June 2015

The Moorings of Arlington Heights

Traffic and Parking Study

Prepared for:

Presbyterian Homes

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1 - INTRODUCTION

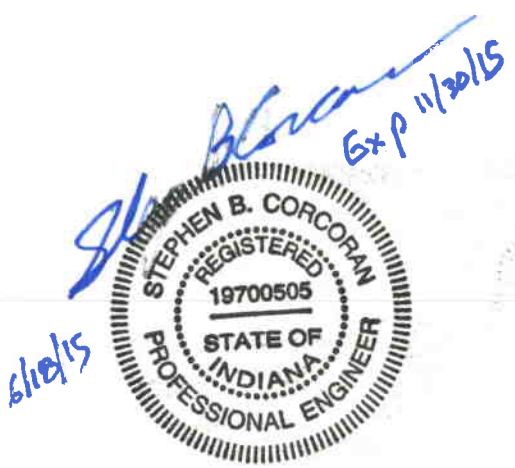
Eriksson Engineering Associates, Ltd. was retained by Presbyterian Homes to conduct a traffic and parking study for proposed changes at The Moorings of Arlington Heights, a congregate care retirement community. The proposed plan calls for construction of an assisted living and memory care facility along with a resident fellowship hall on the campus. Several resident cottages and the skilled care building will be removed to make way for the new buildings.

The purpose of the study was to observe the existing traffic patterns around the site, determine the traffic characteristics of the proposed development, review the parking needs, and develop roadway and parking recommendations.

Findings

The results of traffic and parking study found the following:

- The volume of traffic generated by the development is minimal (8 to 12 vehicles per hour) due to the nature of the use.
- The net change in area traffic volumes is nominal.
- The Mooring's driveway does not require any additional roadway improvements for the additional traffic volumes. Crash data does not support the need for traffic improvements.
- A traffic signal is not currently warranted at the Mooring's driveway and Dryden Place and will not be warranted with the development. When additional development occurs at the campus, the need for a traffic signal will be revisited.
- There is adequate parking at the campus.



2 - EXISTING CONDITIONS

Site Location and Area Land-Use

The subject site is located on the south side of Central Road in Arlington Heights, Illinois. It is occupied by the congregate care retirement community known as The Moorings of Arlington Heights. The campus is surrounded by single-family homes and a church to the north. **Figure 1** illustrates the site location and the surrounding land-uses and roads.

Bicycle, Pedestrian, and Public Transportation

Public sidewalks are located on both sides of Central Road and Dryden Place. The Moorings has an internal walking path system for their residents. PACE does not have bus service on Central Road. Elk Grove Township has a dial-a-ride bus service available to senior citizens. The Moorings provides shuttle services for their residents. No bike routes are located adjacent to the site.

Roadway Characteristics

A description of the area roadways providing access to the site is provided below:

Central Road is an east-west major arterial roadway extending through the southern portion of Arlington Heights, Illinois. It is under the jurisdiction of the Illinois Department of Transportation (IDOT) and has a speed limit of 40 miles per hour. In front of the site, it has two travel lanes in each direction with a painted left-turn median. The access drive to The Moorings is under stop sign control with one inbound lane and two outbound lanes (right and left-turn lanes)

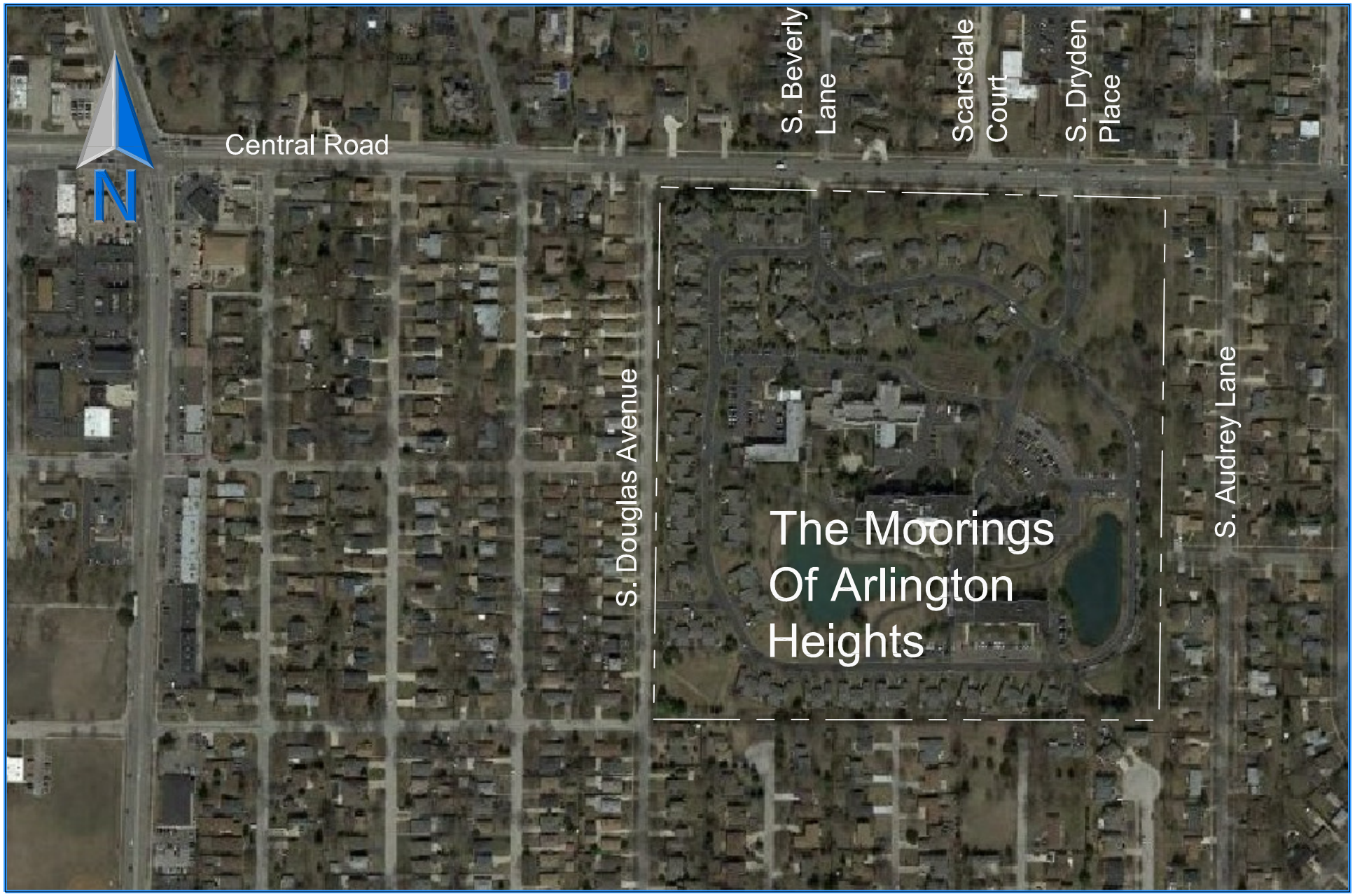
Dryden Place is a residential road that extends north from Central Road and provides access to single-family homes, a church, and an elementary school. At its intersection with Central Road, it has one lane in each direction and under stop sign control. On-street parking is prohibited near Central Road. It has a speed limit is 25 miles per hour and is under the jurisdiction of the Village of Arlington Heights.

