

Traffic Impact Study

Proposed Retail Development

Naperville, Illinois



Prepared For:

vequity

Prepared By

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1.

Introduction

This report summarizes the methodologies, results, and findings of a traffic impact study conducted by Kenig, Lindgren, O'Hara, Aboona, Inc. (KLOA, Inc.) for the proposed retail development to be located in the northeast quadrant of the intersection of Ogden Avenue with Ellsworth Street/North Town Plaza easterly access drive in Naperville, Illinois. As proposed, the site will be redeveloped with a 7,018 square-foot multi-tenant retail building that will include an approximately 2,300 square-foot Starbucks coffee shop with a drive-through. Access to the development will be provided via the existing right-in/right-out access drive on Ogden Avenue and via cross access to the easterly access drive serving North Town Plaza. The proposed development will eliminate the existing westerly full movement access driveway currently serving the site.

The purpose of this study was to examine background traffic conditions, assess the impact that the proposed development will have on traffic conditions in the area, and determine if any roadway or access improvements are necessary to accommodate traffic generated by the proposed development.

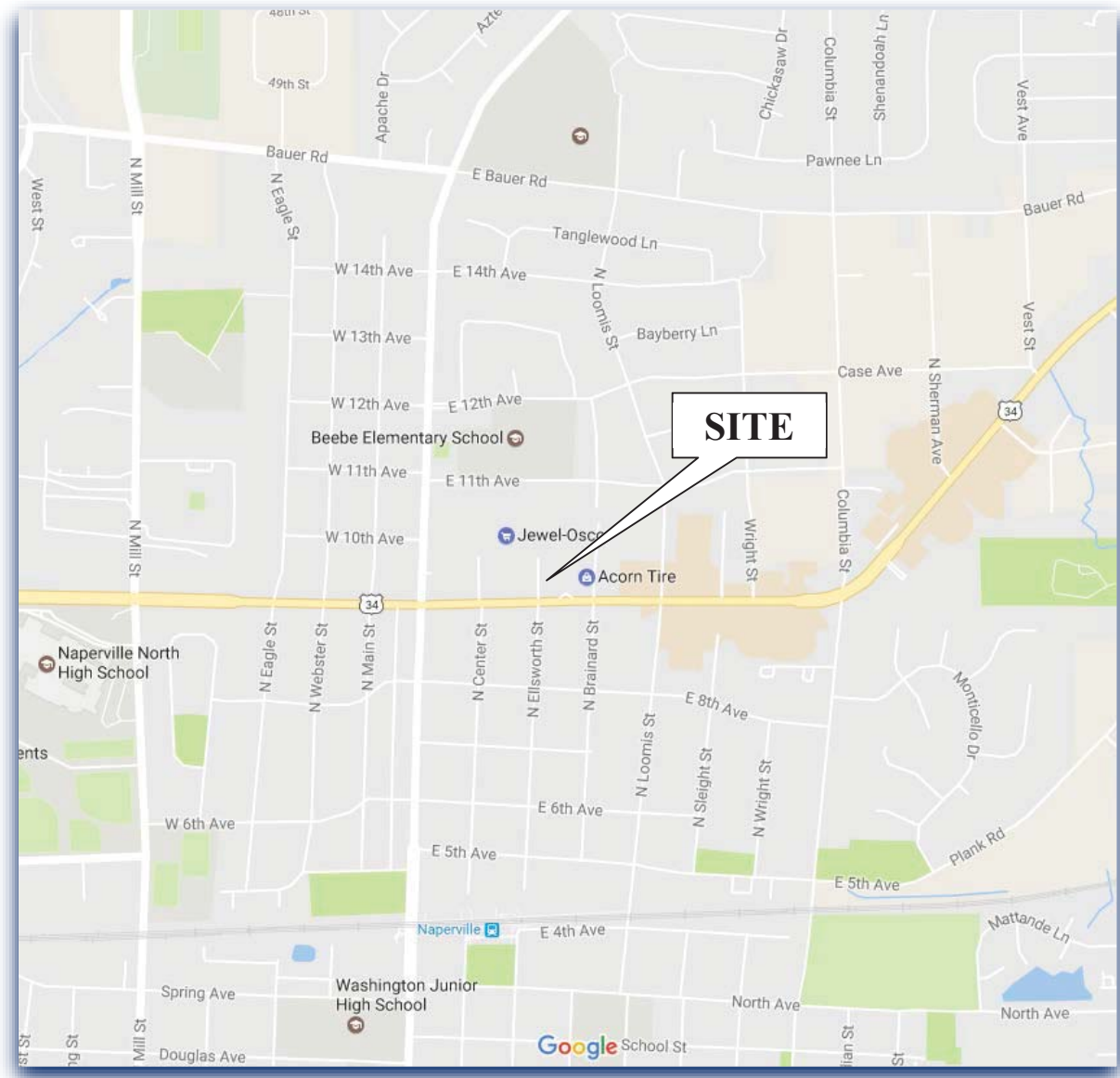
Figure 1 shows the location of the site in relation to the area roadway system. **Figure 2** shows an aerial view of the site area.

The sections of this report present the following:

- Existing roadway conditions
- A description of the proposed development
- Directional distribution of the development traffic
- Vehicle trip generation for the development
- Future traffic conditions including access to the development
- Traffic analyses for the weekday morning and weekday evening peak hours
- Recommendations with respect to adequacy of the site access and adjacent roadway system
- Evaluation of the on-site circulation and drive through stacking
- Evaluation of the adequacy of the proposed parking supply

Traffic capacity analyses were conducted for the weekday morning and weekday evening peak hours for the following conditions:

1. Existing Condition - Analyzes the capacity of the existing roadway system using existing peak hour traffic volumes in the surrounding area.
2. Future Condition - The future projected traffic volumes include the existing traffic volumes increased by an ambient area growth factor (growth not attributable to any particular development) and the traffic estimated to be generated by the proposed subject development.



Site Location

Figure 1

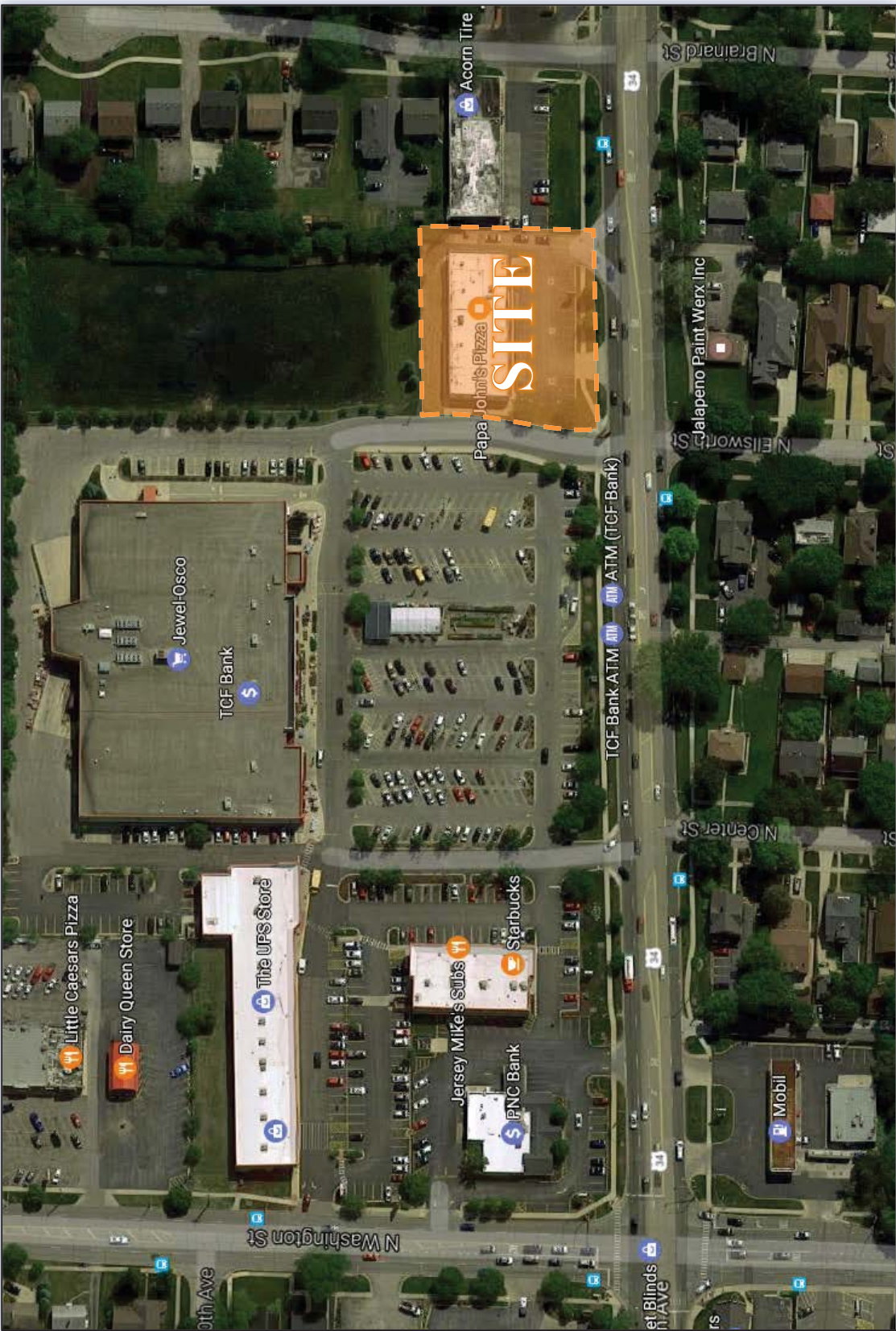


Figure 2

Aerial View of Site Location

Proposed Retail Development
Naperville, Illinois

2.

