road) in the Brambleton development south to Route 50, continuing south to connect with the future Route 234 Bypass in Prince William County. The *2001 Revised CTP* calls for Route 659 Relocated to ultimately be a six-lane divided (U6M) minor arterial with controlled access. A grade-separated interchange is planned at Route 50. The final alignment of Route 659 Relocated between its current southern terminus at Creighton Road (in Brambleton) and Tall Cedars Parkway (in Stone Ridge) has not been determined. From Tall Cedars Parkway south to Braddock Road (Route 620), right-of-way (ROW) for Northstar Boulevard has been identified and partial construction has been proffered as part of approved rezoning applications in the area.

The *2003 Bike & Ped Plan* categorizes Route 659 Relocated as a "baseline connecting roadway" along which bicycle and pedestrian facilities are envisioned in the future. Such facilities are anticipated to be incorporated into the design of this future roadway.

Goshen Road (Route 616) is an existing local road between Route 50 and Braddock Road (Route 620). As a local road, it is not part of the CTP network. Goshen Road intersects Route 50 opposite Fleetwood Road at a median crossover, with stop signs in place on the

side streets. The northernmost segment of Goshen Road, from Route 50 south to the southern entrance of The Boyd School (former Arcola Elementary School), is a paved section approximately 20 feet in width. This segment of Goshen Road is proposed (under pending CPAP 2007-0018) to be improved to an urban two-lane (U2) section and realigned to intersect future Westport Boulevard at a new intersection approximately 500 feet south of Route 50. A five-foot sidewalk is proposed along the western side of this new road section. This realigned segment of Goshen Road is proposed to be renamed ***Marrwood Place*** in the future. The remainder of Goshen Road, from the southern entrance to The Boyd School south to Braddock Road, is an unpaved rural section to which no improvements are planned.

Marrwood Place is a planned local road that will replace relocated Goshen Road between Westport Boulevard and the southern entrance to The Boyd School. Marrwood Place will extend south and east along the frontage of the subject property, providing access to the proposed church and school uses as well as the adjacent Marrwood subdivision. This segment of Marrwood Place is proposed to be constructed (under approved CPAP 2008-0106) to an urban two-lane (U2) section in conjunction with the approved Marrwood subdivision (SBPL 2007-0013); (the CPAP approval extends as far south as the first entrance to the proposed church site, opposite future Goshen Ridge Place). A five-foot sidewalk is proposed on the western side of this new road section. East of the subject property, Marrwood Place is anticipated to be extended to connect with Route 659 Relocated (Northstar Boulevard) in the future.

Westport Boulevard is the planned primary access road to the approved Westport subdivision. It will be a local road and is not included in the CTP network. As indicated on the approved Westport preliminary subdivision plat (SBPL 2006-0040) and on pending construction plans (CPAP 2007-0018), Westport Boulevard would intersect Route 50 at the location of the existing Goshen Road intersection; intersection improvements at this location, including lengthened turn lanes on Route 50, median crossover widening, and (when warranted) signalization. The construction plans indicate that Westport Boulevard is proposed to be constructed as a four-lane divided (U4M) roadway from Route 50 south into the Westport site, beyond the location of the future intersection with relocated Goshen Road (Marrwood Place).

Tall Cedars Parkway is the Route 50 South Collector Road. It is classified as a major collector by the *2001 Revised CTP* and is currently constructed to its interim four-lane divided (U4M) condition within Stone Ridge, from Gum Spring Road (Existing Route 659) west to the new Arcola Elementary School (near the location of its future intersection with Route 659 Relocated). This segment of roadway is ultimately planned to be a six-lane divided (U6M) roadway. West of Route 659 Relocated, Tall Cedars Parkway is planned as a four-lane undivided (R4) roadway west to the Lenah Connector Road. Right-of-way (ROW) reservation for this future roadway has been identified as part of previous Stone Ridge rezoning approvals (including ZMAP 2002-0013) and as part of the approved Marrwood and Westport preliminary subdivisions (SBPL 2007-0013 and SBPL 2006-0040, respectively). There are no current plans to construct this roadway.

The *2003 Bike & Ped Plan* categorizes Tall Cedars Parkway as a "baseline connecting roadway" along which bicycle and pedestrian facilities are envisioned in the future. Such facilities are anticipated to be incorporated into the design of this future roadway.

Review of Submitted Traffic Study

The Applicant's submitted traffic study (dated February 24, 2009) analyzed current and future traffic conditions in the area. The study analyzed the church use in light of its peak hour traffic impacts on Sundays, as well as during weekday AM and PM peak hours, while the school use was analyzed in light of its weekday AM and PM peak hour traffic impacts (the school is not proposed to be open on Sundays). Existing lane use and traffic control is illustrated on *Attachment 3.* Site buildout is projected to occur in two (2) phases: Phase 1 is assumed to be completed in 2012 and includes the proposed church and convent uses; Phase 2 would be completed in 2015 and would add the proposed school use. Relevant portions of the study are summarized below. The study assumes that a revised access configuration to the site from Route 50 (via future Westport Boulevard and Marrwood Place, to include signalization and related intersection improvements to the Route 50/Westport Boulevard intersection) will be in place by 2015.

Sunday Analysis – Proposed Church Use

Existing (2008) Traffic Volumes and Levels of Service (LOS)

Attachment 4 illustrates existing Sunday peak hour traffic volumes in the vicinity of the subject site. Sunday peak hour (12:30 – 1:30 PM) traffic counts were taken at five (5) existing intersections. Given that only Sunday counts were collected, overall daily traffic volumes were not calculated and therefore not included in the report.

Attachments 5 & 6 summarize existing Sunday peak hour intersection LOS in the vicinity of the site. All movements at the signalized intersections and all turning movements at the unsignalized intersections operate at acceptable LOS.

Background Traffic Assumptions

The Applicant's traffic study indicates that regional background traffic will continue to increase due to (1) a total of 20 approved developments in the vicinity of the site, and (2) regional traffic growth (assumed at 2% annually).

Trip Generation from Proposed Church Use

Attachment 7 indicates that the proposed 1,200-seat (58,000-sq ft) church (ITE Code 560) would generate a total of 1,836 average daily trips (ADT) on Sunday, including a total of 723 trips (376 in and 347 out) during the 12:30 – 1:30 PM peak hour. In comparison, the by-right use on the site (19 single family dwellings, ITE Code 210) would generate a total of 158 ADT on Sunday, including 21 peak hour trips (11 in and 10 out).

Trip Distribution & Assignment from Proposed Church Use

The study distributed Sunday peak hour site-generated trips on the existing and future road network based on information related to the service area of the church and congregation. Sixty-percent (60%) of site-generated traffic is estimated to arrive from/depart toward the east via U.S. Route 50. Complete trip distribution and assignment figures for site-generated trips in Phase 1 of the project (2012) are illustrated on *Attachment 8*; updated trip assignment figures for Phase 2 (2015), to reflect the assumed changes to the road network, are provided

on *Attachment 9.* The overall distribution of trips does not change with the implementation of the revised road network assumed by the study.

Forecasted (2012 & 2015) Traffic Volumes, Levels of Service (LOS) and Recommended Mitigation Measures for Church Use

Attachments 10 & 11 illustrate the study's total future (i.e., background traffic plus site-generated traffic) Sunday peak hour traffic forecasts for 2012 and 2015 (the 2015 forecasts incorporate the revised road network assumed in the study).

Attachments 12 (total future columns), 13 & 14 summarize the total future forecasted Sunday peak hour intersection LOS for both 2012 and 2015. The total future lane use and traffic control necessary to achieve the Sunday peak hour LOS categories identified in *Attachments 12, 13, and 14* are depicted in *Attachments 15 (2012) & 16 (2015)* respectively. Construction of Marrwood Place from the southern entrance to The Boyd School (Intersection 7) to the proposed southern entrance to the church site (Intersection 9) is assumed. No physical improvements to the Route 50/Goshen Road intersection (Intersection 1) are assumed to be in place by 2012; as a result, under total future conditions, both the north and south side street movements (Goshen Road and Fleetwood Road) at this location (Intersection 1) are forecast to operate at unacceptable LOS (LOS F) during the Sunday peak hour under stop sign control. The study recommends that traffic control personnel be employed at this location (Intersection 1) to direct traffic during Sunday service hours. The eastbound side street movement (future Ozark Way, opposite the southern entrance to the church site) at Marrwood Place (Intersection 9) is also forecast to operate at an unacceptable LOS (LOS E) during the Sunday peak hour.

By 2015, the study assumes that road improvements constructed by others will be in place, including (1) signalization and turn lane improvements at the Route 50/Westport Boulevard intersection (Intersection 1); (2) construction of Westport Boulevard from Route 50 south into the Westport site; and (3) construction of a realigned segment of Goshen Road (renamed as Marrwood Place) from Westport Boulevard (Intersection 6) to the southern entrance to the Boyd School (Intersection 7). With the assumed improvements in place, the Route 50/Westport Boulevard intersection (Intersection 1) and all other intersections in the study area operate at acceptable LOS (LOS D or better) during the Sunday peak hour, with the exception of the eastbound side street movement at Ozark Place and Marrwood Place (Intersection 9) opposite the southern entrance to the church site. The study indicates that installation of a traffic signal at Route 50 and Westport Boulevard (Intersection 1) may eliminate the need for traffic control personnel during Sunday service hours at this location.

The study notes that a future extension of Marrwood Place east to Northstar Boulevard (Route 659 Relocated) is contemplated in the future, and that such a connection would provide a second ingress/egress to the proposed church site. This would ultimately result in a lower percentage of site traffic accessing the church via Route 50 and Westport Boulevard.

Weekday Analysis – Proposed Church and School Uses

Existing (2008) Traffic Volumes and Levels of Service (LOS)

Attachment 17 illustrates existing weekday AM and PM peak hour traffic volumes, intersection LOS, and lane use and traffic control at two (2) existing intersections in the vicinity of the site.

Attachment 18 (existing column) summarizes existing weekday peak hour LOS at both of the analyzed intersections. All movements operate at acceptable LOS during weekday peak hours under existing traffic controls.

Background Traffic Assumptions

The Applicant's traffic study assumes a 2% annual growth rate; this growth was applied to regional traffic on Route 50, and was also used on all turning movements at the Route 50/Goshen Road intersection and on all through movements on Goshen Road. The study states that this rate was determined based on recent conversations with VDOT.

Trip Generation from Proposed Church and School Uses

Attachment 19 indicates that the proposed 200-student (K-8) private school (ITE Code 534) would generate a total of 176 AM peak hour trips (97 in and 79 out) and a total of 130 PM peak hour trips (61 in and 69 out); *Attachment 19* also indicates that the 1,200-seat (58,000-sq ft) church (ITE Code 560) would generate a total of 42 AM peak hour trips (23 in and 19 out) and 38 PM peak hour trips (20 in and 18 out). No ADT (daily) weekday trip generation figures are provided. Compared to the by-right development potential on the site (19 single family dwellings, ITE Code 210), buildout of the church and school uses would generate a total of 191 additional AM peak hour trips (113 in and 78 out) and 143 additional PM peak hour trips (65 in and 78 out) over the by-right (residential) uses. School buses were not assumed to serve the school.

Trip Distribution & Assignment from Proposed Church and School Uses

The study distributed the site-generated weekday AM and PM peak hour trips on the existing and future road network based on information related to the service area of the church, school and knowledge of the area. The study indicates that weekday trips will be distributed as follows:

To/From	*1200-seat Church*	*200-Student School*
West on Route 50	10 percent	30 percent
East on 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

Source: Wells & Associates (2/24/09)

Site-generated weekday peak hour traffic assignments for 2012 (church) and 2015 (church and school) are illustrated in *Attachment 20*.

Forecasted (2012 & 2015) Traffic Volumes, Levels of Service (LOS) and Recommended Mitigation Measures for Church and School Uses

Attachment 21 illustrates the study's total future (i.e., background traffic plus site-generated traffic) weekday peak hour traffic forecasts for 2012 and 2015 (the 2015 forecasts incorporate the revised road network assumed in the study).

Attachments 18 (total future columns) & 22 summarize the total future forecasted weekday peak hour intersection LOS for both 2012 and 2015. The total future lane use and traffic control assumed to be in place to achieve the weekday peak hour LOS categories identified in *Attachments 18 & 22* are depicted in *Attachment 23* (these improvements are identical to those assumed for the Sunday analysis in *Attachments 15 (2012) & 16 (2015)).* As in the Sunday analysis discussed above, no physical improvements to the Route 50/Goshen Road intersection (Intersection 1) are assumed to be in place by 2012; as a result, both the north and south side street movements (Goshen Road and Fleetwood Road) at this location (Intersection 1) are forecast to operate at unacceptable LOS (LOS F) during both the weekday AM and PM peak hours under stop sign control. The study indicates that although a signal would restore an acceptable LOS to this intersection, signalization is not warranted due to relatively low side street volumes.

Also as in the Sunday analysis discussed above, the study assumes that road improvements constructed by others will be in place by 2015, which will result in acceptable weekday peak hour LOS at the Route 50/Westport Boulevard intersection (Intersection 1). The study again notes that a future extension of Marrwood Place east to Northstar Boulevard (Route 659 Relocated) is contemplated in the future, and that such a connection would provide a second ingress/egress to the proposed church and school site. This connection would ultimately result in a lower percentage of site traffic accessing the site via Route 50 and Westport Boulevard.

