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MEMORANDUM TO: Luigi Randazzo
Keystone Development

FROM: Andrew Bowen
Consultant

Luay R. Aboona, PE, PTOE
Principal

DATE: May 6, 2022

SUBJECT: Traffic, Queuing, and Parking Evaluation
Proposed Rainbow Cone
Orland Park, Illinois

This memorandum summarizes the findings of a summary traffic and parking evaluation conducted by Kenig, Lindgren, O'Hara, Aboona, Inc. (KLOA, Inc.) for the proposed Rainbow Cone ice cream restaurant to be located at 15711 Harlem Avenue in Orland Park, Illinois. The development site is located within the existing The Commons shopping center, an outdoor shopping mall anchored by Meijer. The site, which previously contained a Baker's Square restaurant, is bounded by 157th Street to the north, 71st Court to the east, Harlem Avenue (Illinois Route 43) to the west, and Chili's Bar & Grill to the south.

The purpose of this study was to assess the impact that of proposed restaurant on area roadways and to evaluate drive-through queuing and the proposed parking supply. **Figure 1** shows the location of the site in relation to the area roadway system. **Figure 2** shows an aerial view of the site. **Figure 3** shows the existing roadway characteristics. All figures mentioned in this memorandum are included in the Appendix.

Proposed Development Plan

As proposed, the site will be redeveloped with an approximately 3,022 square-foot Rainbow Cone ice cream restaurant. The restaurant will provide a single lane drive-through with dual ordering boards and a surface parking lot with 43 parking spaces. The restaurant will be open seven days a week from 11:00 A.M. to 10:00 P.M. Access to the restaurant will be provided via the following:

- A full movement access drive off 71st Court located approximately 80 feet south of 157th Street. The access drive will provide one inbound lane and one outbound lane with outbound movements under stop sign control. This access drive will replace an existing full movement access drive at this location.

- An outbound only access drive off 71st Court located approximately 210 feet south of 157th Street. The access drive will provide one outbound lane serving the drive-through and parking lot and one outbound lane that will operate as an escape lane for the drive-through. Outbound movements will be under stop sign control. This access drive will replace an existing full movement access drive at this location.

As part of the development, an existing curb cut on 71st Court between the proposed access drives will be removed. A copy of the preliminary site plan is included in the Appendix.

Trip Generation

The number of vehicles that will generated by the proposed restaurant was based on information provided by the operator from the existing Rainbow Cone restaurant located at 498 East Roosevelt Road in Lombard, Illinois. The provided information listed the number of vehicles that park on-site or enter the drive-through during each hour throughout the day. **Table 1** shows the weekly averages for non-peak days (Monday through Thursday) and peak days (Friday through Sunday). As can be seen, the peak hour of operation for both days was between 8:00 P.M. and 9:00 P.M.

Table 1
LOMBARD LOCATION TRIP GENERATION – WEEKLY AVERAGES

Time Period Start	Non-Peak Day (Monday-Thursday)			Peak Day (Friday-Sunday)		
	Walk-In	Drive-Through	Total	Walk-In	Drive-Through	Total
11:00 AM	1	1	**2**	3	2	**5**
12:00 PM	6	8	**14**	17	14	**31**
1:00 PM	6	8	**14**	17	14	**31**
2:00 PM	7	9	**16**	20	17	**37**
3:00 PM	8	10	**18**	23	19	**42**
4:00 PM	11	14	**25**	31	26	**57**
5:00 PM	8	10	**18**	22	18	**40**
6:00 PM	16	20	**36**	44	36	**80**
7:00 PM	17	21	**38**	48	39	**87**
8:00 PM	19	23	**42**	51	42	**93**
9:00 PM	15	18	**33**	41	33	**74**
10:00 PM	10	12	**22**	27	22	**49**

Existing and Projected Traffic Conditions

In order to determine current traffic conditions in the vicinity of the site, KLOA, Inc. conducted peak period traffic counts on Thursday, March 17, 2022 during the evening peak period (4:00 P.M. to 7:00 P.M.) to represent a non-peak day and on Saturday, March 19, 2022 during the midday peak period (11:30 A.M. to 1:30 P.M.) to represent a peak day. It should be noted that the Saturday time period was chosen as it represents peak traffic operations on the roadway system. The results of the traffic counts indicated that the peak hour of roadway traffic occurred from 4:00 P.M. to 5:00 P.M. on Thursday and from 11:30 A.M. to 12:30 P.M. on Saturday. **Figure 4** illustrates the existing peak hour traffic volumes. Copies of the traffic count summary sheets are included in the Appendix.

The directions from which customers and employees of the proposed restaurant were estimated to approach and depart the site are illustrated in **Figure 5.** Figure 5 also shows the distance between the existing and proposed access intersections.

To provide a conservative analysis, the volume of traffic estimated to be generated by the restaurant during the peak hours of roadway traffic was assumed to be the same as during the peak hour of restaurant traffic. On both peak and non-peak days, the peak hour of restaurant traffic occurs outside of the peak hours of roadway traffic. Based on the information provided by the operator and as shown in Table 1, the restaurant was estimated to generate 42 inbound trips and 42 outbound trips during the peak hour of restaurant traffic on a non-peak day and 93 inbound trips and 93 outbound trips during the peak hour of restaurant traffic on a peak day. The estimated peak hour traffic volumes that will be generated by the proposed restaurant were assigned to the roadway system in accordance with the described directional distribution (Figure 5). The site-generated traffic assignment for the proposed restaurant is illustrated in **Figure 6**.

In order to project Year 2028 conditions (build-out year plus five years), 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 AADT projections provided by the Chicago Metropolitan Agency for Planning (CMAP), the existing traffic volumes were increased by an annually compounded growth rate of 0.4 percent per year for a total of 2.5 percent. The Year 2028 total projected traffic volumes, which included the existing traffic volumes increased by the ambient growth factor and the traffic estimated to be generated by the restaurant, are illustrated in **Figure 7**.

Traffic Analysis

Roadway analyses were performed for the peak hour on a non-peak day and peak day for the existing and Year 2028 total projected traffic volumes. As previously mentioned, in order to be conservative, the analyzed total projected volumes include the peak hour of roadway traffic and the peak hour of restaurant traffic, which do not typically occur at the same time. The traffic analyses were performed using the methodologies outlined in the Transportation Research Board's *Highway Capacity Manual (HCM)*, 6th Edition and analyzed using Synchro/SimTraffic 11 software. The analyses for the 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 2028 total projected conditions are presented in **Tables 2** and **3**. **Table 4** shows the existing and projected 95th percentile queues at the intersection of 157th Street with 71st Court. Summary sheets for the capacity analyses are included in the Appendix.

Table 2
CAPACITY ANALYSIS RESULTS - EXISTING CONDITIONS

Intersection	Non-Peak Day		Peak Day	
	LOS	Delay	LOS	Delay
157th Street with 71st Court[1]				
• Overall	B	10.2	A	9.4
• Eastbound Approach	A	10.0	A	9.4
• Westbound Approach	A	9.7	A	8.9
• Northbound Approach	B	10.8	A	9.8
• Southbound Approach	A	10.0	A	9.2

1 – All-Way Stop Controlled
LOS = Level of Service
Delay is measured in seconds.

Table 3
CAPACITY ANALYSIS RESULTS – YEAR 2028 TOTAL PROJECTED CONDITIONS

Intersection	Non-Peak Day		Peak Day	
	LOS	Delay	LOS	Delay
157th Street with 71st Court[1]				
• Overall	B	11.3	B	11.3
• Eastbound Approach	B	11.0	B	11.2
• Westbound Approach	B	10.3	A	9.8
• Northbound Approach	B	12.4	B	12.6
• Southbound Approach	B	10.7	B	10.3
71st Court with the North Site Access Drive[2]				
• Eastbound Approach	B	11.4	B	12.0
• Northbound Left Turn	A	7.7	A	7.7
71st Court with the South Site Access Drive[2]				
• Eastbound Approach	B	10.8	B	10.6

1 – All-Way Stop Controlled   LOS = Level of Service
2 – Two-Way Stop Controlled   Delay is measured in seconds.