Existing Conditions

Existing transportation conditions in the vicinity of the site were documented based on field visits conducted by KLOA, Inc. in order to obtain a database for projecting future conditions. The following provides a description of the geographical location of the site, physical characteristics of the area roadway system including lane usage and traffic control devices, and existing peak hour traffic volumes.

Site Location

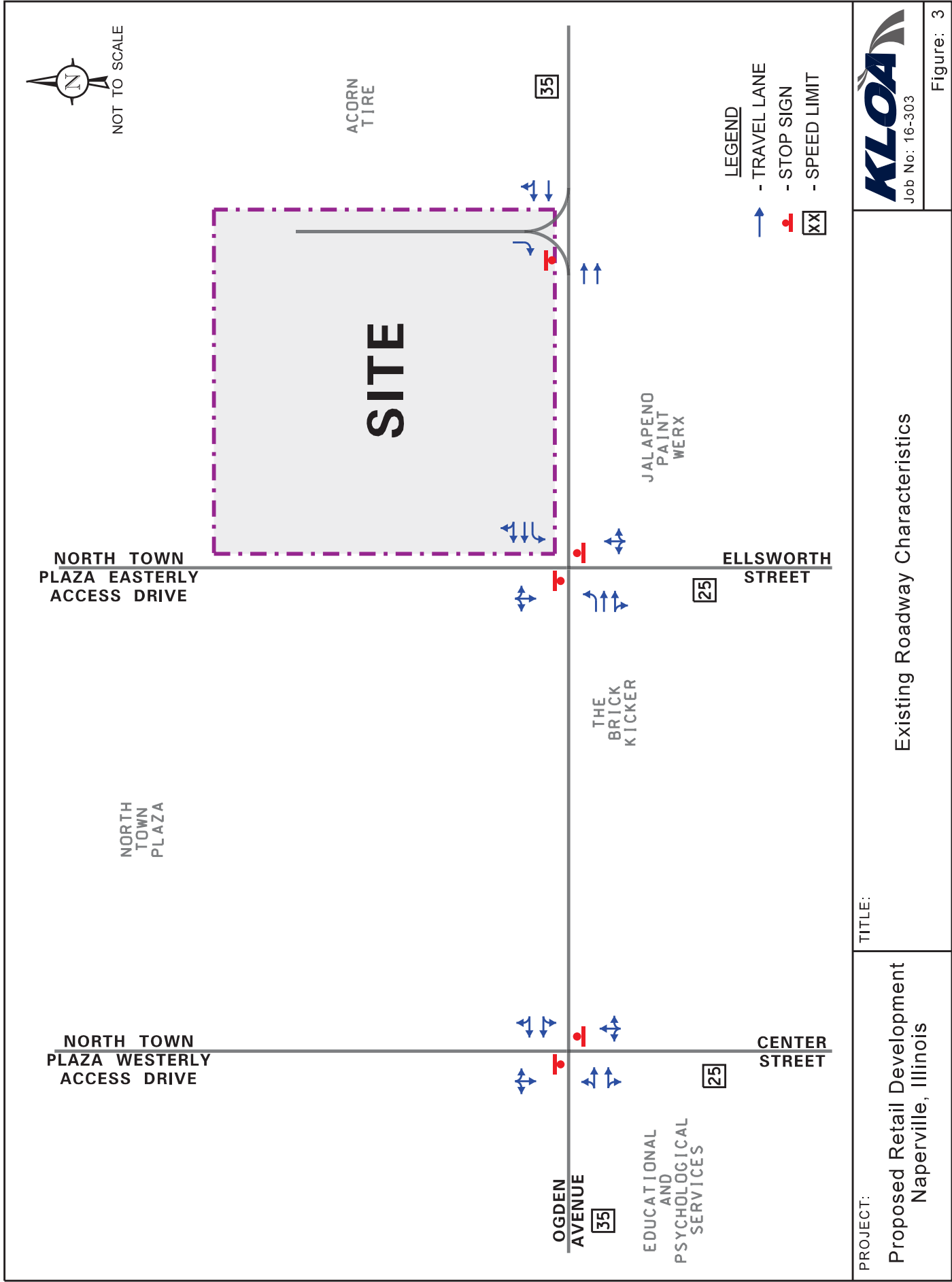
The site, which is currently occupied by a retail building, is located in the northeast quadrant of the intersection of Ogden Avenue with Ellsworth Street/North Town Plaza easterly access drive. Land uses in the vicinity of the site are primarily residential to the north and south and commercial to the east and west and includes the North Town Plaza which is anchored by Jewel-Osco to the west, Acorn Tire and Bill's Car Wash to the east, and State Farm, Haug Chiropractic, Russian School of Mathematics, Jalapeno Paint Werx, The Brick Kicker and Educational & Psychological Services to the south.

Existing Roadway System Characteristics

The characteristics of the existing roadways near the development are described below. **Figure 3** illustrates the existing roadway characteristics.

Ogden Avenue (US Route 34) is an east-west arterial roadway that in the vicinity of the site provides two through lanes in each direction separated by a striped median. At its unsignalized intersection with Ellsworth Street, Ogden Avenue provides an exclusive left-turn lane, an exclusive through lane and a shared through/right-turn lane on both approaches. At its unsignalized intersection with Center Street, Ogden Avenue provides a shared left-turn/through lane and a shared through/right-turn lane on both approaches. Ogden Avenue is under the jurisdiction of the Illinois Department of Transportation (IDOT), carries an annual average daily traffic (AADT) volume of 28,500 vehicles (IDOT AADT 2015) and has a posted speed limit of 35 miles per hour.

Ellsworth Street is a north-south local roadway that provides one lane in each direction and extends from Ogden Avenue to 5th Avenue. At its unsignalized intersection with Ogden Avenue, Ellsworth Street provides a shared left/through/right-turn lane under stop-sign control. Aligned opposite of Ellsworth Street at its intersection with Ogden Avenue is the North Town Plaza easterly full movement access drive which provides a shared left/through/right-turn lane under stop-sign control. Ellsworth Street is under the jurisdiction of the City of Naperville and has a posted speed limit of 25 miles per hour.



Center Street is a north-south local roadway that provides one lane in each direction and extends from Ogden Avenue to 5th Avenue. At its unsignalized intersection with Ogden Avenue, Center Street provides a shared left/through/right-turn lane under stop-sign control. Aligned opposite of Center Street at its intersection with Ogden Avenue is the North Town Plaza westerly full movement access drive which provides a shared left/through/right-turn lane under stop-sign control. Center Street is under the jurisdiction of the City of Naperville and has a posted speed limit of 25 miles per hour.

Existing Traffic Volumes

In order to determine current traffic conditions in the vicinity of the site, KLOA, Inc. conducted peak period traffic counts using Miovision Scout Video Collection Units on Thursday, December 15, 2016 during the weekday morning (7:00 A.M. to 9:00 A.M.) and weekday evening (4:00 P.M. to 6:00 P.M.) peak periods at the intersection of Ogden Avenue with Ellsworth Street/North Town Plaza easterly access drive and Ogden Avenue with Center Street/North Town Plaza westerly access drive. The results of the traffic counts showed that the weekday morning peak hour of traffic occurs from 7:15 A.M. to 8:15 A.M. and the evening peak hour of traffic occurs from 4:45 P.M. to 5:45 P.M. **Figure 4** illustrates the existing peak hour traffic volumes. Copies of the traffic count summary sheets are included in the Appendix.

Gap Study

A gap study was also conducted on Thursday, December 15, 2016 during the weekday morning and weekday evening peak hours on Ogden Avenue at its intersections with Ellsworth Street. Gaps in the westbound direction on Ogden Avenue, which allow traffic to turn left from Ogden Avenue onto the North Town Plaza easterly access drive and right from the North Town Plaza easterly access drive onto Ogden Avenue and gaps in both directions on Ogden Avenue, which allow traffic to turn left from the Jewel-Osco access drive onto Ogden Avenue, were measured. The critical gap and follow-up gap periods required to turn to and from the North Town Plaza easterly access drive were based on information provided in the *Highway Capacity Manual* (HCM) published by the Transportation Research Board (TRB). **Table 1** summarizes the results of the gap study.

