

MEMORANDUM TO: Gary Cordes
Klein, Stoddard, Buck Waller & Lewis, LLC

FROM: Javier Millan
Michael Werthmann, PE, PTOE

DATE: October 26, 2011

SUBJECT: Traffic Impact Study
DeKalb Public Library Expansion
DeKalb, Illinois

This memorandum summarizes the results of a traffic study conducted by Kenig, Lindgren, O'Hara, Aboona, Inc. (KLOA, Inc.) for the proposed expansion of the DeKalb Public Library in DeKalb, Illinois. The existing 19,000 square-foot library is located in the northeast quadrant of the intersection of Oak Street with 3rd Street. The proposed plans call for expanding the building to the west within the existing Ronan-Moore-Finch Funeral Homes parking lot and adjacent properties located in the northwest quadrant of the Oak Street/3rd Street intersection. As part of the expansion, 3rd Street is proposed to be vacated along the library property in order to provide one continuous site that will contain a maximum expansion of 70,000 square feet and approximately 50 off-street parking spaces. In addition, a new 60-space parking lot is proposed to be provided along the south side of Oak Street between 2nd Street and 3rd Street. Approximately 30 parking spaces will be reserved for the library and 30 parking spaces will be reserved for the funeral home. As is the case now, the library patrons will be permitted to park within the funeral home parking spaces as long as the funeral home is not in use.

The purpose of this study is to assess the impact the proposed expansion and 3rd Street vacation will have on traffic conditions in the area and to determine if any roadway or access improvements are necessary to accommodate traffic generated by the expansion and the redistribution of the existing traffic.

Existing Conditions

In order to project future transportation conditions at the site, four general components of existing conditions were considered: (1) the geographic location of the site and the land uses in the area, (2) the characteristics of the roadways in the site area, (3) the vehicle and pedestrian volumes on the adjacent roads, and (4) the on-street parking demand.

Site Location

As indicated previously, the DeKalb Public Library is located in the northeast quadrant of the intersection of Oak Street with 3rd Street. The Ronan-Moore-Finch Funeral Home parking lot is located on the west side of 3rd Street. Although the library does not have a dedicated off-street parking lot, library patrons are permitted to park in the funeral home parking lot when the funeral home is not in use. In addition, the adjacent area provides on-street parking that ranges from two hour, twelve hour and unrestricted. Land uses in the area mainly consist of single family homes to the west, the First Lutheran Church to the north, the First United Methodist Church to the east and the Ronan-Moore-Finch Funeral Home to the south. **Figures 1 and 2** show the site location and an aerial view of the site with respect to the area roadways, respectively.

Site Accessibility

The accessibility of any development is governed by the characteristics of the streets available to accommodate site-generated traffic movements and the traffic control devices regulating traffic operations on those streets. **Figure 3** and the following describes the existing roadways and traffic control.

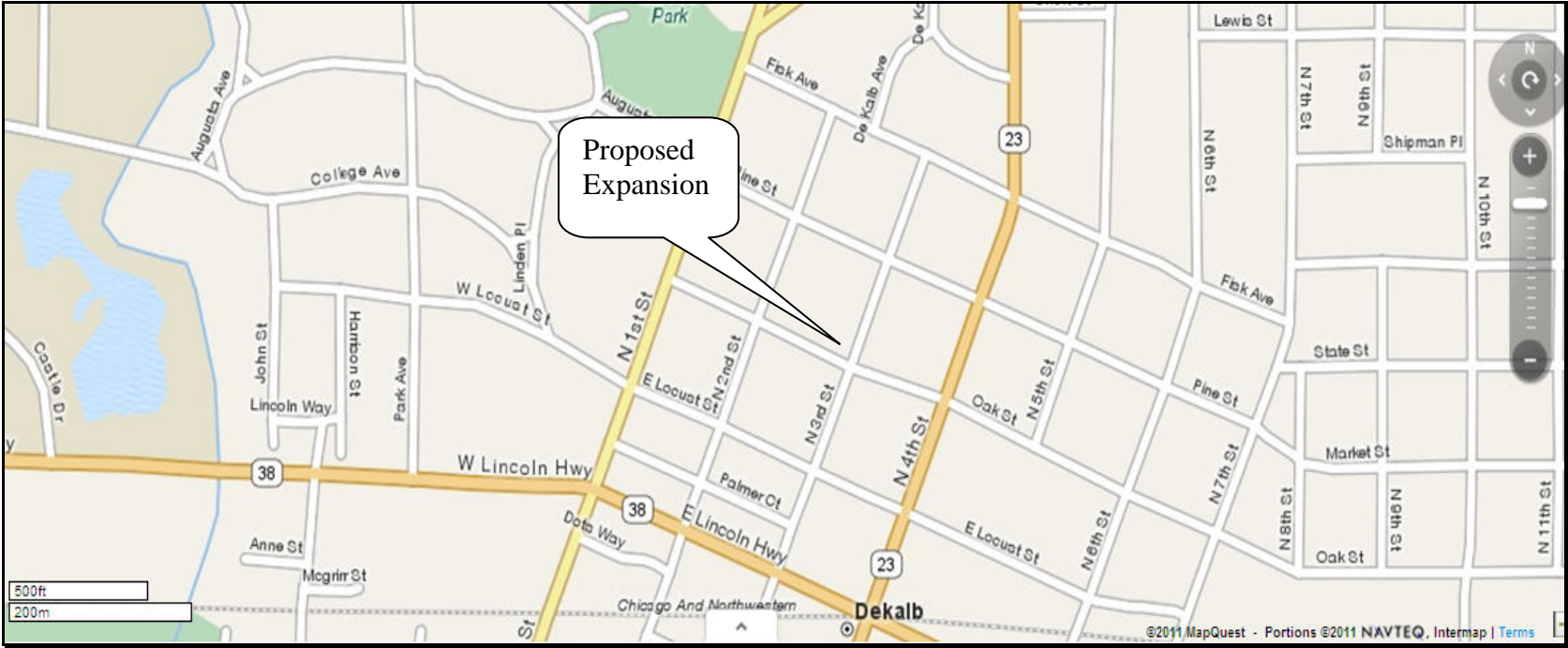
Oak Street is a one-way westbound roadway west of 4th Street and a two-way roadway east of 4th Street. On-street parking is permitted on both sides of the road from 4th Street to 3rd Street and the north side of the road between 3rd Street and 1st Street. Oak Street is under yield sign control at its intersection with 3rd Street and under stop sign control at its intersection with 4th Street and 1st Street.