Transportation Comments

1. Regarding the February 24, 2009 traffic study:

    a. Weekday daily (ADT) trip generation figures should be provided for the church and school uses.

    b. Further explanation/clarification is necessary regarding the rationale for excluding existing Sunday daily (ADT) volumes from the report. The study (pg. 19) states that calculating these volumes would be "difficult".

    c. Further explanation/clarification is necessary regarding the methodology used to factor/convert the weekday PM peak hour for school trips to the weekday PM peak hour for commuter trips. The traffic impact of the school during its PM peak hour should be indicated.

    d. The study (pg. 13) indicates that a traffic signal warrant study is currently under VDOT review for a new signal at the intersection of Route 50 and future Westport Boulevard. OTS is not in receipt of this study and it should be provided for review under separate cover. It is noted that the signal warrant analysis included in the

traffic study (Appendix V, provided as *Attachment 24*) is a summary table based on Figure 2-10 of the *Manual of Traffic Signal Design* and not a full *Manual of Uniform Traffic Control Devices (MUTCD)* warrant study that is required by VDOT for installation of traffic signals on existing roads.

e. The traffic study assumes that all off-site road improvements between the site and Route 50 will be constructed "by others" as part of the adjacent Westport and Marrwood subdivisions. OTS staff notes that both of these developments have only received preliminary subdivision approvals and therefore it is not assured that these sites will be developed as assumed.

f. Further explanation/clarification is necessary regarding the methodology used to determine the distribution of site-generated trips, particularly with respect to the differences assumed between Sunday and weekday trips.

g. The traffic study references the future extension of Marrwood Place as connecting with the Stone Ridge development. This is true only as far east as Route 659 Relocated (Northstar Boulevard) as the pending Stone Ridge rezoning application (ZMAP 2006-0011) proposes to relocate the roadway on the east side of Northstar Boulevard (Millstream Drive) to turn south and connect with Tall Cedars Parkway (in order to avoid a major floodplain crossing). The traffic study (and the vicinity map on the cover sheet of the plan set) should be revised to reflect this scenario.

2. OTS recommends that the traffic signal and associated turn lanes at the intersection of Route 50 and Westport Boulevard (Intersection 1) are installed and operational prior to occupancy of the church (the Applicant should be responsible for the traffic signal warrant study referenced in Comment #1d above should the study not be previously completed by others). Such intersection improvements would serve to benefit the safe and orderly operation of the road network, including traffic generated by the church use, and would be more consistent with driver expectations on a four-lane divided roadway such as Route 50 than would the presence of traffic control personnel. Signalization and related road improvements would also allow for consistent traffic control during all church events, including services at times other than on Sundays, which may generate comparable traffic volumes as Sunday services.

3. Should it be determined that traffic control personnel be utilized at the intersection of Route 50 and existing Goshen Road (Intersection 1) on an interim basis until ultimate road improvements including a traffic signal are in place, OTS recommends that only sworn law enforcement personnel be utilized to provide such traffic control functions. If this option is pursued, discussions with the Loudoun County Sherriff's Office should be initiated to determine its position on this issue, including the extent/duration to which traffic control functions should be provided.

4. The Applicant should coordinate with other parties in the area (i.e., the developers of the Westport and Marrwood subdivisions) to effect, to the extent possible, the construction of the ultimate planned road network (i.e., Westport Boulevard and realigned Goshen Road (Marrwood Place)) between Route 50 and the site prior to the time the church opens for

use. Regardless of the scope of implementation of these ultimate improvements, the traffic signal referenced in Comment #2 above (at Intersection 1) should be configured to accommodate the ultimate alignment of the road network (i.e., Westport Boulevard) with minimal modifications.

5. The existing construction plan approval for Marrwood Place (CPAP 2008-0106) extends south to the proposed northern site entrance (opposite future Goshen Ridge Place). Construction of Marrwood Place to the eastern property line, to include a paved temporary cul-de-sac, is necessary to be in place and open to traffic prior to occupancy of the church uses.

6. A sidewalk along the site frontage should be depicted on the SPEX plat and provided at the time of construction of Marrwood Place and/or site development. The sidewalk should be consistent with the five (5)-foot sidewalk depicted along the west side of Marrwood Place in CPAP 2008-0106 as well as the sidewalk/sidewalk reservation area conditioned as part of the approved development for The Boyd School (SPEX 2008-0021/STPL 2008-0051).

7. Marked crosswalks across both site entrances and Marrwood Place should be provided at the time of construction of Marrwood Place and/or site development.

8. Discussions regarding a fair-share contribution toward the future extension of Marrwood Drive to Northstar Boulevard and/or other transportation improvements are necessary. OTS staff is available to meet with the Applicant regarding this matter.

9. OTS staff requests to be included in any meetings between VDOT and the Applicant regarding these applications.

Conclusion

OTS will offer a recommendation once it has reviewed the Applicant's responses to the comments contained in this referral. Based on the Applicant's responses, additional transportation comments may be necessary. OTS staff is available to meet with the Applicant to discuss the transportation issues related to this proposal.

ATTACHMENTS

1. Site Vicinity Map
2. Detailed Site Location Map (Traffic Study Figure 2-1)
3. Existing Lane Use & Traffic Control (Traffic Study Figure 2-3)
4. Existing (2008) Traffic Volumes (Sunday) (Traffic Study Figure 3-1)
5. Existing (2008) Intersection LOS Summary (Sunday) (Traffic Study Table 3-1)
6. Existing (2008) Intersection LOS Summary (Sunday) (Traffic Study Figure 3-2)
7. Site Trip Generation Analysis/Comparison (Sunday) (Traffic Study Table 5-1)
8. Site-Generated Trip Distribution/Assignment (2012) (Sunday) (Traffic Study Figure 5-1)
9. Site-Generated Trip Distribution/Assignment (2015) (Sunday) (Traffic Study Figure 5-2)
10. Total Future Peak Hour Traffic Forecasts (2012) (Sunday) (Traffic Study Figure 6-1)
11. Total Future Peak Hour Traffic Forecasts (2015) (Sunday) (Traffic Study Figure 6-2)
12. Total Future Intersection LOS Summary (2012 & 2015) (Sunday) (Traffic Study Table 6-1)

13. Total Future Intersection LOS Summary (2012) (Sunday) (Traffic Study Figure 6-3)
14. Total Future Intersection LOS Summary (2015) (Sunday) (Traffic Study Figure 6-4)
15. Future Lane Use & Traffic Control (2012) (Sunday) (Traffic Study Figure 4-1)
16. Future Lane Use & Traffic Control (2015) (Sunday) (Traffic Study Figure 4-2)
17. Existing (2008) Peak Hour Traffic Volumes, LOS Summary, and Lane Use & Traffic Control (Weekday) (Traffic Study Figure 9-1)
18. Total Future Intersection LOS Summary (Weekday) (2012 & 2015) (Traffic Study Table 9-1)
19. Site Trip Generation Analysis/Comparison (Weekday) (Traffic Study Table 9-2)
20. Site-Generated Trip Assignments (2012 & 2015) (Weekday) (Traffic Study Figure 9-7)
21. Total Future Peak Hour Traffic Forecasts (2012 & 2015) (Weekday) (Traffic Study Figure 9-8)
22. Total Future Intersection LOS Summary (2012 & 2015) (Weekday) (Traffic Study Figure 9-9)
23. Future Lane Use & Traffic Control (2012 & 2015) (Weekday) (Traffic Study Figure 9-4)
24. Traffic Signal Warrant Analysis Summary (Route 50/Goshen Road) (Traffic Study Appendix V)

cc: Andrew Beacher, Assistant Director, OTS
Chuck Acker, Traffic Controller/Engineer, OTS
John Bassett, Transportation Engineer, VDOT

VICINITY MAP

ATTACHMENT 1

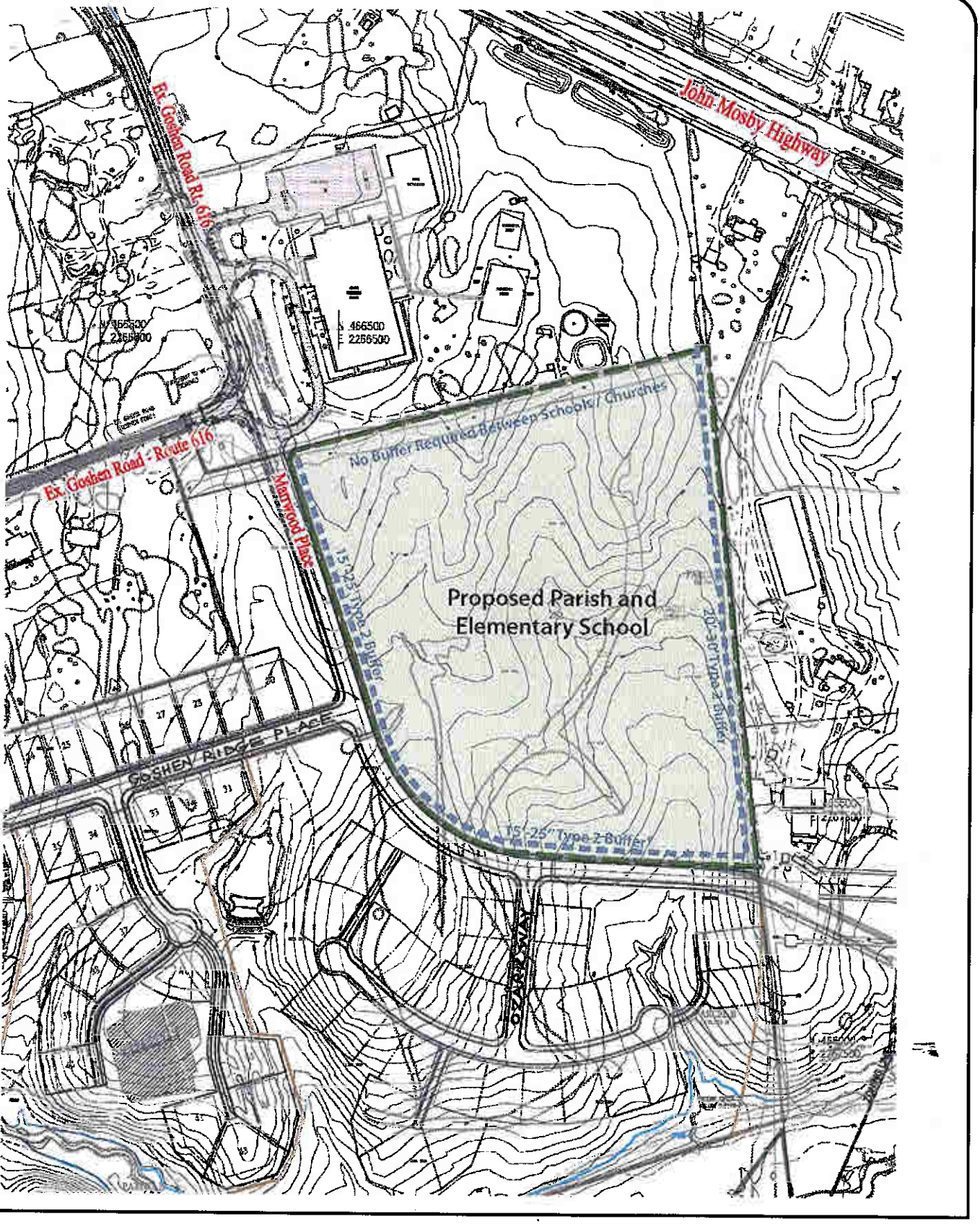

Figure 2–1
Generalized Development Plan

North

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JDP

Catholic Diocese of Arlington
Loudoun County, Virginia

ATTACHMENT 2

Wells + Associates, Inc.