Crash Data Analysis

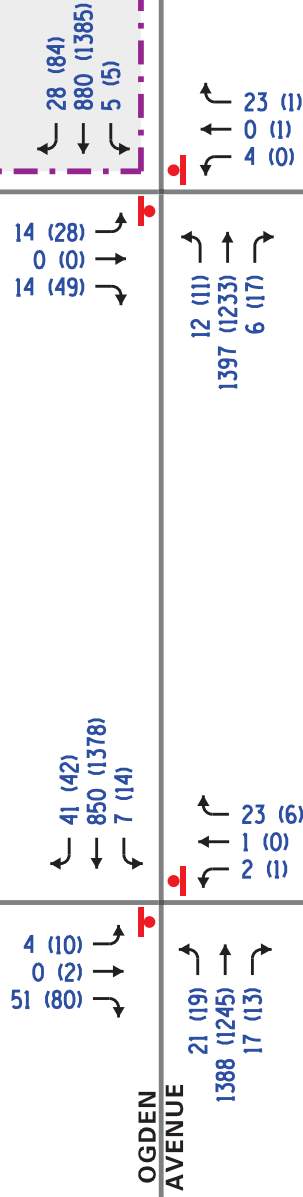
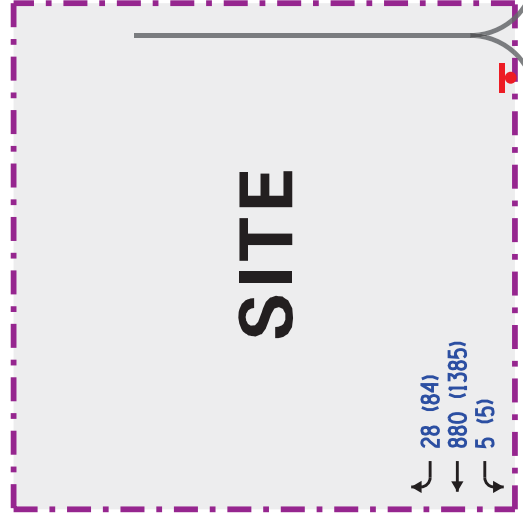
KLOA, Inc. obtained crash data for the past five years (2010 to 2014) for the intersections of Ogden Avenue with Ellsworth Street and Center Street. The crash data for the intersections are summarized in **Tables 2** and **3**, respectively. A review of the crash data indicated that there were no fatalities reported at any of the intersections.

DISCLAIMER: The motor vehicle crash data referenced herein was provided by the Illinois Department of Transportation. The author is responsible for any data analyses and conclusions drawn.



NORTH TOWN
PLAZA EASTERLY
ACCESS DRIVE

NORTH TOWN
PLAZA WESTERLY
ACCESS DRIVE



LEGEND
00 - AM PEAK HOUR (7:15-8:15 AM)
(00) - PM PEAK HOUR (4:45-5:45 PM)

TITLE:

Existing Traffic Volumes

PROJECT:
Proposed Retail Development
Naperville, Illinois

Table 1

GAP STUDY RESULTS – OGDEN AVENUE WITH ELLSWORTH STREET

Time Periods	Number of Potential Movements Based on Gaps Available		
	Eastbound Left-Turns	Southbound Right-Turns	Southbound Left-Turns
Weekday Morning 7:15 - 8:15 A.M.	767	352	62
Weekday Evening 4:45 – 5:45 P.M.	398	158	33

Table 2

OGDEN AVENUE WITH ELLSWORTH STREET – CRASH DATA

Year	Type of Accident Frequency						Total
	Angle	Object	Rear End	Sideswipe	Turning	Other	
2010	1	0	2	0	2	0	5
2011	1	0	2	0	3	0	6
2012	1	0	0	0	1	1	3
2013	1	0	1	0	0	0	2
2014	<u>1</u>	<u>0</u>	<u>1</u>	<u>0</u>	<u>2</u>	<u>0</u>	<u>4</u>
Total	5	0	6	0	8	1	20
Average/Year	1	0	1.2	0	1.6	< 1	5

Table 3

OGDEN AVENUE WITH CENTER STREET – CRASH DATA

Year	Type of Accident Frequency						Total
	Angle	Object	Rear End	Sideswipe	Turning	Other	
2010	2	0	1	0	1	0	4
2011	1	0	1	1	1	0	4
2012	2	0	2	1	0	0	5
2013	3	0	3	1	1	0	8
2014	<u>0</u>	<u>0</u>	<u>5</u>	<u>0</u>	<u>1</u>	<u>0</u>	<u>6</u>
Total	8	0	12	3	4	0	27
Average/Year	1.6	0	2.4	< 1	< 1	0	5.4

3.

Traffic Characteristics of the Proposed Development

In order to properly evaluate future traffic conditions in the surrounding area, it was necessary to determine the traffic characteristics of the proposed development, including the directional distribution and volumes of traffic that it will generate.

Proposed Development Plan

As proposed, the plans call for developing the site with a 7,018 square-foot retail building that will contain a 2,300 square-foot Starbucks coffee shop with a drive-through, 4,718 square feet of retail space and a parking lot with 24 parking spaces.

Access to the proposed development will be provided via an access drive serving the site located approximately 200 feet east of Ellsworth Street that is physically restricted to right-in/right-out movements only. Continued provision of the right-in/right-out access drive will be beneficial to the on-site circulation of the proposed development as it will provide direct access to the drive through for westbound vehicles, minimizing the number of times vehicles circulate the proposed commercial building. Additionally, this access drive will reduce the traffic load at the intersection of Ogden Avenue with the North Town Plaza easterly access drive.

Additional access will be provided via cross access to the easterly access drive serving North Town Plaza. It should be noted that the proposed development will eliminate an existing full movement access drive on Ogden Avenue serving the site located approximately 80 feet east of Ellsworth Street thus improving the traffic flow by reducing the number of curb cuts along Ogden Avenue.

A copy of the preliminary site plan depicting the proposed development and access is included in the Appendix.

Directional Distribution

The directions from which patrons and employees of the retail development will approach and depart the site were estimated based on existing travel patterns, as determined from the traffic counts. **Figure 5** illustrates the directional distribution of the development-generated traffic.

Estimated Site Traffic Generation

The volume of traffic generated by a development is based on the type of land uses and the size of the development. The number of peak hour vehicle trips estimated to be generated by the proposed development of a 2,300 square-foot Starbucks coffee shop with a drive-through and 4,718 square feet of retail is based on vehicle trip generation rates contained in *Trip Generation Manual*, 9th Edition, published by the Institute of Transportation Engineers (ITE). It should be noted that surveys conducted by ITE have shown that a considerable number of trips made to coffee shops are diverted from the existing traffic on the area roadways. This is particularly true during the weekday morning and evening peak hours when traffic is diverted from the home-to-work and work-to-home trips. Such diverted trips are referred to as pass-by traffic. These surveys indicate that on average of 89 percent of the peak hour trips generated by a coffee shop are diverted from existing traffic on the adjacent roads. However, in order to provide a conservative (worst-case) analysis, a pass-by reduction of only 70 percent was applied to the site-generated traffic volumes. Additionally, a ten percent interaction reduction was applied to the trip generation for the Starbucks coffee shop due to the cross access to the Jewel-Osco and the North Town Plaza. **Table 4** shows the site-generated traffic volumes for the proposed development.

Table 4
ESTIMATED SITE-GENERATED TRAFFIC VOLUMES

ITE Land Use Code	Type/Size	Weekday Morning Peak Hour			Weekday Evening Peak Hour			Daily Two-Way Trips
		In	Out	Total	In	Out	Total	
937	Starbucks (2,300 s.f.)	118	113	231	49	49	98	1882
826	Retail (4,718 s.f.)	<u>5</u>	<u>5</u>	<u>10</u>	<u>6</u>	<u>7</u>	<u>13</u>	<u>209</u>
	<i>10% Interaction Reduction</i>	-12	-11	-23	-5	-5	-10	-188
	<i>70% Pass-By Reduction for Starbucks</i>	-73	-73	-146	-31	-31	-62	-1186
	Total New Trips	38	34	72	19	20	39	717

It should be noted that the proposed Starbucks coffee shop will be a relocation of the existing Starbucks coffee shop located within the North Town Plaza at 111 East Ogden Ave. Therefore, this trip generation is conservative as it assumes all the traffic projected to be generated by the proposed Starbucks will be new trips to the roadway network. Additionally, no trips were removed from the roadway network that are currently generated by the existing Starbucks.

4.

Projected Traffic Conditions

The total projected traffic volumes include the existing traffic volumes, increase in background traffic due to ambient growth, and the traffic estimated to be generated by the proposed subject development.

Development Traffic Assignment

The estimated weekday morning and evening peak hour traffic volumes that will be generated by the proposed development were assigned to the roadway system in accordance with the previously described directional distribution (Figure 5). The total new traffic assignment for the commercial development is illustrated in **Figure 6**. The total pass-by traffic assignment for the commercial development is illustrated in **Figure 7**.

Background Traffic Conditions

The existing traffic volumes (Figure 4) were increased by a regional growth factor to account for the increase in existing traffic related to regional growth in the area (i.e., not attributable to any particular planned development). Based on ADT projections provided by the Chicago Metropolitan Agency for Planning (CMAP) in a letter dated January 4, 2017, an increase of approximately one-half of a percent per year for six years (buildout year plus five years) was applied to the through volumes along Ogden Avenue to project Year 2022 conditions. A copy of the CMAP 2040 projections letter is included in the Appendix.

Total Projected Traffic Volumes

The development-generated new and pass-by traffic was added to the existing traffic volumes accounting for background growth to determine the Year 2022 total projected traffic volumes, shown in **Figure 8**.