Pine Street is an east-west, two-lane road in the vicinity of the site that generally provides unrestricted on-street parking on both sides of the road. On-street parking is prohibited on either side of the road west of 2nd Street. Pine Street has a posted speed limit of 30 mph.

1st Street is a four-lane undivided roadway in the vicinity of the site. On-street parking is prohibited on either side of the road. Traffic signal control is provided at its intersection with Pine Street and Locust Street.

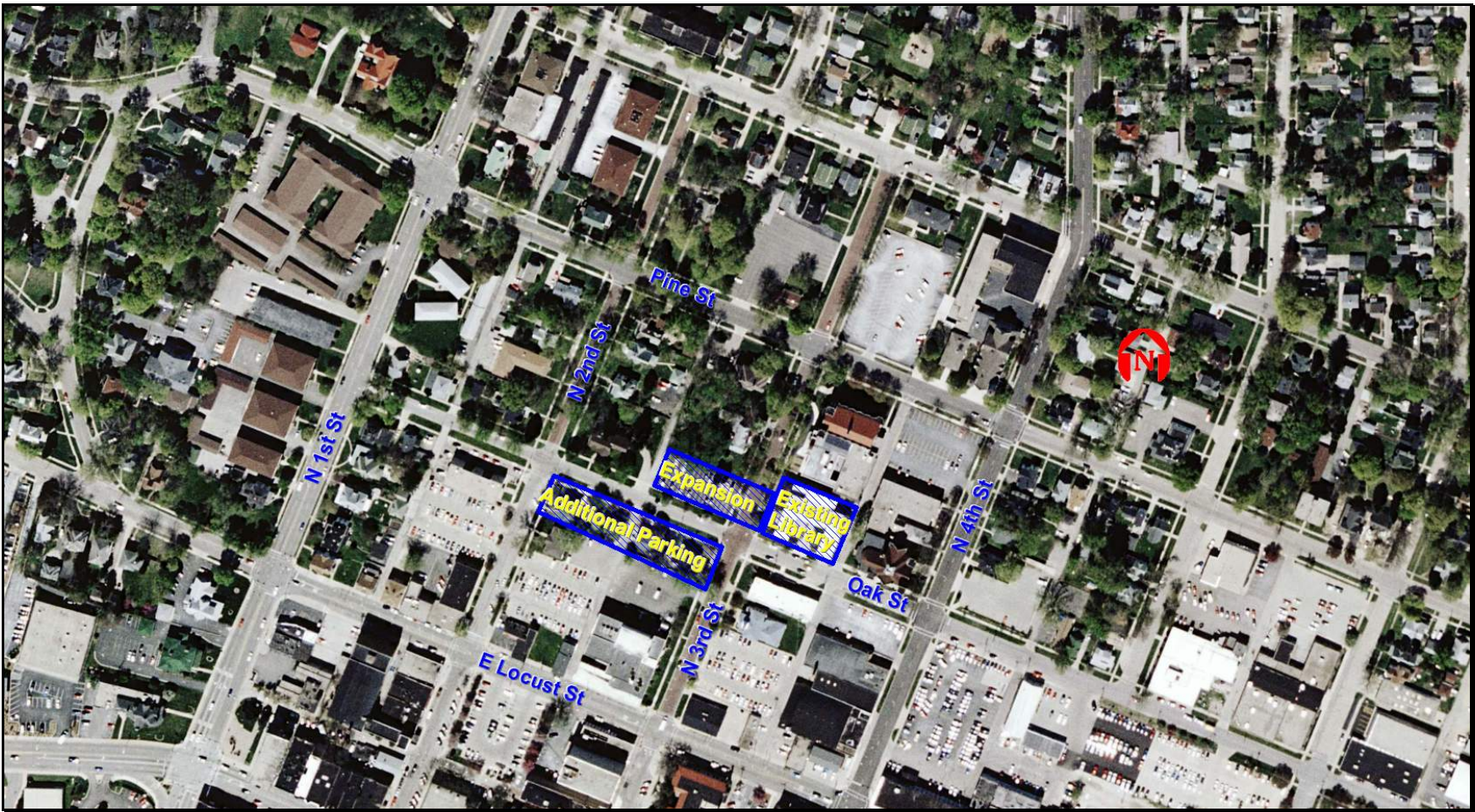
2nd Street is a north-south road that allows two-way traffic between Oak Street and Locust Street. North of Oak Street, the roadway is signed for one-way southbound traffic only. At its unsignalized intersection with Oak Street, 2nd Street is under stop sign control. Unrestricted on-street parking is allowed on the east side of the road between Pine Street and Locust Street.

3rd Street is a north-south road that allows two-way traffic between Oak Street and Locust Street. North of Oak Street, the roadway is signed for one-way northbound traffic only. At its unsignalized intersection with Pine Street, both approaches of 3rd Street are under stop sign control. Unrestricted on-street parking is allowed on both sides of the road between Pine Street and Oak Street and on only the west side of the road between Oak Street and Locust Street.