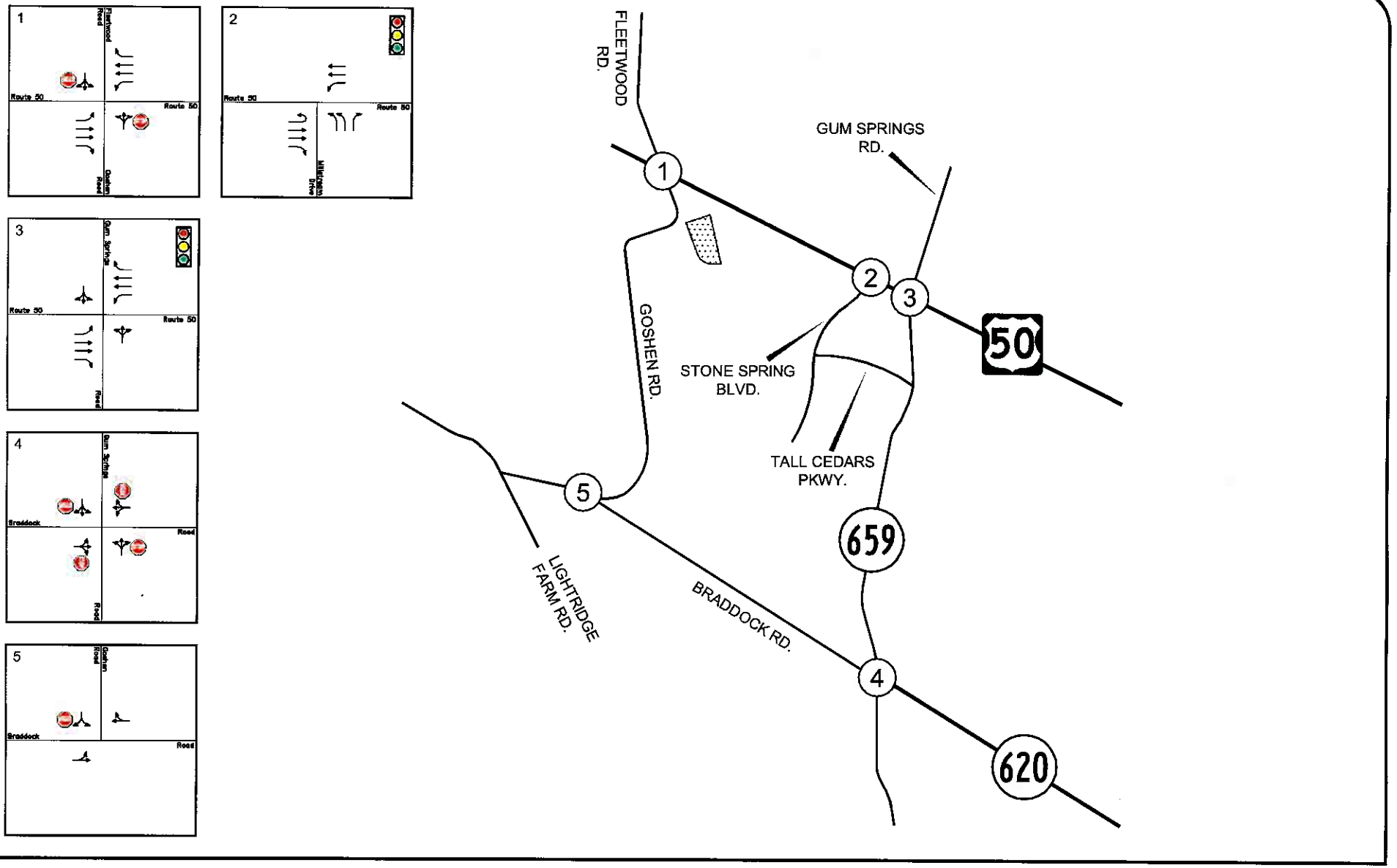

Figure 2-3
Existing Lane Use and Traffic Control

Catholic Diocese of Arlington
Loudoun County, Virginia

ATTACHMENT 3

Wells + Associates, Inc.

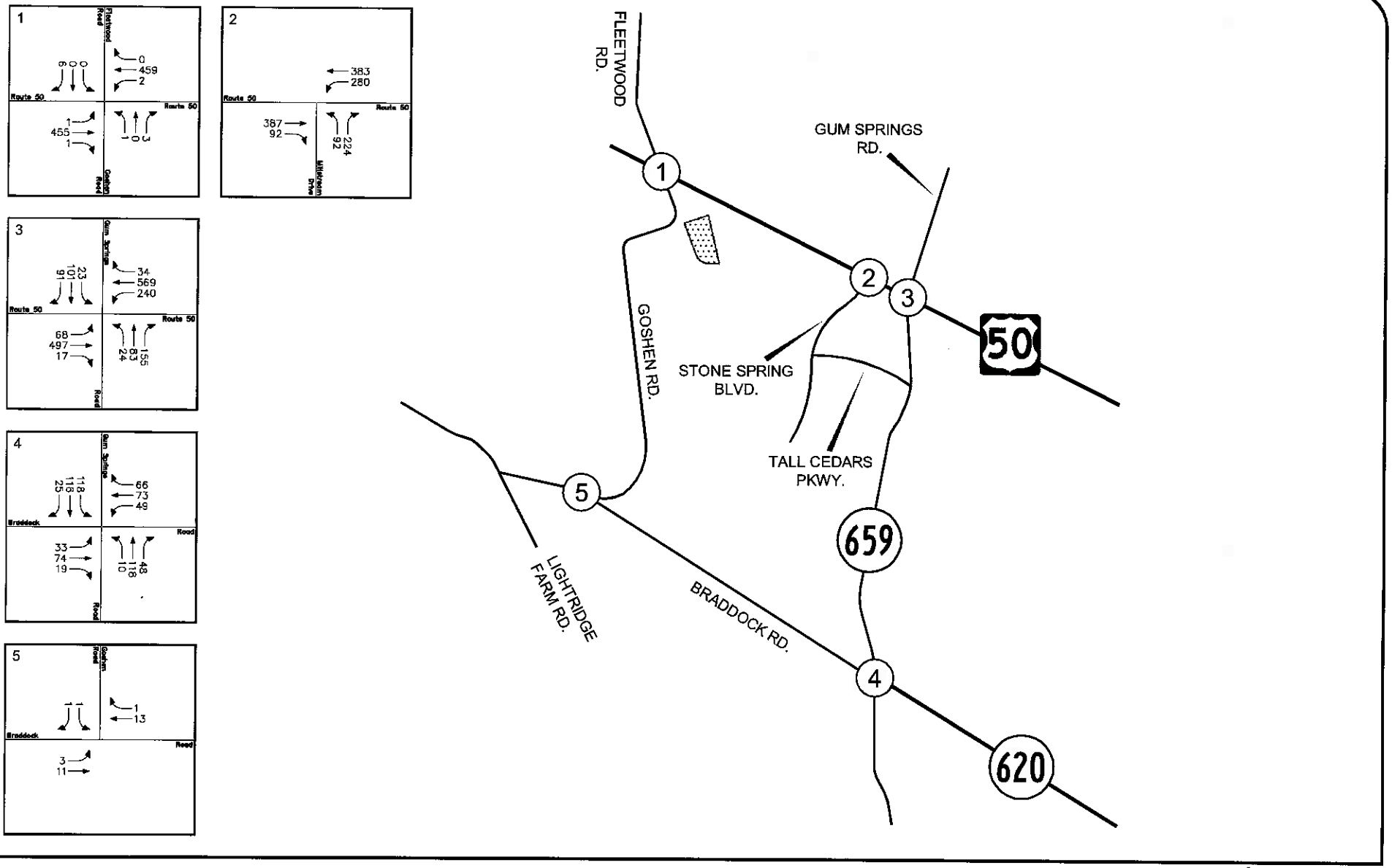

Figure 3-1
2008 Existing Peak Hour Traffic Volumes (Sunday)

SUN PEAK HOUR

North

Catholic Diocese of Arlington
Loudoun County, Virginia

ATTACHMENT 4

Wells + Associates, Inc.

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

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

ATTACHMENT 5

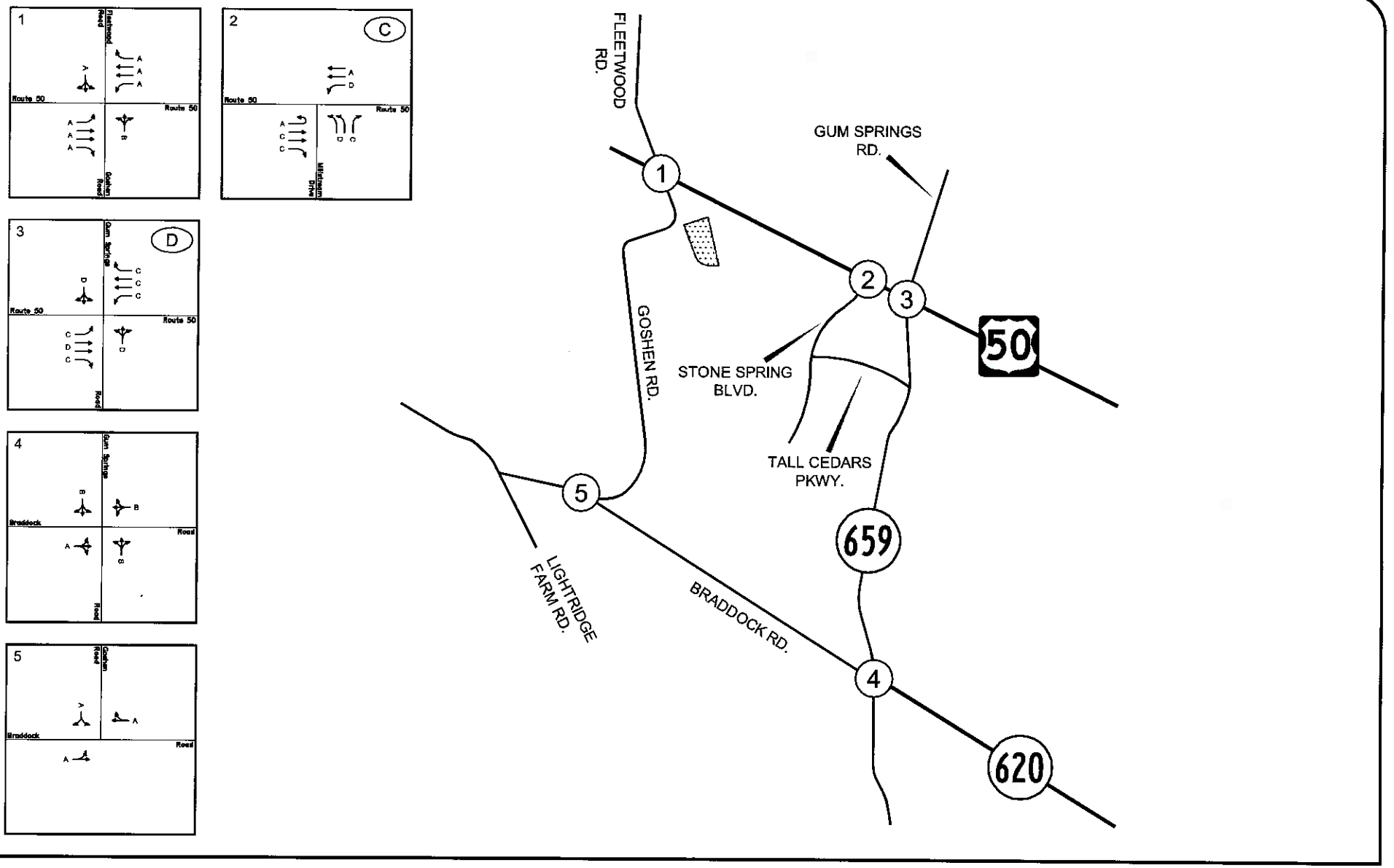

Figure 3-2
2008 Existing Levels of Service

X Levels of Service
(X) Overall Levels of Service

North

Catholic Diocese of Arlington
Loudoun County, Virginia

ATTACHMENT 6

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

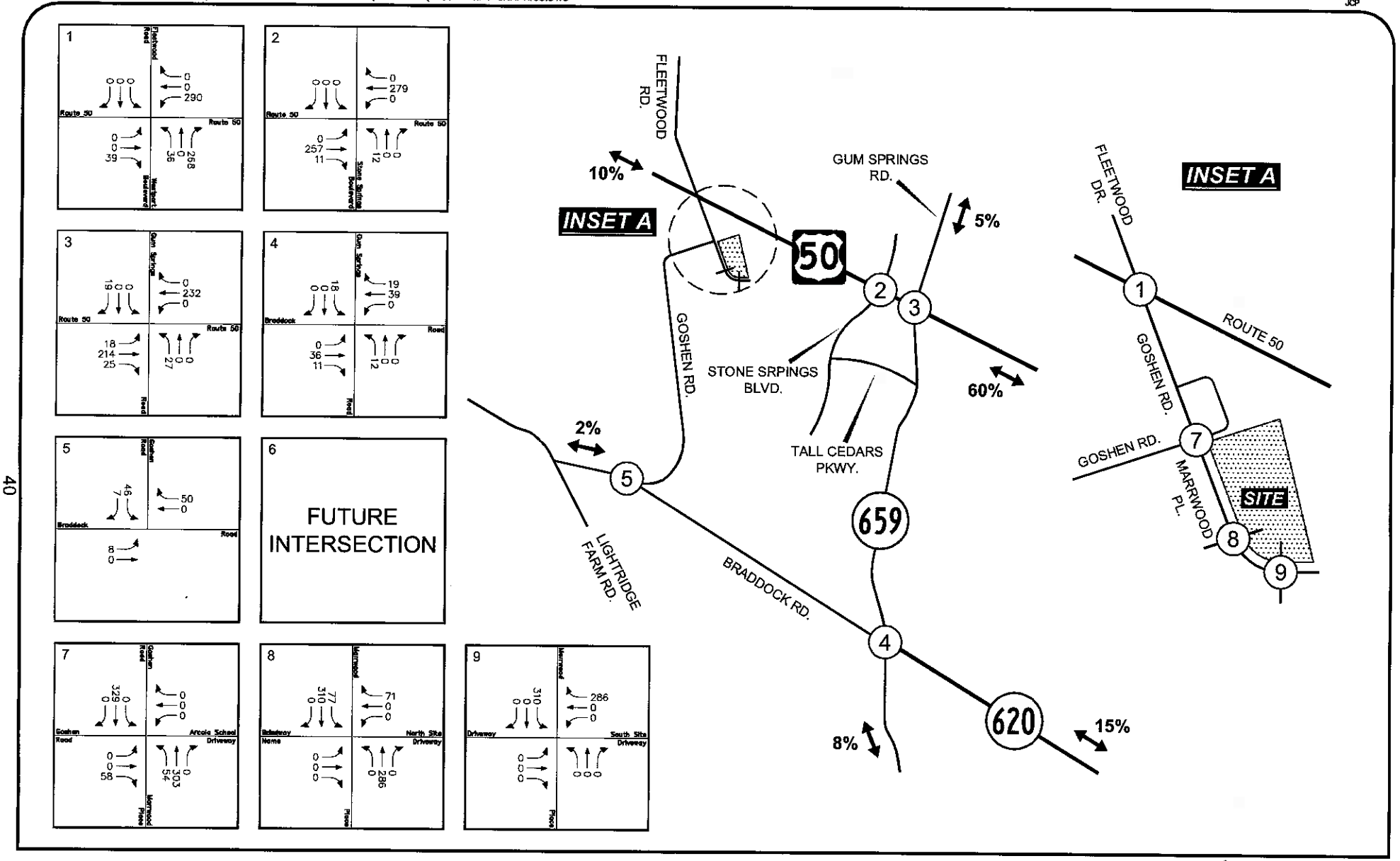
Land Use	ITE Land Use Code	Size	Units	Sunday Peak Hour In	Sunday Peak Hour Out	Sunday Peak Hour Total	Sunday ADT
Approved Development							
Single Family Detached(2)	210	19	D.U.	11	10	21	158
Proposed Development							
Phase I							
Church(3)	560	58,000	SF	387	357	744	1,836
PHASE I NET NEW TRIPS (Approved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