NORTH TOWN
PLAZA EASTERLY
ACCESS DRIVE

NORTH TOWN
PLAZA WESTERLY
ACCESS DRIVE



15 (9)
13 (7)

10 (100)
10 (100)
10 (100)

19 (11)

6 (4)
3 (2)
14 (7)
3 (2)

OGDEN
AVENUE

21 (10)

21 (10)

ELLSWORTH
STREET

LEGEND
00 - AM PEAK HOUR (7:15-8:15 AM)
(00) - PM PEAK HOUR (4:45-5:45 PM)

CENTER
STREET

PROJECT:

Proposed Retail Development
Naperville, Illinois

TITLE:

Estimated Site-Generated Traffic Assignment

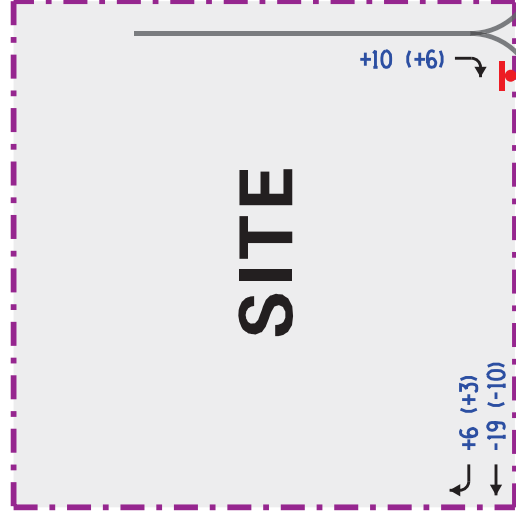


Figure: 6



NORTH TOWN
PLAZA EASTERLY
ACCESS DRIVE

NORTH TOWN
PLAZA WESTERLY
ACCESS DRIVE



+44 (+15)
+19 (+10)
+6 (+3)
-19 (-10)
+10 (+6)
+23 (+13)
-23 (-13)

OGDEN
AVENUE

ELLSWORTH
STREET

CENTER
STREET

LEGEND

00 - AM PEAK HOUR (7:15-8:15 AM)
(00) - PM PEAK HOUR (4:45-5:45 PM)

PROJECT:

Proposed Retail Development
Naperville, Illinois

TITLE:

Estimated Pass-By Traffic Assignment

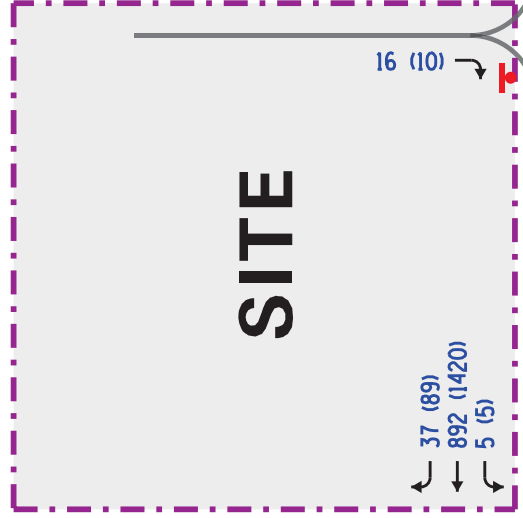


Figure: 7



NORTH TOWN
PLAZA EASTERLY
ACCESS DRIVE

NORTH TOWN
PLAZA WESTERLY
ACCESS DRIVE



73 (52)

0 (0)

46 (66)

41 (42)

894 (1430)

7 (14)

4 (10)

0 (2)

51 (80)

OGDEN
AVENUE

1491 (1308)

77 (36)

1395 (1255)

6 (17)

23 (6)

1 (0)

2 (1)

21 (19)

1451 (1292)

17 (13)

ELLSWORTH
STREET

LEGEND

00 - AM PEAK HOUR (7:15-8:15 AM)
(00) - PM PEAK HOUR (4:45-5:45 PM)

CENTER
STREET

PROJECT:

Proposed Retail Development
Naperville, Illinois

TITLE:

Total Projected Traffic Volumes



Figure: 8

5.

Traffic Analysis and Recommendations

The following provides an evaluation conducted for the weekday morning and weekday evening peak hours. The analysis includes conducting capacity analyses to determine how well the roadway system and access drives are projected to operate and whether any roadway improvements or modification are required.

Traffic Analyses

Roadway and adjacent or nearby intersection analyses were performed for the weekday morning and weekday evening peak hours for the existing (Year 2016) and future projected (Year 2022) traffic volumes.

The traffic analyses were performed using the methodologies outlined in the Transportation Research Board's *Highway Capacity Manual (HCM)*, 2010 and analyzed using the HCS 2010 computer software.

The analyses for the unsignalized intersections determine the average control delay to vehicles at an intersection. Control delay is the elapsed time from a vehicle joining the queue at a stop sign (includes the time required to decelerate to a stop) until its departure from the stop sign and resumption of free flow speed. The methodology analyzes each intersection approach controlled by a stop sign and considers traffic volumes on all approaches and lane characteristics.

The ability of an intersection to accommodate traffic flow is expressed in terms of level of service, which is assigned a letter from A to F based on the average control delay experienced by vehicles passing through the intersection. The *Highway Capacity Manual* definitions for levels of service and the corresponding control delay for signalized intersections and unsignalized intersections are included in the Appendix of this report.

Summaries of the traffic analysis results showing the level of service and overall intersection delay (measured in seconds) for the existing and Year 2022 total projected conditions are presented in **Tables 5** through **7**, respectively. A discussion of the intersections follows. Summary sheets for the capacity analyses are included in the Appendix.

It should be noted that the capacity analyses conducted are conservative as the traffic generated by the existing Starbucks coffee shop was not removed from the roadway network and existing access drives.

Table 5

CAPACITY ANALYSIS RESULTS - UNSIGNALIZED

OGDEN AVENUE WITH ELLSWORTH STREET/NORTH TOWN PLAZA ACCESS DRIVE

Intersection	Weekday Morning Peak Hour		Weekday Evening Peak Hour	
	LOS	Delay	LOS	Delay
Existing Conditions				
• Northbound Approach	C	20.3	F	125.2
• Southbound Approach	C	23.0	E	40.3
• Eastbound Left-Turns	B	10.0	B	13.4
• Westbound Left-Turns	B	12.9	B	11.7
Projected Conditions				
• Northbound Approach	C	22.4	F	160.2
• Southbound Approach	F	56.4	F	90.5
• Eastbound Left-Turns	B	10.7	B	14.3
• Westbound Left-Turns	B	12.9	B	11.9
LOS = Level of Service Delay is measured in seconds Note: The above results are conservative due to the following assumptions: • A 70 percent pass-by reduction was used versus the 89 percent recommended by ITE. • The proposed Starbucks is a relocation of an existing Starbucks within the North Town Plaza. However, all of the projected Starbucks traffic was assumed to be new. • A ten (10) percent interaction reduction was assumed versus the 15 percent reduction recommended by ITE.				

Table 6

CAPACITY ANALYSIS RESULTS - UNSIGNALIZED

OGDEN AVENUE WITH CENTER STREET/NORTH TOWN PLAZA ACCESS DRIVE

Intersection	Weekday Morning Peak Hour		Weekday Evening Peak Hour	
	LOS	Delay	LOS	Delay
Existing Conditions				
• Northbound Approach	C	24.9	C	19.0
• Southbound Approach	B	14.0	E	41.8
• Eastbound Left-Turns	B	10.0	B	13.0
• Westbound Left-Turns	B	14.3	B	11.8
Projected Conditions				
• Northbound Approach	D	28.1	C	20.2
• Southbound Approach	B	14.5	F	50.9
• Eastbound Left-Turns	B	10.2	B	13.4
• Westbound Left-Turns	B	14.9	B	12.1
LOS = Level of Service Delay is measured in seconds.				

Table 7

CAPACITY ANALYSIS RESULTS – UNSIGNALIZED

OGDEN AVENUE WITH RIGHT-IN/RIGHT-OUT ACCESS DRIVE

Intersection	Weekday Morning Peak Hour		Weekday Evening Peak Hour	
	LOS	Delay	LOS	Delay
Projected Conditions				
• Southbound Approach	B	12.2	C	16.2
LOS = Level of Service Delay is measured in seconds.				

Discussion and Recommendations

The following summarizes how the intersections are projected to operate and identifies any roadway and traffic control improvements necessary to accommodate the development traffic.

Ogden Avenue with Ellsworth Street/North Town Plaza Easterly Access Drive

The results of the capacity analysis indicate that the northbound approach operates at the acceptable level of service (LOS) C during the weekday morning peak hour and at LOS F during the weekday evening peak hour. The southbound approach currently operates at LOS C during the weekday morning peak hour and LOS E during the weekday evening peak hour. Assuming future conditions, the northbound approach is projected to continue operating at the existing level of service with increases in delay of approximately two seconds during the weekday morning peak hour and approximately 35 seconds during the weekday evening peak hour. The southbound approach is projected to operate at LOS F during both peak hours.

However, this level of service is expected for a minor roadway such as Ellsworth Street and for access driveways that have an unsignalized intersection with a major roadway such as Ogden Avenue. Additionally, the results of the capacity analyses do not take into consideration the gaps created in the Ogden Avenue traffic stream by the signalized intersections of Ogden Avenue with Washington Street located approximately 800 feet to the west and Ogden Avenue with Loomis Street located 850 feet to the east. This is confirmed by the gap study evaluation discussed later in the next section of this report which shows that adequate gaps exist in the Ogden Avenue traffic stream to accommodate turning movements to and from Ogden Avenue and the North Town Plaza easterly access drive. Field observations conducted during the peak hours indicated that westbound queues did not extend beyond the easterly access drive during the morning peak hour and extended beyond the easterly access drive five times only during the evening peak hour. When queues extended beyond the easterly access drive, courtesy gaps were provided to southbound left-turning vehicles.

The results of the capacity analyses indicated that eastbound and westbound left-turn movements are projected to continue operating at LOS B during both peak hours with increases in delay of less than one second and 95th percentile queues of one to two vehicles. Furthermore, the proposed development will only increase the traffic traversing this intersection by approximately two percent or less. As such, the proposed development will have a limited impact on the operation of this intersection and no roadway or traffic control improvements will be required.

