



DuPage County  
ROBERT J. SCHILLERSTROM  
COUNTY BOARD CHAIRMAN

**DIVISION OF TRANSPORTATION**

(630) 407-6900

FACSIMILE (630) 407-6901

**M E M O R A N D U M**

TO: Paul Hoss, Zoning Coordinator  
Department of Economic Development & Planning

FROM: David A. Ziesemer, P.E., Traffic Engineer

DATE: January 30, 2009

RE: Review of CEMCON and METRO Traffic Impact Analyses  
Resurrection Church - Winfield Township

**REVIEW COMMENTS**

The church development has two means of access to the site. The most direct and less disruptive access is from IL 38 (Roosevelt Road). The developer has elected to choose access from the local street system using Purnell Road. Local opposition to the project has resulted in Winfield Township requesting assistance in the review of the developer's traffic impact study. The Department of Economic Development and Planning (EDP) has asked the Division of Transportation (DDOT) to provide an impartial review.

Initial design standards are most critical for good design of isolated facilities where there is no availability for over flow parking on the local street network. On site parking must meet expectations, the local street network must be developed to meet design year expectations, and limits must be placed on the maximum square footage of the facility. Elements for the traffic impact study and parking design must include a reasonable passenger vehicle occupancy rate and peak arrival period factor. The developer's initial impact study used an occupancy rate of four passengers per vehicle (PPV). Recent church construction in Milton Township revealed this value to be inaccurate. Research of reasonable values using recognized transportation sources revealed a 1.93 PPV rate used by the Chicago Metropolitan Agency of Planning (CMAP) statistics for civic and religious activities. DDOT performed a study of its own at the Wheaton Bible Church in West Chicago which revealed a 1.8 PPV rate and a peak arrival period of 30 minutes using 75% of the arrival volume. The Wheaton Bible Church has 1,375 parking spaces for a 1,400 seating capacity and individual services fill roughly one half of existing parking. A 1.8 to 2.0 PPV rate using the 30 minute arrival duration appears to satisfy both the traffic design as well as final parking requirements for the Wheaton Bible Church.

This is the second review of this project. The first review advised the developer to adjust the passenger occupancy arrival period and resubmit the traffic impact study. In this second review, the developer submitted a revised scope reducing attendance from 1900 to 1500 seating. Included in the submittal are vehicle capacity and passenger occupant studies. The consultants passenger occupancy studies conducted for two churches having similar attendance identified a 2.5 to 2.8 PPV rate. The consultant, however, has submitted capacity studies including the suggested 1.8 PPV rate. The consultant's recommended improvements include a left turn bay at the Purnell Road entrance and widening improvements on Indian Knoll Road for exiting traffic. No additional improvements are planned at the intersection of Winfield Road and Purnell Road.

DDOT provided an independent Synchrony traffic capacity analysis using the reduced (1500) seating. DDOT analysis indicates the left turn lane addition at the Purnell Road entrance works satisfactorily for a 2.0 PPV rate but may require an additional right turn lane and an additional egress lane to operate satisfactorily using the 1.8 PPV rate. This analysis revealed similar results at the intersection of Winfield Road and Purnell Road requiring a southbound right turn lane with intersection reconfiguration. In order to guarantee adequate operation of the local street system for the 2018 design year without major improvements it will be necessary to reduce the size of the facility below the proposed 1500 seating level.

## RECOMMENDATIONS

- In order to guarantee safe operation without major improvements to the local street system using Purnell Road as the main access, Resurrection Church should be limited to a maximum seating of 1400. Full build out should guarantee parking availability for 800 vehicles internal to the site. A separate left turn bay will be required at the Purnell Road entrance meeting IDOT requirements. Indian Knoll Road will require widening to meet Fire Code and to provide an exit to Roosevelt Road. The consultant should revise and resubmit the traffic impact study. The revised Traffic Impact Study should include turning vehicle counts for major intersections. Maintaining a higher seating capacity will require additional improvements to the Purnell Road entrance and the Winfield Road/Purnell Road intersection as mentioned previously.
- The developer's cost to use Roosevelt Road as the main access to the Church appears to be no more than that to use Purnell Road when all improvement factors are considered. In fact access from Roosevelt Road would allow the Church to maintain their seating above 1500, would reduce adverse traffic distances, and would reduce the wear and tear to the local street network. This alternative would seem to be the advantageous alternative to all concerned parties. If this alternative is selected, the number of parking spaces provided would need to be increased in proportion to the increase in seating capacity of the sanctuary. It is DDOT's recommendation the developer also pursue this alternative with the IDOT permit staff and report back before the final Traffic Impact Statement is submitted. DDOT would be willing to support the developer in this approach.

**SUPPLEMENTAL TRAFFIC IMPACT STUDY  
FOR  
CHURCH OF THE RESURRECTION  
PURNELL ROAD PROPERTY**

**WINFIELD TOWNSHIP, DUPAGE COUNTY, ILLINOIS**



**AUGUST 1, 2008  
REVISED FEBRUARY 26, 2009**

**903.772**

**PROFESSIONAL ENGINEER'S CERTIFICATION**

STATE OF ILLINOIS }  
                          SS.  
COUNTY OF DUPAGE }

I, BRUCE P. TALBOT, A LICENSED PROFESSIONAL ENGINEER OF ILLINOIS, HEREBY CERTIFY THAT THIS  
TECHNICAL SUBMISSION WAS PREPARED ON BEHALF OF THE CHURCH OF THE RESURRECTION  
CEMCON, LTD. UNDER MY PERSONAL DIRECTION.

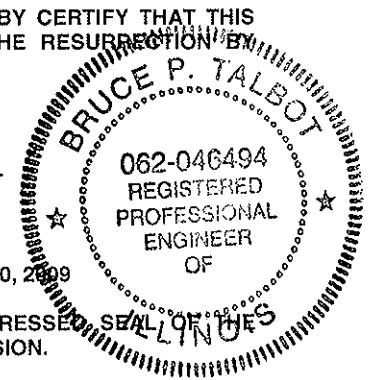
DATED THIS 26<sup>th</sup> DAY OF Feb, AD, 2009

  
ILLINOIS LICENSED PROFESSIONAL ENGINEER NO. 062-046494

MY LICENSE EXPIRES ON NOVEMBER 30, 2009

PROFESSIONAL DESIGN FIRM LICENSE NO. 184-002937, EXPIRATION DATE IS APRIL 30, 2009

NOTE: UNLESS THIS DOCUMENT BEARS THE ORIGINAL SIGNATURE AND IMPRESSED SEAL OF THE  
DESIGN PROFESSIONAL ENGINEER, IT IS NOT A VALID TECHNICAL SUBMISSION.



**PREPARED FOR:**

CHURCH OF THE RESURRECTION  
1825 COLLEGE AVENUE  
WHEATON, IL 60187

630-653-3888

**PREPARED BY:**

CEMCON, LTD.  
2280 WHITE OAK CIRCLE  
SUITE 100  
AURORA, IL 60502-9675

630-862-2100

**SUPPLEMENTAL TRAFFIC IMPACT STUDY  
FOR  
CHURCH OF THE RESURRECTION  
PURNELL ROAD PROPERTY  
WINFIELD TOWNSHIP, DUPAGE COUNTY, ILLINOIS**

**TABLE OF CONTENTS**

<u>SECTION</u>	<u>PAGE NO.</u>
EXECUTIVE SUMMARY OF REVISION 1	1
I. BACKGROUND / OVERVIEW	5
II. PROPOSED SITE ACCESS AND PARKING	5
III. EXISTING AND DESIGN YEAR BACKGROUND TRAFFIC	5
IV. VEHICULAR TRIP GENERATION	6
V. DIRECTION DISTRIBUTION FOR SITE GENERATED TRAFFIC	7
VI. SITE TRAFFIC – TURNING MOVEMENTS	8
VII. CAPACITY ANALYSIS	8
VIII. SUMMARY AND CONCLUSIONS	12

**SUPPLEMENTAL TRAFFIC IMPACT STUDY  
FOR  
CHURCH OF THE RESURRECTION  
PURNELL ROAD PROPERTY  
WINFIELD TOWNSHIP, DUPAGE COUNTY, ILLINOIS**

**EXECUTIVE SUMMARY**

Following is a summary of technical documentation submittals and Traffic Impact Study (TIS) related coordination accomplished between August 2008 and this February 2009 final TIS report.

**August 1, 2008 Supplemental Traffic Impact Study**

On August 1, 2008 CEMCON, Ltd. submitted the "Supplemental Traffic Impact Study for Church of the Resurrection" report to DuPage County for review and approval. The referenced report provided traffic impact analysis results for two (2) different conditions. The "typical" average week condition was evaluated based on standard engineering practice methodology using the ITE Trip Generation Manual. A second, "worst case scenario" traffic analysis was performed based on the "one day a year" peak facility use whereby all of the proposed 584 parking spaces would be utilized. As documented in the above referenced report, analysis results for both conditions indicated that there would be no significant adverse traffic impacts due to the proposed project.