Notes:

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

(2) Peak Hour of Generator

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



40

Figure 5-1
2012 Site Generated Traffic Assignments and Directional Distributions (Sunday)

XX% Directional Distribution

000 SUN PEAK HOUR

North

Catholic Diocese of Arlington
Loudoun County, Virginia

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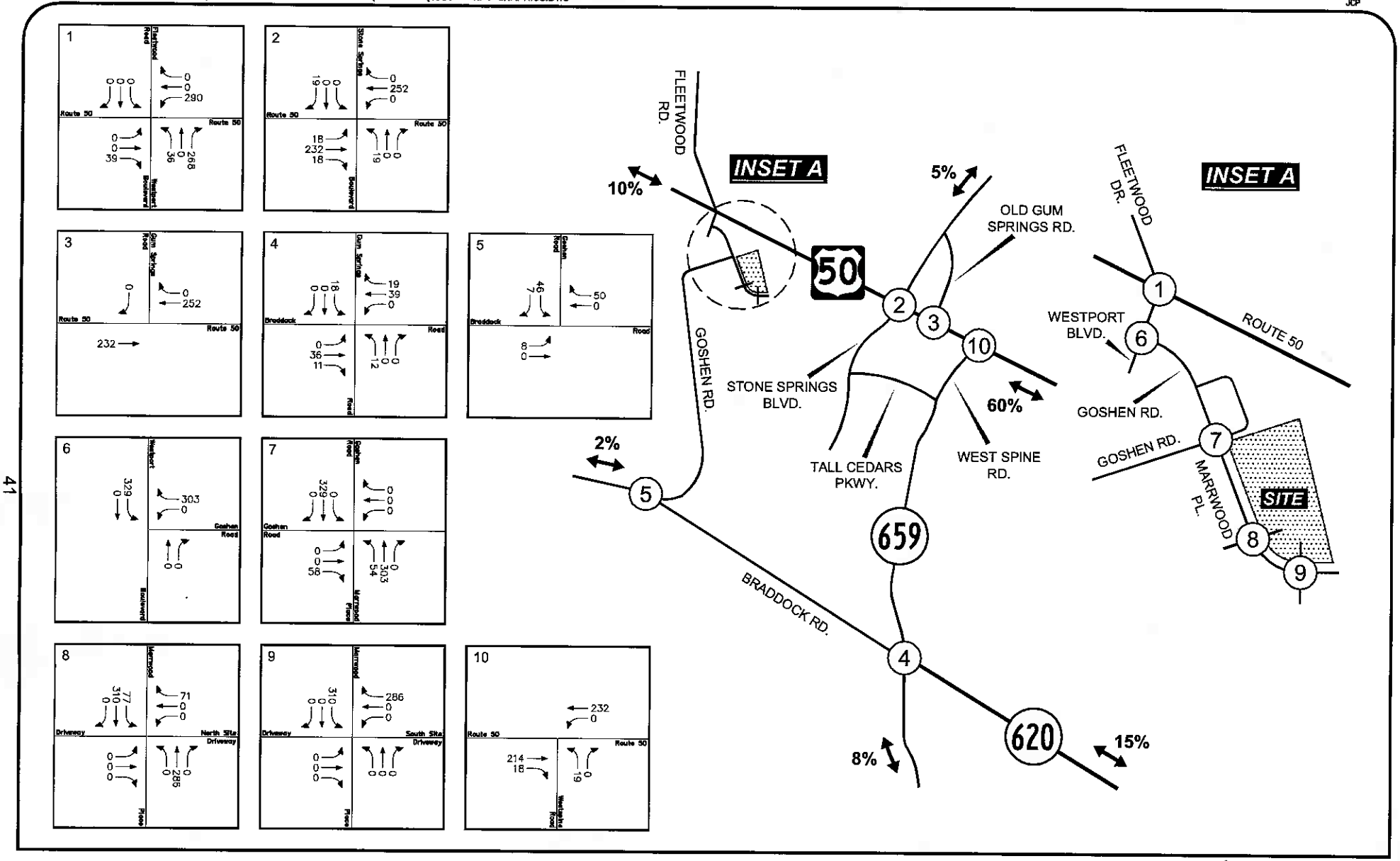

Figure 5–2
2015 Site Generated Traffic Assignments and Directional Distributions (Sunday)

XX% Directional Distribution

000 SUN PEAK HOUR

North

Catholic Diocese of Arlington
Loudoun County, Virginia

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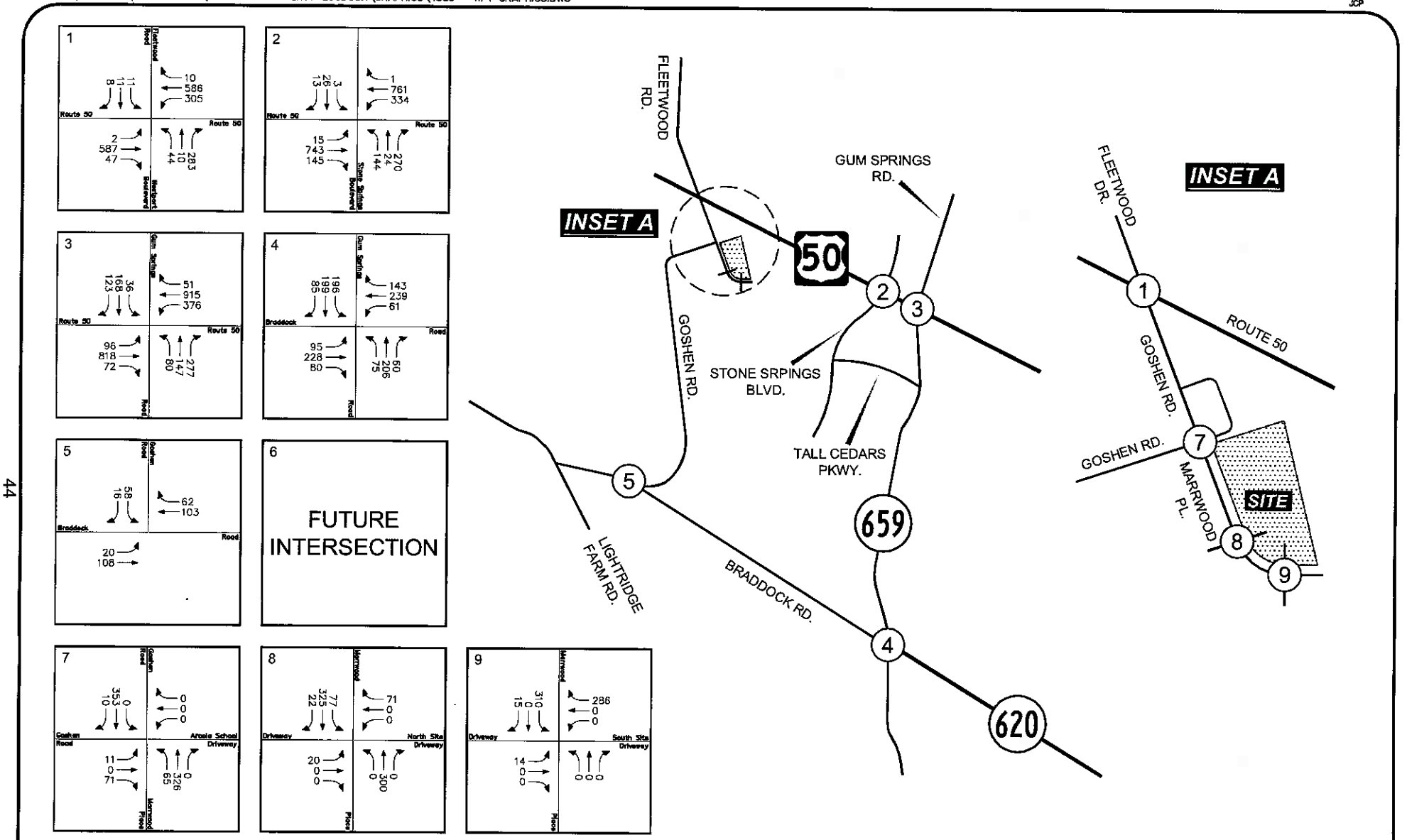

Figure 6-1
2012 Peak Hour Traffic Assignments with Special Exception Use (Sunday)

Catholic Diocese of Arlington
Loudoun County, Virginia

ATTACHMENT 10

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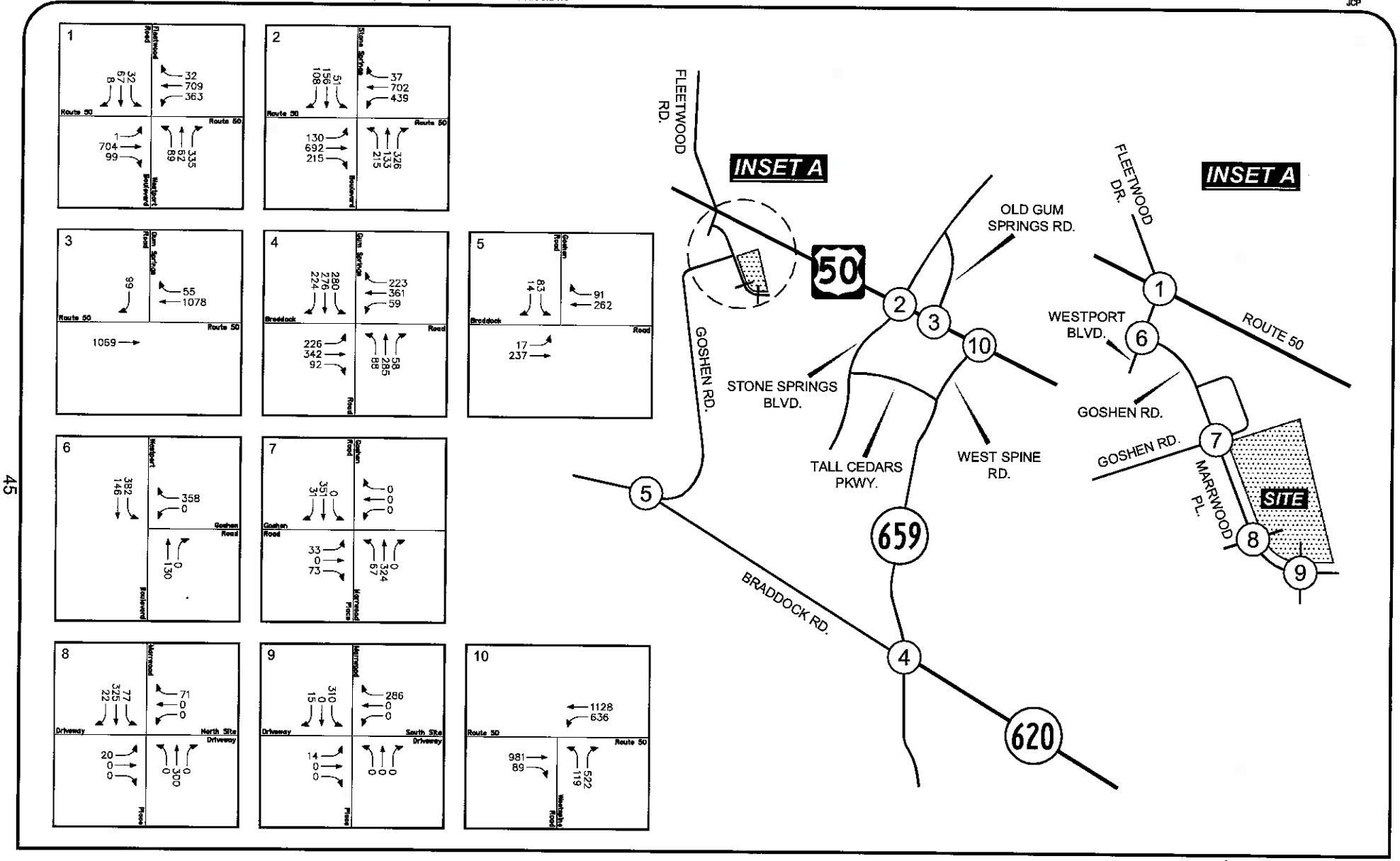