Existing Traffic Volumes

Weekday morning (7:00 to 9:00 AM) and afternoon (4:00 to 6:00 PM) manual traffic counts were conducted in November, 2014 at the intersection of Central Road at Dryden Place and The Moorings' entrance. These counts showed the peak-hours of Central Road traffic occurring from 7:15 to 8:15 AM and 4:45 to 5:45 PM on a weekday. Peak-hour traffic going into and out of The Moorings occurred from 7:15-8:15 AM and 4:00-5:00 PM. The existing traffic volumes are shown in **Figure 2** and included in the **Appendix**.

Existing Crash Data

Crash data was obtained for the intersection covering the last four years of available data (2009-2012). There were a total of five crashes over the four years (1.25 crashes/year). Only one crash in the four years involved a vehicle turning left out of The Moorings campus. One crash resulted in an injury and four others had property damage.



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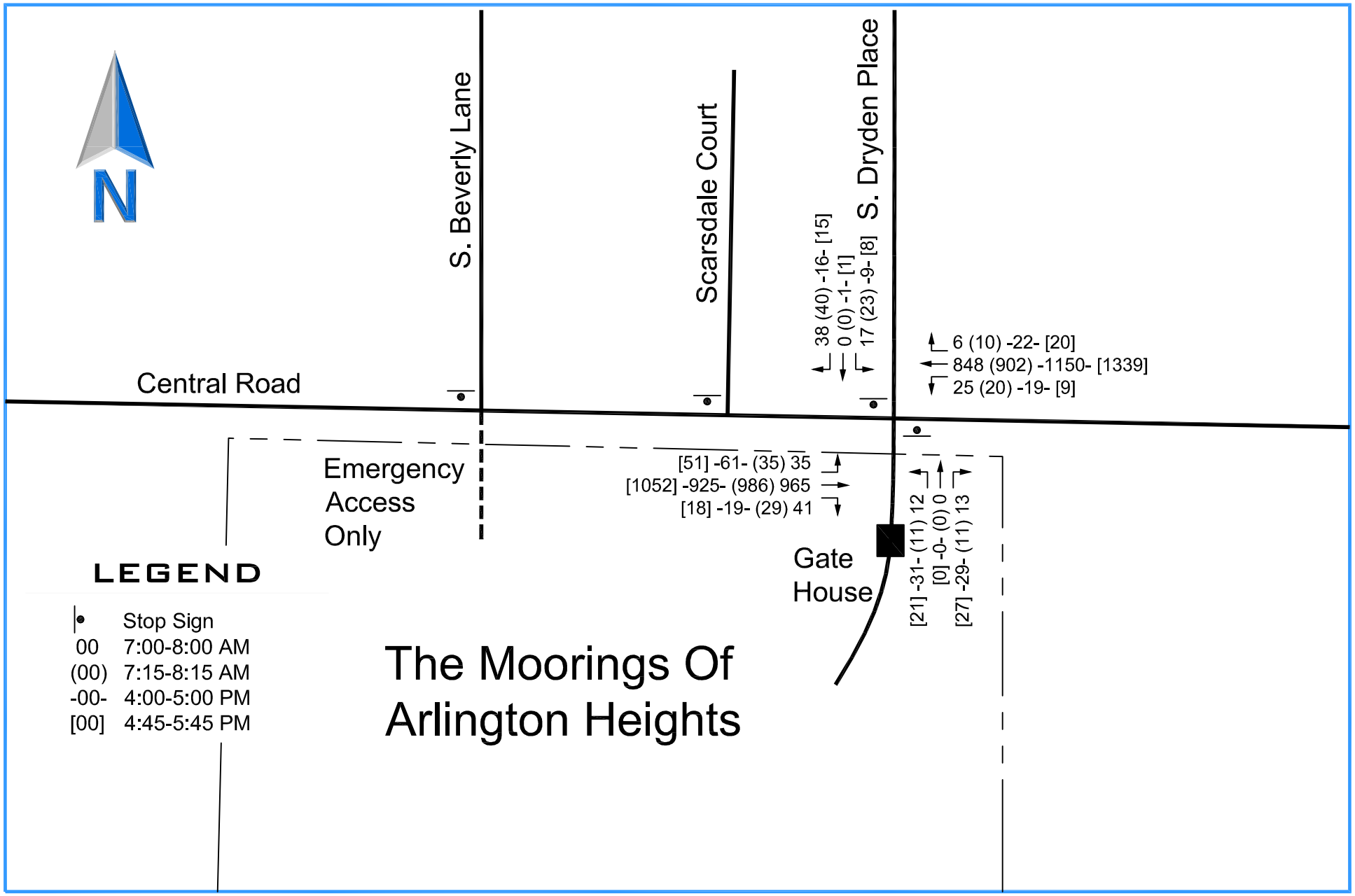
Site Location And Area Roadways

Figure 1



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Existing Traffic Volumes

Figure 2

3 - SITE TRAFFIC CHARACTERISTICS

Site Plan

The plan calls for construction of an assisted living and memory care facility along with a resident fellowship hall on the campus. Several resident cottages and a skilled care building will be removed to make way for the buildings. Please note that The Moorings has an ongoing program to renovate and combine their independent living apartments to better meet their resident's needs. Over time, the total number of residential units on the campus has been decreasing. **Table 1** summarizes the campus residential units and skilled nursing beds in 2006, when the last traffic study was completed, the current 2014 unit count and occupancy levels, and the total units when completed.