Ogden Avenue with Center Street/North Town Plaza Westerly Access Drive

The results of the capacity analysis indicate that the northbound approach currently operates at LOS C during the weekday morning and weekday evening peak hour and the southbound approach is projected to operate at LOS B during the weekday morning peak hour and at LOS E during the weekday evening peak hour. Assuming future conditions, the northbound approach is projected to operate at LOS D during the weekday morning peak hour and LOS C during the weekday evening peak hour with increases in delay of three seconds and one second, respectively. The southbound approach is projected to operate at LOS B during the weekday morning peak hour and at LOS F during the weekday evening peak hour with increases in delay of less than one second and nine seconds, respectively.

These results are consistent with the results for the intersection of Ogden Avenue with the North Town Plaza easterly access drive and are typical of these types of intersections. The eastbound and westbound left-turn movements are projected to continue operating at LOS B during both peak hours with increases in delay of less than one second and 95th percentile queues of one to two vehicles. Field observations during the peak hours indicated that during the weekday morning peak hour westbound queues along Ogden Avenue occasionally extend beyond the westerly access drive and during the weekday evening peak hour westbound queues on Ogden Avenue regularly extend beyond the westerly access drive. Courtesy gaps are generally provided for eastbound left-turning vehicles and seldom provided for southbound left-turning vehicles. These conditions resulted in a low volume of traffic turning left from the westerly access drive onto Ogden Avenue.

Ogden Avenue with Right-In/Right-Out Access Drive

The results of the capacity analysis indicate that the southbound approach is projected to operate at LOS B during the weekday morning peak hour and at LOS C during the weekday evening peak hour with 95th percentile queues of one to two vehicles. As previously indicated, the provision of this access drive will allow westbound vehicles direct access to the drive through entrance, particularly the morning pass-by vehicles, reducing the number of times vehicles must circulate the building. Additionally, this access driveway will reduce the traffic load experienced at the intersection of Ogden Avenue with the North Town Plaza easterly access drive. As such, this access drive will be adequate in accommodating the traffic projected to be generated by the proposed development and will provide efficient and flexible access.

Gap Study Evaluation

Table 8 shows the number of available gaps compared to the number of required gaps that are needed to accommodate the projected traffic turning between Ogden Avenue and the North Town Plaza easterly access drive. As shown in Tables 8, there is a sufficient number of gaps available in the Ogden Avenue traffic stream to accommodate the eastbound left turns from Ogden Avenue onto the North Town Plaza easterly access drive, southbound right-turns from the North Town Plaza easterly access drive onto Ogden Avenue and southbound left-turns from the North Town Plaza easterly access drive onto Ogden Avenue during both the weekday morning and weekday evening peak hours of adjacent roadway traffic. This indicated that the intersection of Ogden Avenue with Ellsworth Street/North Town Plaza easterly access drive will operate adequately.

Table 8

REQUIRED GAPS ON OGDEN AVENUE AT ELLSWORTH STREET

Maneuver	Weekday Morning Peak Hour		Weekday Evening Peak Hour	
	Available Gaps	Required Gaps	Available Gaps	Required Gaps
Eastbound Left Turns	767	65	398	25
Southbound Right Turns	352	32	158	17
Southbound Left Turns	62	59	33	24

On-Site Circulation and Design

As proposed, the pick-up window will be located on the west side of the building with the order board located on the north side of the building. Motorists will enter the drive-through lane from the northeast side of the building and travel around the north and west sides of the building. The drive-through lane should be under stop sign control at its intersection with the east-west drive aisle. Based on City of Naperville Code of Ordinances, the proposed drive-through should provide stacking for four vehicles at each bay window and ordering station. As designed, the drive-through lane will provide stacking for ten vehicles (six vehicles from the order board and four vehicles from the pick-up window), meeting City code.

Studies conducted by KLOA, Inc. at other coffee/donut stores have shown that the average queue observed from the order board was four vehicles occurring during the morning peak period. As such, the proposed design with stacking for four vehicles from the order board will be adequate to accommodate the peak demand of the drive-through operation.

Based on a review of the plan, the provision of a donut/coffee shop with a drive-through lane can be accommodated from a traffic standpoint without undue congestion for the following reasons:

- Donut/coffee stores draw the majority of their traffic during the peak period (as much as 89 percent) from the existing traffic on the adjacent roadway system and, as such, add minimal new traffic to the roadway system during the critical peak periods.
- The drive-through operation's peak demand will occur in the morning when the other uses within the proposed retail space are either closed or generating a limited number of trips. This variation in traffic usage allows for good synergy between the coffee/donut shop and the rest of the development. As a result, and in the unlikely event that stacking demand exceeds the proposed drive-through lane, adequate room exists within the drive aisle on the east side of the building to accommodate the vehicles without negatively impacting on-site circulation.

In order to provide efficient and orderly internal traffic flow, the following is recommended:

- Wayfinding signs directing traffic to the drive-through lane should be provided at the right-in/right-out access drive, at the cross access and at the entrance of the drive-through lane.
- "Do Not Enter" signs facing south should be posted at the exit throat of the drive-through lane.
- Exiting movements from the drive-through lane should be under stop sign control.
- Clear lines of sight to the east for vehicles exiting the drive-through lane should be maintained.

Parking Evaluation

As proposed, the development will provide 24 parking spaces. Based on City of Naperville Code of Ordinances, parking for general retail space and coffee shops is to be provided at 4 spaces per 1,000 square feet for a total of 28 spaces. This results in a deficit of 4 parking spaces. However, the peak parking demand for the proposed coffee shop will occur in the morning when the other retail developments are either not open or not generating a significant amount of traffic. **Table 9** summarizes the hourly parking demand based on the time of day factors published in the ITE *Parking Generation Manual*, 4th Edition. As can be seen from Table 9, adequate parking will be provided for the retail center as the proposed uses are complementary and the peak parking demands for each use will occur at different times throughout the day. Therefore, the proposed parking supply of 24 parking spaces will be adequate in accommodating the projected parking demand of the proposed commercial development.

Table 9
PROJECTED HOURLY PARKING DEMAND

Hour	Starbucks Parking Demand		Retail Parking Demand		Total Parking Demand	
	Friday	Saturday	Friday	Saturday	Friday	Saturday
7:00 AM	7	9	1	3	8	12
8:00 AM	9	8	3	5	12	11
9:00 AM	6	7	7	11	13	14
10:00 AM	5	6	13	14	18	19
11:00 AM	4	6	17	17	21	23
12:00 PM	4	4	19	19	23	23
1:00 PM	2	3	18	19	20	22
2:00 PM	2	3	18	19	20	22
3:00 PM	2	3	17	17	19	20
4:00 PM	2	3	15	14	17	17
5:00 PM	2	3	12	13	14	16
6:00 PM	2	3	12	14	14	17
7:00 PM	2	3	15	10	17	13
8:00 PM	2	3	13	10	15	13
9:00 PM	2	3	8	8	10	11
Note: The parking demand between 2:00 P.M. and 9:00 P.M. for Starbucks was assumed as the hourly distribution for coffee shops has no information past 2:00 P.M.						

6. Conclusion

Based on the preceding analyses and recommendations, the following conclusions have been made:

- The development-generated traffic will not have a significant impact on area roadways.
- Traffic existing from the North Town Plaza easterly access drive or Ellsworth Street onto Ogden Avenue will continue to experience delays due to the high volume of through traffic along Ogden Avenue.
- Adequate gaps exist in the Ogden Avenue traffic stream to accommodate the projected left and/or right turning movements from the North Town Plaza easterly access drive.
- Providing access off Ogden Avenue and via the cross access will be adequate in accommodating the development-generated traffic and will ensure that efficient and flexible access is provided, particularly for drive-through traffic.
- The drive-through lane will provide stacking for ten vehicles, which will be adequate in accommodating the projected the peak demand of the drive-through operation.
- The proposed development will provide a sufficient number of parking spaces to accommodate the projected parking demand.

Appendix

- Traffic Count Summary Sheets
 - Site Plan
- CMAP 2040 Projections Letter
 - Level of Service Criteria
- Capacity Analysis Summary Sheets

Traffic Count Summary Sheets



Kenig Lindgren O'Hara Aboona, Inc.
9575 W. Higgins Rd., Suite 400

Rosemont, Illinois, United States 60018
(847)518-9990

Count Name: Ogden Avenue with Ellsworth
Street
Site Code:
Start Date: 12/15/2016
Page No: 1