Site Location Map

Figure 1

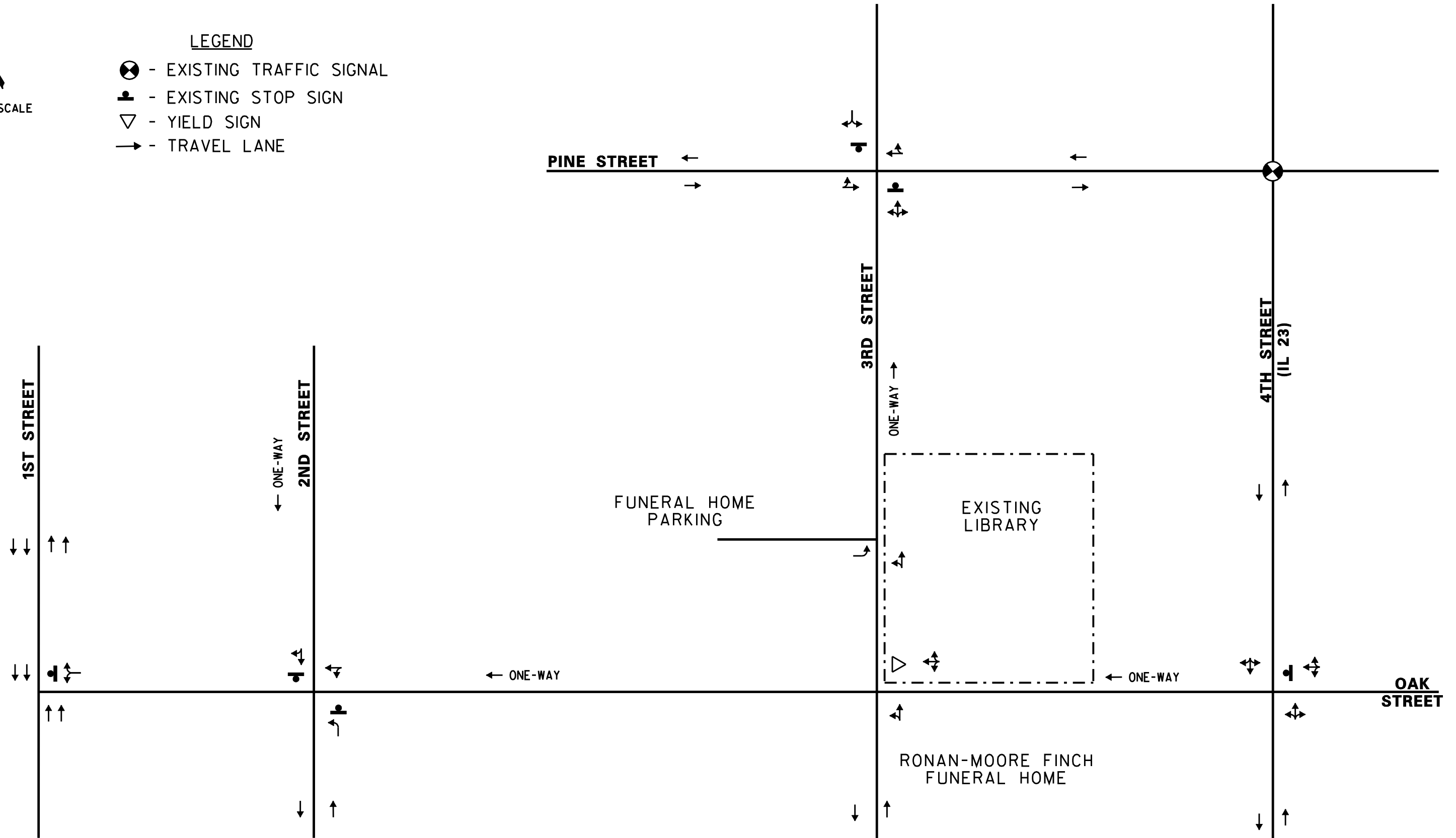


Aerial View of Site

Figure 2



- LEGEND**
- ⊗ - EXISTING TRAFFIC SIGNAL
 - Ⓜ - EXISTING STOP SIGN
 - ▽ - YIELD SIGN
 - - TRAVEL LANE



PROJECT:
 PROPOSED DEKALB LIBRARY
 EXPANSION
 DEKALB, ILLINOIS

TITLE:
 EXISTING ROADWAY GEOMETRICS AND TRAFFIC CONTROL

PROJECT NO: 11-163



FIGURE NO: 3

4th Street (IL 23) is a north-south two-lane undivided road in the vicinity of the site. On-street parking is prohibited on either side of the road. 4th Street is under traffic signal control at its intersections with Pine Street and Locust Street

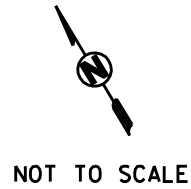
Existing Traffic Volumes and Parking Demand

In order to determine current traffic conditions on the existing roads, KLOA, Inc. conducted peak period vehicular and pedestrian counts at the following intersections:

- Oak Street with 1st Street
- Oak Street with 2nd Street
- Oak street with 3rd Street
- Oak street with 4th Street
- Pine Street with 3rd Street

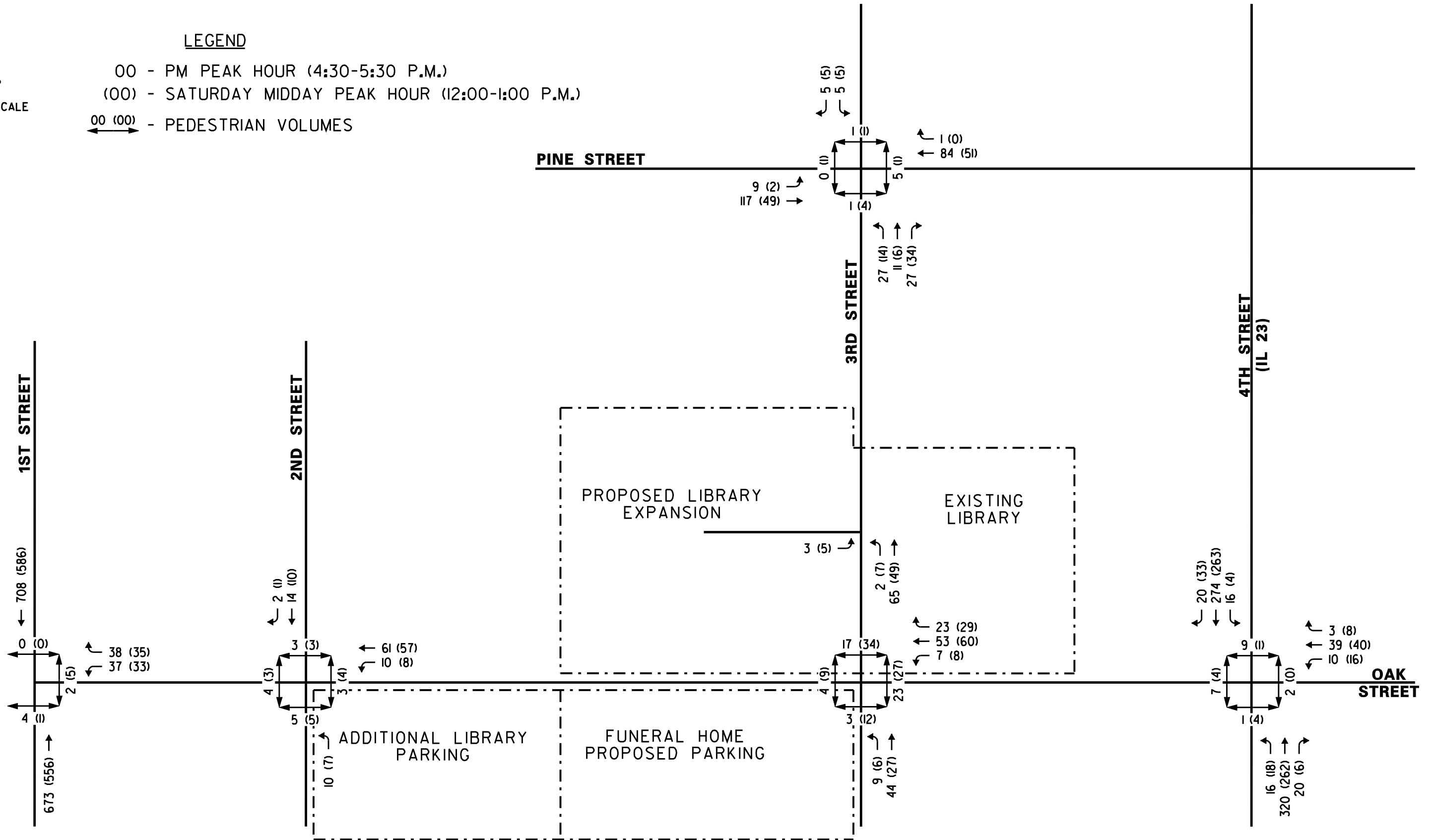
The traffic counts were conducted on Thursday, October 13, 2011 during the weekday evening (4:00 to 6:00 P.M.) peak period and on Saturday, October 15, 2011 during the midday (12:00 P.M. to 3:00 P.M.) peak period. These time periods were chosen since they coincide with the peak period of vehicular traffic as well as the peak usage hours of the library. The results of the traffic counts showed that the weekday evening peak hour of traffic occurs from 4:30 to 5:30 P.M. and the Saturday midday peak hour of traffic occurs from 12:00 to 1:00 P.M. **Figure 4** illustrates the existing peak hour vehicle and pedestrian volumes.