**November 5, 2008 DuPage Division of Transportation Memorandum**

On November 5, 2008, the DuPage County Division of Transportation (DuDOT) issued a brief memorandum requesting that "Traffic Volumes for similar size churches in the area should be obtained to determine the anticipated trip generation during the Sunday peak hour". The DuDOT memorandum did not provide any other comments on the August 1, 2008 TIS report referenced above.

**December 16, 2008 DuDOT Coordination Meeting**

Representatives from the Church of the Resurrection and CEMCON, Ltd. attended a coordination meeting at DuDOT on December 16, 2008 to further discuss the Traffic Impact Analysis results.

DuDOT provided additional written "Review Comments" during this meeting to summarize an independent study and analysis of Wheaton Bible Church performed exclusively by a DuDOT staff member. In general, the review comments and attached data indicated that the DuDOT staff member observed vehicle arrivals for back to back Sunday services at Wheaton Bible Church, located on North Avenue. Observation results reported by DuDOT for a period between 9:15 a.m. and 11:30 a.m. showed 1,231 vehicle arrivals and 2,450 vehicle occupants, which equates to an average vehicle occupancy rate of approximately 2.0 for that particular day at Wheaton Bible Church. However, the DuDOT review comments suggested using only the data for the second service traffic count at 1.8 persons per vehicle (i.e. data from first service count disregarded), and applying a parameter that 75% of all arrivals occur within a half hour time period.

The comments also indicated that DuDOT prepared and ran an independent Synchro model using the above data/parameters with a church seating capacity of 1,900, and that the Synchro model results indicated potential adverse impacts at the Winfield/Purnell Road Intersection. DuDOT requested that CEMCON, Ltd. update the Traffic Impact Study to reflect the above parameters from Wheaton Bible Church, and provide a Synchro analysis with the resubmittal.

During the December 16, 2008 meeting, the petitioner stated that Wheaton Bible Church is not a valid comparison as it is not a "similar size church", nor are the myriad of programmed activities during Sunday services similar to the Church of the Resurrection's operations. For example, Wheaton Bible Church was designed for total occupancy exceeding 5,200 persons, and holds Hispanic services and a variety of other activities and ministry events concurrent with normal Sunday services. CEMCON, Ltd. expressed concern and disagreement with the DuDOT directive to use a vehicle occupancy of 1.8 given that it was a significant deviation from typical values previously utilized in similar studies, and was based on one single data set or event. Further, CEMCON expressed concern as to whether one (1) person located inside Wheaton Bible Church (as it was explained to CEMCON) could accurately record vehicle occupancy, as drop-offs and patrons using multiple building entrances (separate from the main entrance) could not be easily observed given the extensive size and use of the building. Given the expressed concerns, DuDOT directed the Church representatives to perform their own traffic counts if they were not comfortable with the results of DuDOT's study of Wheaton Bible Church.

#### January 19, 2009 Memorandum from CEMCON, Ltd.

Based on the above-referenced DuDOT directive to perform an independent traffic study for Church of the Resurrection, the Church engaged in additional comprehensive traffic and vehicle occupancy counts in January 2009 to supplement previous traffic count data collected for "Church of the

Resurrection". In total, vehicle occupancy counts for the Church of the Resurrection were conducted on three (3) separate occasions, and indicated an average existing vehicle occupancy of 2.61. As directed by DuDOT, CEMCON, Ltd. developed an independent Synchro model to incorporate the data from the Church of the Resurrection, the 75% vehicle arrival in 30 minutes criterion specified by DuDOT, and traffic generated by a facility with a seating capacity of 1,500. CEMCON, Ltd.'s Synchro model results verified that the proposed roadway network has adequate capacity to accommodate the projected traffic for the project. This technical documentation was provided to DuDOT in January 2009 for review and approval.

#### February 5, 2009 DuDOT Meeting

A meeting between Church of the Resurrection representatives and DuPage County representatives was held at DuDOT offices on February 5, 2009. The purpose of the meeting was to discuss data provided by CEMCON, Ltd. in January 2009 (see above), and additional independent Synchro modeling completed by DuDOT and described in a January 30, 2009 DuDOT Memorandum. DuDOT did not provide any review comments relative to the updated analysis (using actual Church of the Resurrection data) submitted by CEMCON, Ltd. in January 2009 (see above), but provided the following specific directives or conclusions at the meeting:

- 1.) DuDOT completed an additional Synchro analysis using their conservative vehicle occupancy of 1.8 previously established, and concluded that they will support the project if the Church seating capacity is limited to 1,400.
- 2.) That no improvements of any kind to Winfield Road would be required if the seating capacity is limited to 1,400 based on DuDOT analysis.
- 3.) That a right-turn lane on Purnell Road (at the site entrance) would not be required, but that DuDOT would request a left-turn lane.
- 4.) That CEMCON, Ltd. should contact IDOT (District 1) to explain the proposed widening of Indian Knoll Road to accommodate emergency vehicles, and document the communication with IDOT in the updated Traffic Impact Study. DuDOT specifically stated that the Church does not need to secure IDOT approval at this time, but simply requested that CEMCON coordinate with IDOT to explain the proposal.

- 5.) That CEMCON, Ltd. should update the Traffic Impact Study to incorporate the independent Synchro modeling by DuDOT into the record, as well as a record of communication with IDOT.
- 6.) The church should consider on-site area(s) which could potentially be utilized for additional parking in the future if necessary. It was generally agreed that the currently planned 584 parking spaces would remain as the design basis for parking, but that the Church would identify other on-site areas which could be converted to parking in the event that it is necessary in the future. The Church clearly stated its objective to maintain the open space to the extent possible.

#### **February 2009 Final TIS Report Revision**

Based on the conclusions and directives provided during the February 5, 2009 meeting as outlined above, CEMCON, Ltd. has updated this Traffic Impact Study to incorporate the following documentation.

- 1.) As requested, the conservative independent Synchro modeling data prepared by DUDOT has been incorporated into the revised report as provided to CEMCON, Ltd. The DuDOT data is provided in Appendix D.
- 2.) Appendix E has been added to the report to provide documentation for the contact with IDOT (Mr. Wisniewski) regarding widening Indian Knoll road for emergency access purposes. Additional information will be forwarded to IDOT as the plans progress. At this time, there is no reason to believe that IDOT would pose any objection to a minor widening of an existing public road to accommodate emergency vehicle access.
- 3.) The Synchro analysis prepared by CEMCON, Ltd. and previously submitted to DuPage County in January 2009 has been incorporated into the revised TIS Report, along with the vehicle occupancy counts for the Church of the Resurrection reflected in the Synchro analysis. This documentation has been incorporated given that it is based on actual vehicle occupancy data collected on several occasions for the Church of the Resurrection, and therefore, more accurately reflects anticipated traffic volumes for the proposed project.

**SUPPLEMENTAL TRAFFIC IMPACT STUDY**  
**FOR**  
**CHURCH OF THE RESURRECTION**  
**PURNELL ROAD PROPERTY**  
**WINFIELD TOWNSHIP, DUPAGE COUNTY, ILLINOIS**

**I. BACKGROUND / OVERVIEW**

This study is a supplement to the original Traffic Impact Study prepared by CEMCON, Ltd. dated February 5, 2008, for the Church of the Resurrection/Purnell Road Property. The purpose of this report is to evaluate in more detail the impact that the proposed Church will have on the existing and future traffic conditions of the adjacent roadway network, in light of new information on the proposed site access and existing traffic volumes.

**II. PROPOSED SITE ACCESS AND PARKING**

A proposed full access to the site will be located on Purnell Road, consisting of one inbound lane and two outbound lanes. In addition, a south-east bound left turn lane will be constructed on Purnell Road. A right turn lane was also originally proposed at the same location. A secondary, gated, one-way access will be constructed at the south end of Indian Knoll Road. This access will only be opened during peak times at the conclusion of services on Sundays, and will only be open to exiting vehicles. The proposed site plan includes parking for a minimum of 584 vehicles.

**III. EXISTING AND DESIGN YEAR BACKGROUND TRAFFIC**

The existing annual average daily traffic (AADT) and the Sunday average daily traffic (ADT) on the surrounding road network is shown on Figure 1. These volumes were developed on the basis of traffic counts taken on Sunday, June 29, 2008; Monday, June 30, 2008; and Tuesday, July 1, 2008. The existing roadway network experiences peak volumes during weekday mornings and late afternoon/early evening, consistent with typical "rush hour" traffic patterns. Conversely, the Church's weekly peak volume of traffic will be generated on Sunday mornings from approximately 10:00 a.m. to 11:00 a.m. During this time period, the existing traffic is less than one-third of the weekday peak hour traffic. Since the Church will not significantly impact the traffic operations during the weekday peak hours, the "Design Hour" that will be considered in this analysis will be the Sunday peak hour of trip generation.