Table 1
The Moorings of Arlington Heights
Existing and Proposed Unit Counts

Unit Type	Existing			Total Proposed	Change From 2006
	May 2006(1)	November 2014			
		Units	Occupied		
Skilled Care	105	105	49	105	-
Sheltered Care	45	45	37	-	-45
Assisted Living	-	-	-	70	+70
Assisted Living Memory Care	-	-	-	20	+20
High Care Total	**150**	**150**	**86**	**195**	**+45**
Apartments	**232**	**212**	**193**	**202**	**-30**
Cottages	**81**	**81**	**74**	**73**	**-8**
Independent Living Total	**313**	**293**	**267**	**275**	**-38**
Total of All Units Types	**463**	**443**	**353**	**470**	**+7**

(1) Date of counts from prior traffic study

Trip Generation

Assisted-living/memory care facilities provide their residents with supervision and assistance with activities of daily living , coordination of their health care services; and monitoring of resident activities to help to ensure their health, safety, and well-being. Assistance may include the administration or supervision of medication, or personal care services provided by a trained staff person. No residents own or are able to drive a vehicle. Vehicle trips to and from these facilities consist of employee trips (56%), service or vendor trips (15%), and visitors (29%) according to the American Senior Housing Association.

Traffic estimates were based on the existing traffic volumes and trip rates for the occupied units on campus. These trip rates were then compared to senior housing and care data provided by the Institute of Transportation Engineer's Trip Generation 9th Ed. manual and found to be higher. The existing facility's trip rates were then applied to the vacant and

proposed units on the campus. The results are shown in **Tables 2 and 3.** The additional traffic generated by the net increase in units on the campus is minimal with 5 to 8 new trips an hour.

Table 2
The Moorings of Arlington Heights
Existing and Projected Morning Traffic Volumes

The Moorings	Number of Units	Morning Peak Periods					
		Mooring's Peak (7:00-8:00 AM)			Central Road Peak (7:15-8:15 AM)		
		In	Out	Total	In	Out	Total
Existing Occupied	353	66	25	91	49	22	71
Existing Vacant	90	17	6	23	12	6	18
Existing Subtotal	**443**	**83**	**31**	**114**	**61**	**28**	**89**
Net Units(1)	27	5	2	7	4	2	5
Total	**470**	**88**	**33**	**121**	**65**	**30**	**95**

(1) Net increase in units – See Table 1

Table 3
The Moorings of Arlington Heights
Existing and Projected Evening Traffic Volumes

The Moorings	Number of Units	Evening Peak Periods					
		Mooring's Peak (4:00-5:00 PM)			Central Road Peak (4:45-5:45 AM)		
		In	Out	Total	In	Out	Total
Existing Occupied Units	353	39	60	99	28	48	76
Existing Vacant Units	90	10	15	25	7	12	19
Existing Subtotal	**443**	**49**	**75**	**124**	**35**	**60**	**95**
Net Units(1)	27	3	5	8	2	4	6
Total	**470**	**52**	**80**	**132**	**37**	**64**	**101**

(2) Net increase in units – See Table 1

The proposed fellowship hall is for the use of the residents of the campus and would not generate additional trips on Central Road. It will be used by the residents for religious and other purposes that currently occur at The Moorings. The fellowship hall spaces will provide additional elbow room to simplify scheduling of activities.

Trip Distribution

The trip distribution for the development is based on the distribution of employees in the area, location of retail, restaurant, and entertainment venues, and the road network. The trip distribution for the site is shown on **Table 4** and **Figure 3** which was based on existing traffic pattern at the Moorings entrance.

Table 4
Directional Distribution

Direction	Inbound Percentage	Outbound Percentage
East on Central Road	40%	50%
West on Central Road	60%	50%
Total	**100%**	**100%**

Trip Assignment

The future vehicular trips that are generated by the development were distributed to the area roadways based on the directional distribution analysis and the proposed site plan. **Figure 4** displays the trip assignment for the projected site traffic volumes. **Figure 5** illustrates the existing traffic volumes with the existing development at full occupancy. **Figure 6** shows the Total Traffic volumes, which are the sum of the existing traffic volumes and the site traffic volumes.