Turning Movement Data

Start Time	Ogden Avenue Eastbound						Ogden Avenue Westbound						Ellsworth Street Northbound						Access Drive Southbound							
	U-Turn	Left	Thru	Right	Peds	App. Total	U-Turn	Left	Thru	Right	Peds	App. Total	U-Turn	Left	Thru	Right	Peds	App. Total	U-Turn	Left	Thru	Right	Peds	App. Total	Int. Total	
7:00 AM	0	3	290	2	0	295	0	2	176	3	0	181	0	0	0	1	0	1	0	4	0	0	0	0	4	481
7:15 AM	0	0	354	1	0	355	0	0	247	6	0	253	0	2	0	3	0	5	0	1	0	3	0	4	617	
7:30 AM	0	7	344	1	0	352	0	1	246	10	0	257	0	1	0	5	0	6	0	6	0	4	0	10	625	
7:45 AM	0	2	353	2	0	357	0	3	191	4	0	198	0	1	0	10	0	11	0	4	0	6	0	10	576	
Hourly Total	0	12	1341	6	0	1359	0	6	860	23	0	889	0	4	0	19	0	23	0	15	0	13	0	28	2299	
8:00 AM	0	3	346	2	2	351	0	1	192	8	0	201	0	0	0	5	0	5	0	3	0	1	0	4	561	
8:15 AM	0	4	291	0	0	295	0	1	155	3	0	159	0	1	0	5	0	6	0	4	0	6	0	10	470	
8:30 AM	0	2	313	1	0	316	0	1	177	11	0	189	0	0	0	2	0	2	0	4	0	0	0	4	511	
8:45 AM	0	2	286	1	0	289	0	1	204	8	0	213	0	0	0	4	0	4	0	3	0	2	0	5	511	
Hourly Total	0	11	1236	4	2	1251	0	4	728	30	0	762	0	1	0	16	0	17	0	14	0	9	0	23	2053	
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
4:00 PM	0	2	286	1	0	289	0	1	322	18	0	341	0	0	0	3	1	4	0	9	1	9	0	19	653	
4:15 PM	0	6	306	3	0	315	0	1	332	14	0	347	0	0	0	0	0	0	0	9	1	11	0	21	683	
4:30 PM	0	2	315	3	0	320	0	0	330	18	0	348	0	1	1	1	0	3	0	8	0	5	0	13	684	
4:45 PM	0	5	301	5	0	311	0	1	325	27	0	353	0	0	0	1	0	1	0	8	0	12	0	20	685	
Hourly Total	0	15	1208	12	0	1235	0	3	1309	77	0	1389	0	1	4	3	0	8	0	34	2	37	0	73	2705	
5:00 PM	0	1	334	3	0	338	0	1	337	21	0	359	0	0	0	0	0	0	0	5	0	12	0	17	714	
5:15 PM	0	2	271	3	0	276	0	2	342	21	0	365	0	0	0	0	0	0	0	7	0	12	0	19	660	
5:30 PM	0	3	320	6	0	329	0	1	359	15	0	375	0	0	1	0	0	1	0	8	0	13	0	21	726	
5:45 PM	0	6	316	6	0	328	0	4	329	11	0	344	0	0	0	0	0	0	0	8	0	13	0	21	693	
Hourly Total	0	12	1241	18	0	1271	0	8	1367	68	0	1443	0	0	1	1	0	1	0	28	0	50	0	78	2793	
Grand Total	0	50	5026	40	2	5116	0	21	4264	198	0	4483	0	6	5	38	0	49	0	91	2	109	0	202	9850	
Approach %	0.0	1.0	98.2	0.8	-	-	0.0	0.5	95.1	4.4	-	-	0.0	12.2	10.2	77.6	-	-	0.0	45.0	1.0	54.0	-	-	-	
Total %	0.0	0.5	51.0	0.4	-	51.9	0.0	0.2	43.3	2.0	-	45.5	0.0	0.1	0.1	0.4	-	0.5	0.0	0.9	0.0	1.1	-	2.1	-	
Lights	0	46	4947	40	-	5033	0	21	4168	195	-	4384	0	6	5	37	-	48	0	88	2	104	-	194	9659	
% Lights	-	92.0	98.4	100.0	-	98.4	-	100.0	97.7	98.5	-	97.8	-	100.0	100.0	97.4	-	98.0	-	96.7	100.0	95.4	-	96.0	98.1	
Buses	0	0	33	0	-	33	0	0	41	0	-	41	0	0	0	0	-	0	0	0	0	0	0	0	74	
% Buses	-	0.0	0.7	0.0	-	0.6	-	0.0	1.0	0.0	-	0.9	-	0.0	0.0	0.0	-	0.0	-	0.0	0.0	0.0	-	0.0	0.8	
Single-Unit Trucks	0	1	38	0	-	39	0	0	46	2	-	48	0	0	0	1	-	1	0	3	0	3	-	6	94	
% Single-Unit Trucks	-	2.0	0.8	0.0	-	0.8	-	0.0	1.1	1.0	-	1.1	-	0.0	0.0	2.6	-	2.0	-	3.3	0.0	2.8	-	3.0	1.0	
Articulated Trucks	0	3	8	0	-	11	0	0	9	1	-	10	0	0	0	0	-	0	0	0	0	2	-	2	23	
% Articulated Trucks	-	6.0	0.2	0.0	-	0.2	-	0.0	0.2	0.5	-	0.2	-	0.0	0.0	0.0	-	0.0	-	0.0	0.0	1.8	-	1.0	0.2	
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	
% Bicycles on Road	-	0.0	0.0	0.0	-	0.0	-	0.0	0.0	0.0	-	0.0	-	0.0	0.0	0.0	-	0.0	-	0.0	0.0	0.0	-	0.0	0.0	
Pedestrians	-	-	-	-	2	-	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	0	-	-	

Rosemont, Illinois, United States 60018
(847)518-9990

Page No: 4

Turning Movement Peak Hour Data (7:15 AM)

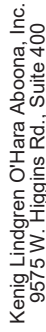
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Rosemont, Illinois, United States 60018
(847)518-9990

Site Code:
Start Date: 12/15/2016
Page No: 6

Turning Movement Peak Hour Data (4:45 PM)

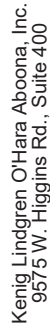
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Rosemont, Illinois, United States 60018
(847)518-9990

Turning Movement Data

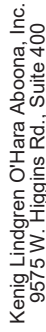
Turning Movement Data



Count Name: Ogden Avenue with Center Street
Site Code:
Start Date: 12/15/2016
Page No: 4

Turning Movement Peak Hour Data (7:15 AM)

Start Time	Ogden Avenue Eastbound						Ogden Avenue Westbound						Center Street Northbound						Jewel Osco Southbound						
	U-Turn	Left	Thru	Right	Peds	App. Total	U-Turn	Left	Thru	Right	Peds	App. Total	U-Turn	Left	Thru	Right	Peds	App. Total	U-Turn	Left	Thru	Right	Peds	App. Total	Int. Total
7:15 AM	0	5	353	6	0	364	0	2	245	8	0	255	0	1	0	0	1	1	0	0	0	9	0	9	629
7:30 AM	0	3	337	4	0	344	0	0	243	9	0	252	0	0	0	0	11	0	0	0	0	8	0	8	615
7:45 AM	0	8	354	4	0	366	0	3	178	16	0	197	0	1	0	7	0	8	0	2	0	12	0	14	585
8:00 AM	0	5	337	3	0	345	0	2	184	8	0	194	0	0	1	5	0	6	0	2	0	22	0	24	569
Total	0	21	1381	17	0	1419	0	7	850	41	0	898	0	2	1	23	1	26	0	4	0	51	0	55	2398
Approach %	0.0	1.5	97.3	1.2	-	-	0.0	0.8	94.7	4.6	-	-	0.0	7.7	3.8	88.5	-	-	0.0	7.3	0.0	92.7	-	-	-
Total %	0.0	0.9	57.6	0.7	-	59.2	0.0	0.3	35.4	1.7	-	37.4	0.0	0.1	0.0	1.0	-	1.1	0.0	0.2	0.0	2.1	-	2.3	-
PHF	0.000	0.656	0.975	0.708	-	0.969	0.000	0.583	0.867	0.641	-	0.880	0.000	0.500	0.250	0.523	-	0.591	0.000	0.500	0.000	0.580	-	0.573	0.953
Lights	0	21	1355	17	-	1393	0	6	811	38	-	855	-	2	1	22	-	25	0	3	0	51	-	54	2327
% Lights	-	100.0	98.1	100.0	-	98.2	-	85.7	95.4	92.7	-	95.2	-	100.0	100.0	95.7	-	96.2	-	75.0	-	100.0	-	98.2	97.0
Buses	0	0	12	0	-	12	0	0	16	0	-	16	0	0	0	0	-	0	0	0	0	0	-	0	28
% Buses	-	0.0	0.9	0.0	-	0.8	-	0.0	1.9	0.0	-	1.8	-	0.0	0.0	0.0	-	0.0	-	0.0	-	0.0	-	0.0	1.2
Single-Unit Trucks	0	0	12	0	-	12	0	1	16	2	-	19	0	0	0	1	-	1	0	0	0	0	-	0	32
% Single-Unit Trucks	-	0.0	0.9	0.0	-	0.8	-	14.3	1.9	4.9	-	2.1	-	0.0	0.0	4.3	-	3.8	-	0.0	-	0.0	-	0.0	1.3
Articulated Trucks	0	0	2	0	-	2	0	0	7	1	-	8	0	0	0	0	-	0	0	1	0	0	-	1	11
% Articulated Trucks	-	0.0	0.1	0.0	-	0.1	-	0.0	0.8	2.4	-	0.9	-	0.0	0.0	0.0	-	0.0	-	25.0	-	0.0	-	1.8	0.5
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	-	0.0	0.0	0.0	-	0.0	-	0.0	0.0	0.0	-	0.0	-	0.0	0.0	0.0	-	0.0	-	0.0	-	0.0	-	0.0	0.0
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	-	-	-



Count Name: Ogden Avenue with Center Street
Site Code:
Start Date: 12/15/2016
Page No: 6

Turning Movement Peak Hour Data (4:45 PM)

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Site Plan

CMAP 2040 Projections Letter



Chicago Metropolitan Agency for Planning

233 South Wacker Drive
Suite 800
Chicago, Illinois 60606
312 454 0400
www.cmap.illinois.gov

January 3, 2017

Brendan S. May
Consultant
Kenig, Lindgren, O'Hara and Aboona, Inc.
9575 West Higgins Road
Suite 400
Rosemont, IL 60018

Subject: Ogden Avenue east of Washington Street
IDOT

Dear Mr. May:

In response to a request made on your behalf and dated January 3, 2017, we have developed year 2040 average daily traffic (ADT) projection of 32,300 for the subject location.