Figure 6-2
2015 Peak Hour Traffic Forecasts with Special Exception Use (Sunday)

SUN PEAK HOUR
000

North

Catholic Diocese of Arlington
Loudoun County, Virginia

ATTACHMENT 11

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Table 6-I
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)/ Gosheen 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]		B [11.6]	
		NBLTR	B [11.9]	C [23.8]		F [712.6]	
		SBLTR	A [9.9]	C [24.1]		F [712.8]	
2015 Background Improvement (Westport): Realign Gosheen 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 (12.6)
		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					
2012 Background Improvement: Construct SB Approach Add EB and WB Through Lanes, Optimize Timings	Signalized	EBL	N/A	C (20.3)	D (38.2)	B (19.7)	D (46.2)
		EBT		C (22.2)	C (31.4)	C (23.1)	C (32.2)
		EBR		C (20.2)	C (29.2)	B (19.7)	C (28.6)
		WBL		C (23.2)	D (35.2)	C (26.7)	D (43.2)
		WBT		A (8.2)	B (12.3)	A (8.2)	B (12.6)
		WBR		A (7.3)	B (11.3)	A (6.8)	B (10.8)
		NBL		C (25.6)	D (39.4)	C (29.6)	D (47.4)
		NBT		B (16.8)	C (21.6)	C (20.1)	C (27.6)
		NBR		A (9.5)	B (10.5)	B (12.3)	B (15.2)
		SBL		C (29.1)	D (35.7)	C (33.2)	D (43.2)
		SBT		C (30.6)	D (38.9)	D (35.1)	D (48.3)
		SBR		C (29.0)	C (33.8)	C (33.1)	D (41.0)
		Overall		B (17.2)	C (26.6)	B (18.2)	C (29.8)
3. John Mosby Highway (Route 50)/ Gum Spring Road (Route 659)	Signalized	EBL	N/A	D (36.8)	N/A	N/A	N/A
		EBT		E (57.3)			
		EBR		D (43.0)			
		WBL		F (100.4)			
		WBT		D (40.1)			
		WBR		C (31.4)			
		NBLTR		F (133.3)			
		SBLTR		E (76.6)			
		Overall		E (73.7)			
Background Improvements: Add EB and WB Through Lanes, Optimize Timings	Signalized	EBL	N/A	D (36.8)	N/A	D (37.9)	N/A
		EBT		D (50.4)		E (55.1)	
		EBR		D (43.2)		D (43.7)	
		WBL		D (44.9)		E (61.0)	
		WBT		C (34.0)		C (34.3)	
		WBR		C (29.2)		C (27.8)	
		NBLTR		C (28.2)		D (38.4)	
		SBLTR		C (24.6)		C (29.1)	
		Overall		D (37.4)		D (43.2)	
Total Future Improvements: Optimize Timings	Signalized	EBL	N/A	N/A	N/A	D (35.2)	N/A
		EBT				D (51.0)	
		EBR				D (41.0)	
		WBL				D (52.0)	
		WBT				C (31.7)	
		WBR				C (25.7)	
		NBLTR				D (42.4)	
		SBLTR				C (30.6)	
		Overall				D (40.9)	
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 (30.3)	N/A
		WBLTR		C (21.5)	E (71.0)	C (26.7)	
		NBLTR		B (12.8)	B (19.6)	B (14.0)	
		SBLTR		C (22.4)	F (167.0)	C (27.0)	
		Overall		C (20.7)	F (209.4)	C (24.9)	
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)/ Gosheen Road (Route 616)	Unsignalized	EBLT	A [1.6]	A [0.9]	A [0.4]	A [1.3]	A [0.7]
		SBLR	A [8.5]	A [8.9]	B [13.0]	B [10.7]	C [15.0]
6. Westport Boulevard/ Gosheen 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. Gosheen Road (Route 616)/ Arcola School Driveway/Marrwood Place	Unsignalized	EBLTR	N/A	A [8.9]	A [9.2]	B [12.9]	C [16.3]
		WBLTR	N/A	A [0.0]	A [0.0]	A [0.0]	A [0.0]
		NBLTR	N/A	A [3.5]	A [2.9]	A [1.9]	A [2.0]
		SBLTR	N/A	A [0.0]	A [0.0]	A [0.0]	A [0.0]
8. Marrwood Place/ North Site Driveway/Marrwood Driveway	Unsignalized	EBLTR	N/A	N/A	N/A	C [24.4]	C [22.7]
		WBLTR				B [10.6]	B [10.5]
		NBLTR				A [2.1]	A [1.8]
9. Marrwood Place/ South Site Driveway/Marrwood Driveway	Unsignalized	EBLTR	N/A	N/A	N/A	E [35.2]	E [35.2]
		WBLTR				A [9.6]	A [9.6]
		SBLTR				A [7.5]	A [7.5]
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 (28.2)
		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.

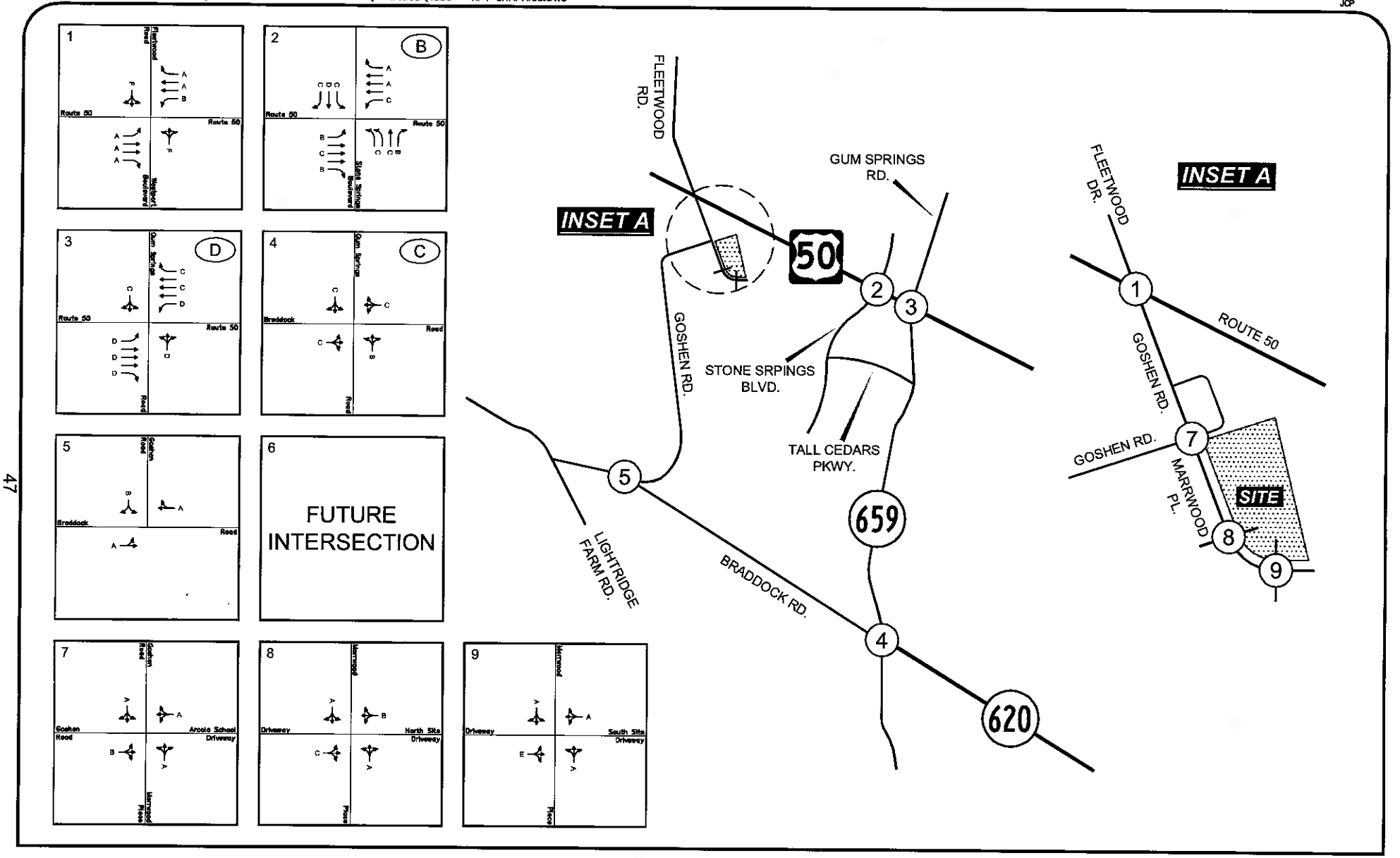

Figure 6-3
2012 Levels of Service with Special Exception Use

X Levels of Service
(X) Overall Levels of Service

North

Catholic Diocese of Arlington
Loudoun County, Virginia

ATTACHMENT 13

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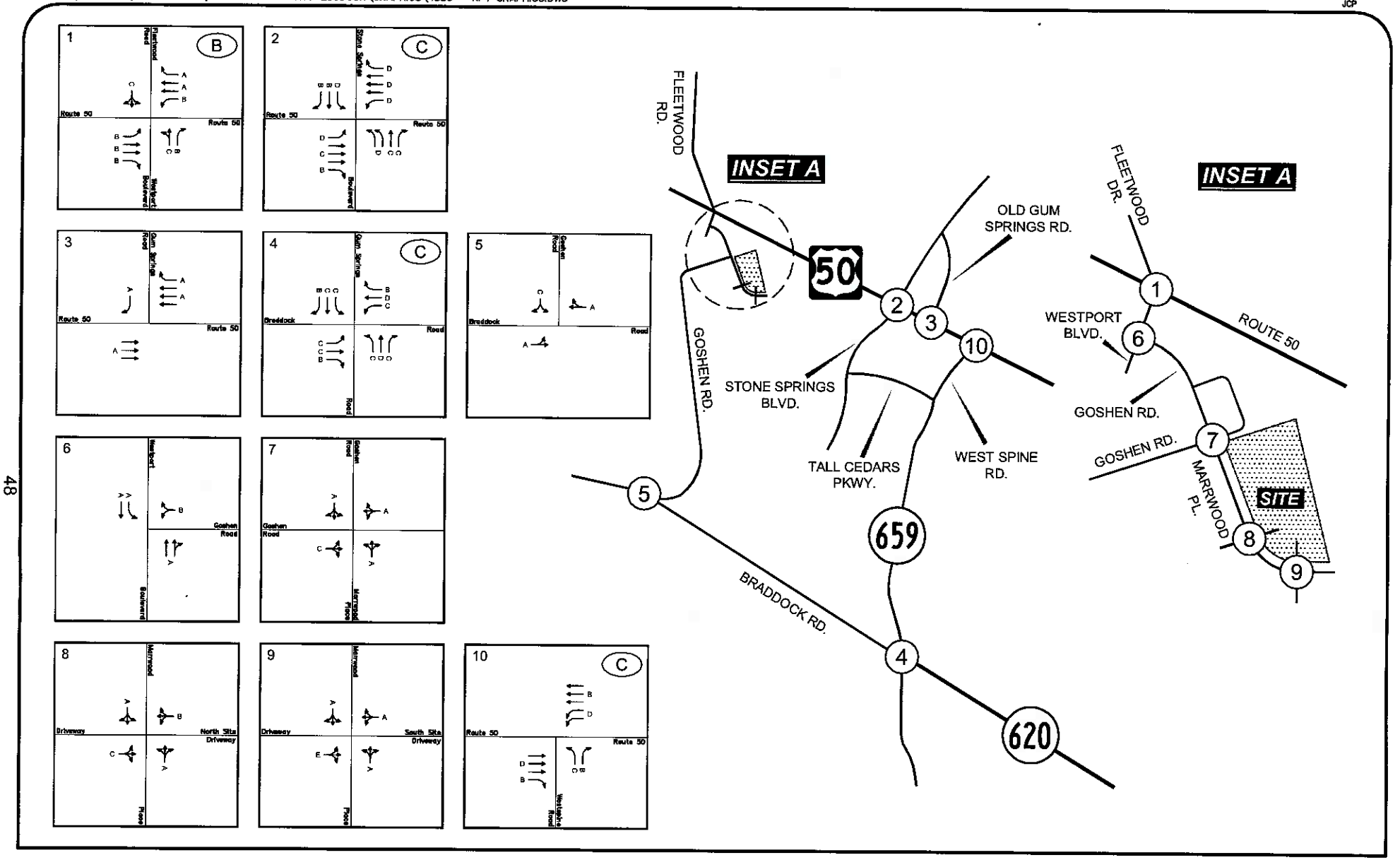