Table 4
95TH PERCENTILE QUEUES – 157TH STREET WITH 71ST COURT

	Non-Peak Day		Peak Day	
	Existing Conditions	Total Projected Conditions	Existing Conditions	Total Projected Conditions
• Eastbound Approach	28	38	23	43
• Westbound Approach	18	20	10	13
• Northbound Approach	38	55	28	58
• Southbound Approach	30	33	25	30

Intersection Analysis Discussion

The following summarizes how the intersections are projected to operate.

157th Street with 71st Court

The results of the capacity analysis indicate that this intersection currently operates at Level of Service (LOS) B during the non-peak day peak hour and LOS A during the peak day peak hour. Further, all movements operate at LOS B or better during the peak hour on both days. Under Year 2028 total projected conditions, this intersection is projected to operate at LOS B during the peak hour on a non-peak day and a peak day with increases in delay of approximately one and two seconds, respectively. All movements are projected to continue to operate at LOS B or better.

It should be noted that northbound 95th percentile queues at this intersection are projected to block the location of the proposed north access drive during the peak hour on both days. This is primarily the result of the limited distance between the access drive and this intersection and not intersection operations, as the northbound approach is projected to operate at a good LOS B during both peak hours. SimTraffic simulations of this intersection indicated that under Year 2028 total projected conditions, northbound queues from this intersection are projected to block the location of the proposed north access drive less than 25 percent of the time during the peak hour on both days.

Overall, this intersection can adequately accommodate site-generated traffic and no roadway or traffic control improvements will be required as part of the development.

71st Court with the North Site Access Drive

As proposed, a full movement access drive will be provided on the west side of 71st Court approximately 80 feet south of 157th Street. Under Year 2028 total projected conditions, outbound movements from this intersection are projected to operate at LOS B during the non-peak day and peak day peak hours. Further, 95th percentile queues for the outbound movement are not projected to exceed one to two vehicles during the peak hour on both days and vehicles waiting to exit the site will not negatively impact on-site circulation. Northbound left-turn movements into the site are projected to operate at LOS A during the peak hour on both days.

As previously mentioned, 95th percentile northbound queues from the intersection of 157th Street with 71st Court are projected to block the location of this access drive. However, these queues are only projected to block this intersection less than 25 percent of the time. Further, vehicles will be able to exit the site from the drive-through or parking lot at the south site access drive, which is not projected to be blocked during either peak hour. As such, this access drive will be adequate in accommodating the traffic projected to be generated by the proposed restaurant.

71st Court with the South Site Access Drive

As proposed, an outbound only access drive will be provided on the west side of 71st Court approximately 210 feet south of 157th Street. Under Year 2028 total projected conditions, outbound movements from this intersection are projected to operate at LOS B during the non-peak day and peak day peak hours. Further, 95th percentile queues for the outbound movement are not projected to exceed one to two vehicles during the peak hour on both days and vehicles waiting to exit the site will not negatively impact on-site circulation. 95th percentile northbound queues from the intersection of 157th Street with 71st Court are not projected to block the location of this access drive during either peak hour. As such, this access drive will be adequate in accommodating the traffic projected to be generated by the proposed restaurant.

Drive Through Evaluation

The restaurant will provide a single lane drive-through with dual ordering boards. The pick-up window for the drive-through will be located on the north side of the building with the order boards located east of the building. Vehicles will enter the drive-through lane near the southwest corner of the building and travel around the south, east, and north sides of the restaurant. A by-pass lane for queuing vehicles will be provided at the southeast corner of the building with direct exit onto 71st Court. Approximately seven vehicles will be able to stack from the pick-up window and approximately nine vehicles can stack from the order boards within the drive-through lane for a total of 16 vehicles. Further, approximately six additional vehicles can stack along the south and west sides of the building before reaching the exit to the drive-through lane and approximately nine additional vehicles can queue within the site before reaching 71st Court for a total of 31 vehicles within the site.

Lombard Restaurant Surveys

In order to determine the projected drive-through queueing and demand, KLOA, Inc. conducted surveys at the existing Rainbow Cone in Lombard. It should be noted that the existing Lombard restaurant provides only one order board. As such, the proposed site will be able to process drive-through vehicles more efficiently. Further, the surveys were conducted before the implementation of online ordering, which will reduce drive-through demand. As a result of both of these factors, the drive-through analysis is conservative.

The surveys were conducted on Saturday, April 23, 2022 from 6:00 P.M. to 10:00 P.M. which was a warm dry day. Further, the surveys were conducted on a Saturday, which is a peak day, during the peak hours of operation. The surveys of the restaurant counted the queue from the order board, the queue from the pick-up window, and the number of new vehicles entering the drive-through in five-minute intervals. The results of the surveys are shown in **Table 4**.

Table 4
DRIVE-THROUGH OBSERVATIONS

Time	Pick-Up Window Queue	Order Board Queue	Total Queue	New Drive-Through Vehicles	Time	Pick-Up Window Queue	Order Board Queue	Total Queue	New Drive-Through Vehicles
6:00 PM	2	0	2	1	8:00 PM	5	7	12	3
6:05 PM	1	3	4	3	8:05 PM	5	7	12	3
6:10 PM	4	0	4	2	8:10 PM	4	8	12	4
6:15 PM	4	2	6	1	8:15 PM	5	8	13	2
6:20 PM	3	0	3	3	8:20 PM	5	10	15	4
6:25 PM	2	3	5	4	8:25 PM	5	10	15	3
6:30 PM	4	1	5	1	8:30 PM	4	12	16	3
6:35 PM	3	2	5	5	8:35 PM	4	13	17	2
6:40 PM	4	1	5	3	8:40 PM	4	15	19	2
6:45 PM	3	4	7	1	**8:45 PM**	**4**	**17**	**21**	3
6:50 PM	2	5	7	3	**8:50 PM**	**4**	**17**	**21**	3
6:55 PM	4	4	8	4	8:55 PM	4	14	18	3
7:00 PM	3	2	5	2	9:00 PM	4	12	16	2
7:05 PM	3	4	7	3	9:05 PM	5	12	17	4
7:10 PM	3	4	7	4	9:10 PM	5	10	15	3
7:15 PM	4	1	5	1	9:15 PM	4	10	14	2
7:20 PM	1	3	4	4	9:20 PM	5	10	15	2
7:25 PM	3	3	6	4	9:25 PM	4	12	16	2
7:30 PM	4	2	6	2	9:30 PM	4	12	16	2
7:35 PM	4	0	4	4	9:35 PM	4	9	13	3
7:40 PM	4	2	6	4	9:40 PM	4	10	14	3
7:45 PM	4	2	6	4	9:45 PM	4	10	14	4
7:50 PM	3	4	7	3	9:50 PM	2	9	11	2
7:55 PM	4	6	10	4	9:55 PM	3	9	12	3

Survey Result Analysis

A review of the survey indicated the following:

- The total queue exceeded 16 vehicles during just 10 of the 48 surveyed periods, all of which occurred between 8:30 P.M. and 9:30 P.M. A queue of 16 or less vehicles will be able to be accommodated within the proposed site drive-through lane.

- The peak queue observed was 21 vehicles at 8:45 P.M. and 8:50 P.M. A queue of 21 vehicles will be able to be accommodated within the proposed site without blocking the drive-through exit.

- The peak volume of new drive-through traffic during a one-hour period was 41 vehicles occurring three times (7:20 P.M. to 8:20 P.M., 7:25 P.M. to 8:25 P.M., and 7:35 P.M. to 8:35 P.M.). This matches with the data provided by the operator which indicated a peak hour of 42 vehicles joining the drive-through occurring between 8:00 P.M. to 9:00 P.M.

Vehicle Processing Time Analysis

In order to further evaluate the drive-through, the drive-through queue was estimated based on vehicle processing time and the average peak day trip generation data provided by the operator. The rate at which the restaurant can process a vehicle was based on the surveys conducted at the existing Lombard facility discussed above. The number of vehicles that were processed during a one-hour period was calculated as the number of new vehicles that joined the drive-through less the increase in total queue length (or plus the decrease in queue length) during that time period. Based on the surveys, the average numbers of vehicles processed during an hour was approximately 32 or approximately one vehicle every 113 seconds. Note that this is the rate at which vehicles are processed, not the average wait length.