The subsequent analysis is based on two assumptions: first, that the entire proposed project is constructed and in use by the design year, 2018; and second, that the traffic volumes on the existing roadway network will grow at a rate of 1% per year from 2008 to 2018. The projected background volumes are shown in Figure 2. (Note: revised calculations using a growth rate of 2.5% per year instead of 1% are included in the appendix.)

#### **IV. VEHICULAR TRIP GENERATION**

The projected peak hour and daily trip generation for the Church development was estimated as shown in Table 1, below. In order to understand the true impact of the site traffic, this report will consider two future conditions - one to represent the volumes generated on any typical Sunday morning throughout the year, and the other to represent the higher volumes generated on special Holidays when services are more fully attended. A brief description of the two conditions follows:

1. **Typical Sunday:** The trips expected to be generated during the peak hour of a typical Sunday were calculated using standard rates from the ITE Trip Generation Manual (7<sup>th</sup> Edition), using a design seating capacity of 1500 as originally specified by the Church. Although current attendance is lower than 1500 persons, this condition assumes that with future growth, the design capacity will be realized. These trips are shown on the first line of Table 1. (Note: Although the proposed seating capacity has been reduced from 1500 to 1400, the original calculations included herein are left unchanged for the record.)
2. **Special Holiday Service:** In order to analyze the condition representing the maximum anticipated site traffic, a second set of calculations was performed. This condition recognizes the fact that attendance for one or two religious holidays each year is significantly higher than for the typical Sunday. The parking capacity of 584 spaces was designed to fully accommodate this extra demand. The maximum one-hour traffic volume that can reasonably be projected, therefore, would be 584 vehicles exiting and 584 vehicles entering. This would only occur if the parking lot is filled to capacity for two consecutive services, with the peak hour encompassing both the end of the first service and the beginning of the second service. It must be emphasized that this situation is expected to occur only once per year. These trips are shown on the second line of Table 1.
3. **DuDOT Estimated Traffic:** At the request of the DuPage County Division of Transportation (DuDOT), a third set of traffic volumes was developed, using the following criteria:
  - a. Trips are computed by seating capacity divided by vehicle occupancy.
  - b. Seating capacity is reduced from 1500 to 1400.
  - c. Average vehicle occupancy is 1.80 persons per vehicle.

d. 75% of peak hour arriving traffic occurs within the peak 30 minutes. Analyze using the peak 30-minute flowrate, converted to vehicles per hour.

Under these assumptions, the projected actual peak hour site traffic would be  $1400/1.8 = 778$  vehicles exiting and 778 vehicles entering, and the peak arrival rate used for analysis is  $778 \times 0.75 \times 2 = 1167$  vehicles per hour. These projected trips are also listed in Table 1, and shown diagrammatically in Appendix D.

**TABLE 1- Trip Generation**

Use	ITE Land Use Code			Units	Sunday Peak Hour Trips (Vehicles per Hour)		Sunday total
					In	Out	
<b>Typical Sunday:</b> Church	560	1500	seat		482	445	2295
Source: ITE Trip Generation Manual - 7th Edition							
<b>Holiday Traffic:</b> Church	n/a	584	space		584	584	n/a
Source: As described above and per site plan							
<b>DuDOT Estimated Traffic:</b> Computed by assuming 1400 seats, 100% filled, and an average occupancy of 1.80 persons per vehicle. Source: DuPage County Division of Transportation requirements					778	778	n/a

The vehicle occupancy value of 1.8 persons per vehicle used above has been the subject of much debate. Standard, authoritative sources such as the ITE Trip Generation manual offer no direct data or guidance on the matter. Therefore, several local studies were made, with results of the individual counts varying from approximately 2 to more than 3 persons per vehicle. Data collected at the Church of the Resurrection itself, at its current location, suggest an expected occupancy of approximately 2.8, while existing occupancy values for other studied churches are slightly lower. Absent a clear consensus, DuDOT elected to use a conservative value of 1.8 in order to ensure that traffic is not underestimated. Additional data and correspondence related to the vehicle occupancy counts are included in the Appendix for informational purposes.

## **V. DIRECTIONAL DISTRIBUTION FOR SITE GENERATED TRAFFIC**

Estimated trip distribution was based on a review of existing traffic patterns, land use and highway network orientation as it relates to population and employment centers, as well as a listing of known zip codes of current church members. It should be noted that the trip assignments are based on traffic using the most direct and logical routes to and from their destinations, recognizing that people will tend to avoid routes that include low-speed streets or involve difficult maneuvers such as left turns onto busy

highways. For example, most exiting trips to the north and west are assigned to Purnell-Gary's Mill-Illinois 59, rather than to Indian Knoll, where a left turn onto Illinois 38 would be necessary. Similarly, traffic will avoid the already-difficult left turn from Purnell onto Winfield Road, instead exiting via Indian Knoll and turning right. Finally, there is no reason to expect site traffic to use Cantigny Drive as a short cut, as it offers no benefit compared to simpler alternate routes. Exiting traffic will use Indian Knoll as it is shorter and more direct; for inbound traffic it is faster to stay on Winfield Road (speed limit 45 mph) than to use the circuitous, 25 mph route along Cantigny Drive.

The estimated distribution of site-generated traffic is shown in Figure 3.

## **VI. SITE TRAFFIC – TURNING MOVEMENTS**

The directional distribution shown in Figure 3 was combined with the total trip generation shown in Table 1 to determine the projected peak hour site-generated traffic volumes for each of the two conditions. These are shown in Figures 4 and 5.

By further combining the site traffic shown in Figures 4 and 5 with the projected background traffic for the design year (as described above in Section III), the total projected peak hour volumes for the full build out based on the increased traffic volumes for the year 2018 are obtained. These volumes are shown in Figures 6 and 7.

## **VII. CAPACITY ANALYSES**

Highway Capacity Manual methods and procedures were implemented through HCS+ v5.21 (HCS) to evaluate capacity and level of service for the design hour volumes for the fully developed year 2018. Note that the HCS results represent the highest-volume 15 minute period within the peak hour, and input values were adjusted to simulate high levels of peaking for site traffic.

### **A. Typical Sunday Services**

The proposed full access on Purnell Road was analyzed as a one-way stop-controlled intersection, with Purnell Road as the major road and the stop sign controlling the site exit. The Roosevelt Road/Indian Knoll Road intersection was analyzed in the same fashion, with Roosevelt Road as the major road and a stop sign controlling the Indian Knoll Road approach. The applicable measures of effectiveness are stopped delay per vehicle, Level of Service (LOS), and 95<sup>th</sup> Percentile Queue Length in number of vehicles (95% Queue). Note that for a stop-controlled intersection, LOS is computed only for left turns from the major street, and for all movements from the minor street. All other movements do not have to stop or yield, and therefore operate at Level of Service A. It is worthy of note, therefore, that the

northwest-bound Purnell Road traffic turning right, unconstrained, into the site is considered to be LOS A – thus it will not “back up” into Purnell Road and interfere with through traffic.

The results of the analysis have been summarized in Table 2 below, and the HCS outputs are included in the Appendix.

**TABLE 2: Stop-Controlled Intersection Capacity Analysis for Site Access Points (Typical Sunday Traffic)**

Intersection		Lane Groups				
		EBL	SBL	SBR	NB	WBL
Purnell Rd/Site	LOS	A	B	A	-	-
	Delay in Sec	9.5	14.4	8.9	-	-
	95 % Queue	<1	<1	<1	-	-
Indian Knoll/ Roosevelt Rd	LOS	-	-	-	C	A
	Delay in Sec	-	-	-	16.4	8.3
	95 % Queue	-	-	-	4.0	<1

Other nearby intersections that could be significantly affected by the site generated traffic were also analyzed. (Note that the background traffic volumes are based on automated approach counts, not turning movement counts – so turning volumes were estimated for these analyses.) The results have been summarized in Table 3, and the HCS outputs are included in the Appendix.

**TABLE 3: Stop-Controlled Intersection Capacity Analysis for Nearby Intersections (Typical Sunday Traffic)**

Intersection		Lane Groups						
		EBL	EBR	WBL	WBLR	NBL	NBLR	SBL
Purnell Rd/ Winfield Rd	LOS	E	B	-	-	B	-	-
	Delay in Sec	49.2	15.6	-	-	11.8	-	-
	95 % Queue	<1	1.6	-	-	1.0	-	-
Gary's Mill /Purnell Rd	LOS	-	-	A	-	-	B	-
	Delay in Sec	-	-	7.8	-	-	11.8	-
	95 % Queue	-	-	<1	-	-	1	-
IL59/Gary's Mill Rd	LOS	-	-	-	E	-	-	B
	Delay in Sec	-	-	-	41.8	-	-	10.3
	95 % Queue	-	-	-	3.4	-	-	<1

The results shown in Tables 2 and 3 indicate that the site access points as well as the surrounding road network will operate at high levels of service at most locations during the Sunday peak time period,

even after allowing for background traffic growth and significant growth in church membership. The two locations where LOS E is indicated in Table 3 are both left turns from a minor street onto a major arterial, where the low LOS is due to estimated *existing* turning volumes, not due to site-generated traffic. It is also notable that despite the level of service, the 95<sup>th</sup> percentile queue lengths for those movements are short (less than one to approximately three cars).