Figure 6-4
2015 Levels of Service with Special Exception Use

X Levels of Service
(X) Overall Levels of Service

North

Catholic Diocese of Arlington
Loudoun County, Virginia

ATTACHMENT 14

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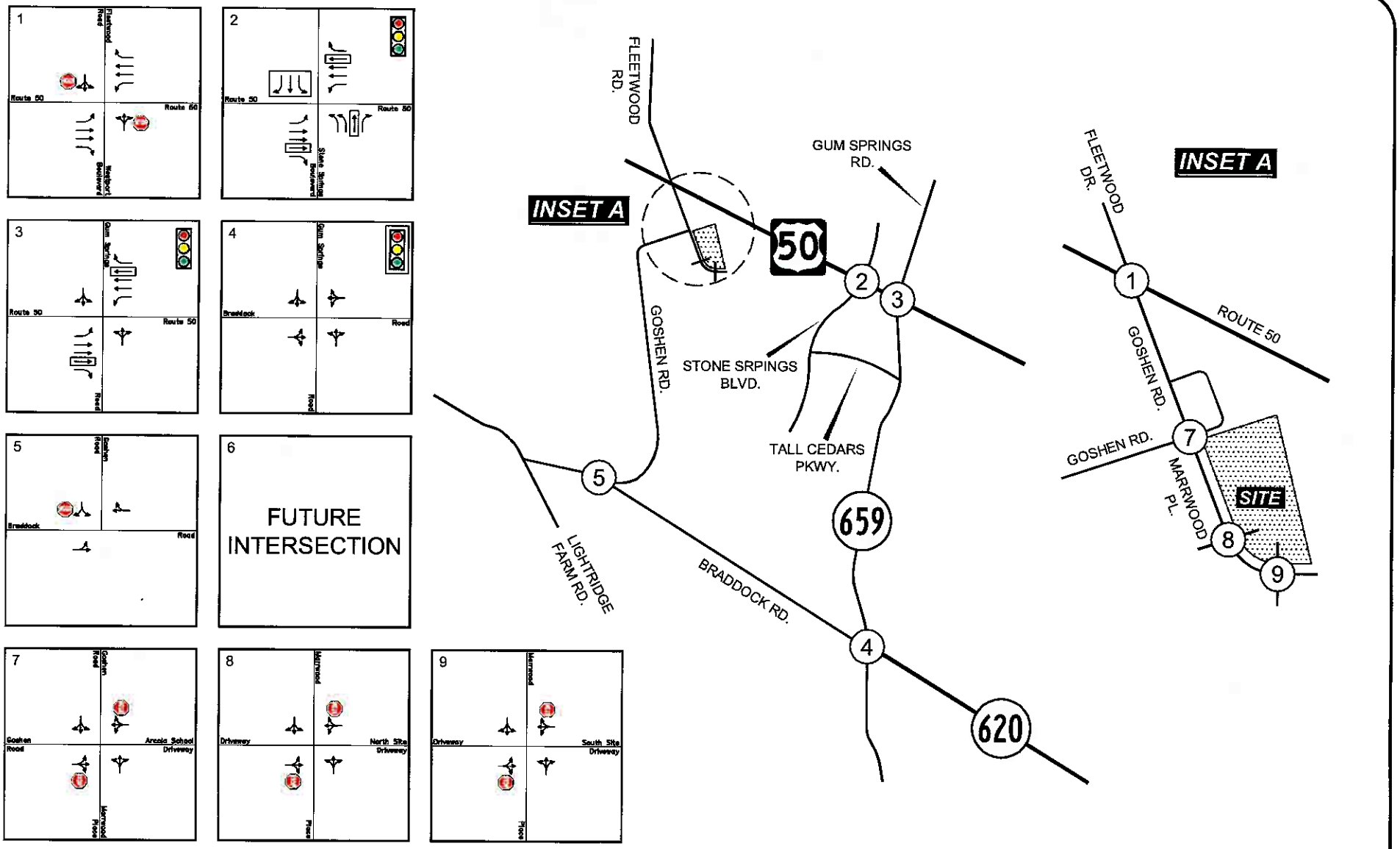

Figure 4–1
2012 Planned Lane Use and Traffic Control

Represents One Travel Lane
Signalized Intersection
Stop Sign
Background Improvement

North

Catholic Diocese of Arlington
Loudoun County, Virginia

ATTACHMENT 15

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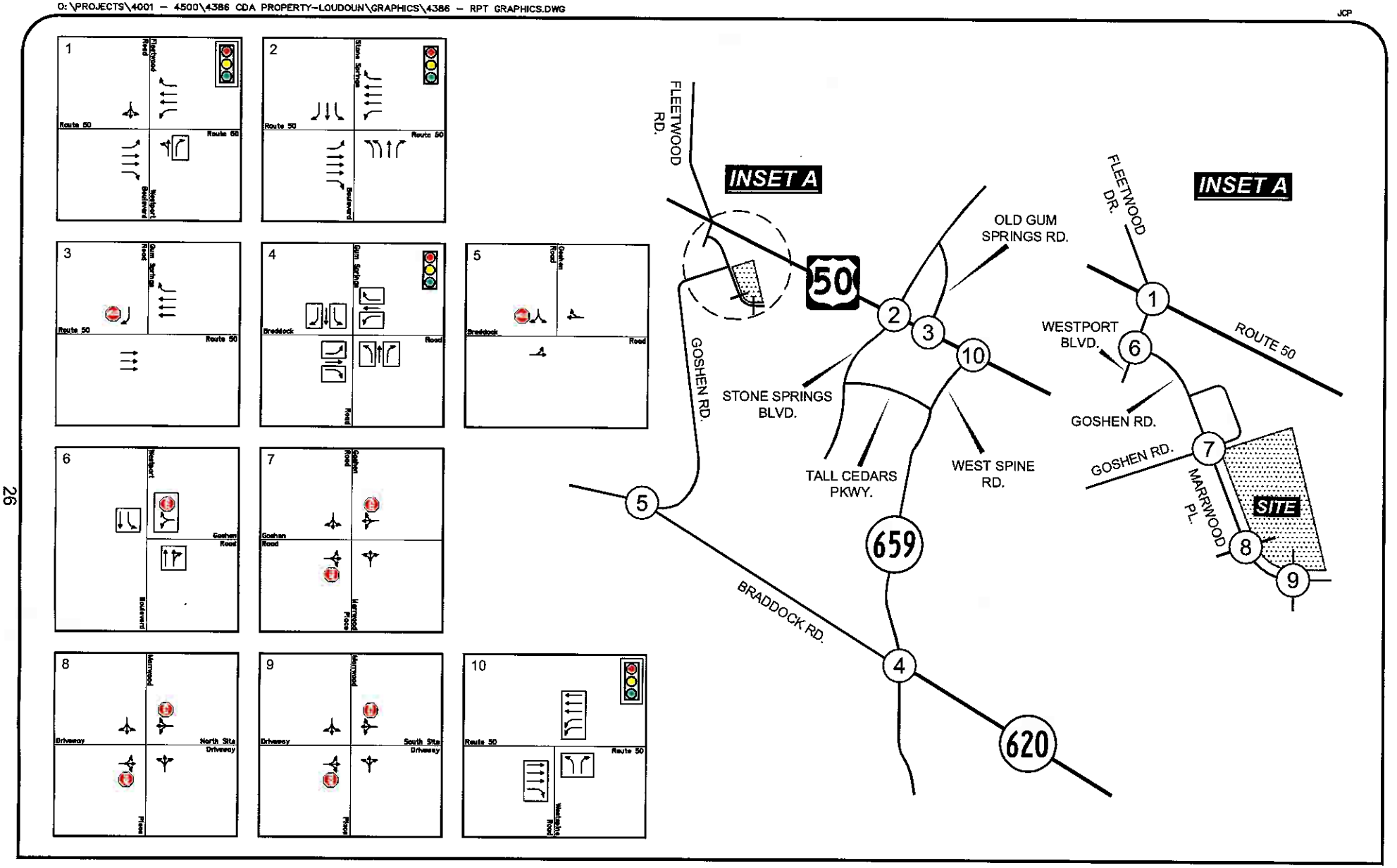

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Figure 4–2
2015 Planned Lane Use and Traffic Control

Represents One Travel Lane
Signalized Intersection
Stop Sign
Background Improvement

North

Catholic Diocese of Arlington
Loudoun County, Virginia

ATTACHMENT 16

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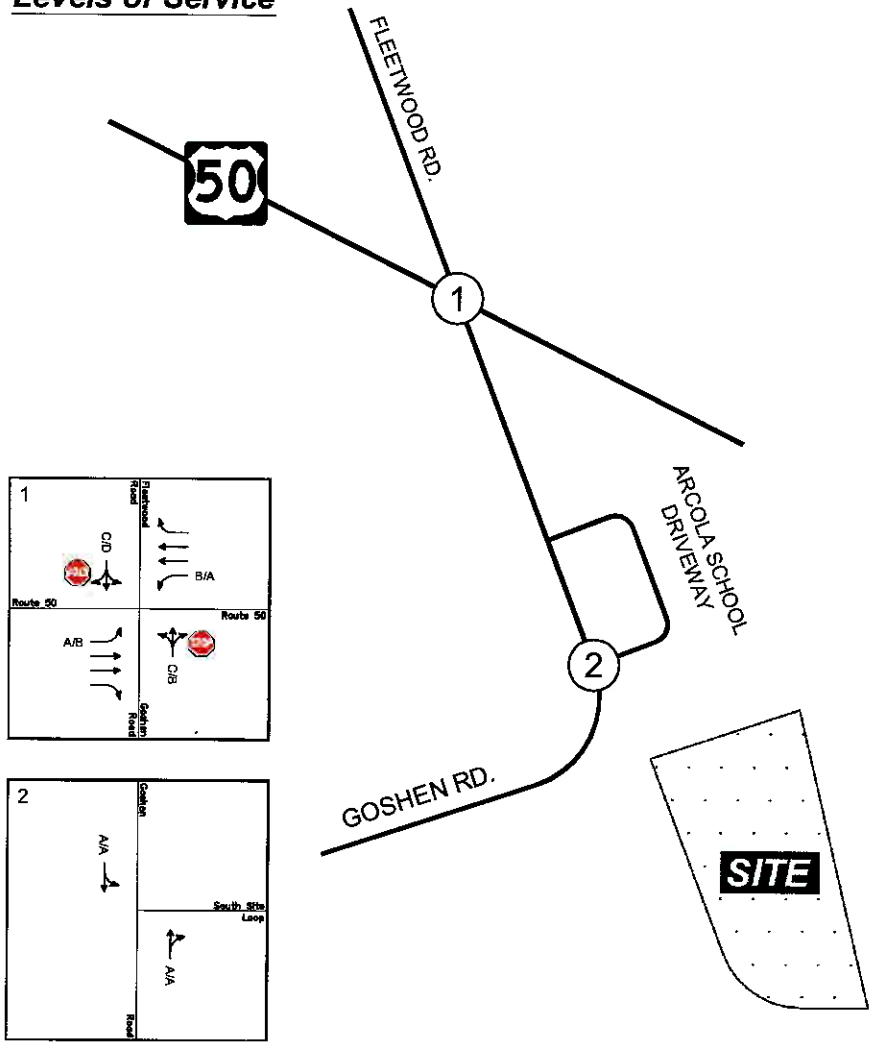
Existing Lane Use and Traffic Control, and Levels of Service



Existing Peak Hour Traffic Counts and ADT

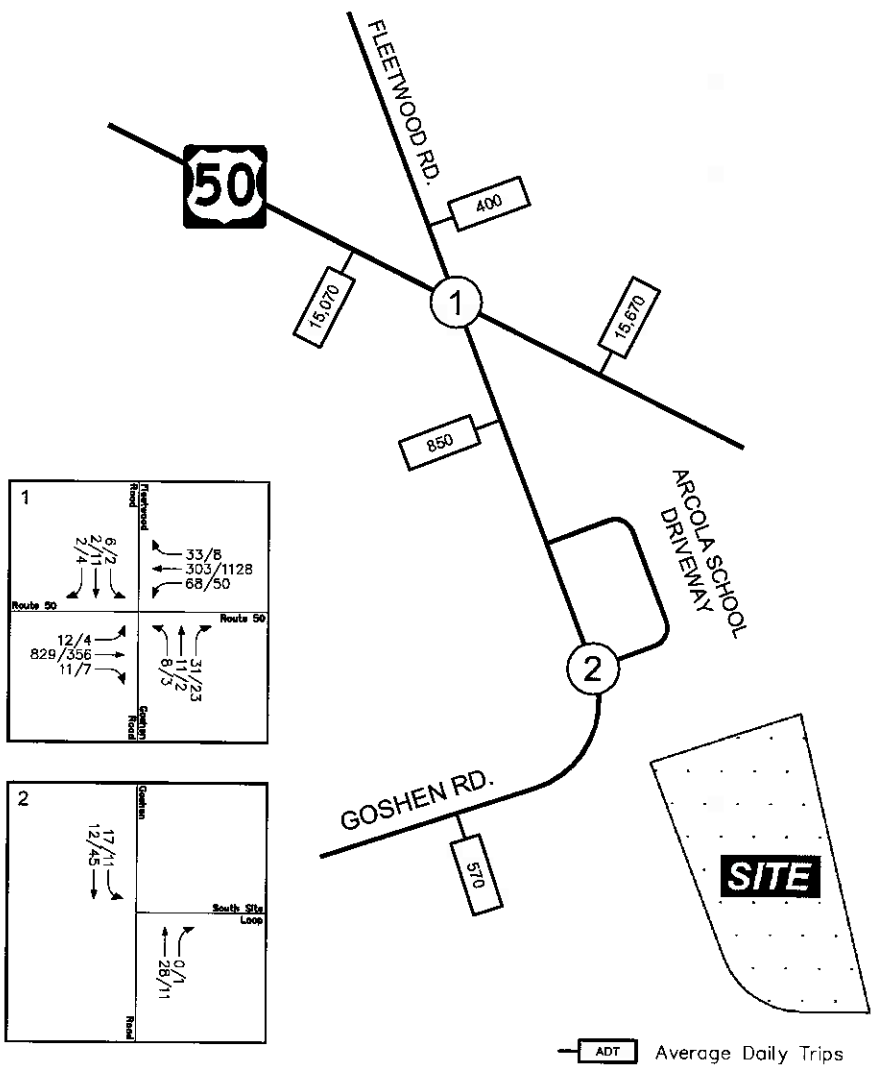


Figure 9-1
Existing Weekday Peak Hour Traffic Volumes, Levels of Service and Existing Lane Use and Traffic Control

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

Catholic Diocese of Arlington
Loudoun County, Virginia

ATTACHMENT 17

Wells + Associates, Inc.