Traffic projections are developed using existing ADT data provided in the request letter and the results from the October 2016 CMAP Travel Demand Analysis. The regional travel model uses CMAP 2040 socioeconomic projections and assumes the implementation of the GO TO 2040 Comprehensive Regional Plan for the Northeastern Illinois area.

If you have any questions, please call me at (312) 386-8806.

Sincerely,

A handwritten signature in black ink, appearing to read 'Jose Rodriguez'.

Jose Rodriguez, PTP, AICP
Senior Planner, Research & Analysis

cc: Fortmann (IDOT)
S:\AdminGroups\ResearchAnalysis\TrafficForecasts_CY2017\Naperville\du-01-17\du-01-17.docx

Level of Service Criteria

LEVEL OF SERVICE CRITERIA

Signalized Intersections		
Level of Service	Interpretation	Average Control Delay (seconds per vehicle)
A	Favorable progression. Most vehicles arrive during the green indication and travel through the intersection without stopping.	≤10
B	Good progression, with more vehicles stopping than for Level of Service A.	>10 - 20
C	Individual cycle failures (i.e., one or more queued vehicles are not able to depart as a result of insufficient capacity during the cycle) may begin to appear. Number of vehicles stopping is significant, although many vehicles still pass through the intersection without stopping.	>20 - 35
D	The volume-to-capacity ratio is high and either progression is ineffective or the cycle length is too long. Many vehicles stop and individual cycle failures are noticeable.	>35 - 55
E	Progression is unfavorable. The volume-to-capacity ratio is high and the cycle length is long. Individual cycle failures are frequent.	>55 - 80
F	The volume-to-capacity ratio is very high, progression is very poor and the cycle length is long. Most cycles fail to clear the queue.	>80.0
Unsignalized Intersections		
Level of Service	Average Total Delay (SEC/VEH)	
A	0 - 10	
B	> 10 - 15	
C	> 15 - 25	
D	> 25 - 35	
E	> 35 - 50	
F	> 50	

Source: *Highway Capacity Manual*, 2010.

Capacity Analysis Summary Sheets

HCS 2010 Two-Way Stop-Control Report

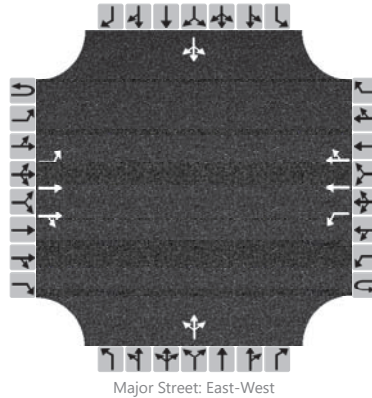
General Information

Analyst	BSM
Agency/Co.	KLOA, Inc.
Date Performed	1/4/2017
Analysis Year	2016
Time Analyzed	AM Peak Hour
Intersection Orientation	East-West
Project Description	16-303

Site Information

Intersection	Ogden with Ellsworth
Jurisdiction	IDOT
East/West Street	Ogden Avenue
North/South Street	Ellsworth Street
Peak Hour Factor	0.95
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	2	0	0	1	2	0		0	1	0		0	1	0
Configuration		L	T	TR		L	T	TR			LTR				LTR	
Volume, V (veh/h)		12	1397	6		5	880	28		4	0	23		14	0	14
Percent Heavy Vehicles (%)		0				0				0	0	4		14	0	7
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Left Only								1							

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		13				5					28				30	
Capacity, c (veh/h)		728				462					264				230	
v/c Ratio		0.02				0.01					0.11				0.13	
95% Queue Length, Q ₉₅ (veh)		0.1				0.0					0.4				0.4	
Control Delay (s/veh)		10.0				12.9					20.3				23.0	
Level of Service, LOS		B				B					C				C	
Approach Delay (s/veh)	0.1				0.1				20.3				23.0			
Approach LOS									C				C			

HCS 2010 Two-Way Stop-Control Report

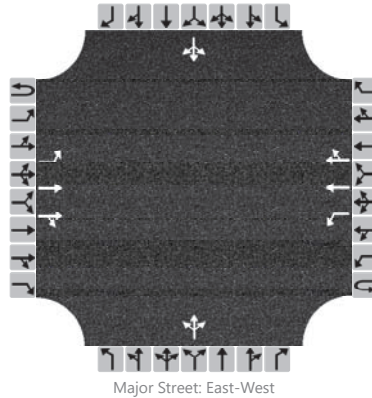
General Information

Analyst	BSM
Agency/Co.	KLOA, Inc.
Date Performed	1/4/2017
Analysis Year	2016
Time Analyzed	PM Peak Hour
Intersection Orientation	East-West
Project Description	16-303

Site Information

Intersection	Ogden with Ellsworth
Jurisdiction	IDOT
East/West Street	Ogden Avenue
North/South Street	Ellsworth Street
Peak Hour Factor	0.96
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	2	0	0	1	2	0		0	1	0		0	1	0
Configuration		L	T	TR		L	T	TR			LTR				LTR	
Volume, V (veh/h)		11	1233	17		5	1385	84		0	1	1		28	0	49
Percent Heavy Vehicles (%)		0				0				0	0	0		0	0	0
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Left Only								1							

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		11				5					2				80	
Capacity, c (veh/h)		441				539					32				179	
v/c Ratio		0.02				0.01					0.06				0.45	
95% Queue Length, Q ₉₅ (veh)		0.1				0.0					0.2				2.1	
Control Delay (s/veh)		13.4				11.7					125.2				40.3	
Level of Service, LOS		B				B					F				E	
Approach Delay (s/veh)	0.1				0.0				125.2				40.3			
Approach LOS									F				E			

HCS 2010 Two-Way Stop-Control Report

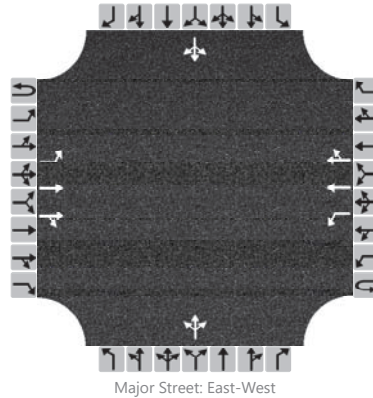
General Information

Analyst	BSM
Agency/Co.	KLOA, Inc.
Date Performed	1/4/2017
Analysis Year	2022
Time Analyzed	AM Peak Hour
Intersection Orientation	East-West
Project Description	16-303

Site Information

Intersection	Ogden with Ellsworth
Jurisdiction	IDOT
East/West Street	Ogden Avenue
North/South Street	Ellsworth Street
Peak Hour Factor	0.95
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	2	0	0	1	2	0		0	1	0		0	1	0
Configuration		L	T	TR		L	T	TR			LTR				LTR	
Volume, V (veh/h)		77	1395	6		5	892	37		4	0	23		73	0	46
Percent Heavy Vehicles (%)		0				0				0	0	4		3	0	2
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Left Only								1							

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		81				5					28				125	
Capacity, c (veh/h)		714				463					235				187	
v/c Ratio		0.11				0.01					0.12				0.67	
95% Queue Length, Q ₉₅ (veh)		0.4				0.0					0.4				4.0	
Control Delay (s/veh)		10.7				12.9					22.4				56.4	
Level of Service, LOS		B				B					C				F	
Approach Delay (s/veh)	0.6				0.1				22.4				56.4			
Approach LOS									C				F			

HCS 2010 Two-Way Stop-Control Report

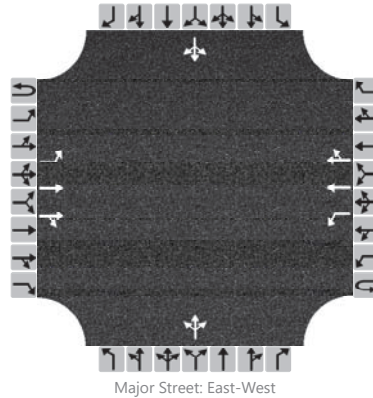
General Information

Analyst	BSM
Agency/Co.	KLOA, Inc.
Date Performed	1/4/2017
Analysis Year	2022
Time Analyzed	PM Peak Hour
Intersection Orientation	East-West
Project Description	16-303

Site Information

Intersection	Ogden with Ellsworth
Jurisdiction	IDOT
East/West Street	Ogden Avenue
North/South Street	Ellsworth Street
Peak Hour Factor	0.96
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	2	0	0	1	2	0		0	1	0		0	1	0
Configuration		L	T	TR		L	T	TR			LTR				LTR	
Volume, V (veh/h)		36	1255	17		5	1420	89		0	1	1		52	0	66
Percent Heavy Vehicles (%)		0				0				0	0	0		0	0	0
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Left Only								1							

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		38				5					2					123
Capacity, c (veh/h)		425				528					25					150
v/c Ratio		0.09				0.01					0.08					0.82
95% Queue Length, Q ₉₅ (veh)		0.3				0.0					0.2					5.3
Control Delay (s/veh)		14.3				11.9					160.2					90.5
Level of Service, LOS		B				B					F					F
Approach Delay (s/veh)	0.4				0.0				160.2				90.5			
Approach LOS									F				F			