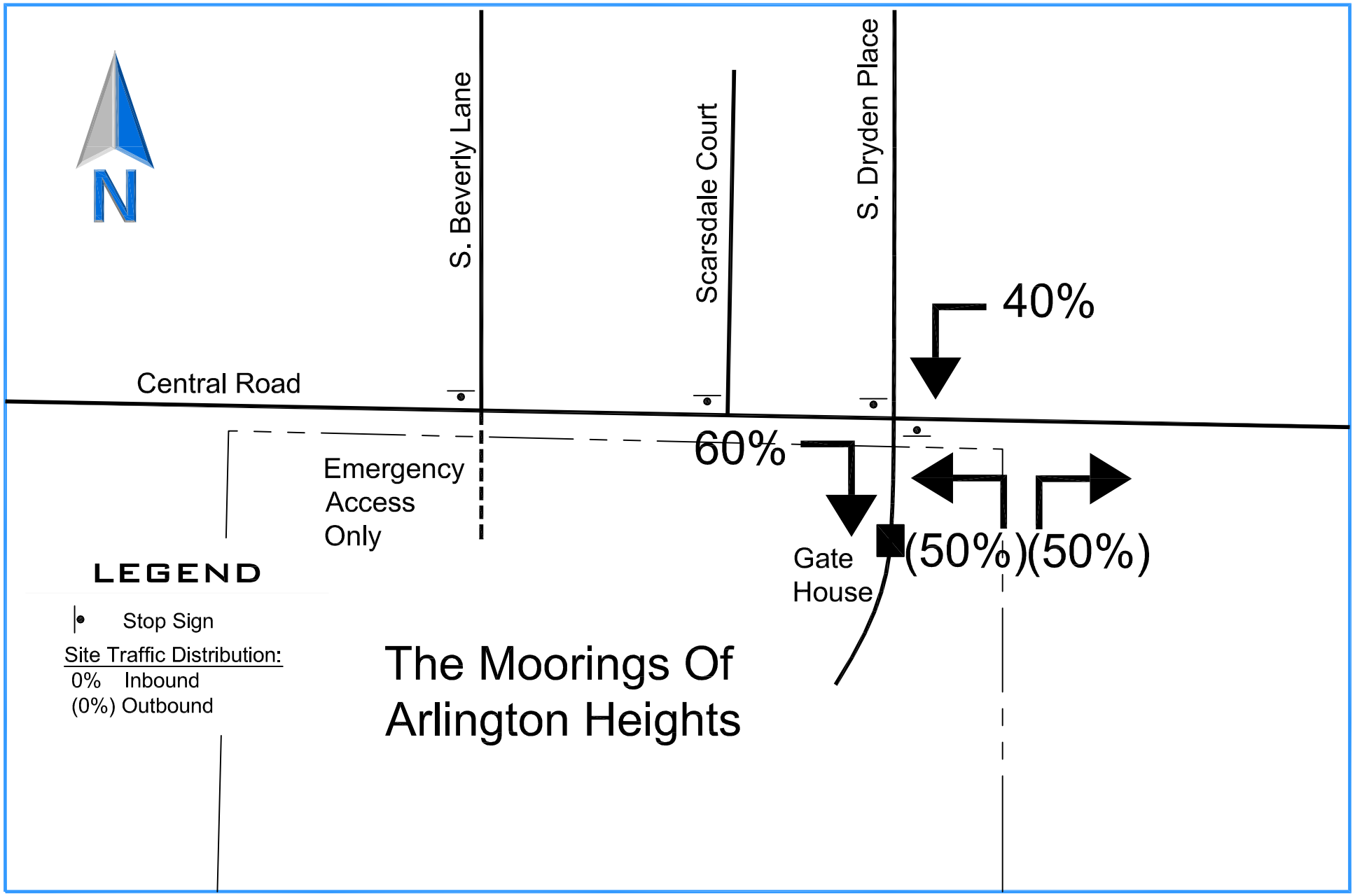
Intersection Capacity Analyses

An intersection's ability to accommodate traffic flow is based on the average control delay experienced by vehicles passing through the intersection. The intersection and individual traffic movements are assigned a level of service (LOS), ranging from A to F based on the control delay created by a traffic signal or stop sign. Control delay consists of the initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. LOS A has the best traffic flow and least delay. LOS E represents saturated or at capacity conditions. LOS F experiences oversaturated conditions and extensive delays. The Highway Capacity Manual definitions for levels of service and the corresponding control delay for both signalized and unsignalized intersections are shown in **Table 5**.

Table 5
Level of Service Criteria for Intersections

Level of Service	Description	Control Delay (seconds/vehicle)	
		Signals	Stop Signs
A	Minimal delay and few stops	<10	<10
B	Low delay with more stops	>10-20	>10-15
C	Light congestion	>20-35	>15-25
D	Congestion is more noticeable with longer delays	>35-55	>25-35
E	High delays and number of stops	>55-80	>35-50
F	Unacceptable delays and over capacity	>80	>50

Source: Highway Capacity Manual 2010



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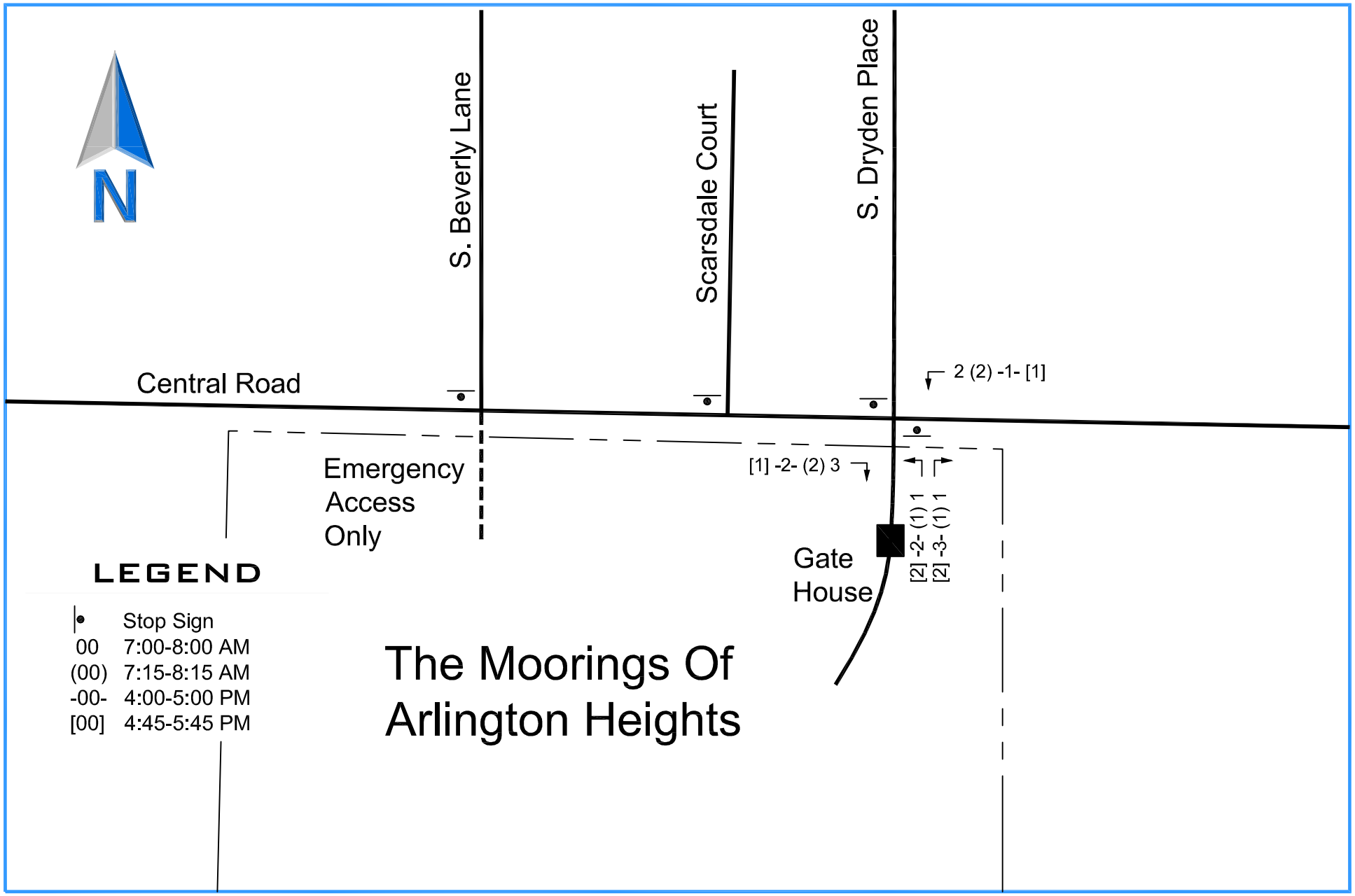
Directional Distribution