Table 5 shows the projected queue at the end of each hour based on the peak day trip generation data provide by the operator and a processing rate of 32 vehicles per hour. The results of this evaluation showed the drive-through queue exceeding 16 vehicles only between 8:00 P.M. and 10:00 P.M. and a peak queue of 22 vehicles.

Table 5
VEHICLE PROCESSING TIME ANALYSIS

Time Period Start	Drive Through Vehicles	Average Vehicles Processed in an Hour	Increase in Queue	Remaining Vehicles
11:00 AM	2	32	0	0
12:00 PM	14	32	0	0
1:00 PM	14	32	0	0
2:00 PM	17	32	0	0
3:00 PM	19	32	0	0
4:00 PM	26	32	0	0
5:00 PM	18	32	0	0
6:00 PM	36	32	4	4
7:00 PM	39	32	7	11
8:00 PM	42	32	10	21
9:00 PM	33	32	1	22
10:00 PM	22	32	-10	12

Summary Evaluation

Based on both surveys at the existing Rainbow Cone location and the vehicle processing time analysis, drive-through queues will be able to be accommodated within the proposed drive-through lane during the majority of a peak day with the exception of an approximately one-hour period. This one-hour period will occur between approximately 8:30 P.M. and 9:30 P.M. which is later than the peak demand of walk-in/parking customers. Further, the peak drive-through queue is projected to be approximately 21 to 22 vehicles, which can be accommodated within the drive-through lane and adjacent to the building without blocking the drive-through exit. This peak queue will not impact operations on the two-way drive aisle serving the majority of the site parking spaces. In addition, the site will be able to accommodate up to nine additional vehicles beyond the projected peak queue before reaching 71st Court.

Parking Evaluation

As previously mentioned, the proposed restaurant will provide 43 parking spaces. Based on the analysis below, the proposed parking supply will be adequate in accommodating the restaurant's peak parking demand.

Village of Orland Park Requirements

The Village of Orland Park Land Development Code requires a parking ratio of one parking space per 100 square feet for restaurants. Based on the above and the building size of 3,022 square feet, 31 spaces should be provided. As such, the proposed number of parking spaces is 12 spaces more than the Village of Orland Park parking requirements.

ITE Parking Generation Manual

In reviewing the survey data published in the Institute of Transportation Engineers' (ITE) 5th Edition of the *Parking Generation Manual*, the following average peak parking demands were determined based on Land-Use Code 934 ("Fast-Food Restaurant with Drive-Through"):

- Weekday: 26 parking spaces (ratio of 8.66 spaces per 1,000 square feet)
- Saturday: 28 parking spaces (ratio of 9.18 spaces per 1,000 square feet)

Based on ITE *Parking Generation Manual* rates, the proposed restaurant should provide a total of 28 parking spaces to accommodate the peak parking demand, which results in a surplus of 15 parking spaces.

Parking Occupancy Surveys

Peak parking demand surveys were conducted on Saturday, April 23, 2022 from 6:00 P.M. to 10:00 P.M. at the existing Rainbow Cone in Lombard. The parking occupancy surveys were conducted in 30-minute intervals and included all the parking spaces on-site. The results of the parking occupancy surveys are summarized in **Table 5**. As can be seen from the results of the parking occupancy surveys, the restaurant experienced a peak parking demand of 38 spaces occurring at 7:00 P.M. As such, the proposed number of parking spaces is five spaces more than the observed peak parking demand.

Table 6
PARKING OCCUPANCY SURVEYS

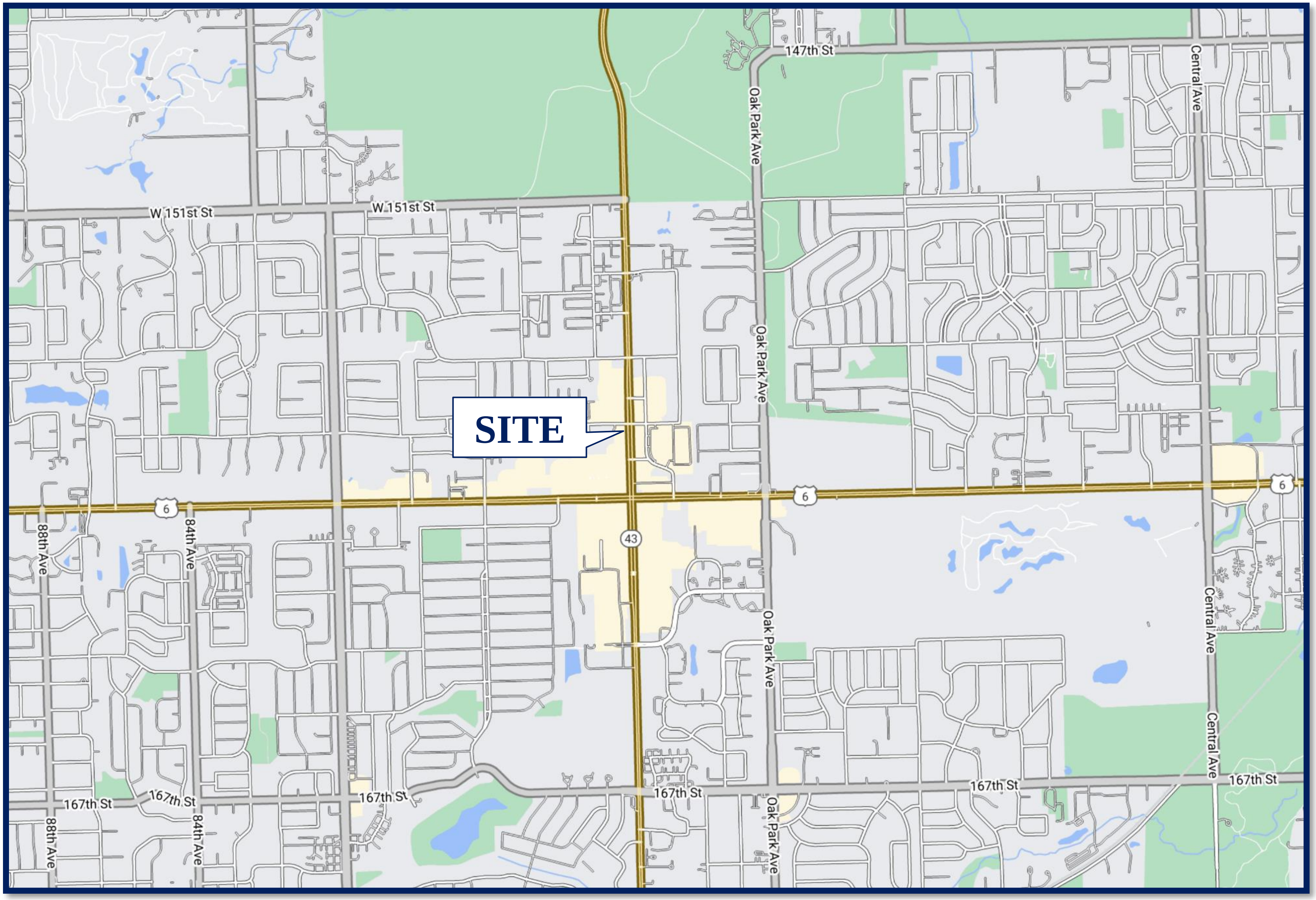
Time	North Parking Lot	South Parking Lot	Total
6:00 PM	13	15	28
6:30 PM	17	17	34
7:00 PM	14	24	38
7:30 PM	9	18	27
8:00 PM	17	18	35
8:30 PM	13	19	32
9:00 PM	19	16	35
9:30 PM	5	11	16
10:00 PM	2	12	14