In addition to the traffic counts, KLOA, Inc. also surveyed the number of vehicles parked on the area roadways before and after the traffic counts. **Table 1** shows the on-street parking inventory per road per block and the number of vehicles parked before and after the traffic counts.



LEGEND

- 00 - PM PEAK HOUR (4:30-5:30 P.M.)
- (00) - SATURDAY MIDDAY PEAK HOUR (12:00-1:00 P.M.)
- ↔ (00) - PEDESTRIAN VOLUMES



PROJECT:
 PROPOSED DEKALB LIBRARY
 EXPANSION
 DEKALB, ILLINOIS

TITLE:
 EXISTING PEAK HOUR TRAFFIC AND PEDESTRIAN VOLUMES

PROJECT NO: 11-163



FIGURE NO: 4

Table 1
ON-STREET PARKING DEMAND

	Inventory	Time			
		Tuesday		Saturday	
		3:55 P.M.	6:05 P.M.	11:55 A.M.	3:05 P.M.
North side of Oak between 3 rd and 4 th	7	5	5	7	6
South side of Oak between 3 rd and 4 th	8	5	5	5	5
North side of Oak between 3 rd and 2 nd	11	1	0	0	0
South side of Oak between 3 rd and 2 nd	--	NP	NP	NP	NP
North side of Oak between 2 nd and 1 st	11	6	2	1	3
South side of Oak between 2 nd and 1 st	--	NP	NP	NP	NP
North side of Pine between 3 rd and 4 th	13 ¹	0	0	0	0
South side of Pine between 3 rd and 4 th	13 ¹	1	3	0	0
North side of Pine between 3 rd and 2 nd	10 ¹	0	0	1	0
South side of Pine between 3 rd and 2 nd	10 ¹	0	3	0	0
North side of Pine between 2 nd and 1 st	--	NP	NP	NP	NP
South side of Pine between 2 nd and 1 st	--	NP	NP	NP	NP
East side of 3 rd between Locust and Oak	--	NP	NP	NP	NP
West side of 3 rd between Locust and Oak	9	3	0	1	1
East side of 3 rd between Oak and Pine	6 ¹	3	4	3	1
West side of 3 rd between Oak and Pine	11 ¹	5	8	3	2
East side of 2 nd between Locust and Oak	12 ¹	5	2	3	1
West side of 2 nd Between Locust and Oak	--	NP	NP	NP	NP
East side of 2 nd between Oak and Pine	14 ¹	2	4	2	0
West side of 2 nd between Oak and Pine		NP	NP	NP	NP

NP = No Parking
1 - Approximate number of parking spaces

Development Traffic Characteristics

In order to properly evaluate future traffic conditions in the surrounding area, it was necessary to determine the traffic characteristics of the proposed library expansion, including the directional distribution and volumes of traffic that will be generated as well as the efficiency of the proposed access and parking.

Proposed Site and Development Plan

The proposed plans call for expanding the existing building to the west within the existing Ronan-Moore-Finch Funeral Homes parking lot and adjacent properties. As part of the expansion, 3rd Street is proposed to be vacated along the library property in order to provide one continuous site that will contain a maximum expansion of 70,000 square feet and approximately 50 off-street parking spaces. In addition, a new 60-space parking lot is proposed to be provided along the south side of Oak Street between 2nd Street and 3rd Street. Approximately 30 parking spaces will be reserved for the library and 30 parking spaces will be reserved for the funeral home. As is the case now, the library patrons will be permitted to park within the funeral home parking spaces as long as the funeral home is not in use. Access to the parking lot adjacent to the expansion is proposed to be provided via both Oak Street and 3rd Street north of the proposed vacation and access to the parking lot south of Oak Street is proposed to be provided via Oak Street, 2nd Street and 3rd Street.

Proposed Roadway Vacation

As part of the proposed expansion, 3rd Street is proposed to be vacated from Oak Street to the northern property line of the library. As proposed, the south portion of 3rd Street will terminate at Oak Street and the north portion will terminate as a cul-de-sac at the library's northern property line. In order to provide access to the First Lutheran Church and the homes along the west side of 3rd Street south of Pine Street, 3rd Street is proposed to be converted to a two-way road from Pine Street to the proposed cul-de-sac. Lastly, access to the parking lot adjacent to the expansion is proposed via both Oak Street and the proposed cul-de-sac. Therefore, the library will have access to 3rd Street from both the north and south (via Oak Street) sides of the proposed vacation.