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

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

Notes:

Numbers in parentheses () represent delay at signalized intersections in seconds per vehicle.

Numbers in square brackets [] represent delay at unsignalized intersections in seconds per vehicle.

Asterisk [*] represents delay in excess of 999.9 seconds.

Wells + Associates, Inc
McLean, Virginia

ATTACHMENT 18

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

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

Notes:

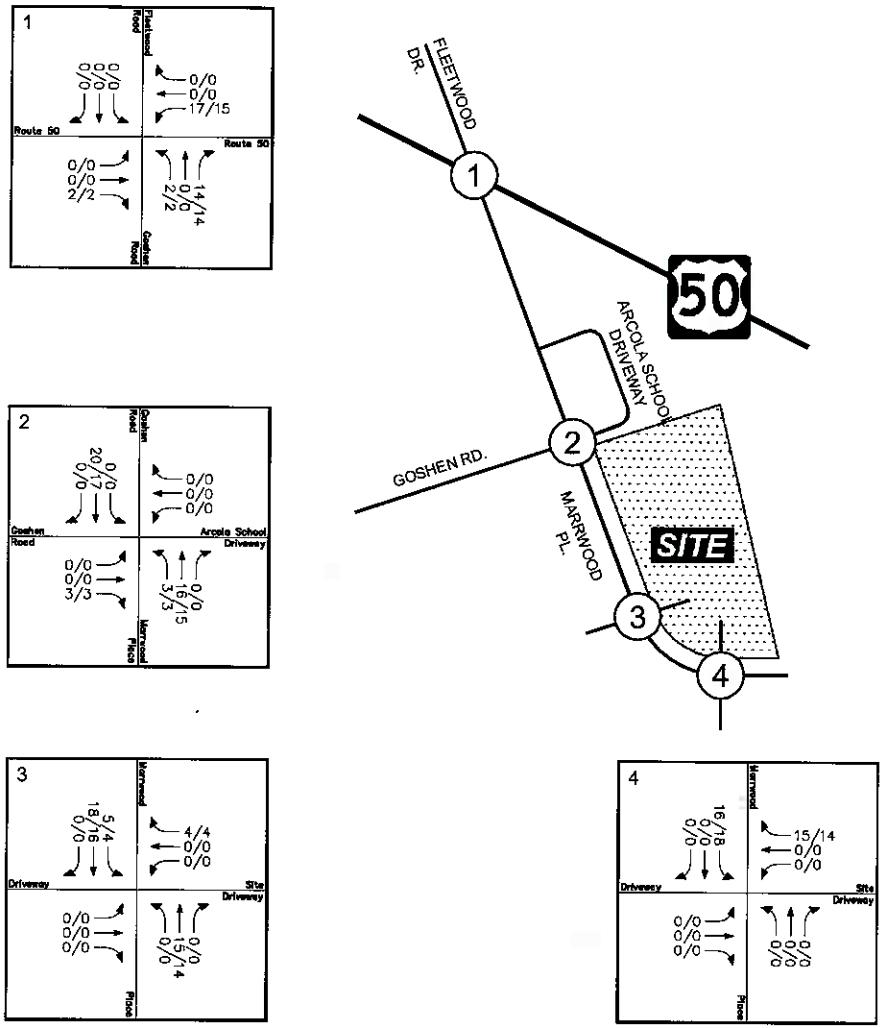
(1) Traffic estimates based on Institute of Transportation Engineers (ITE) Trip Generation, Seventh Edition.

(2) Peak Hour of Generator

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

ATTACHMENT 19

2012 - Site Trips (Church)



2015 - Site Trips (Church & School)

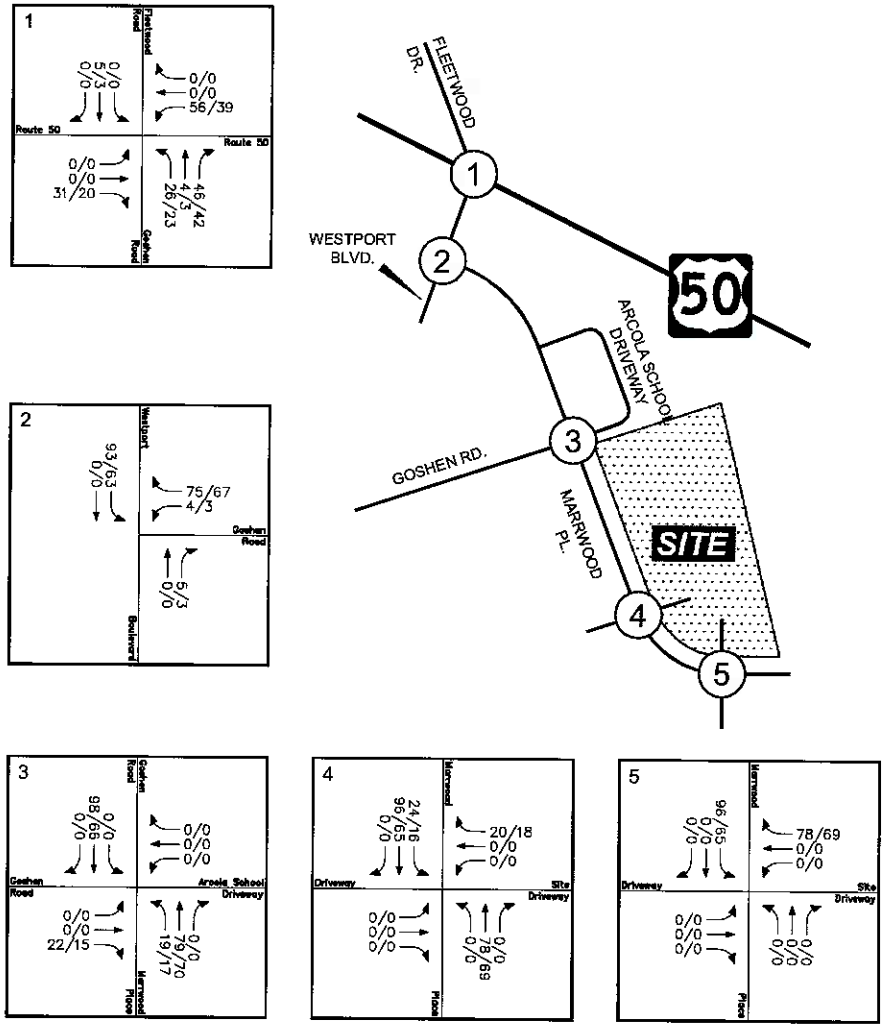


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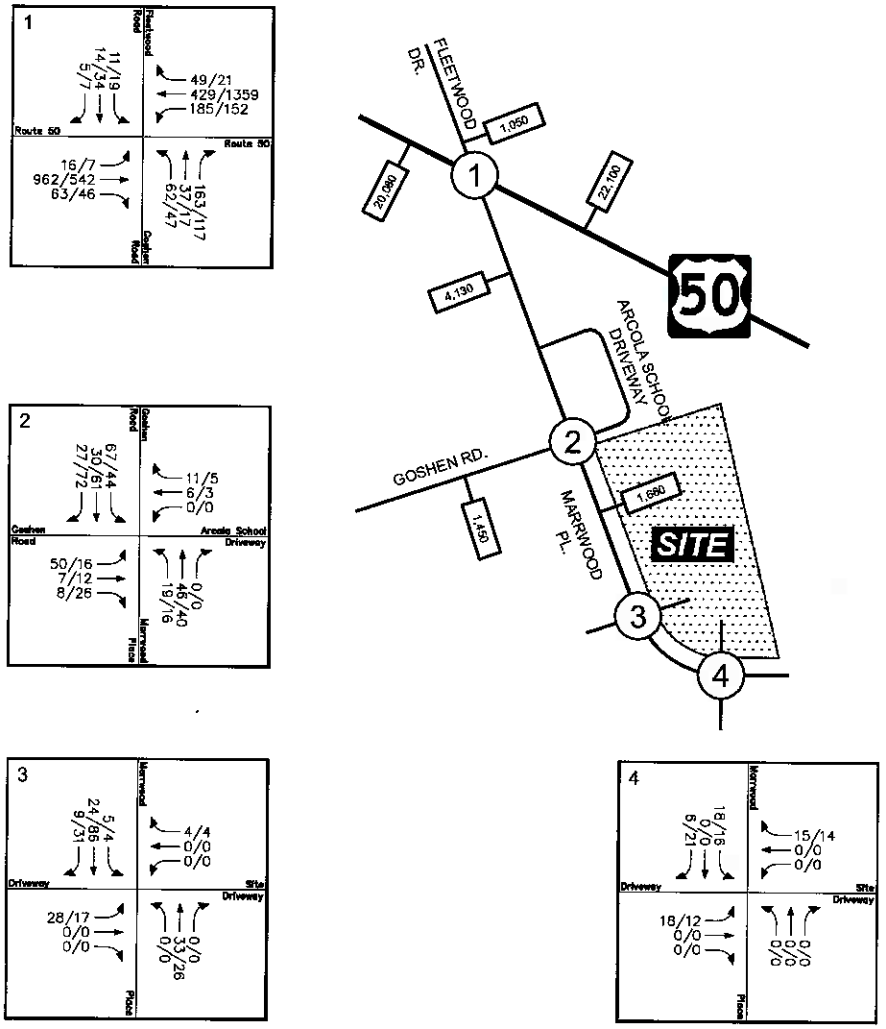
Figure 9-7
Site Generated Traffic Assignments (Weekday)

AM PEAK HOUR
PM PEAK HOUR
000/000

North

2012 - Traffic Forecasts with Proposed Program



2015 - Traffic Forecasts with Proposed Program

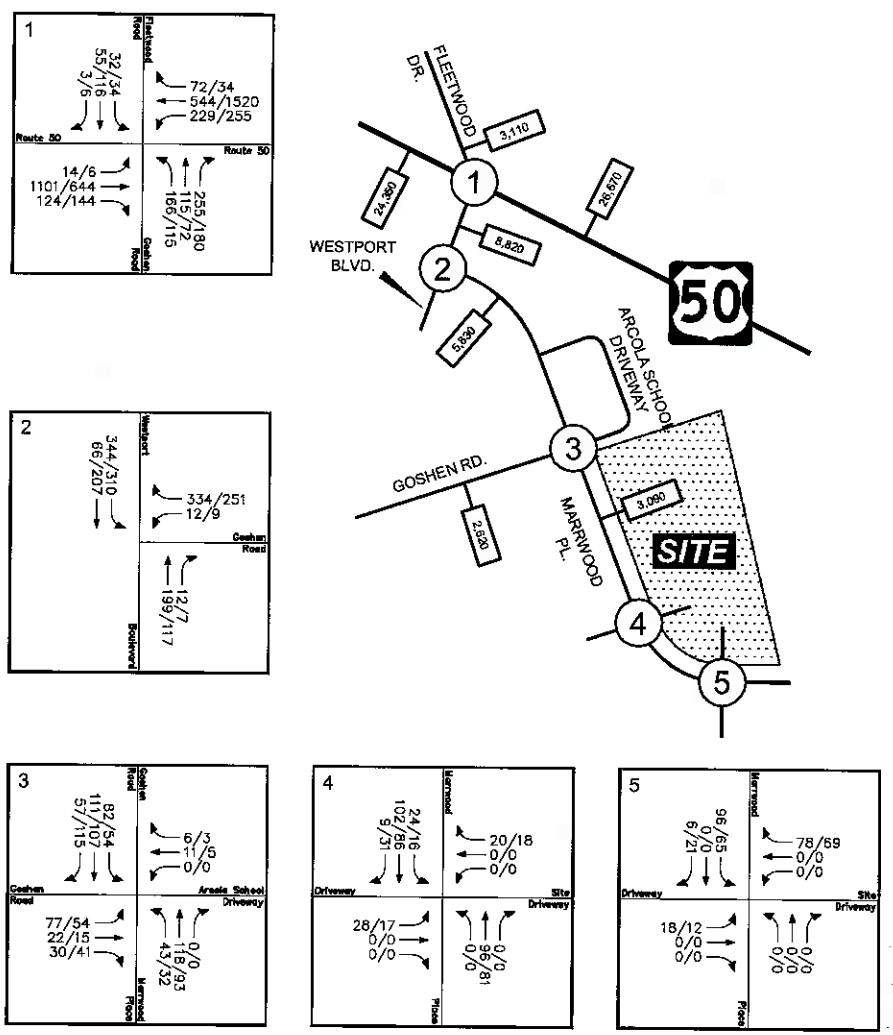


Figure 9-8
Peak Hour Traffic Forecasts with Proposed Development Program (Weekday)