Figure 3



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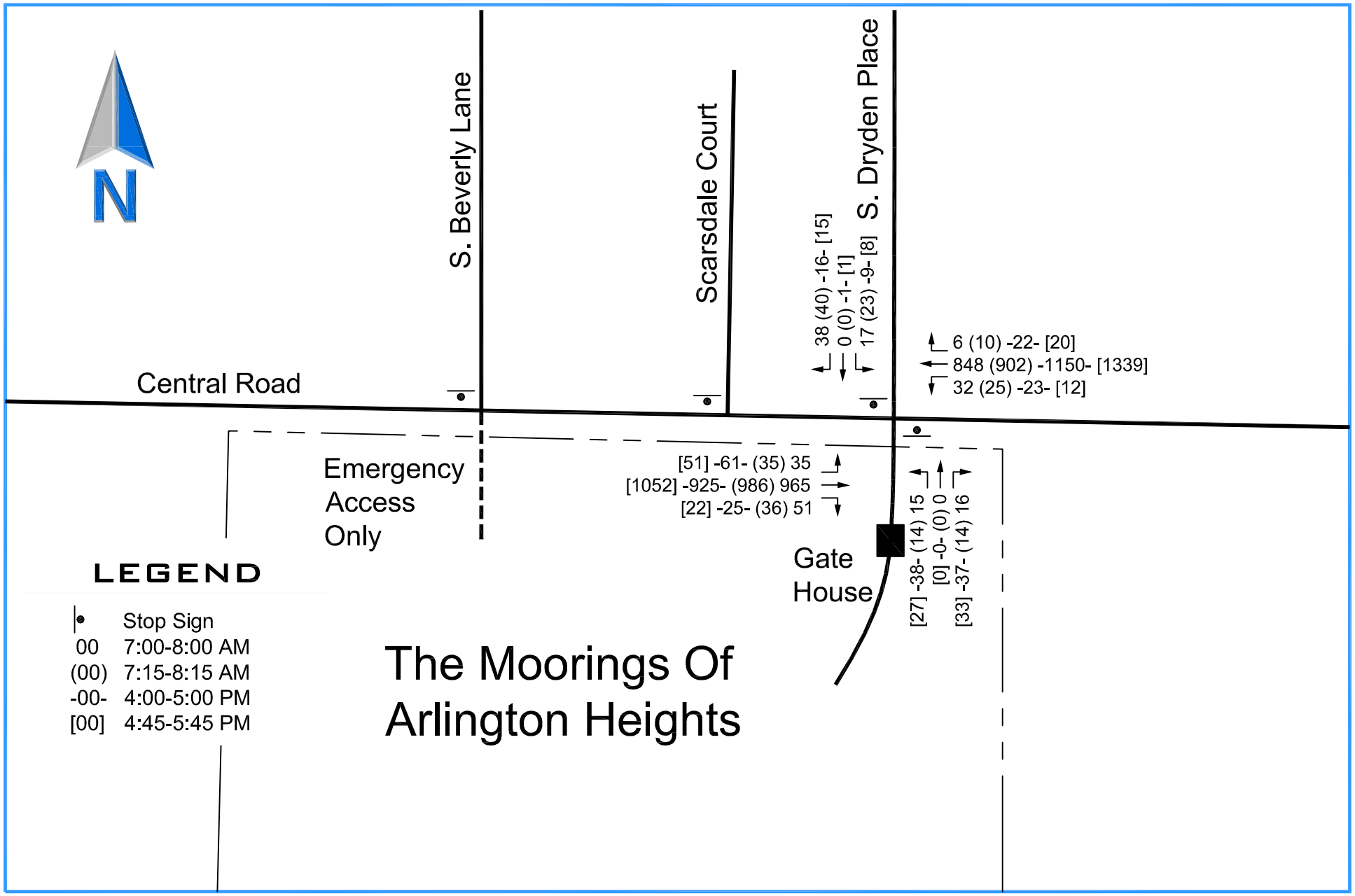
Additional Phase 1 Traffic Volumes

Figure 4



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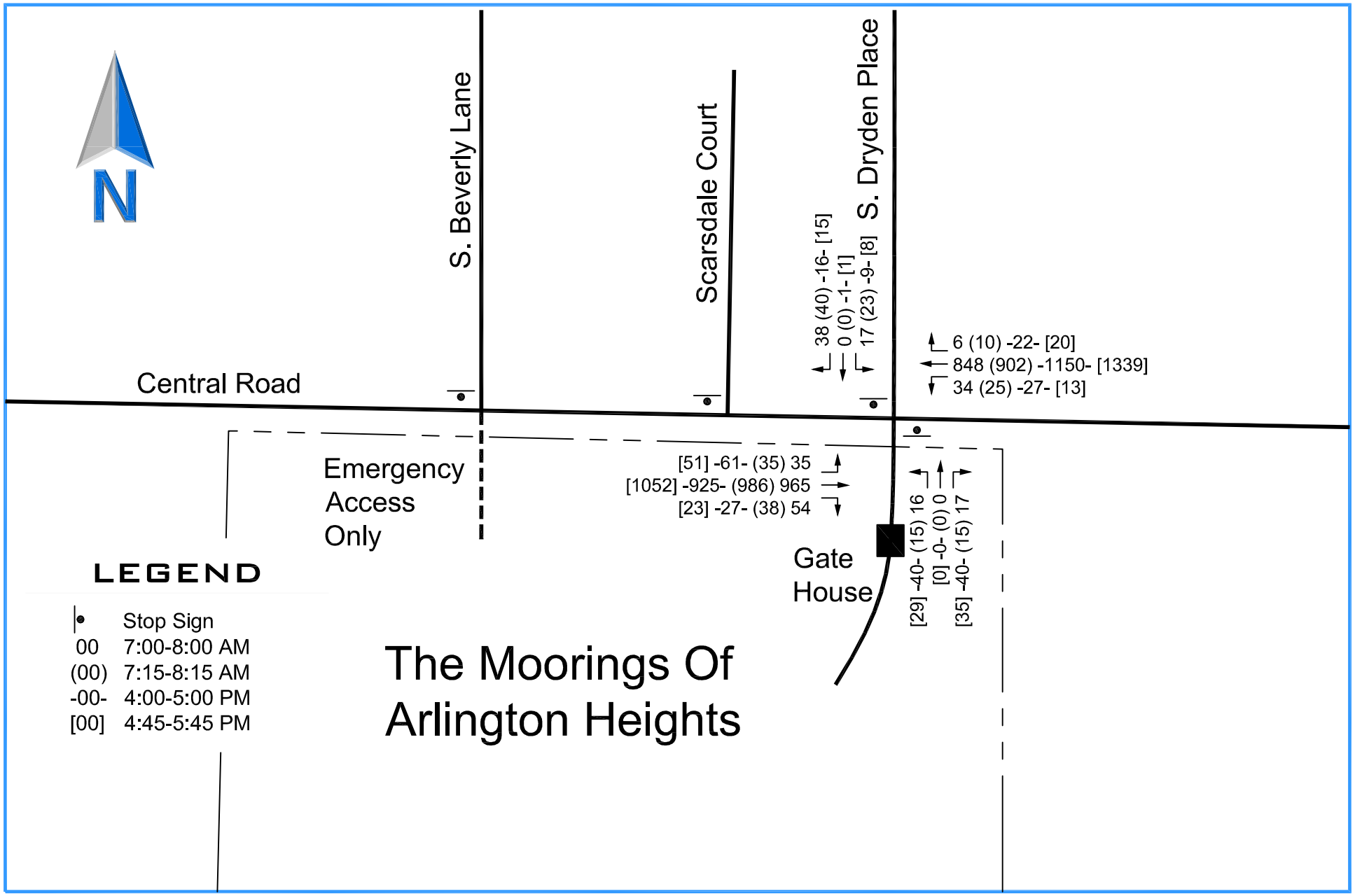
Existing Traffic Volumes At Full Occupancy