From Figure 3 it can be seen that the proposed vacated portion of 3rd Street carries a relatively low volume of traffic. Currently, 3rd Street carries a total of 65 vehicles during the evening peak hour and 49 vehicles during the Saturday peak hour. With access to the funeral home parking lot, which is used by library patrons, and the library drop off/pick up lane located on 3rd Street, it can be seen that a good portion of the 3rd Street traffic is generated by the existing library. Furthermore, the grid roadway system provides motorists several convenient alternative routes to traverse around the proposed vacated portion of 3rd Street, including 1st Street and 4th Street which are located only one to two blocks from 3rd Street.

Based on the existing traffic volumes and roadway system, the existing traffic volumes were redistributed to represent existing traffic conditions with the proposed vacation. **Figure 5** illustrates the existing peak hour traffic volumes assuming the proposed 3rd Street vacation. While a small percentage of the 3rd Street traffic was redistributed to other north-south roads in the area, the majority of the 3rd Street traffic was redistributed around the vacated portion of 3rd Street by traversing west on Oak Street to 1st Street than north on 1st Street to Pine Street.

Directional Distribution

The directional distribution of expansion-generated trips on the external roads is a function of several variables, including the operational characteristics of the roadway system and the ease with which drivers can travel over various sections of the roadway system without encountering congestion. The directions from which patrons of the library will approach and depart the site were estimated based on the existing travel patterns, as determined from the traffic counts. **Figure 6** illustrates the directional distribution of traffic which is also listed in **Table 2**.

Table 2
DIRECTIONAL DISTRIBUTION

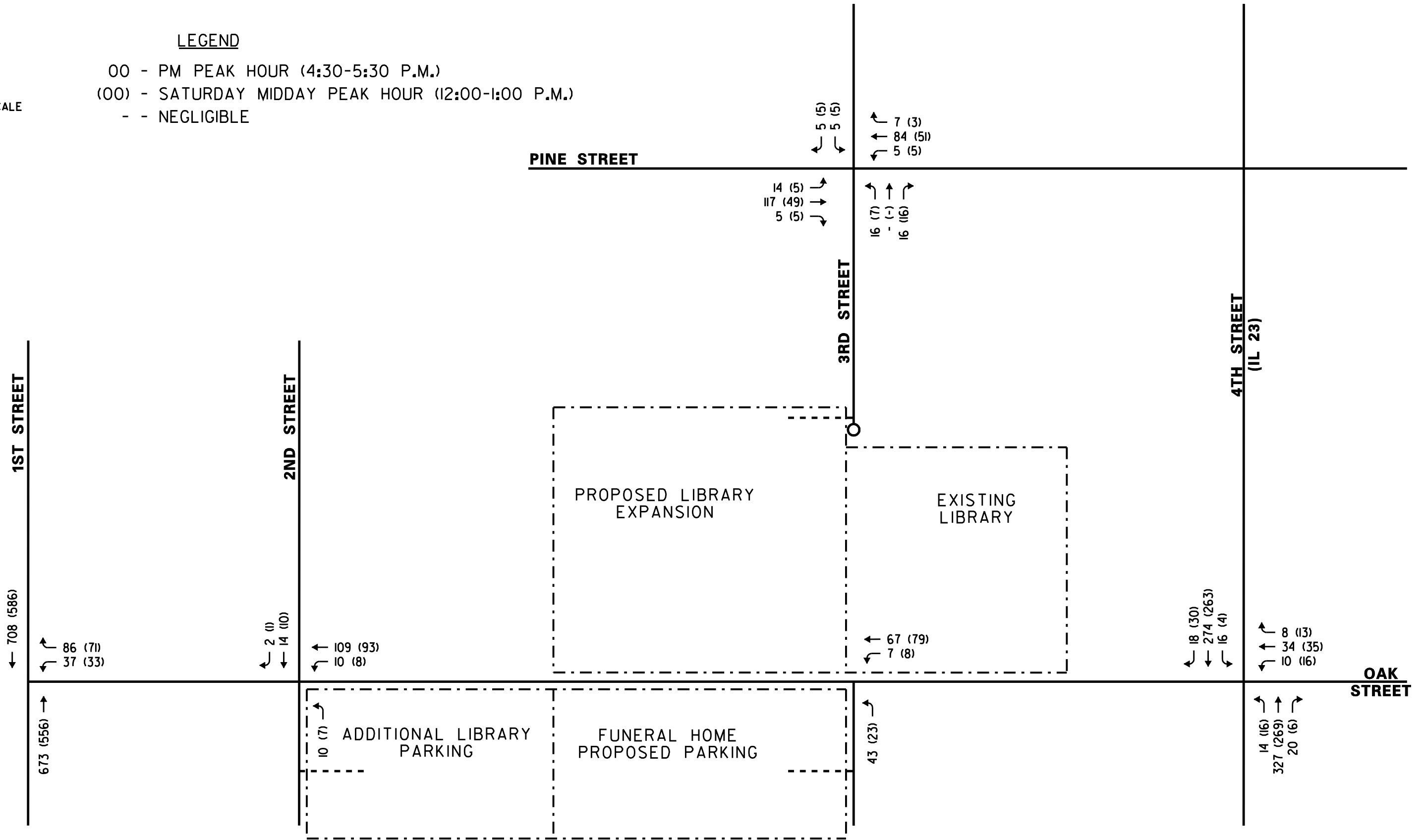
Direction	Percent
To and from the on north 4 th Street	20%
To and from the south on 4 th Street	25%
To and from the north on 1 st Street	20%
To and from the south on 1 st Street	15%
To and from the south on 3 rd Street	5%
To and from the south on 2 nd Street	5%
To and from the east on Oak Street	5%
To and from the east on Pine Street	<u>5%</u>
Total	100%



NOT TO SCALE

LEGEND

- 00 - PM PEAK HOUR (4:30-5:30 P.M.)
- (00) - SATURDAY MIDDAY PEAK HOUR (12:00-1:00 P.M.)
- - NEGLIGIBLE



PROJECT:
 PROPOSED DEKALB LIBRARY
 EXPANSION
 DEKALB, ILLINOIS

TITLE:
 REASSIGNED EXISTING PEAK HOUR TRAFFIC VOLUMES

PROJECT NO: 11-163



FIGURE NO: 5

20%

LEGEND

00% - PERCENTAGE DISTRIBUTION



NOT TO SCALE

20%

5%

PINE STREET

1ST STREET

2ND STREET

3RD STREET

4TH STREET
(IL 23)