#### B. Holiday Services

The same analyses as above were performed using the higher volumes identified for the Holiday condition (see Table 1). The results are summarized in Tables 4 and 5.

**TABLE 4: Stop-Controlled Intersection Capacity Analysis for Site Access Points (Holiday Traffic)**

Intersection		Lane Groups				
		EBL	SBL	SBR	NB	WBL
Purnell Rd/Site	LOS	B	C	A	-	-
	Delay in Sec	10.4	17.6	9.0	-	-
	95 % Queue	<1	1.3	<1	-	-
Indian Knoll/ Roosevelt Rd	LOS	-	-	-	C	A
	Delay in Sec	-	-	-	18.8	8.1
	95 % Queue	-	-	-	5.3	<1

Once again, all the critical movements above are shown to have Level of Service C or better, as well as very manageable queue lengths. Comparing the results listed above to Table 2, the increase in delay per vehicle due to the holiday (for those movements required to yield or subject to stop control) is no more than 3.2 seconds, and is less than one second for three of the five movements.

**TABLE 5: Stop-Controlled Intersection Capacity Analysis  
for Nearby Intersections (Holiday Traffic)**

Intersection		Lane Groups						
		EBL	EBR	WBL	WBLR	NBL	NBLR	SBL
Purnell Rd/ Winfield Rd	LOS	F	C	-	-	B	-	-
	Delay in Sec	63.4	17.8	-	-	12.9	-	-
	95 % Queue	<1	2.2	-	-	1.3	-	-
Gary's Mill /Purnell Rd	LOS	-	-	A	-	-	B	-
	Delay in Sec	-	-	7.9	-	-	12.8	-
	95 % Queue	-	-	<1	-	-	1.4	-
IL59/Gary's Mill Rd	LOS	-	-	-	E	-	-	B
	Delay in Sec	-	-	-	43	-	-	10.4
	95 % Queue	-	-	-	4.2	-	-	<1

The additional impact of holiday traffic at these intersections is also marginal – amounting to 2.2 seconds per vehicle or less for 6 of the 7 movements. The other movement, left turns from Purnell Road onto Winfield Road, has a poor Level of Service but, as previously noted, this is more attributable to estimated existing traffic than to site traffic. Therefore, the overall impact of site traffic, even during the highest-traffic day of the year, is well within acceptable limits.

### C. DuDOT Estimated Traffic

At the request of the DuPage County Division of Transportation (DuDOT), the capacity analysis for this level of traffic was conducted using Synchro and SimTraffic, rather than Highway Capacity Software. DuDOT supplied a Synchro model which represents the most critical portion of the peak hour, when most vehicles are arriving for the later of the two services. The peak flowrates were converted to hourly volumes for input, and run with a peak hour factor of 1.00 since the peaking was accounted for directly in the input volumes. After running a visual simulation of the model using SimTraffic, DuDOT concluded that the traffic operations would be acceptable for the 1400-seat church. The model includes a left turn lane, but no right turn lane, on Purnell Road at the site entrance, and includes no additional improvements at the Purnell Road/Winfield Road intersection.

The levels of service and critical queue lengths indicated by the Synchro/SimTraffic outputs are shown in Table 6. The most critical measure in this analysis is the queue length for the northbound left turn on Winfield Road at Purnell Road. DuDOT is concerned that if this queue is in excess of the available storage, it could block northbound through traffic to the extent that stopped or slowed vehicles could back up into the Mack Road intersection.

**TABLE 6: Capacity Analysis and Simulation Results**  
**(DuDOT Traffic)**

Intersection		Lane Groups						
		EBL	EBR	NBL	NBT	SBL	SBR	SBTR
Purnell Rd/ Winfield Rd (Synchro)	LOS	D		C	*	N/A	N/A	*
	Delay in Sec		33.0	17.8	*	N/A	N/A	*
	95 % Queue (ft.)		62	70	*	N/A	N/A	*
Purnell Rd/ Winfield Rd (SimTraffic)	Avg. Queue (ft.)	23	56	114	82	N/A	N/A	23
	Max Queue (ft.)	32	81	145	235	N/A	N/A	50
		EBL	EBT	NBL	NBT	SBL	SBR	WBTR
Site Entrance /Purnell Rd. (Synchro)	LOS	B	*	N/A	N/A	F	B	*
	Delay in Sec	12.9	*	N/A	N/A	59.0	12.4	*
	95 % Queue	41	*	N/A	N/A	78	12	*
Site Entrance /Purnell Rd. (SimTraffic)	Avg. Queue (ft.)	83	*	N/A	N/A	91	36	43
	Max Queue (ft.)	117	*	N/A	N/A	175	51	90

\* Synchro does not compute LOS for free-flowing through movements.

Note that the queue lengths reported by SimTraffic include not only vehicles that are fully stopped, but also vehicles that slow to less than a speed threshold (10 feet per second), even momentarily. Thus the queue lengths often are greater than those computed by Synchro.

The results in Table 6 show that even using a very high trip generation and a detailed microsimulation methodology, the levels of service and queuing during the peak traffic period will be acceptable. The predicted queue length for the northbound left turn on Winfield Road ranges from 70 feet to a maximum of 145 feet, which can be accommodated by the existing roadway without affecting the Mack Road intersection. (The existing turn lane provides approximately 125 feet at full width, plus 40 additional feet of usable storage within the taper area.) This conclusion is supported subjectively by the visual simulation in SimTraffic. A copy of the Synchro model is included on a CD in the Appendix to facilitate review of the simulation.

### **VIII. SUMMARY AND CONCLUSIONS**

1. The peak hour of traffic generation for the proposed development will occur at approximately 10:00 a.m. to 11:00 a.m. on Sundays. The schedule of projected uses for the Church is typical of most churches, and indicates very little traffic during the weekday commuting periods, which are the highest traffic hours of the week on the surrounding roads. Therefore, the appropriate

time period during which to assess the traffic impact of the proposed development is during the Sunday peak hour of generation, when site traffic will have its greatest relative effect.

2. Traffic counts taken in June/July 2008 in the vicinity of the site confirm that existing traffic volumes during the Sunday design hour are less than one third of the existing weekday peak hour volumes. In addition, the new counts are generally in close agreement with ADT's from past years published online by IDOT and DuPage County, suggesting relatively stable traffic patterns in the area.
3. Site traffic will not use Cantigny Drive as a short cut, as there is no benefit to doing so. Traffic will remain on main arterial and collector streets.
4. Capacity analyses were performed for the full development condition, accounting for both general traffic growth and maximum anticipated growth in Church membership, for the year 2018 ("Typical Traffic"). The results of these analyses indicate that the proposed access points as well as nearby existing intersections will be only marginally affected by the added traffic, and will in almost all cases, still operate at Level of Service "C" or better. Level of Service C is generally considered the desirable design value for new construction.
5. Consideration of the maximum site traffic volumes that can reasonably be projected to occur, though only approximately once per year ("Holiday Traffic"), does not significantly change the results of the capacity analyses. Average delay per vehicle will increase but only by up to one or two seconds in most cases. Level of Service C is still indicated for all locations, except for two specific left turn movements where little or no site-generated traffic is assigned.
6. Use of the County's alternative procedure to compute trip generation on the basis of occupancy, using a very conservative value of 1.8 (despite having existing data available from the Church that indicates occupancy of 2.8 would be reasonable), as well as evaluating the result using microsimulation methods instead of standard capacity analysis also indicates that the proposed traffic would operate in an acceptable manner during the simulated peak traffic period.

In summary, the proposed development will generate moderate amounts of traffic, peaking at a time on Sunday when existing volumes on surrounding roads are low and the capacity exists to accommodate the additional traffic. With the site access and parking improvements as described in Section II, the existing roadway network will operate at high levels of service without causing significant adverse impacts.