Conclusion

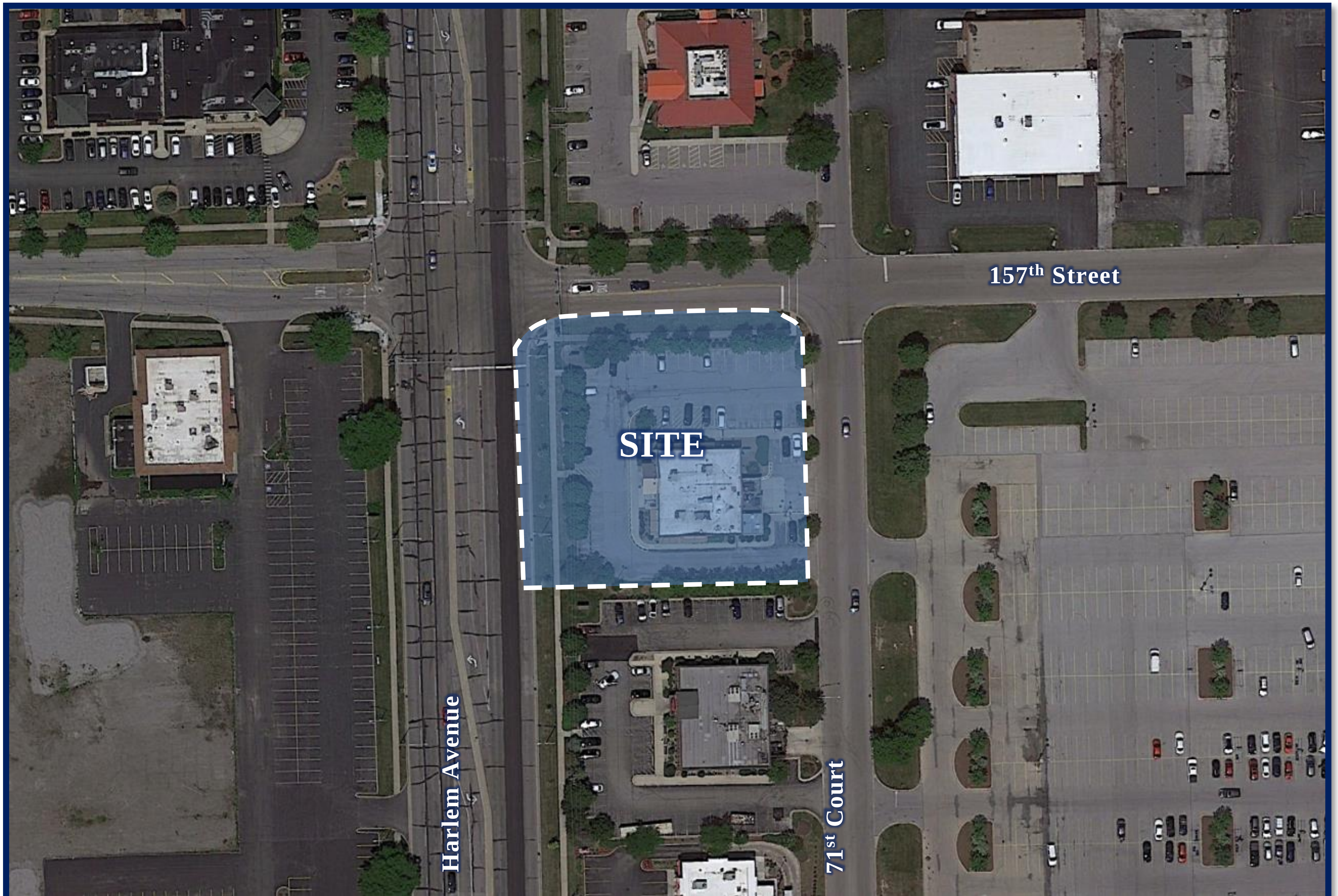
Based on the preceding analyses and recommendations, the following conclusions have been made:

- The intersection of 157th Street with 71st Court has sufficient reserve capacity to accommodate site-generated traffic.
- The access system that will serve the proposed restaurant via 71st Court will be adequate in accommodating the restaurant-generated traffic.
- The proposed drive-through lane will provide sufficient stacking that will adequately accommodate the projected peak demand of the drive-through operations without impacting the traffic within the site or on 71st Court.
- The proposed parking supply of 43 parking spaces will be adequate in accommodating the projected peak parking demand of the proposed restaurant.