PROPOSED LIBRARY
EXPANSION

EXISTING
LIBRARY

5%

OAK
STREET

15%

ADDITIONAL LIBRARY
PARKING

FUNERAL HOME
PROPOSED PARKING

5%

5%

25%

PROJECT:
PROPOSED DEKALB LIBRARY
EXPANSION
DEKALB, ILLINOIS

TITLE:
ESTIMATED DIRECTIONAL DISTRIBUTION

PROJECT NO: II-163



FIGURE NO: 6

Proposed Site Traffic Generation

The traffic generation characteristics of any development are based on the magnitude and character of its land use. As proposed, the expansion will provide a maximum of 70,000 additional square feet of space. Based on data collected by KLOA, Inc. at other libraries throughout the Chicagoland area, libraries generate approximately 2.79 trips per 1,000 square feet during the weekday evening peak hour and 2.56 trips per 1,000 square feet during the Saturday midday peak hour. The estimates of the peak hour traffic that will be generated by the proposed library expansion were based on these trip rates. **Table 3** shows the estimated number of peak hour trips estimated to be generated by the expansion.

Table 3
PEAK HOUR SITE-GENERATED TRAFFIC VOLUMES

Land Use	Evening Peak Hour		Saturday Peak Hour	
	In	Out	In	Out
70,000 square foot Library Expansion	95	95	90	90

Traffic Assignment

The estimated weekday evening and Saturday midday peak hour traffic volumes that will be generated by the proposed library expansion were assigned to the modified roadway system in accordance with the previously described directional distribution. **Figure 7** illustrates the peak hour traffic assignments for the expansion. The proposed expansion traffic was added to the redistributed existing traffic volumes to obtain total traffic volumes, which are illustrated in **Figure 8**.

Evaluation and Recommendations

In order to evaluate the impact of the anticipated traffic volumes, the site access drives and the adjacent intersections were analyzed based on the addition of the expansion-generated traffic volumes along the modified roadway system. From the analysis, recommendations can be developed for site access facilities and road improvements.

Proposed Roadway Vacation

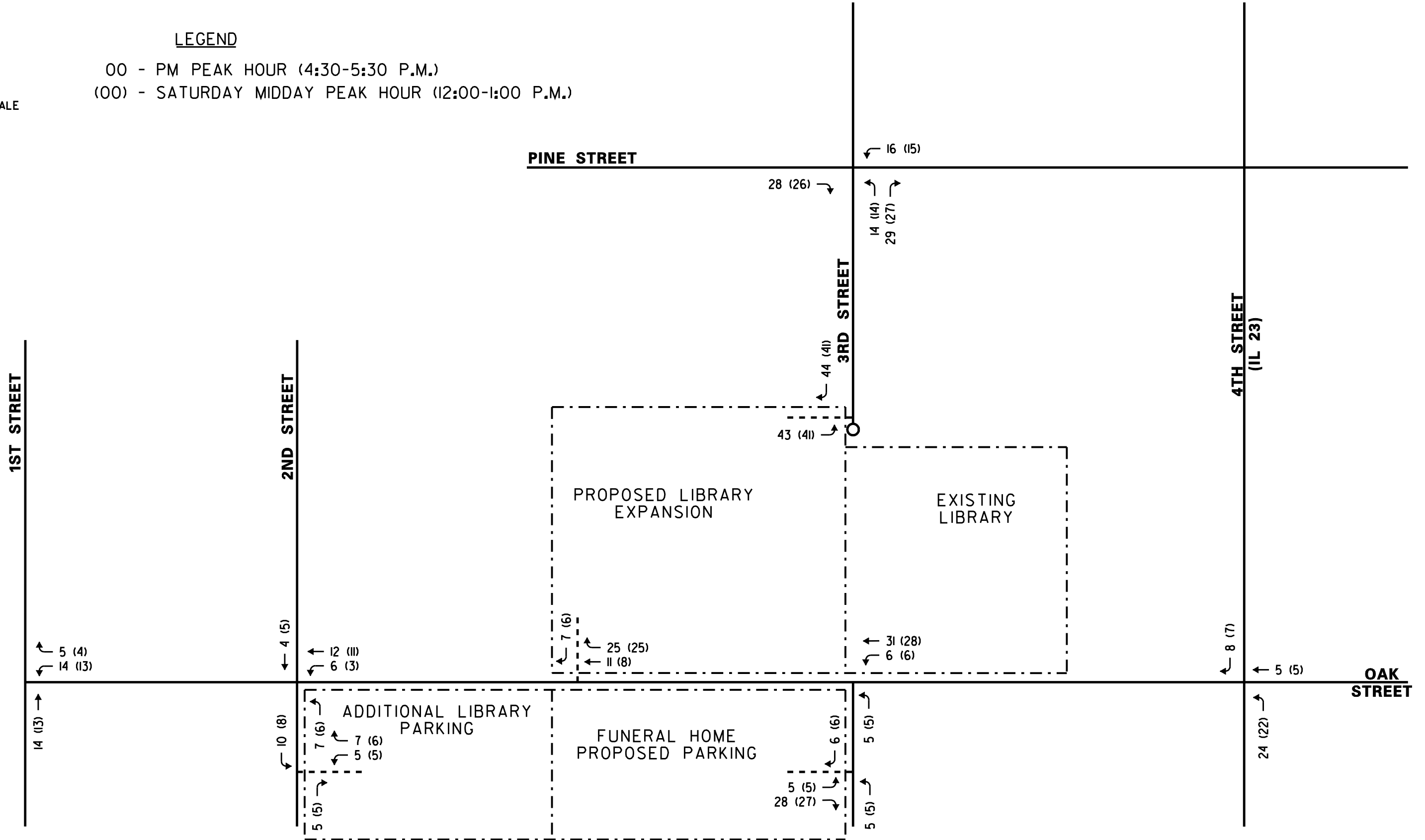
As part of the proposed expansion, 3rd Street is proposed to be vacated from Oak Street to the northern property line of the library. As proposed, the south portion of 3rd Street will terminate at Oak Street and the north portion will terminate as a cul-de-sac at the library's northern property line. In order to provide access to the First Lutheran Church and the homes along the west side of 3rd Street south of Pine Street, 3rd Street is proposed to be converted to a two-way road from Pine Street to the proposed cul-de-sac. In order to accommodate the two-way traffic, parking on one side of 3rd Street between Pine Street and the cul-de-sac will need to be eliminated.