# **FIGURES**

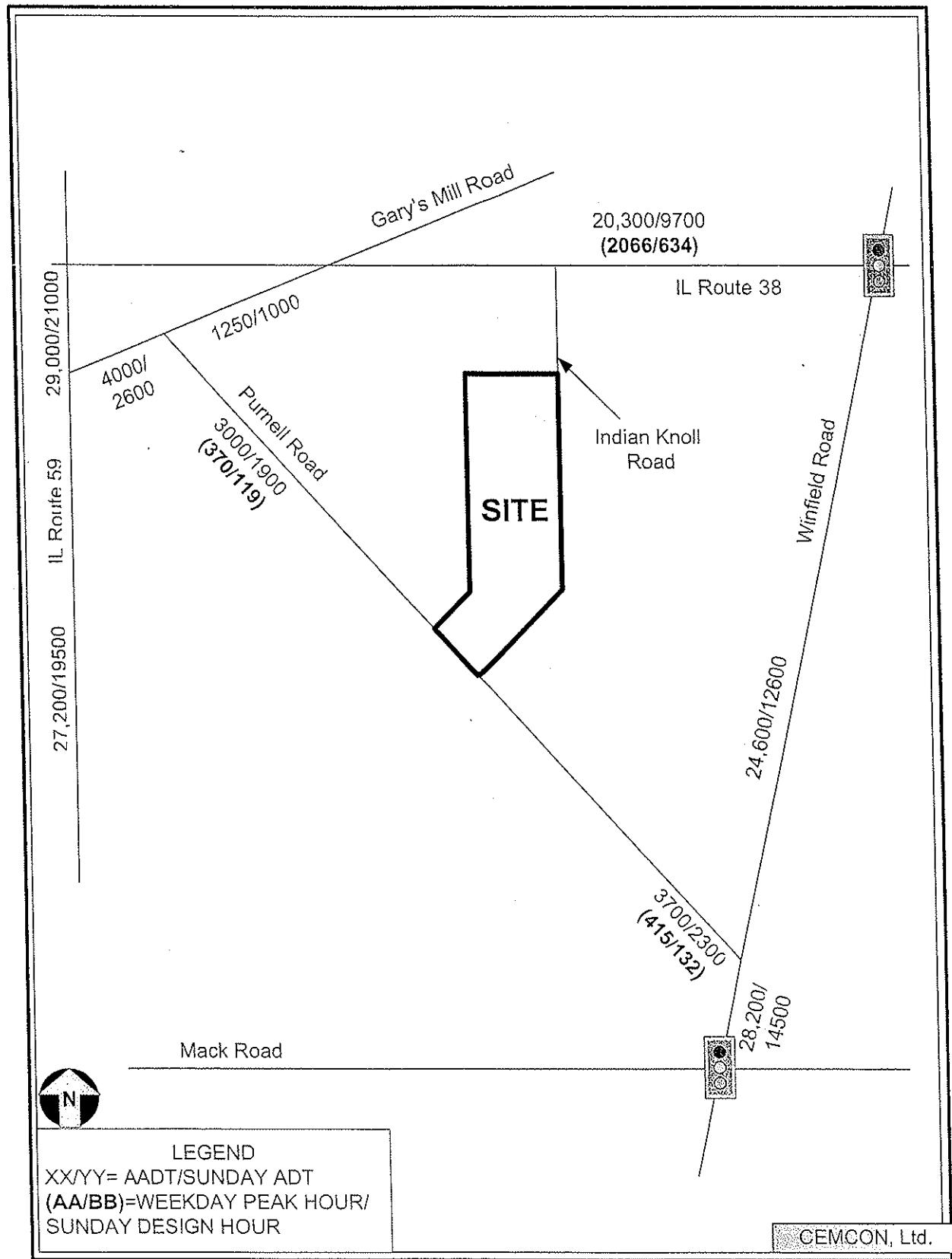


FIGURE 1. Existing Traffic Volumes (2008)