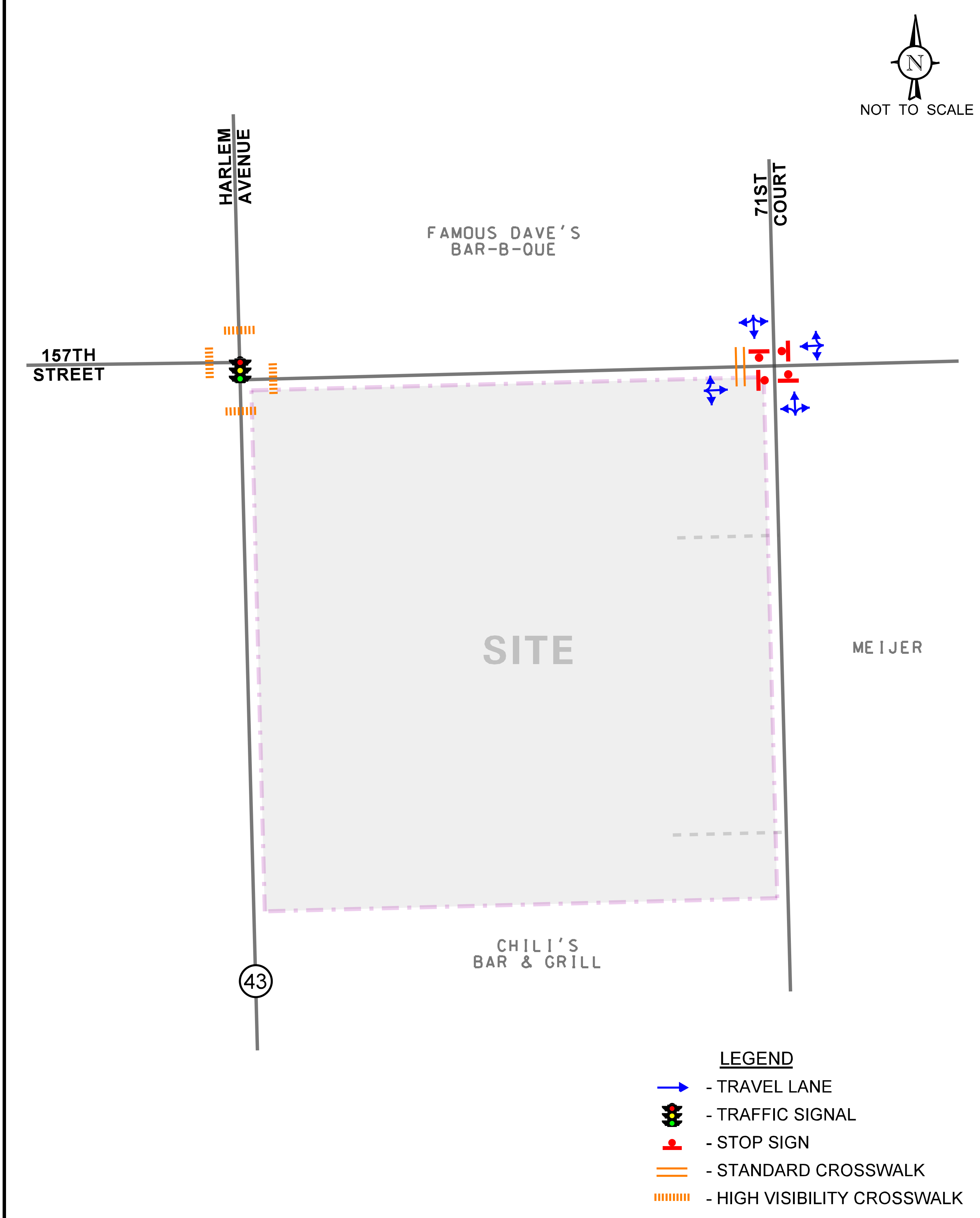
Appendix



Site Location **Figure 1**



Aerial View of Site **Figure 2**



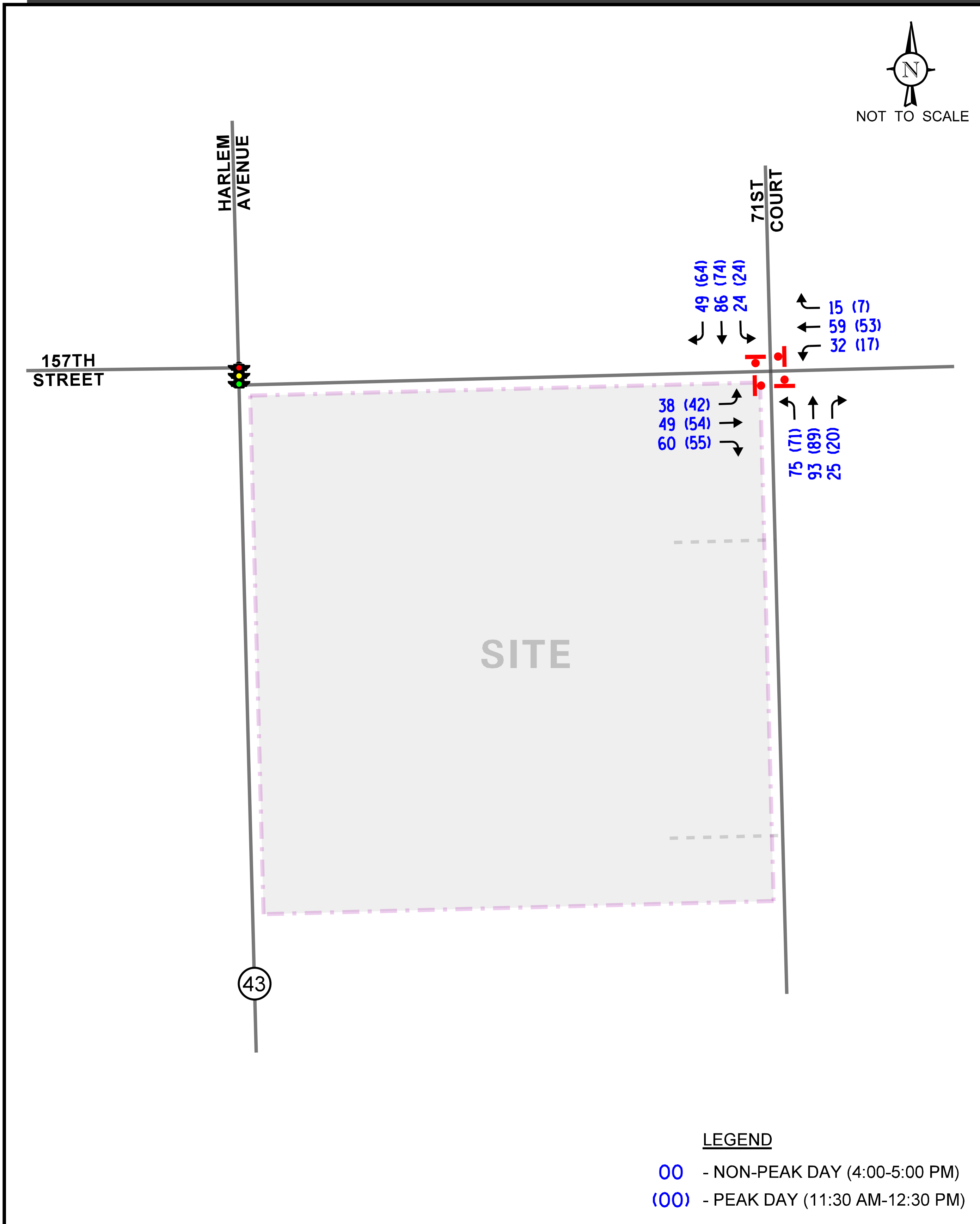
Rainbow Cone
Orland Park, Illinois

Existing Roadway Characteristics

KLOA
Kenig,Lindgren,O'Hara,Aboona,Inc.