NOT TO SCALE

LEGEND

00 - PM PEAK HOUR (4:30-5:30 P.M.)
(00) - SATURDAY MIDDAY PEAK HOUR (12:00-1:00 P.M.)



PROJECT:
PROPOSED DEKALB LIBRARY
EXPANSION
DEKALB, ILLINOIS

TITLE:
SITE TRAFFIC ASSIGNMENT

PROJECT NO: 11-163



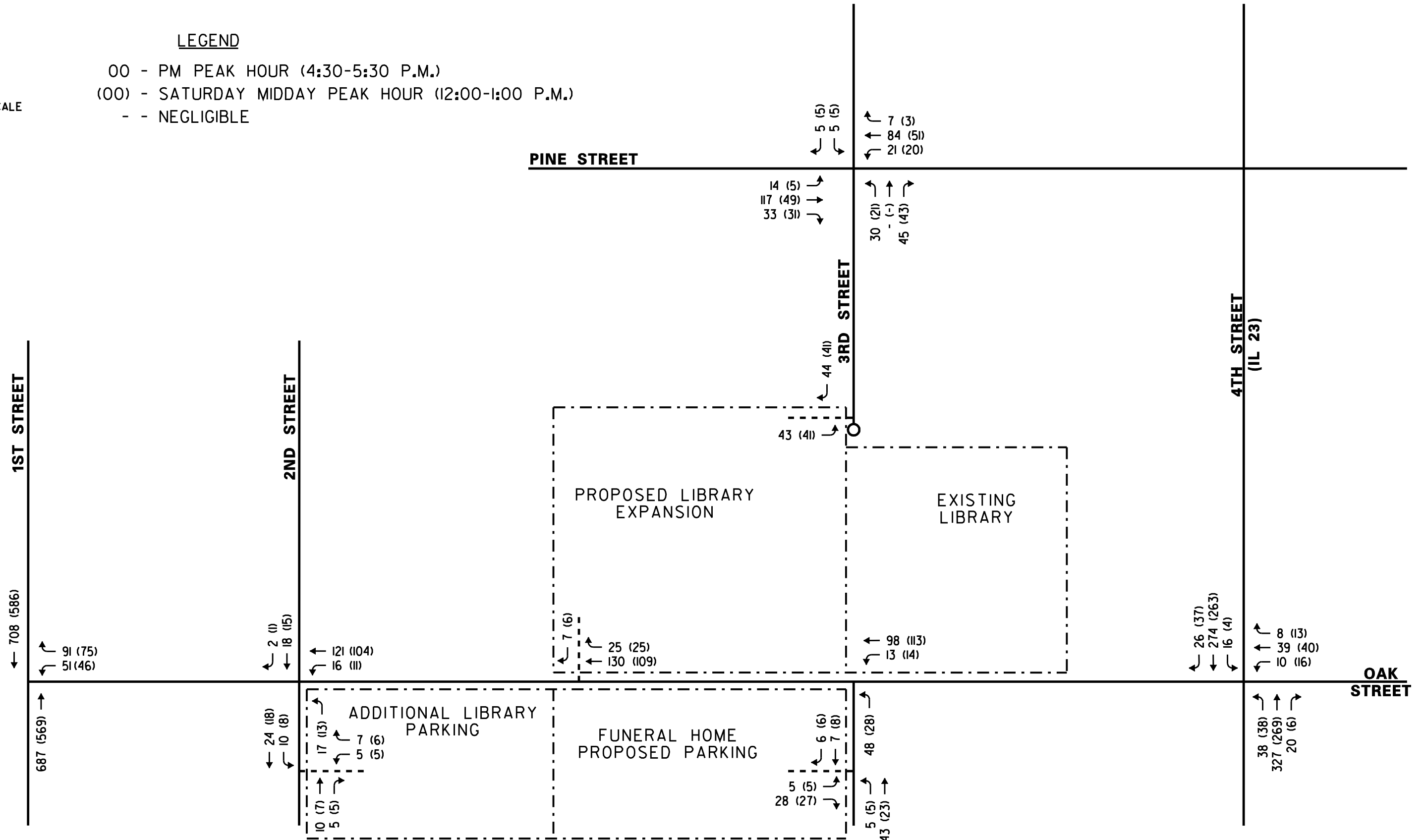
FIGURE NO: 7



NOT TO SCALE

LEGEND

- 00 - PM PEAK HOUR (4:30-5:30 P.M.)
- (00) - SATURDAY MIDDAY PEAK HOUR (12:00-1:00 P.M.)
- - NEGLIGIBLE



PROJECT:
 PROPOSED DEKALB LIBRARY
 EXPANSION
 DEKALB, ILLINOIS

TITLE:
 FUTURE PEAK HOUR TRAFFIC VOLUMES

PROJECT NO: 11-163



FIGURE NO: 8

Site Access

Expansion Parking Lot. Access to the proposed 50-space parking lot adjacent to the expansion will be provided via one two-way access drive on both (1) the proposed 3rd Street cul-de-sac and (2) Oak Street at the west end of the expansion. The proposed access system will provide the library with two-way access to 3rd Street from both the north and south (via Oak Street) sides of the proposed vacation. This will provide the library with a very flexible access system that will help to reduce the impact of the library expansion by better distributing the traffic along the roadway system. It should be noted that non-library traffic may use this parking lot as a means to traverse around the proposed 3rd Street vacation. As such, the parking lot should be monitored in the future to determine if traffic calming measures should be implemented within the parking lot to discourage cut-through traffic.

Southern Parking Lot. As part of the expansion, a new 60-space parking lot is proposed to be provided along the south side of Oak Street between 2nd Street and 3rd Street. Approximately 30 parking spaces will be reserved for the library and 30 parking spaces will be reserved for the funeral home. As is the case now, the library patrons will be permitted to park within the funeral home parking spaces as long as the funeral home is not in use. Access to the parking lot will be provided via one two-way access drive on 2nd Street, 3rd Street and Oak Street.

Given the low traffic volumes on the adjacent roadways coupled with the low traffic volumes to be generated by the proposed expansion, no widening of Oak Street, 3rd Street or 2nd Street will be necessary to provide exclusive turn lanes. Based on the projected traffic volumes and the results of the capacity analyses (to be discussed later), the access drives should provide one inbound lane and one outbound lane with outbound movements under stop sign control.