Figure 5



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Total Traffic Volumes

Figure 6

Capacity analyses were conducted for the intersection using the computer program SYNCHRO to determine the existing operating conditions of the access system. These analyses were performed for the weekday peak-hours. Copies of the capacity analysis summaries are included in the **Appendix**. **Table 6 and 7** shows the existing and projected level of service results for each of the movements at the intersection. The movements are working well except for the northbound though/left-turn lane which works at Level of Service F in the evening peak-hours. This will not change with the proposed changes. Although this movement works poorly, the volume of traffic and queuing is low.

Based on the capacity analyses and the minimal amount of additional site traffic, no additional improvements are recommended for the intersection of Central Road at Dryden Place/the Moorings Access.

Table 6
Central Road/ Dryden Place/ Moorings Entrance
Morning Movement Level of Service and Delay

Movement	Mooring's Peak (7:00-8:00 AM)		Central Road Peak (7:15-8:15 AM)	
	Existing Volumes	Total Volumes	Existing Volumes	Total Volumes
Eastbound Left	LOS A – 3.6 sec	LOS A – 3.8 sec	LOS A – 4.3 sec	LOS A – 4.3 sec
Westbound Left	LOS A – 5.5 sec	LOS A – 6.0 sec	LOS A – 5.1 sec	LOS A – 5.2 sec
Northbound Thru/Left	LOS D – 29.9 sec	LOS D – 29.5 sec	LOS D – 34.4 sec	LOS D – 34.4 sec
Northbound Right	LOS A – 1.0 sec	LOS A – 1.0 sec	LOS A – 1.0 sec	LOS A – 1.0 sec
Southbound Dryden	LOS C – 18.1 sec	LOS C – 17.9 sec	LOS D– 31.4 sec	LOS D– 31.5 sec

Table 7
Central Road/ Dryden Place/ Moorings Entrance
Evening Movement Level of Service and Delay

Movement	Mooring's Peak (4:00-5:00 PM)		Central Road Peak (4:45-5:45 AM)	
	Existing Volumes	Total Volumes	Existing Volumes	Total Volumes
Eastbound Left	LOS A – 8.0 sec	LOS A – 8.2 sec	LOS A – 8.9 sec	LOS A – 8.8 sec
Westbound Left	LOS A – 5.6 sec	LOS A – 6.0 sec	LOS A – 5.6 sec	LOS A – 5.9 sec
Northbound Thru/Left	LOS F – 67.6 sec	LOS F – 63.1 sec	LOS F – 85.7 sec	LOS F – 125.2 sec
Northbound Right	LOS A – 1.8 sec	LOS A – 1.8 sec	LOS A – 1.8sec	LOS A – 5.0 sec
Southbound Dryden	LOS D – 32.1 sec	LOS D – 33.9 sec	LOS D– 28.8 sec	LOS D– 17.3 sec

4 - PARKING

Parking Requirements

The parking requirements for the existing development and addition were calculated based on the Village of Arlington Heights' Zoning Ordinance. Parking at assisted living and memory care facilities is primarily generated by employees and visitors. Residents of the facility do not drive. National parking data is available from the Institute of Transportation Engineers (ITE) in their publication *Parking Generation*, 4th Edition for assisted living facilities (Land Use Code 254). **Tables 8** and **9** summarize the zoning code and ITE parking requirements for The Moorings campus.

Table 8
Zoning Code and ITE Requirements for
The Existing Mooring's Development

Unit Type	Units	Zoning Code Requirement	Total	ITE Parking Demand	Total
Senior Apartments	212	One Space per Unit	212.0	0.59 spaces per unit	125.1
Senior Villas	81	Two Spaces per Unit	162.0	0.59 spaces per unit	47.8
Skilled Care	105	One Space per Two Beds	52.5	0.35 spaces per bed	36.8
Sheltered Care	45	One Space per Two Beds	22.5	0.35 spaces per bed	15.8
Totals	**443**		**449.0**		**225.5**

Table 9
Zoning Code and ITE Requirements
Proposed Plan

Unit Type	Units	Zoning Code Requirement	Total	ITE Parking Demand	Total
Senior Apartments	202	One Space per Unit	202.0	0.59 spaces per unit	119.2
Senior Villas	73	Two Spaces per Unit	146.0	0.59 spaces per unit	43.1
Skilled Care	105	One Space per Two Beds	52.5	0.35 spaces per bed	36.8
Assisted Living	70	One Space per Two Beds	35.0	0.41spaces per unit	28.7
Assisted Living: Memory Care	20	One Space per Two Beds	10.0	0.41 spaces per bed	8.2
Resident Fellowship hall	486(1) seats	One Space for each 5 Seats	97.2	0.20 spaces per seat(2)	97.2
	470		**542.7 (445.5)(3)**		**333.2 (236.0) (3)**