HCS 2010 Two-Way Stop-Control Report

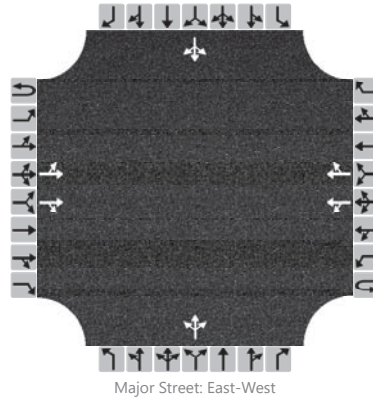
General Information

Analyst	BSM
Agency/Co.	KLOA, Inc.
Date Performed	1/4/2017
Analysis Year	2016
Time Analyzed	AM Peak Hour
Intersection Orientation	East-West
Project Description	16-303

Site Information

Intersection	Ogden with Center
Jurisdiction	IDOT
East/West Street	Ogden Avenue
North/South Street	Center Street
Peak Hour Factor	0.95
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	0	2	0		0	1	0		0	1	0
Configuration		LT		TR		LT		TR			LTR				LTR	
Volume, V (veh/h)		21	1388	17		7	850	41		2	1	23		4	0	51
Percent Heavy Vehicles (%)		0				14				0	0	0		0	0	0
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Left Only								1							

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		22				7					27				58	
Capacity, c (veh/h)		739				396					208				459	
v/c Ratio		0.03				0.02					0.13				0.13	
95% Queue Length, Q ₉₅ (veh)		0.1				0.1					0.4				0.4	
Control Delay (s/veh)		10.0				14.3					24.9				14.0	
Level of Service, LOS		B				B					C				B	
Approach Delay (s/veh)	0.9				0.4				24.9				14.0			
Approach LOS									C				B			

HCS 2010 Two-Way Stop-Control Report

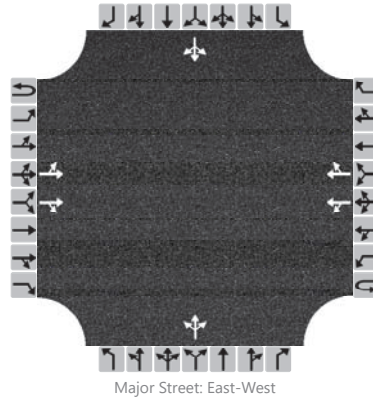
General Information

Analyst	BSM
Agency/Co.	KLOA, Inc.
Date Performed	1/4/2017
Analysis Year	2016
Time Analyzed	PM Peak Hour
Intersection Orientation	East-West
Project Description	16-303

Site Information

Intersection	Ogden with Center
Jurisdiction	IDOT
East/West Street	Ogden Avenue
North/South Street	Center Street
Peak Hour Factor	0.97
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	0	2	0		0	1	0		0	1	0
Configuration		LT		TR		LT		TR			LTR				LTR	
Volume, V (veh/h)		19	1245	13		14	1378	42		1	0	6		10	2	80
Percent Heavy Vehicles (%)		0				0				0	0	0		10	0	0
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Left Only								1							

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		20				14					7				94	
Capacity, c (veh/h)		467				541					264				188	
v/c Ratio		0.04				0.03					0.03				0.50	
95% Queue Length, Q ₉₅ (veh)		0.1				0.1					0.1				2.5	
Control Delay (s/veh)		13.0				11.8					19.0				41.8	
Level of Service, LOS		B				B					C				E	
Approach Delay (s/veh)	1.1				0.9				19.0				41.8			
Approach LOS									C				E			

HCS 2010 Two-Way Stop-Control Report

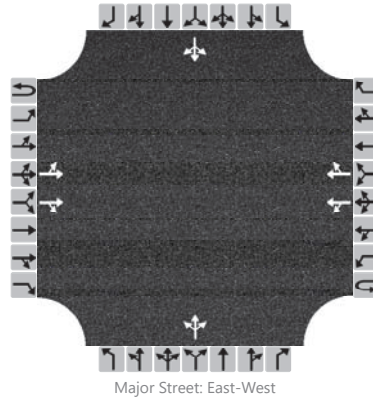
General Information

Analyst	BSM
Agency/Co.	KLOA, Inc.
Date Performed	1/4/2017
Analysis Year	2022
Time Analyzed	AM Peak Hour
Intersection Orientation	East-West
Project Description	16-303

Site Information

Intersection	Ogden with Center
Jurisdiction	IDOT
East/West Street	Ogden Avenue
North/South Street	Center Street
Peak Hour Factor	0.95
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	0	2	0		0	1	0		0	1	0
Configuration		LT		TR		LT		TR			LTR				LTR	
Volume, V (veh/h)		21	1451	17		7	894	41		2	1	23		4	0	51
Percent Heavy Vehicles (%)		0				14				0	0	0		0	0	0
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Left Only								1							

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		22				7					27				58	
Capacity, c (veh/h)		710				372					183				435	
v/c Ratio		0.03				0.02					0.15				0.13	
95% Queue Length, Q ₉₅ (veh)		0.1				0.1					0.5				0.5	
Control Delay (s/veh)		10.2				14.9					28.1				14.5	
Level of Service, LOS		B				B					D				B	
Approach Delay (s/veh)	1.2				0.4				28.1				14.5			
Approach LOS									D				B			

HCS 2010 Two-Way Stop-Control Report

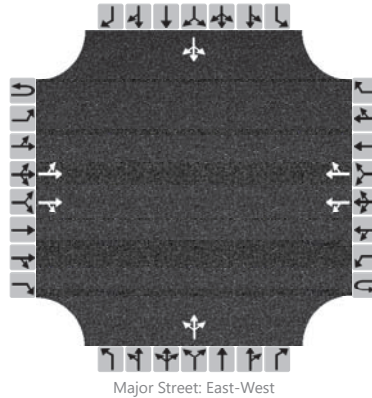
General Information

Analyst	BSM
Agency/Co.	KLOA, Inc.
Date Performed	1/4/2017
Analysis Year	2022
Time Analyzed	PM Peak Hour
Intersection Orientation	East-West
Project Description	16-303

Site Information

Intersection	Ogden with Center
Jurisdiction	IDOT
East/West Street	Ogden Avenue
North/South Street	Center Street
Peak Hour Factor	0.97
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	0	2	0		0	1	0		0	1	0
Configuration		LT		TR		LT		TR			LTR				LTR	
Volume, V (veh/h)		19	1292	13		14	1430	42		1	0	6		10	2	80
Percent Heavy Vehicles (%)		0				0				0	0	0		10	0	0
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Left Only								1							

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		20				14					7				94	
Capacity, c (veh/h)		446				519					244				168	
v/c Ratio		0.04				0.03					0.03				0.56	
95% Queue Length, Q ₉₅ (veh)		0.1				0.1					0.1				2.9	
Control Delay (s/veh)		13.4				12.1					20.2				50.9	
Level of Service, LOS		B				B					C				F	
Approach Delay (s/veh)	1.3				1.1				20.2				50.9			
Approach LOS									C				F			

HCS 2010 Two-Way Stop-Control Report

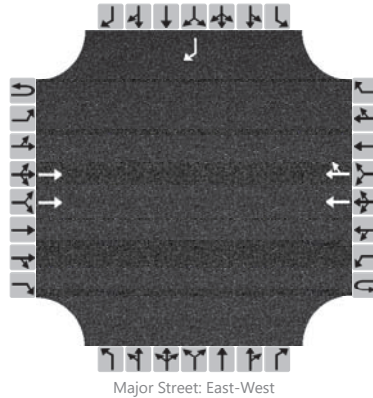
General Information

Analyst	BSM
Agency/Co.	KLOA, Inc.
Date Performed	1/4/2017
Analysis Year	2022
Time Analyzed	AM Peak Hour
Intersection Orientation	East-West
Project Description	16-303

Site Information

Intersection	Ogden with RIRO
Jurisdiction	IDOT
East/West Street	Ogden Avenue
North/South Street	Right-in/Right-out
Peak Hour Factor	0.95
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	0	2	0		0	0	0		0	0	1
Configuration			T				T	TR								R
Volume, V (veh/h)			1491				918	37								16
Percent Heavy Vehicles (%)																0
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

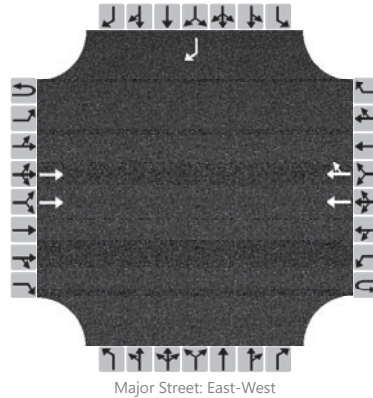
Flow Rate, v (veh/h)																17
Capacity, c (veh/h)																520
v/c Ratio																0.03
95% Queue Length, Q ₉₅ (veh)																0.1
Control Delay (s/veh)																12.2
Level of Service, LOS																B
Approach Delay (s/veh)													12.2			
Approach LOS													B			

HCS 2010 Two-Way Stop-Control Report

General Information

Analyst	BSM	Intersection	Ogden with RIRO
Agency/Co.	KLOA, Inc.	Jurisdiction	IDOT
Date Performed	1/4/2017	East/West Street	Ogden Avenue
Analysis Year	2022	North/South Street	Right-in/Right-out
Time Analyzed	PM Peak Hour	Peak Hour Factor	0.95
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	16-303		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	0	2	0		0	0	0		0	0	1
Configuration			T				T	TR								R
Volume, V (veh/h)			1308				1504	20								10
Percent Heavy Vehicles (%)																0
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)																11
Capacity, c (veh/h)																331
v/c Ratio																0.03
95% Queue Length, Q ₉₅ (veh)																0.1
Control Delay (s/veh)																16.2
Level of Service, LOS																C
Approach Delay (s/veh)													16.2			
Approach LOS													C			