External Street Improvements

In order to determine how the external intersections and the access drives will operate with the addition of the expansion generated traffic volumes and the modified roadway system, capacity analyses were conducted for the intersections under both existing and future conditions. **Table 4** illustrates the intersection levels of service found under existing and proposed conditions. The number in parenthesis illustrates the seconds of delay experienced and represents the greater of the two minor approaches.

Table 4
LEVELS OF SERVICE AND DELAY

Intersection	Existing Conditions		Proposed Conditions	
	Evening Peak	Saturday Peak	Evening Peak	Saturday Peak
Oak Street with 4 th Street	C (17.3)	C (15.4)	C (18.3)	C (16.2)
Oak Street with 3 rd Street	A (9.9)	A (9.9)	B (10.5)	B (10.3)
Oak Street with 2 nd Street	A (9.6)	A (9.5)	B (10.1)	A (9.9)
Oak Street with 1 st Street	C (19.9)	C (15.8)	C (17.7) ¹	B (14.7) ¹
Pine Street with 3 rd Street	B (10.1)	A (9.1)	B (10.3)	A (9.5)
Oak Street with Parking Lot Access Drive			A (9.0)	A (8.9)
3 rd Street with Parking Lot Access Drive			A (8.6)	A (8.5)
2 nd Street with Parking Lot Access Drive			A (8.6)	A (8.6)

1 - Assumes geometric improvements to Oak Street at its intersection with 1st Street

The results of the capacity analyses show that the intersections in the study area are currently operating at acceptable levels of service. With the addition of the expansion-generated traffic and the reassignment of existing traffic, the intersections are projected to continue to operate at an acceptable level of service. Therefore, the existing roadway system has sufficient reserve capacity to accommodate the expansion generated traffic and the redistribution of traffic due to the proposed vacation. Nevertheless, the following recommendations have been developed to enhance operations:

- It is recommended that Oak Street approach at its intersection with 1st Street be restriped to provide an exclusive left-turn lane and an exclusive right-turn lane. This restriping will require the removal of approximately two to three parking spaces along the north side of Oak Street.
- In order to enhance both vehicle and pedestrian operations, it is recommended that the Oak Street/3rd Street intersection be under all-way stop sign control.

Although the capacity analyses have shown that the roadway system will operate at acceptable levels of service under future conditions, to further enhance accessibility and circulation on the area, the City may want to consider converting Oak Street to two-way traffic from 3rd Street to 4th Street. However, the conversion of Oak Street would impact the number of on-street parking spaces and may impact the loading zone for the funeral home.

Area Circulation Evaluation

As previously indicated, the proposed expansion will include the vacation of a portion of 3rd Street. Based on a review of the existing and projected traffic volumes, the impact of the vacation will be reduced as follows:

- 3rd Street is currently a one-way northbound roadway. As such, the proposed vacation is only impacting one flow of traffic.
- 3rd Street currently carries a relatively low volume of traffic (65 and 49 trips during the evening and Saturday midday peak hours, respectively). With access to the funeral home parking lot, which is used by library patrons and the library drop off/pick up lane located on 3rd Street, a good portion of the 3rd Street traffic is generated by the existing library.
- The grid roadway system provides motorists several convenient routes to traverse around the proposed vacated portion of 3rd Street, including 1st Street and 4th Street which are located only one to two blocks from 3rd Street.
- Access to the library from the north will be greatly enhanced with the proposed conversion of 3rd Street to two-way traffic between Pine Street and the cul-de-sac and the fact that direct access will be provided to the library parking lot from the cul-de-sac.
- At a maximum, northbound traffic will have to travel four additional east-west blocks in order to traverse around the vacated portion of 3rd Street. Further, it is likely that a portion of the Oak Street traffic desiring to travel this portion of 3rd Street will be distributed to 1st Street or 4th Street both of which are arterial roads that have been designed to accommodate the additional traffic.
- The results of the capacity analyses have shown that the roads and intersections within the area have sufficient reserve capacity to accommodate the additional traffic.

Further, the impact on the First Lutheran Church will be reduced for the following reasons.

- As currently proposed, the church will be allowed to use the library parking lot during its Sunday services. As we have indicated, the library parking is proposed to have direct access from both Oak Street and 3rd Street north of the proposed vacation. As such, the church traffic will have direct access to the parking lot from 3rd Street from both the north and south (via Oak Street) of the proposed vacation.
- The church will now have direct southbound access from Pine Street to the church and the library parking lot. Currently, 3rd Street is a one-way northbound street and, as such, direct access to the church is only provided from the south. This will greatly improve access to and from the church's existing parking lot which is located in the southwest quadrant of the Pine Street/3rd Street intersection.

- While direct access from the south on 3rd Street to the church will be eliminated, the church will still have direct access to the library parking lot from 3rd Street south of the vacation via Oak Street.

Conclusion

Based on the preceding analyses, the following is concluded:

- The existing roadway system has sufficient reserve capacity to accommodate the additional traffic to be generated by the proposed expansion and the redistribution of traffic due to the proposed vacation.
- Although the existing roadways and intersections are projected to operate at acceptable level of services, the study has developed several recommendations to enhance operations and improve accessibility to the area.
- The access drives to/from the parking lots have been designed to promote efficient and orderly access with limited impact on the roadway system. Further, the site access system provides excellent access flexibility which will help to distribute the traffic along the roadway system.
- The impact of the proposed 3rd Street vacation will be reduced for several reasons, including that 3rd Street is a one-way northbound street, 3rd Street currently carries a low volume of traffic and the flexibility of the existing grid roadway system and the access system to the parking lots which provide convenient alternative routes around the vacated portion of 3rd Street.
- The conversion of 3rd Street to allow two-way traffic from Pine Street south to the proposed access drive into library parking lot will provide enhanced accessibility to the parking lot and to the First Lutheran Church.

Appendix

LEVEL OF SERVICE CRITERIA FOR UNSIGNALIZED INTERSECTIONS

Level of Service	Average Total Delay (SEC/VEH)
A	≤ 10
B	> 10 and ≤ 15
C	> 15 and ≤ 25
D	> 25 and ≤ 35
E	> 35 and ≤ 50
F	> 50

Source: *Highway Capacity Manual*, 1998.