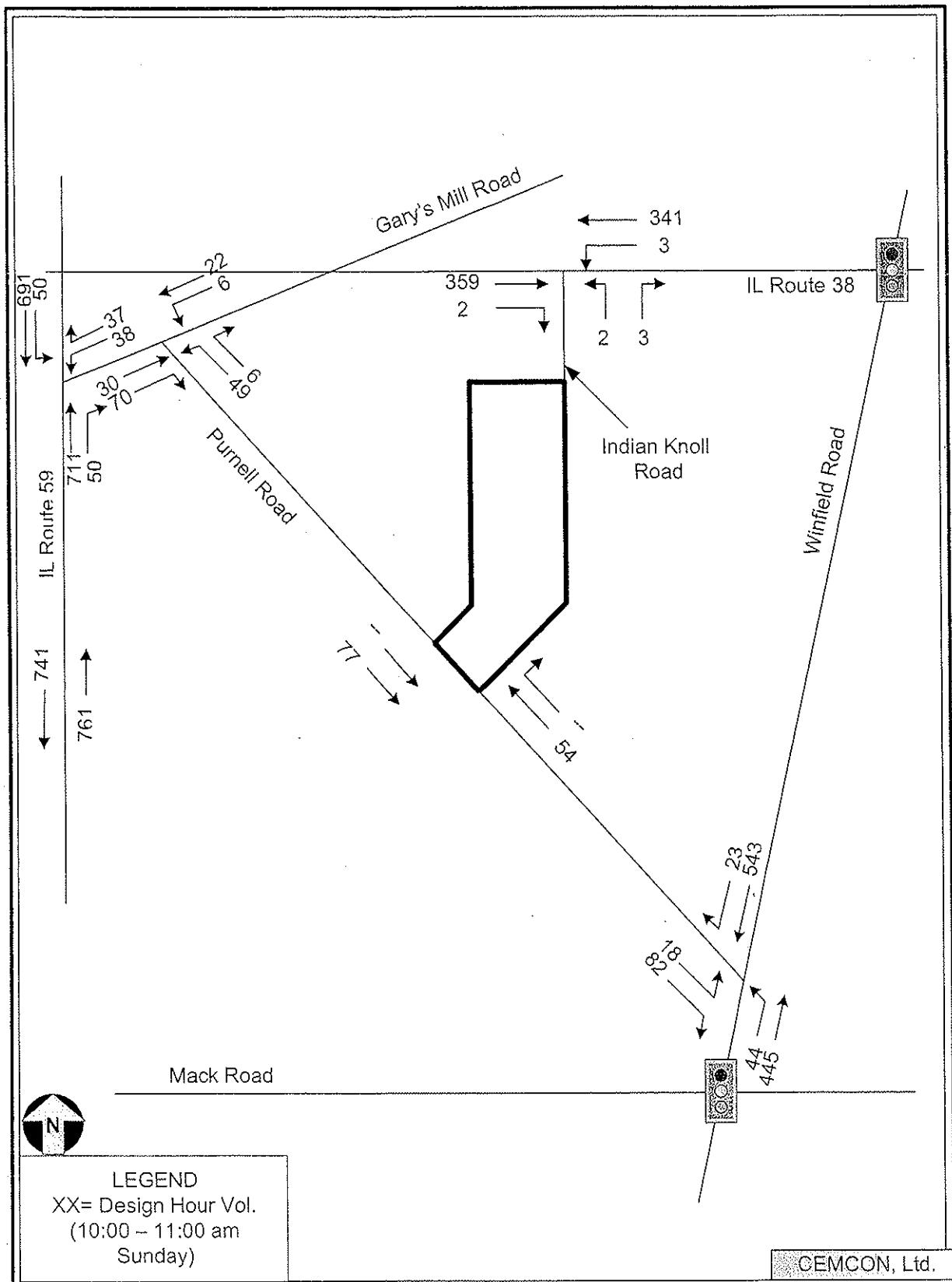


FIGURE 2. Estimated 2018 Design Hour Traffic Volumes

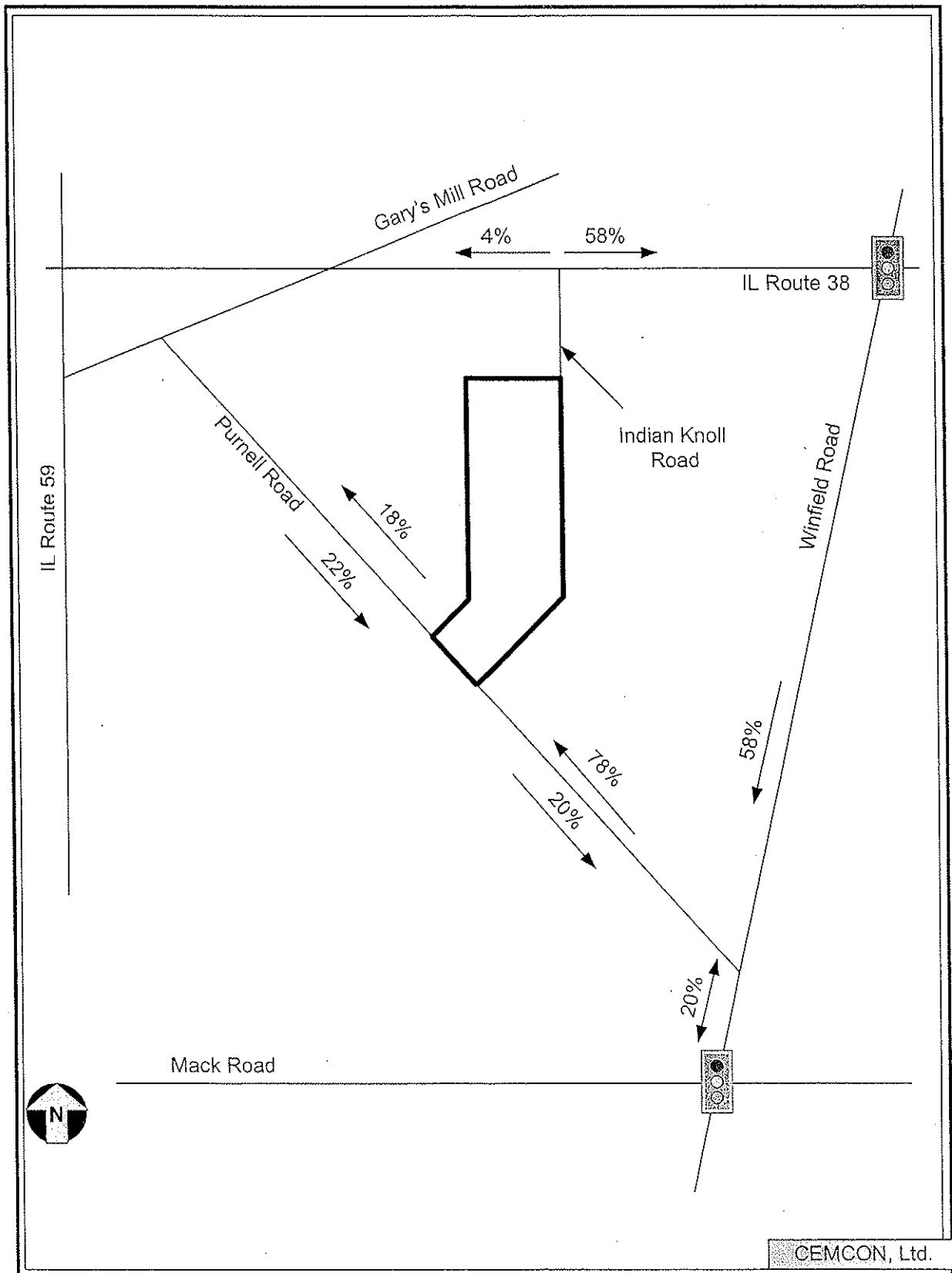


FIGURE 3. Directional Distribution of Site Traffic

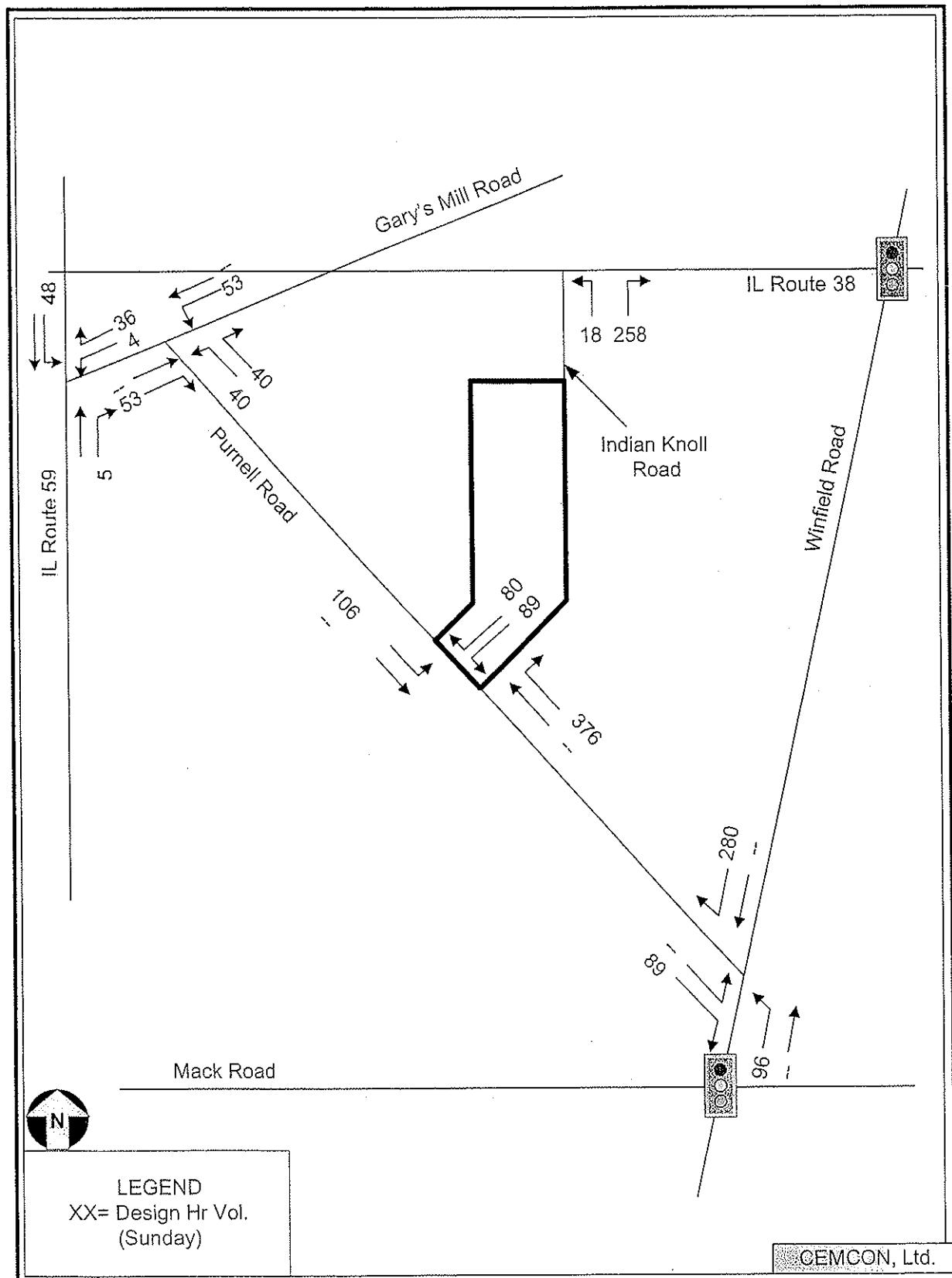


FIGURE 4. Site Traffic Volumes for Typical Sunday

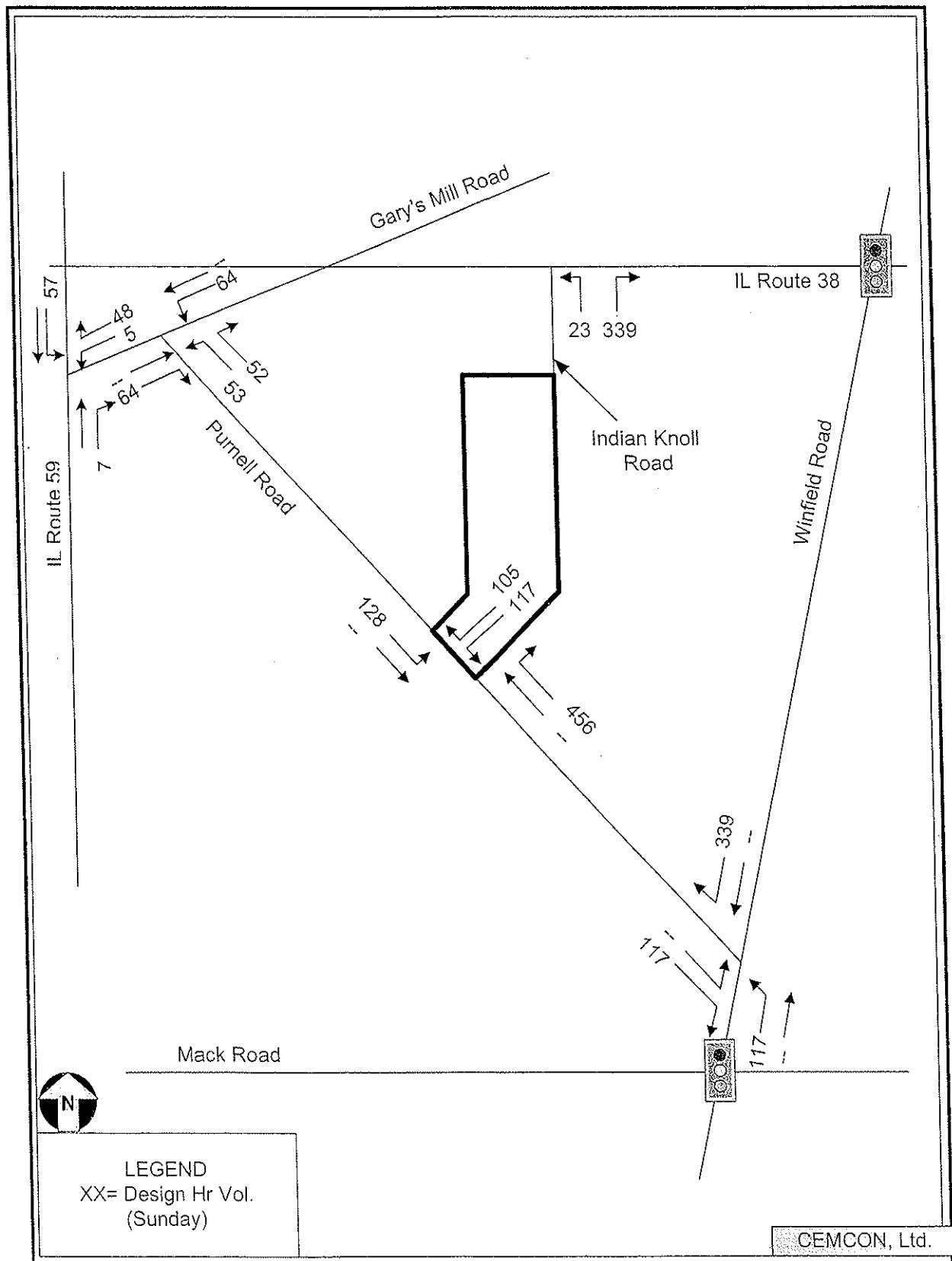