Job No: 22-107

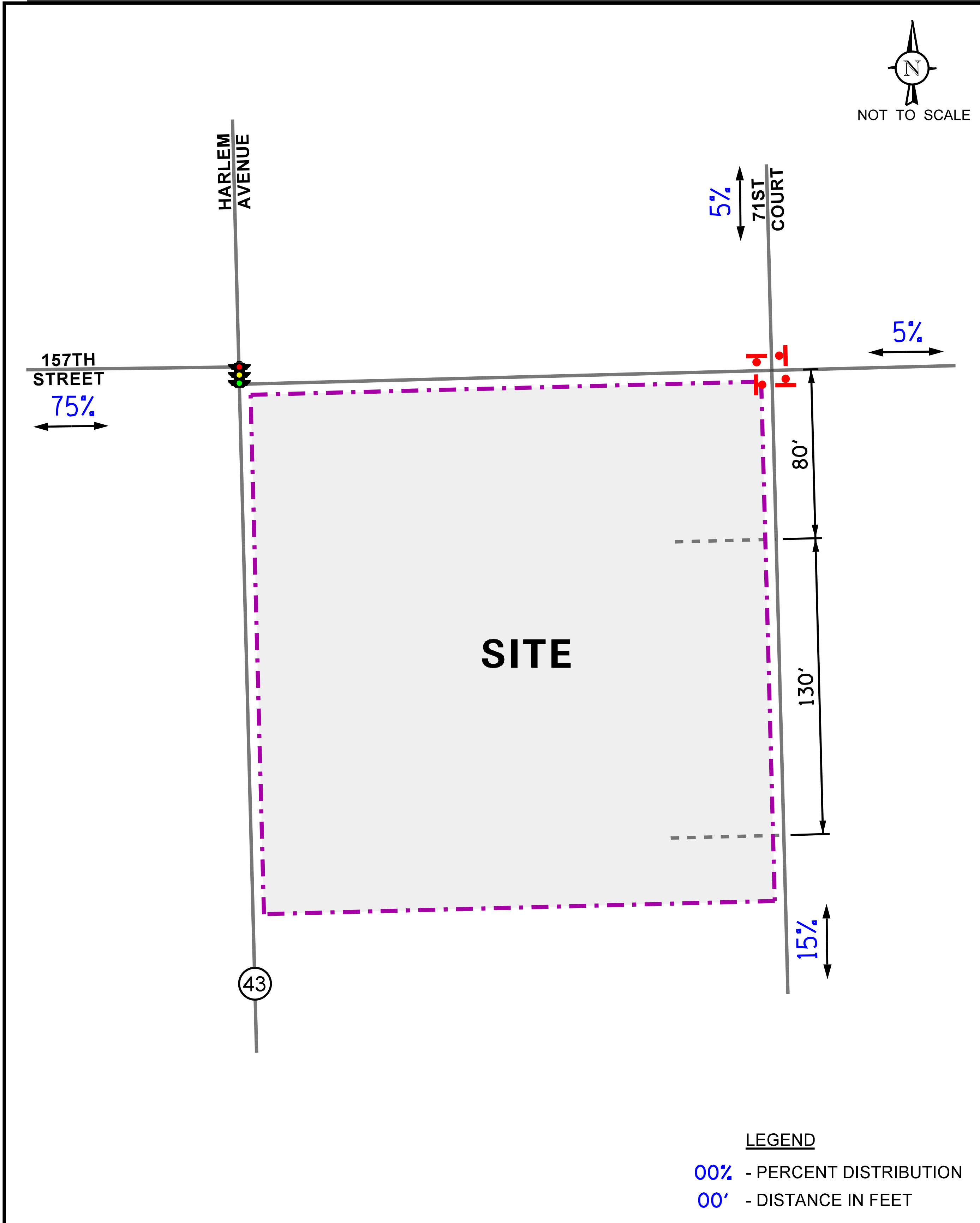
Figure: 3



Rainbow Cone
Orland Park, Illinois

Existing Traffic Volumes

KLOA
Kenig,Lindgren,O'Hara,Aboona,Inc.
Job No: 22-107
Figure: 4



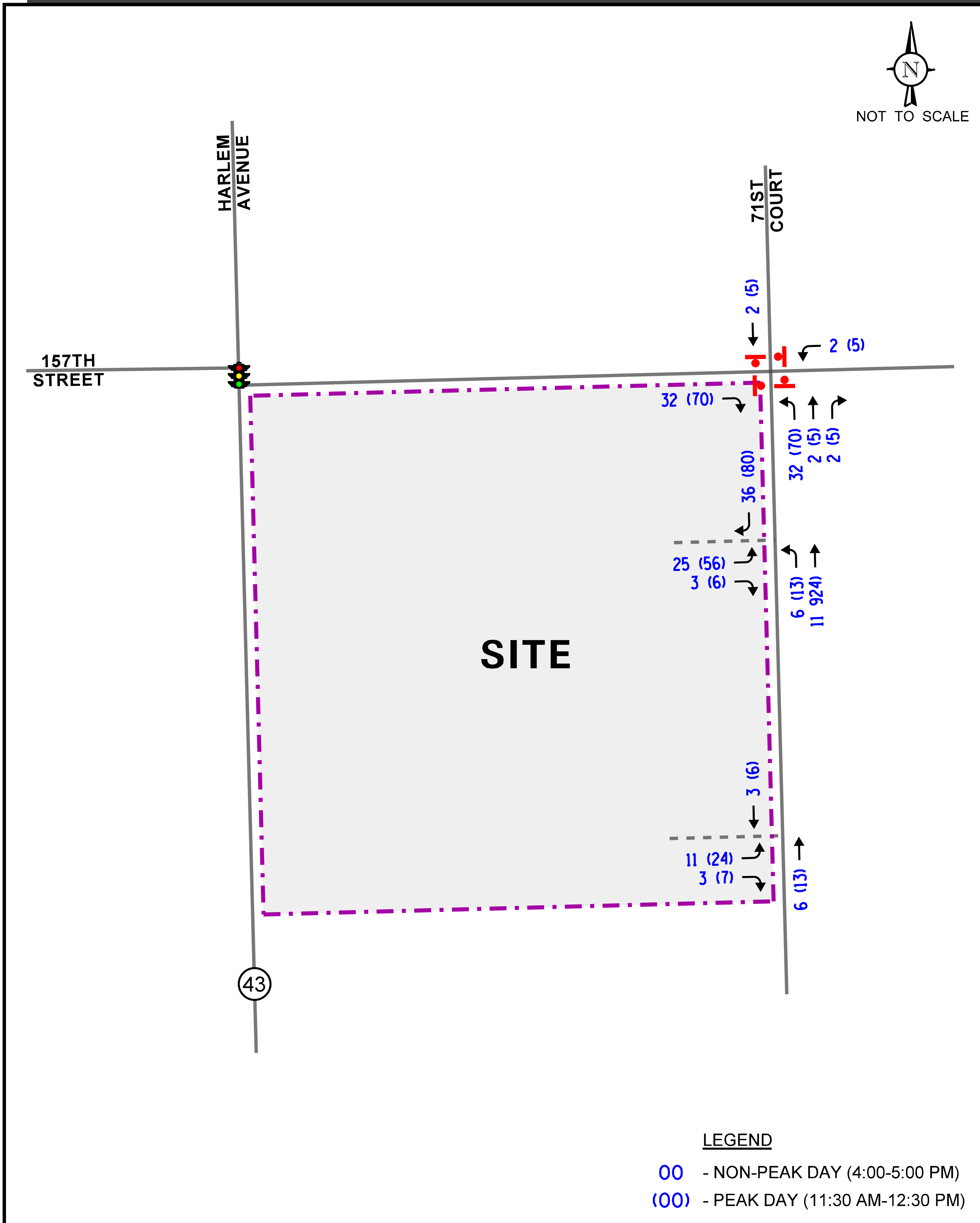
Rainbow Cone
Orland Park, Illinois

Estimated Directional Distribution

KLOA
Kenig,Lindgren,O'Hara,Aboona,Inc.

Job No: 22-107

Figure: 5



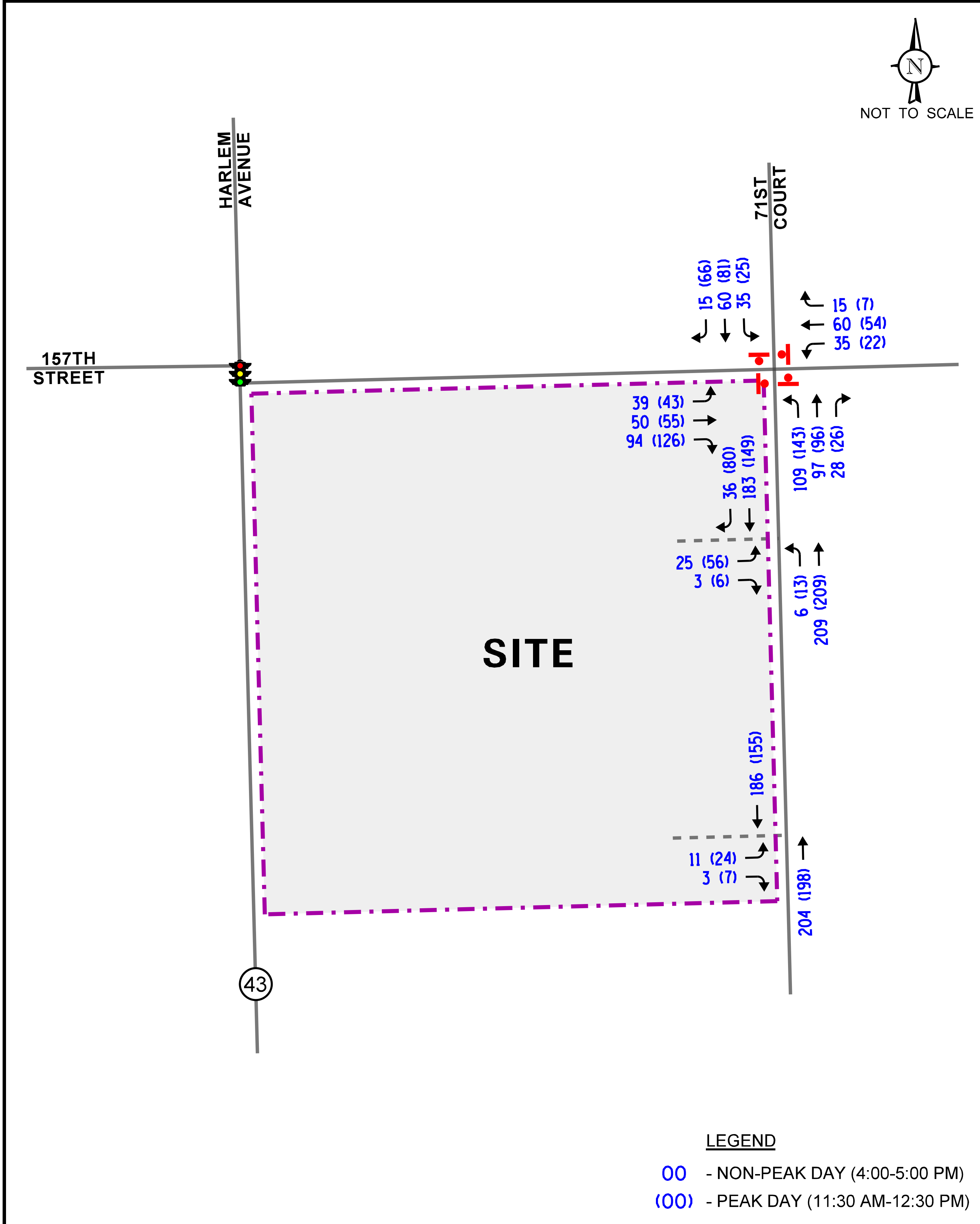
Rainbow Cone
Orland Park, Illinois

New Site Traffic Volumes

Kenig,Lindgren,O'Hara,Aboona,Inc.