(1) Approximately 3,400 sq. ft. at 7 sq. ft. per person = 486 seats
(2) Peak demand on a Sunday
(3) Requirement without Resident Fellowship hall

The zoning requirement calculations assume that the resident fellowship hall is used by off-campus visitors. However, this space will primarily serve and support only our on-site residents for various activities and programs which will not generate any significant traffic or parking need from off-campus visitors. The hall will, on occasion, be used for memorial services. The

Mooring's religious services team reports that most attendees of memorial services are from within the campus. In addition to on-site residents, memorial services typically draw 10-25 outside guests with a maximum of 20 vehicles. On very rare occasions (once every year or two) they see a few more visitors. The Moorings has an internal parking management team that oversees and manages parking during these types of events and does not believe that there is or will be a lack of available parking for these type of events. In conclusion our calculation of the number of seats shown for the resident fellowship hall (486 seats) is based on the building code capacity (1 seat per seven square feet) and does not reflect the proposed usage of the space.

Parking Inventory

The existing parking spaces on the campus are summarized below in **Table 10** along with the zoning requirements. The existing campus currently exceeds the zoning code parking requirements. Please note that the parking areas for the apartments are shared with the skilled care and assisted-living units.

Table 10
Moorings Existing Parking Inventory

Unit Type	Units	Location	Regular	Accessible	Total	Code Requirement	Diff.
Senior Apartments	**212**	Underground Garage Spaces	79		79		
		By Guard House	4		4		
		Surface Spaces South of Building	41	3	44		
		Surface Spaces by Entrance	70	3	73		
		subtotal	**194**	**6**	**200**	**212**	-12
Senior Villas	**81**	54 - One Car Garages	54		54		
		27 - Two Car Garages	54		54		
		Driveway Spaces	108		108		
		Off-Street Parking	12		12		
		subtotal	**228**		**228**	**162**	+66
Skilled Care Asstd. Living Memory Care	**150**	East of Building	18	1	19		
		Along Old Barn Road	31	2	33		
		West of Building	36	2	38		
		subtotal	**85**	**5**	**90**	**75**	+15
Totals	**443**		**507**	**11**	**518**	**449**	+69

The proposed parking supply is shown in **Table 11** along with the zoning requirements. Thirty eight existing surface parking spaces near the sheltered care building and the parking associated with 10 residential villas will be demolished for a total of 58 spaces. Those spaces will be replaced by 25 spaces under the south end of the new building, a new 40 space surface lot west of the building, and 13 additional spaces along the south side of Old Barn Road for a total of 78 new spaces. There will be a net gain of 20 spaces on-site. Without the resident fellowship hall parking requirement, the development will exceed the zoning requirement (538 vs 446).

Table 11
Proposed Parking Inventory

Unit Type	Units	Location	Regular	Accessible	Total	Code Requirement	Diff.
Senior Apartments	**202**	Underground Garage Spaces	79		79		
		By Guard House	4		4		
		Surface Spaces South of Building	41	3	44		
		Surface Spaces by Entrance	70	3	73		
		subtotal	**194**	**6**	**200**	**202**	-2
Senior Villas	**73**	48 - One Car Garages	48		48		
		25 - Two Car Garages	50		50		
		Driveway Spaces	98		98		
		Off-Street Parking	12		12		
		subtotal	**208**		**208**	**146**	+62
Skilled and Sheltered Care	**195**	East of Building	18	1	19		
		West of the Building	38	2	40		
		Along Old Barn Road	44	2	46		
		Under the Building	25		25		
		subtotal	**125**	**5**	**130**	**98**	+32
Totals	**470**		**527**	**11**	**538**	**446**	+92

Residential Auto Ownership

The Moorings of Arlington Heights provided resident vehicle ownership data for the apartments and villas on existing campus and is summarized in **Table 12**. As previously noted, residents in the skilled care and assisted living/memory care are not able to drive. Forty three percent of the residential units do not have a vehicle.

Table 12
Moorings Resident's Auto Ownership

Unit Type	Occupied Units[1]	Number of Units with			Total Vehicles	Average Vehicles per Unit
		0 veh.	1 veh.	2 veh.		
Senior Apartments	190	97	90	3	93	.49
Senior Villas	73	13	52	8	68	.85
Totals	**263**	**110**	**142**	**11**	**161**	**.61**

(1) March 2015 Data

Parking Demand Survey

Parking counts were conducted at the campus on Thursday November 13, 2014 and are summarized below in **Table 13.** The surveyed numbers were then adjusted to represent full occupancy.

Table 13
Existing Parking Survey

Unit Type	Spaces Available	Surveyed		Adjusted for Full Occupancy	
		Vehicles	%	Vehicles	%
Senior Apartments	200	**161**	71%	**176**	88%
Senior Villas	228	**68**	30%	**74**	33%
Skilled and Sheltered Care	90	**66**	73%	**90**	100%
Total	518	**295**	57%	**340**	67%

Table 14 shows the total parking demand based on the surveys which can be accommodated on the site. Please note that the employee parking can be shifted from the west of the new building to west of the existing building to balance out the total demand.

Table 14
Total Parking Demand
Based on Parking Surveys

Unit Type	Spaces Available	Demand	
		Vehicles	%
Senior Apartments	200	**168**	88%
Senior Villas	208	**67**	33%
Skilled and Sheltered Care	130	**117**	90%
Total	538	**352**	65%

5 - TRAFFIC SIGNAL WARRANT ANALYSIS

A traffic signal warrant study was conducted to determine if the intersection of The Mooring's entrance or Dryden Place with Central Road met the minimum requirements for a traffic signal. The investigation of the need for a traffic control signal shall include an analysis of factors related to the existing operation and safety at the study location and the potential to improve these conditions, and the applicable factors contained in the following traffic signal warrants:

Warrant 1 - Eight-Hour Vehicular Volume
Warrant 2 - Four-Hour Vehicular Volume
Warrant 3 - Peak Hour Vehicular Volume
Warrant 4 - Pedestrian Volume
Warrant 5 - School Crossing
Warrant 6 - Coordinated Signal System
Warrant 7 - Crash Experience
Warrant 8 - Roadway Network
Warrant 9 - Intersection Near a Grade Crossing

The satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal.