FIGURE 5. Site Traffic Volumes for Holiday Service

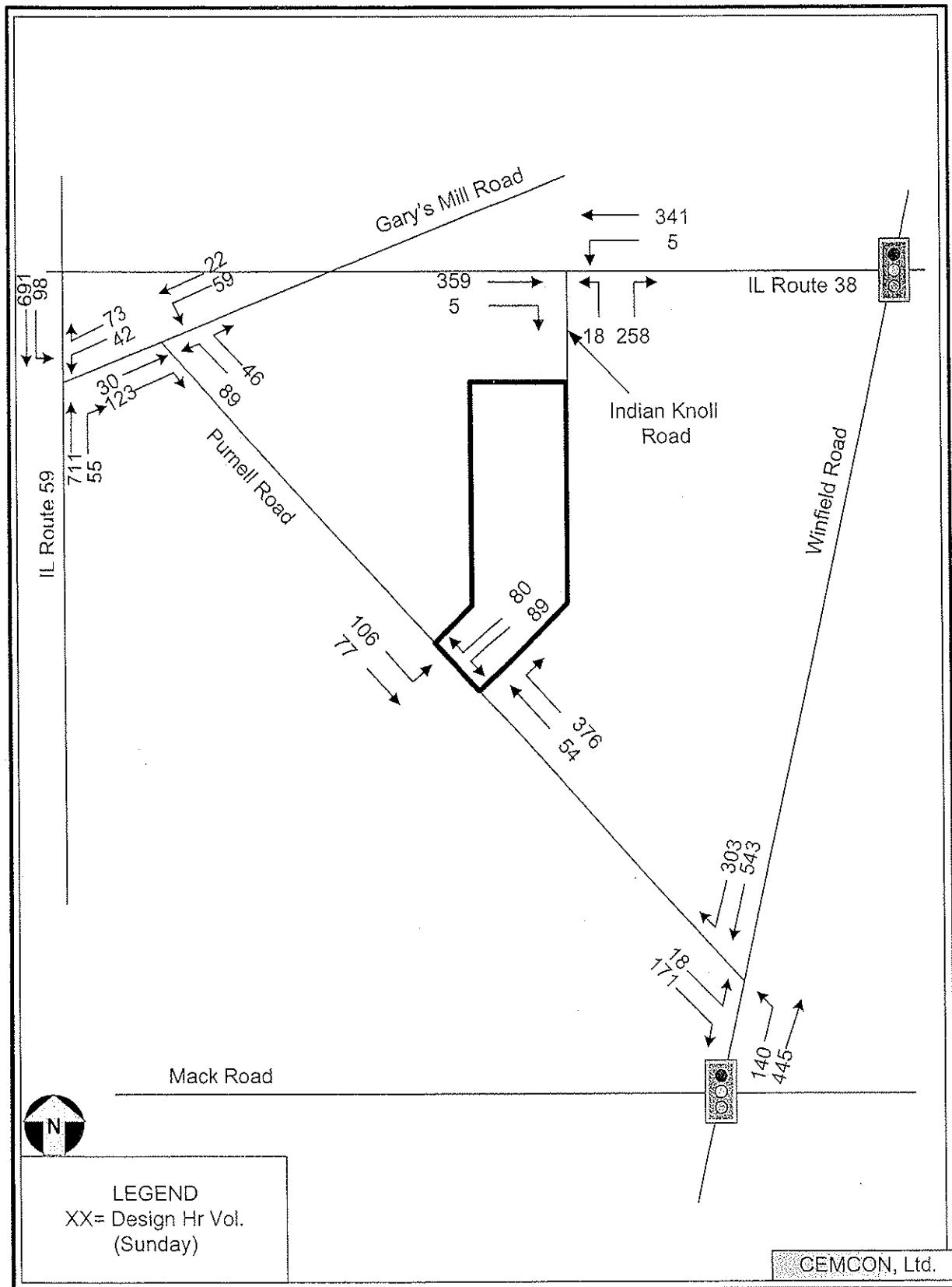


FIGURE 6. Total Projected Traffic for Typical Sunday

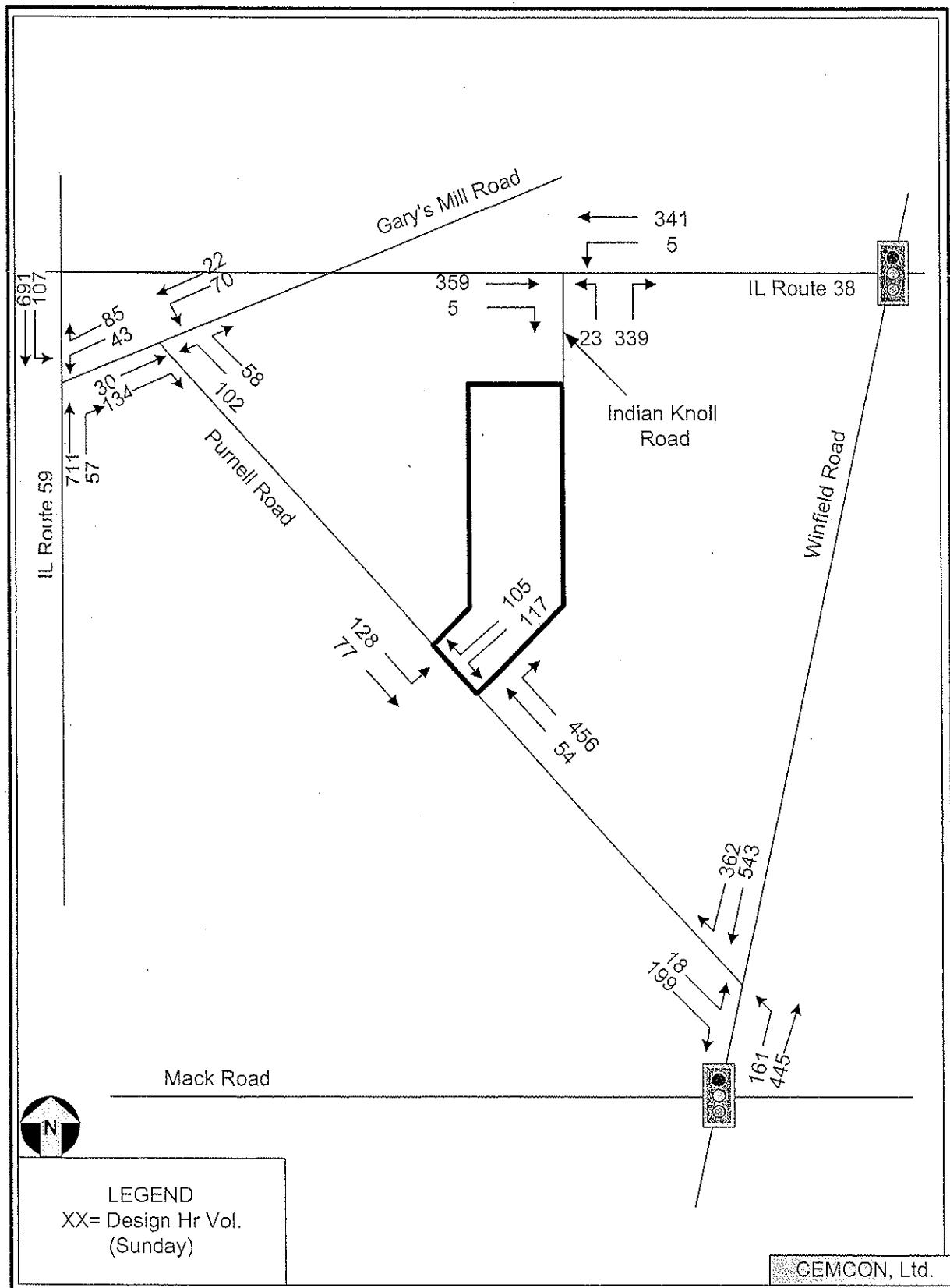


FIGURE 7. Total Projected Traffic for Holiday Service

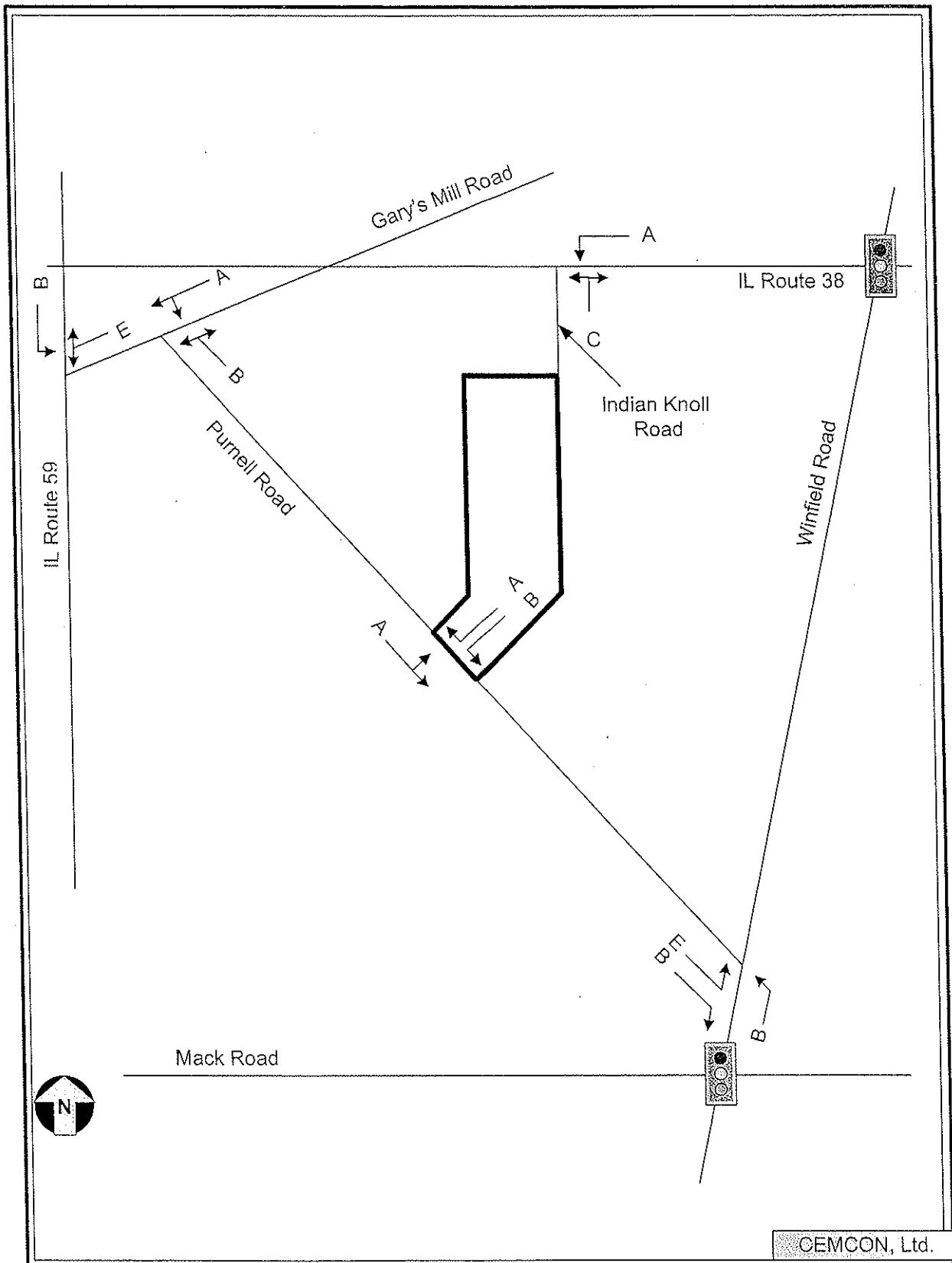


FIGURE 8. Level of Service - Typical Sunday

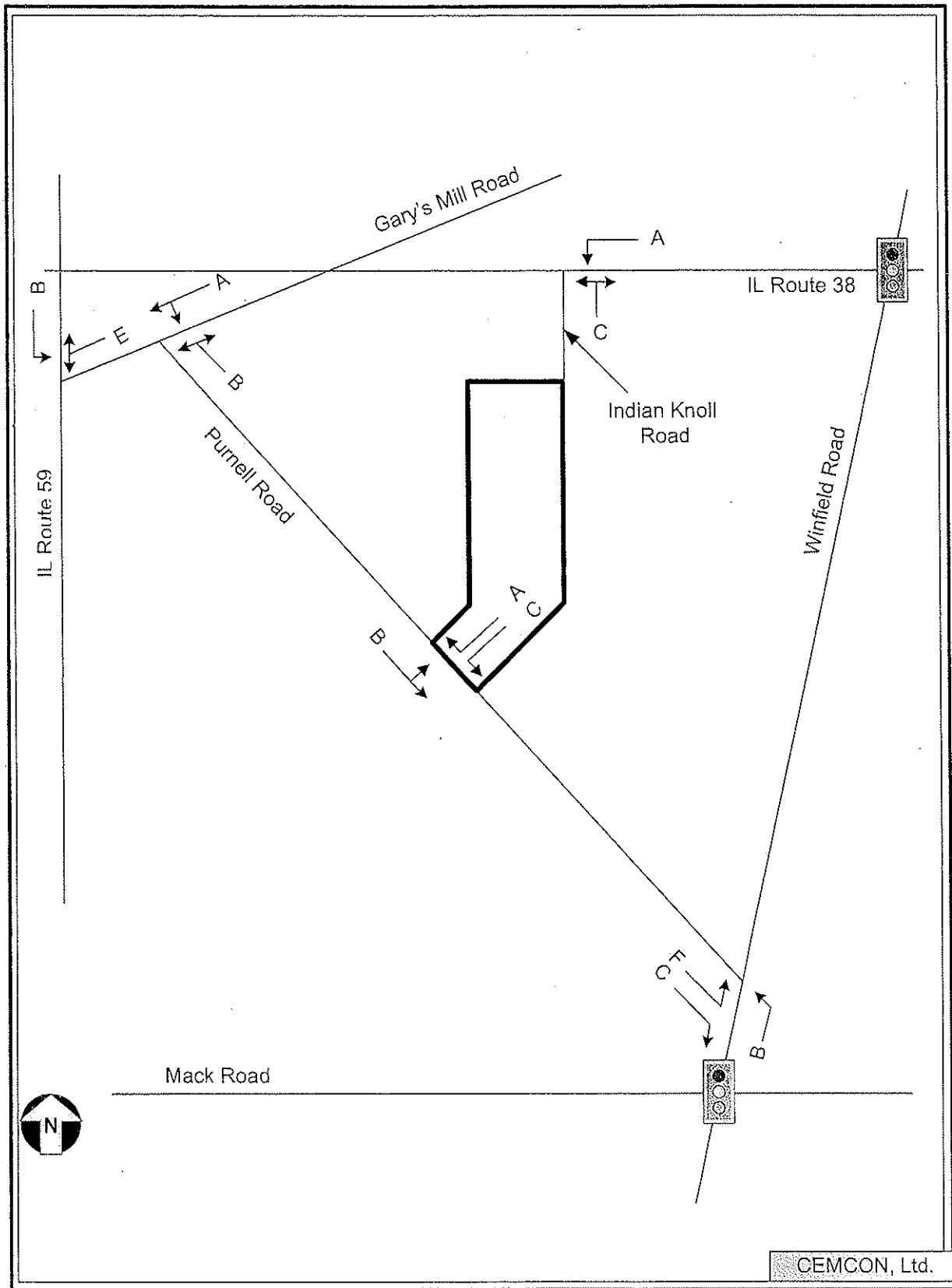


FIGURE 9. Level of Service - Holiday Service

# APPENDIX

## CONTENTS:

- A. Highway Capacity Software (HCS) Printouts For Original Analysis
- B. Vehicle Occupancy Counts And Summaries
- C. Correspondence and Revised Cemcon Synchro Modeling
- D. DuDOT Synchro Modeling
- E. IDOT Coordination
- F. CD with Synchro Input Files