Job No: 22-107

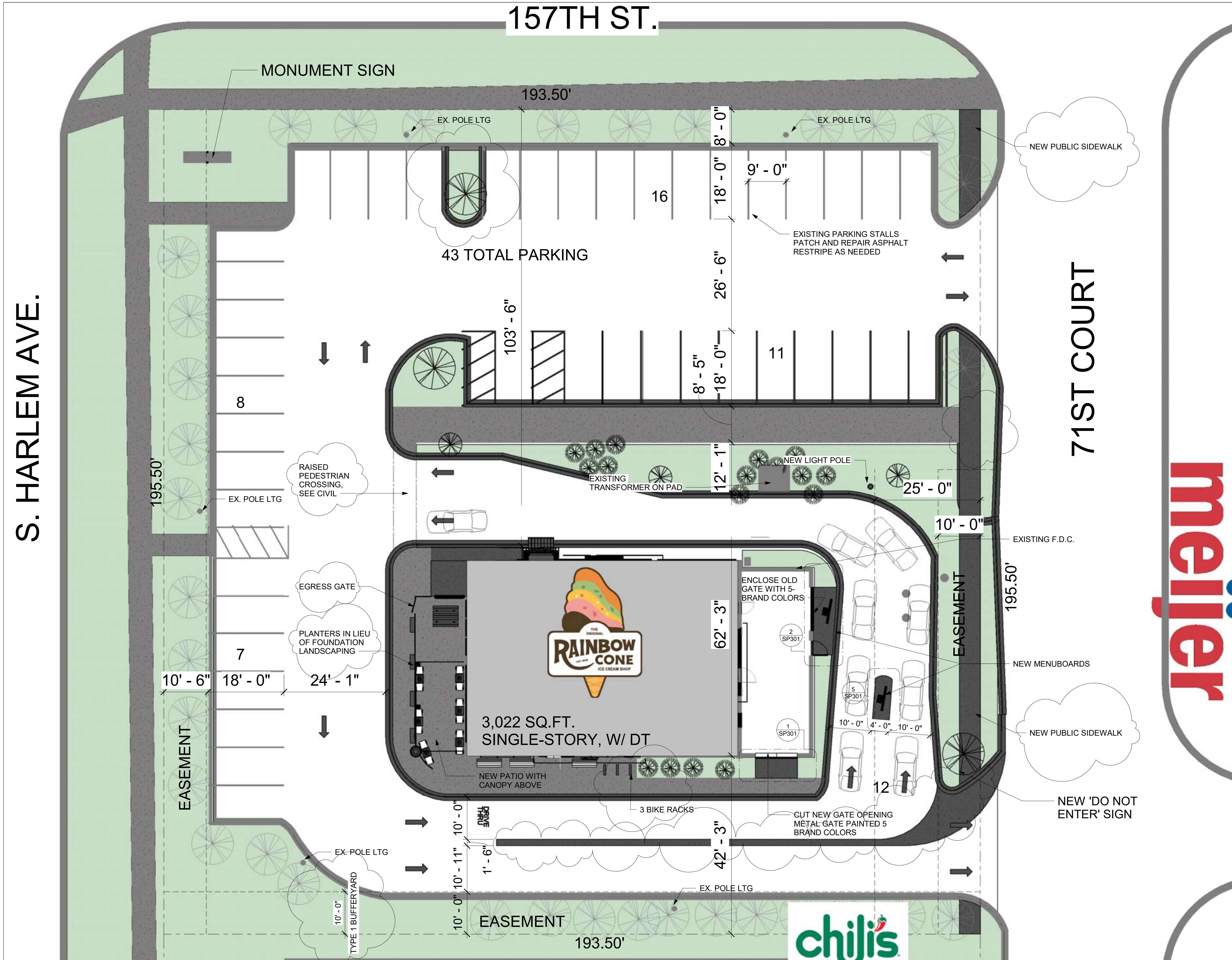
Figure: 6



Rainbow Cone
Orland Park, Illinois

Year 2028 Total Projected Traffic Volumes

KLOA
Kenig,Lindgren,O'Hara,Aboona,Inc.
Job No: 22-107
Figure: 7



1 SITE PLAN
3/32" = 1'-0"

ORLAND PARK ZONING CODE

DISTRICT: GENERAL BUSINESS

1. REAR SETBACK SHALL BE 30'
EXISTING COMPLIES

2. SIDE SETBACK SHALL BE 15' MIN.
EXISTING COMPLIES

3. BICYCLE PARKING 1 PER 10 CAR STALLS PROVIDED NEAR MAIN ENTRY

4. EXISTING HANDICAP PARKING STALLS AND SIGNAGE ARE PLANNED TO BE REUSED, AND WILL BE FIELD VERIFIED TO MEET THE WIDTH REQUIREMENTS OF THE ORLAND PARK CODES

5. 43 TOTAL PARKING STALLS REMAIN ON SITE IN THE EXISTING LOCATION

6. MIN. LOT AREA SHALL BE 10,000 SF WITH MIN 80' LENGTH.
COMPLIES WITH 37,900 SF AND 195.5 FEET

7. FAR MAX IS 1.0
COMPLIES WITH 3,022 SF BUILDING

8. MAX HEIGHT IS 4 STORIES OR 50'
COMPLIES WITH 1 STORY, 20'

9. 25% MINIMUM GREEN SPACE WITH MAX 75% FOR BUILDING, PAVEMENT, STORM WATER STORAGE
COMPLIES WITH 9,850 SQ.FT. OF GREEN SPACE OR 26% OF THE TOTAL 0.87 ACRES

10. REQUIRED PARKING SHALL BE 9X18
COMPLIES

ZONING CODE REQUIREMENTS

TAG	PHASE	USE	SQ.FT.	PARKING: PARKING REQ.	PARKING: PARKING PROVIDED	SIGNAGE: SIGNAGE REQ.	SIGNAGE: SIGNAGE PROVIDED	LOT SIZE (ACRES)	BLDG HEIGHT	LANDSCAPING	SETBACKS: NORTH	SETBACKS: SOUTH	SETBACKS: WEST	SETBACKS: EAST
RC		RESTAURANT	3,022 SF	1 PER 100 SF + 7 STACKING AT DT LANE 30 REQUIRED	43		2 WALL SIGNS	0.87 ac	20 FT	COMPLIES	103.5'	42.3'	62.3'	39.5'

0' 2' 4' 8' 16'

KEYSTONE PLANNING+DESIGN
KEYSTONE CONSTRUCT, LLC
418 CLINTON PL., RIVER FOREST, IL 60305
KeystonePlanningDesign.com

THE ORIGINAL RAINBOW CONE EST. 1926 ICE CREAM SHOP

15711 S HARLEM AVE, ORLAND PARK, IL 60462

No.	Description	Date
	CONCEPT MTG	12/22/21
	PRE-APP	12/31/21
	IFZ	1/12/22
1	IFZ staff rev.1	3/02/22

SITE PLAN

SP100

Scale 3/32" = 1'-0"

4/5/2022 1:18:49 PM

Orland Park, IL | Weather: Warm and Dry | 03/18/22
157th St and 71st Ct | 12:23:16
Thursday March 17, 2022

TURNS/TEAPAC[Ver 3.61.12] - 15-Minute Counts: All Vehicles - by Mvmt

Intersection # 6 157/71

Begin	N-Approach			E-Approach			S-Approach			W-Approach			Int
Time	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT	Total
1600	19	29	9	4	19	9	7	31	18	17	19	11	192
1615	14	20	6	5	8	9	8	20	20	20	8	10	148
1630	9	17	4	3	18	6	6	17	19	13	13	6	131
1645	7	20	5	3	14	8	4	25	18	10	9	11	134
1700	7	25	2	1	12	10	4	17	17	15	7	6	123
1715	12	17	4	4	11	7	4	23	12	16	11	12	133
1730	15	19	3	2	13	4	2	20	12	18	11	9	128
1745	15	20	6	5	16	9	6	14	22	16	12	15	156
1800	11	24	2	5	18	4	4	15	10	15	5	12	125
1815	6	14	1	4	10	4	2	11	13	11	9	7	92
1830	10	13	4	1	14	6	4	15	12	7	8	6	100
1845	8	7	3	3	8	4	7	12	10	11	6	10	89
Total	133	225	49	40	161	80	58	220	183	169	118	115	1551

TURNS/TEAPAC[Ver 3.61.12] - 15-Minute Counts: All Vehicles - Totals

Intersection # 6 157/71

Begin	Approach Totals				Exit Totals				Int
Time	N	E	S	W	N	E	S	W	Total
1600	57	32	56	47	46	35	55	56	192
1615	40	22	48	38	35	22	49	42	148
1630	30	27	42	32	26	23	36	46	131
1645	32	25	47	30	39	18	38	39	134
1700	34	23	38	28	24	13	50	36	123
1715	33	22	39	39	39	19	40	35	133
1730	37	19	34	38	31	16	41	40	128
1745	41	30	42	43	34	24	45	53	156
1800	37	27	29	32	32	11	43	39	125
1815	21	18	26	27	22	12	29	29	92
1830	27	21	31	21	22	16	26	36	100
1845	18	15	29	27	25	16	22	26	89
Total	407	281	461	402	375	225	474	477	1551