ADT Average Daily Trips

AM PEAK HOUR
PM PEAK HOUR
000/000

North

Catholic Diocese of Arlington
Loudoun County, Virginia

ATTACHMENT 21

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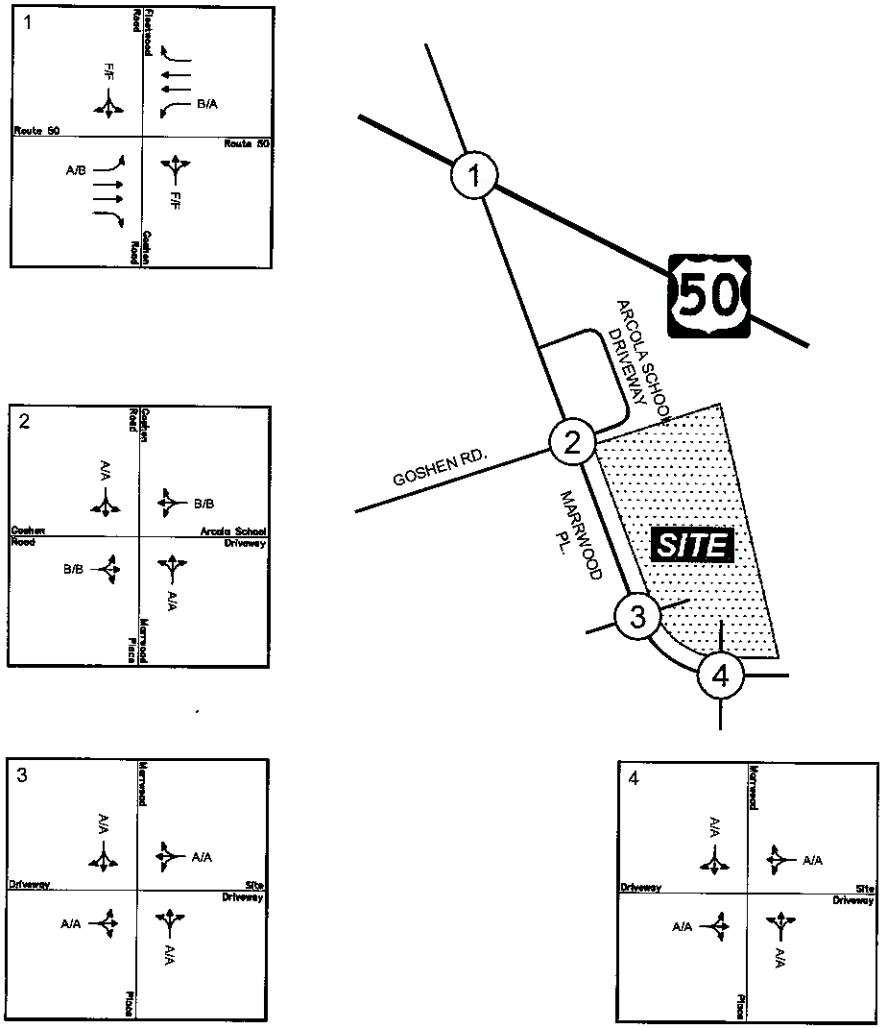
2012 - Phase I (Church)



2015 - Phase II (Church and School)

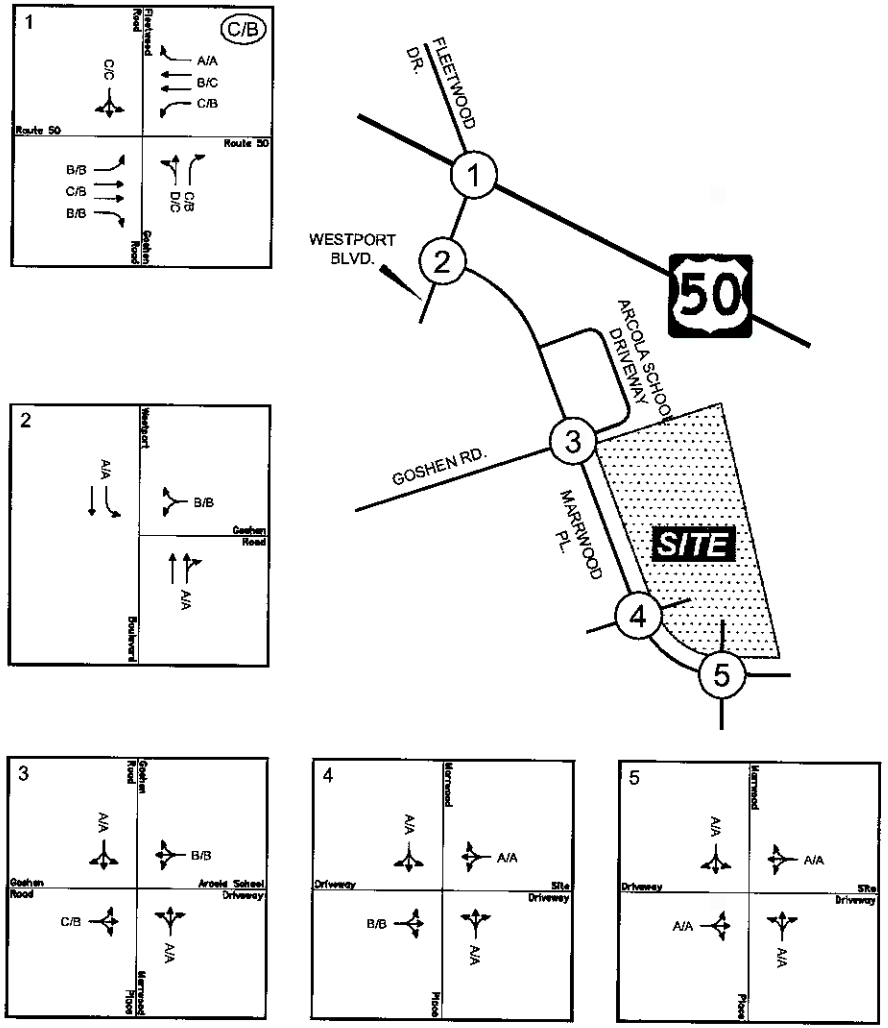


Figure 9-9
Future Levels of Service with Proposed Development Program

x/x Levels of Service
(x/x) Overall Levels of Service

North

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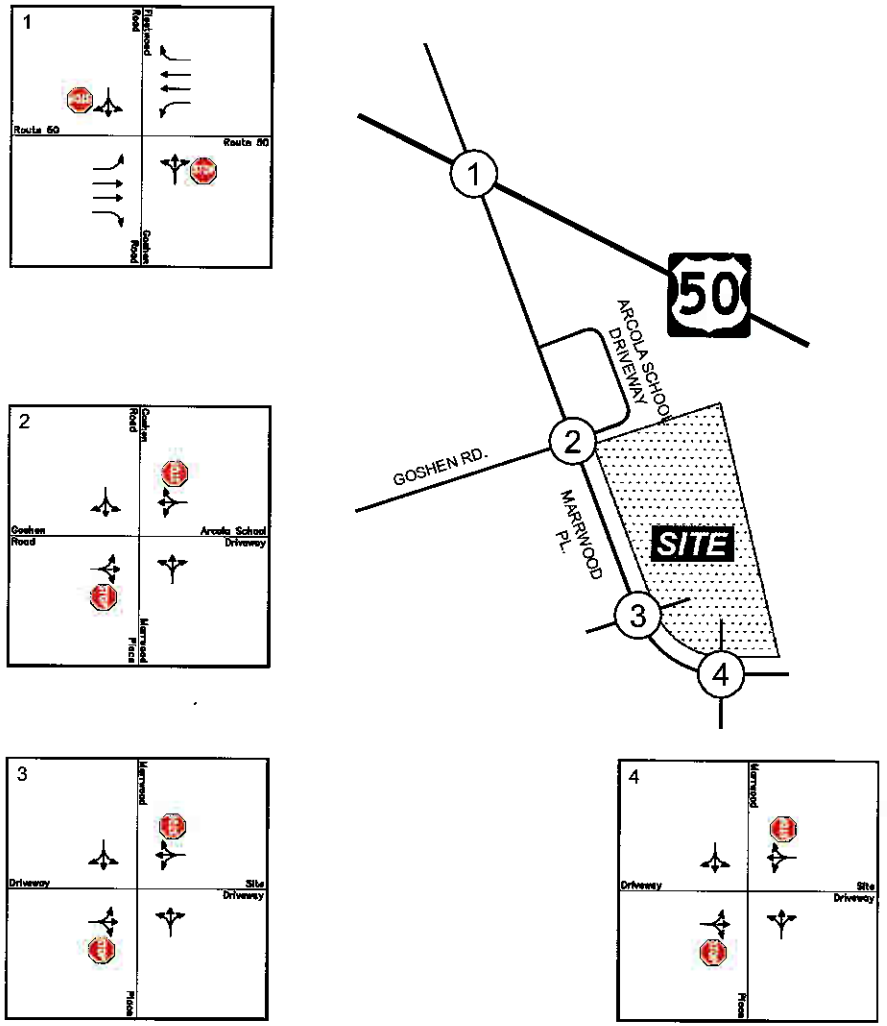
ATTACHMENT 22

Wells + Associates, Inc.

2012 - Phase I (Church)



2015 - Phase II (Church and School)

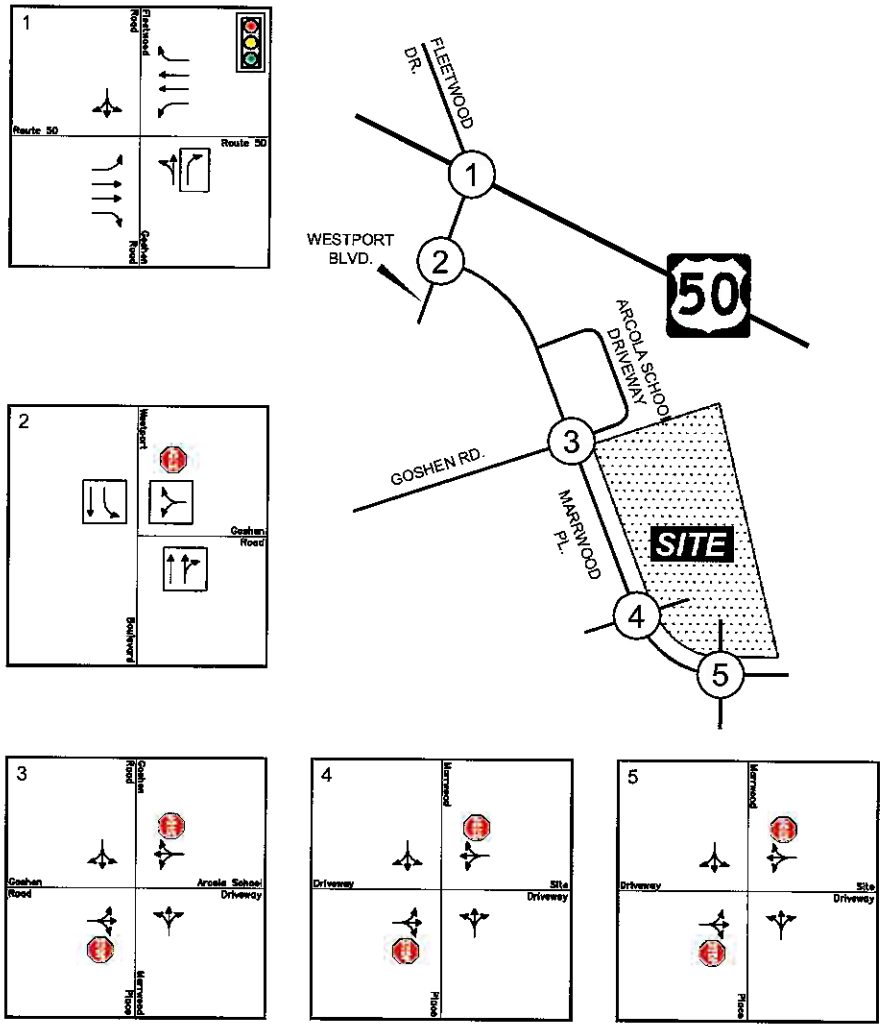


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Figure 9-4
Future Lane Use and Traffic Control (Weekday)

Represents One Travel Lane
Signalized Intersection
Stop Sign
Improvements

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ATTACHMENT 23

Wells + Associates, Inc.

Table V
Goshen Road/Route 50
CDA Loudoun Property
2012 Warrants 1A, 1B, 1C

Proposed Development - 2012	Route 50			Goshen Road			
	Projected ADT	Min. Required EADT	Satisfied	Projected ADT	Min. Required EADT	Satisfied	Warrant Satisfied
Goshen Road/Route 50							
Warrant 1A - Minimum Vehicular Volume	21,270	9,600	Yes	1,810	3,200	No	No
Warrant 1B - Interruption of Continuos Traffic	21,270	14,400	Yes	1,810	1,600	Yes	Yes
Warrant 1C - Combination 80%	21,270	7,680	Yes	1,810	2,560	No	No
	21,270	11,520	Yes	1,810	1,280	Yes	

Source: Institute of Traffic Engineers, Manual of Traffic Signal Design, 2nd Edition.