Orland Park, IL Weather: Cool and Rain 03/21/22
157th St and 71st Ct 10:26:26
Saturday March 19, 2022

TURNS/TEAPAC[Ver 3.61.12] - 15-Minute Counts: All Vehicles - by Mvmt

Intersection # 7 157/71/sat

Begin	N-Approach			E-Approach			S-Approach			W-Approach			Int
Time	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT	Total
1130	21	15	8	4	17	6	2	19	22	16	20	13	163
1145	11	18	8	0	16	0	4	23	16	10	13	8	127
1200	14	14	4	0	12	3	7	16	13	13	7	11	114
1215	18	27	4	3	8	8	7	31	20	16	14	10	166
1230	18	18	3	2	10	10	5	22	18	10	5	11	132
1245	14	28	3	0	11	3	5	22	15	11	10	8	130
1300	10	25	4	2	13	6	3	19	24	17	8	10	141
1315	13	24	3	3	10	8	7	26	14	18	14	10	150
1330	16	21	7	3	7	2	4	19	23	11	8	9	130
1345	13	22	4	1	9	3	2	27	18	19	15	13	146
Total	148	212	48	18	113	49	46	224	183	141	114	103	1399

TURNS/TEAPAC[Ver 3.61.12] - 15-Minute Counts: All Vehicles - Totals

Intersection # 7 157/71/sat

Begin	Approach Totals				Exit Totals				Int
Time	N	E	S	W	N	E	S	W	Total
1130	44	27	43	49	36	30	37	60	163
1145	37	16	43	31	31	25	28	43	127
1200	32	15	36	31	27	18	30	39	114
1215	49	19	58	40	44	25	51	46	166
1230	39	22	45	26	35	13	38	46	132
1245	45	14	42	29	30	18	42	40	130
1300	39	21	46	35	31	15	48	47	141
1315	40	21	47	42	39	24	50	37	150
1330	44	12	46	28	31	19	34	46	130
1345	39	13	47	47	41	21	44	40	146
Total	408	180	453	358	345	208	402	444	1399

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.

Intersection	
Intersection Delay, s/veh	10.2
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	38	49	60	32	59	15	75	93	25	24	86	49
Future Vol, veh/h	38	49	60	32	59	15	75	93	25	24	86	49
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	48	62	76	41	75	19	95	118	32	30	109	62
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	10	9.7	10.8	10
HCM LOS	A	A	B	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	39%	26%	30%	15%
Vol Thru, %	48%	33%	56%	54%
Vol Right, %	13%	41%	14%	31%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	193	147	106	159
LT Vol	75	38	32	24
Through Vol	93	49	59	86
RT Vol	25	60	15	49
Lane Flow Rate	244	186	134	201
Geometry Grp	1	1	1	1
Degree of Util (X)	0.346	0.264	0.2	0.281
Departure Headway (Hd)	5.105	5.108	5.355	5.019
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	708	703	670	719
Service Time	3.112	3.14	3.388	3.027
HCM Lane V/C Ratio	0.345	0.265	0.2	0.28
HCM Control Delay	10.8	10	9.7	10
HCM Lane LOS	B	A	A	A
HCM 95th-tile Q	1.5	1.1	0.7	1.2

Intersection	
Intersection Delay, s/veh	11.3
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Vol, veh/h	39	50	94	35	60	15	109	97	28	25	90	50
Future Vol, veh/h	39	50	94	35	60	15	109	97	28	25	90	50
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	49	63	119	44	76	19	138	123	35	32	114	63
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	11	10.3	12.4	10.7
HCM LOS	B	B	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	47%	21%	32%	15%
Vol Thru, %	41%	27%	55%	55%
Vol Right, %	12%	51%	14%	30%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	234	183	110	165
LT Vol	109	39	35	25
Through Vol	97	50	60	90
RT Vol	28	94	15	50
Lane Flow Rate	296	232	139	209
Geometry Grp	1	1	1	1
Degree of Util (X)	0.437	0.339	0.219	0.306
Departure Headway (Hd)	5.311	5.267	5.667	5.281
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	678	681	632	679
Service Time	3.35	3.31	3.716	3.325
HCM Lane V/C Ratio	0.437	0.341	0.22	0.308
HCM Control Delay	12.4	11	10.3	10.7
HCM Lane LOS	B	B	B	B
HCM 95th-tile Q	2.2	1.5	0.8	1.3

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	25	3	6	209	183	36
Future Vol, veh/h	25	3	6	209	183	36
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	26	3	6	220	193	38

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	444	212	231	0	-	0
Stage 1	212	-	-	-	-	-
Stage 2	232	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	571	828	1337	-	-	-
Stage 1	823	-	-	-	-	-
Stage 2	807	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	568	828	1337	-	-	-
Mov Cap-2 Maneuver	568	-	-	-	-	-
Stage 1	819	-	-	-	-	-
Stage 2	807	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.4	0.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1337	-	588	-	-
HCM Lane V/C Ratio	0.005	-	0.05	-	-
HCM Control Delay (s)	7.7	0	11.4	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

Intersection						
Int Delay, s/veh	0.4					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	11	3	0	204	186	0
Future Vol, veh/h	11	3	0	204	186	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	12	3	0	215	196	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	411	196	-	0	-	0
Stage 1	196	-	-	-	-	-
Stage 2	215	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	-	-
Pot Cap-1 Maneuver	597	845	0	-	-	0
Stage 1	837	-	0	-	-	0
Stage 2	821	-	0	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	597	845	-	-	-	-
Mov Cap-2 Maneuver	597	-	-	-	-	-
Stage 1	837	-	-	-	-	-
Stage 2	821	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.8	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT
Capacity (veh/h)	-	637	-
HCM Lane V/C Ratio	-	0.023	-
HCM Control Delay (s)	-	10.8	-
HCM Lane LOS	-	B	-
HCM 95th %tile Q(veh)	-	0.1	-

Intersection	
Intersection Delay, s/veh	9.4
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Vol, veh/h	42	54	55	17	53	7	71	89	20	24	74	64
Future Vol, veh/h	42	54	55	17	53	7	71	89	20	24	74	64
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	49	63	64	20	62	8	83	103	23	28	86	74
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	9.4	8.9	9.8	9.2
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	39%	28%	22%	15%
Vol Thru, %	49%	36%	69%	46%
Vol Right, %	11%	36%	9%	40%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	180	151	77	162
LT Vol	71	42	17	24
Through Vol	89	54	53	74
RT Vol	20	55	7	64
Lane Flow Rate	209	176	90	188
Geometry Grp	1	1	1	1
Degree of Util (X)	0.28	0.235	0.127	0.243
Departure Headway (Hd)	4.822	4.825	5.093	4.638
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	741	739	698	769
Service Time	2.883	2.891	3.167	2.699
HCM Lane V/C Ratio	0.282	0.238	0.129	0.244
HCM Control Delay	9.8	9.4	8.9	9.2
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	1.1	0.9	0.4	1

Intersection	
Intersection Delay, s/veh	11.3
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	43	55	126	22	54	7	143	96	26	25	81	66
Future Vol, veh/h	43	55	126	22	54	7	143	96	26	25	81	66
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	50	64	147	26	63	8	166	112	30	29	94	77
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	11.2	9.8	12.6	10.3
HCM LOS	B	A	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	54%	19%	27%	15%
Vol Thru, %	36%	25%	65%	47%
Vol Right, %	10%	56%	8%	38%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	265	224	83	172
LT Vol	143	43	22	25
Through Vol	96	55	54	81
RT Vol	26	126	7	66
Lane Flow Rate	308	260	97	200
Geometry Grp	1	1	1	1
Degree of Util (X)	0.451	0.372	0.154	0.288
Departure Headway (Hd)	5.264	5.148	5.726	5.186
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	684	698	625	692
Service Time	3.297	3.187	3.772	3.226
HCM Lane V/C Ratio	0.45	0.372	0.155	0.289
HCM Control Delay	12.6	11.2	9.8	10.3
HCM Lane LOS	B	B	A	B
HCM 95th-tile Q	2.3	1.7	0.5	1.2