Warrant 1 – Eight-Hour Vehicular Volume (Condition A – Eight Hour Vehicular Volume)

This warrant is intended for application at locations where a large volume of intersecting traffic is the principal reason to consider installing a new traffic signal. Warrant 1A is satisfied if the following conditions are met for any eight hours of an average day, for a major street with a speed limit of 40 mph and two lanes at each major street approach and minor street approach with one or two lanes:

- 600 vehicles per hour on major street (total of both approaches)
- 150 vehicles per hour on minor street (Dryden Place – 1 lane)
- 200 vehicles per hour on minor street (The Moorings – 2 lanes)

For the major street approach, Central Road, there were at least eight hours that satisfy the conditions of Warrant 1A. However, there are no time periods in which the conditions of Warrant 1A are satisfied for either minor street approach. The highest hourly minor street volume found during the analysis period was vehicles between 84 vph on Dryden Place and 60 vph at the Moorings entrance, which is significantly below the volume threshold (150-200 vph) required for Warrant 1A. As a result, **Warrant 1A is NOT SATISFIED**.

Warrant 1 – Eight-Hour Vehicular Volume (Condition B – Interruption of Continuous Traffic)

This warrant is intended for application at locations where Condition A is not satisfied and where the traffic volume on the major street is so heavy that traffic on a minor intersection street suffers excessive delay or conflict in entering or crossing the major street. Warrant 1B is satisfied if the following conditions are met for any eight hours of an average day, for a major street with a speed limit of 40 mph and two lanes at each approach and minor street approach with one or two lanes:

- 900 vehicles per hour on major street (total of both approaches)
- 75 vehicles per hour on minor street (Dryden Place – 1 lane)
- 150 vehicles per hour on minor street (The Moorings – 2 lanes)

For the major street approach, there are eight hours that would satisfy the conditions of Warrant 1B. However, there in only one hour in which the conditions of Warrant 1B are satisfied for the minor street approach. The highest hourly volume found during the analysis period was 84 vehicles on Dryden Place which exceeds the 75 vph threshold for only one of the eight hours of the day. As a result, **Warrant 1B is NOT SATISFIED**.

Warrant 2 – Four-Hour Vehicular Volume

This warrant is intended to be applied where the volume of intersecting traffic is the principal reason to consider installing a traffic control signal. Warrant 2 is satisfied if an engineering study finds that, for each of any four hours of an average day, the plotted points representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor street approach (one direction only) all fall above the applicable curve in Figure 4C-1 of the MUTCD, which is found in the Appendix. On the minor street, the higher volume is not required to be on the same approach during each of these four hours. The minor street approach volumes must exceed 80 vph, which is the lower threshold volume, which only occurs for one hour and not the four hours required. As a result, **Warrant 2 is NOT SATISFIED**.

Warrant 3 – Peak Hour

This warrant is intended for use at a location where traffic conditions are such that for a minimum of one hour of an average day, the minor-street traffic suffers undue delay where entering or crossing the major street. This warrant is only to be applied in unusual cases, such as office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time. This warrant is satisfied if the following two categories are met:

A. If all three of the following conditions exist for the same one hour (any four consecutive 15-minute periods) of an average day:

   a. The total stopped time delay experienced by the traffic on one minor-street approach (one direction only) controlled by a STOP sign equals or exceeds 5 vehicle-hours for a two-lane approach; and

   b. The volume on the same minor street approach (one direction only) equals and exceed 150 vehicles per hour for two moving lanes; and

   c. The total entering volume serviced during the hour exceeds 650 vehicles per hour for intersections with three approaches.

B. The plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor-street approach (one direction only) for 1 hour (any four consecutive 15-minute periods) of an average day falls above the applicable curve on Figure 4C-3.

The minor street approach volume never exceeds 100 vehicles per hour minimum volume, thus this warrant is not satisfied. Thus, **Warrant 3 is NOT SATISFIED**.

Warrant 4 – Pedestrian Volume

This warrant is intended for application where the traffic volume on a major street is so heavy that pedestrians experience excessive delay in crossing the major street. The need for a traffic control signal at an intersection shall be considered if an engineering study finds that one of the following criteria is met:

A. For each of any four hours of an average day, the plotted points representing the vehicles per hour on the major street (total of both approaches) and the corresponding pedestrians per hour crossing the major street (total of all crossings) all fall above the curve in Figure 4C-6; or
B. For one hour (any four consecutive 15-minute periods) of an average day, the plotted points representing the vehicles per hour on the major street (total of both approaches) and the corresponding pedestrians per hour crossing the major street (total of all crossings) falls above the curve in Figure 4C-8.

The volume of pedestrians crossing at this intersection was zero during the traffic counts. Thus, **Warrant 4 is NOT SATISFIED.**

Warrant 5 – School Crossing

This warrant is intended for application where school children crossing the major street are the principal reason to consider installing a traffic control signal. For the purposes of this warrant, the word "schoolchildren" includes elementary through high school students.

Dryden Elementary School is located 1,300 feet to the north but no school children were observed crossing Central Road, thus **Warrant 5 is NOT SATISFIED.**

Warrant 6 – Coordinated Signal System

Progressive movement in a coordinated signal system sometimes necessitates installing traffic control signals at intersections where they would not otherwise be needed in order to maintain proper platooning of vehicles. The need for a traffic control signal in terms of this warrant should be considered if one of the following is met:

A. On a one-way street or a street that has traffic predominately in one direction, the adjacent traffic control signals are so far apart that they do not provide the necessary degree of vehicular platooning.

B. On a two-way street, adjacent traffic control signals do not provide the necessary degree of platooning and the proposed and adjacent traffic control signals will provide a progressive operation.

Existing traffic signals are located 2,450 feet to the west at Arlington Heights Road and 1,300 feet to the east at Arthur Avenue. A traffic signal at this location would not improve traffic flow or platooning on Central Road. This warrant is not applicable, and thus **Warrant 6 is NOT SATISFIED**.

Warrant 7 – Crash Experience

The crash experience signal warrant conditions are intended for application where the severity and frequency of crashes are the principal reasons to consider installing a traffic control signal. The need for traffic control signal shall be considered if an engineering study finds that all of the following criteria are met:

A. Adequate trial of alternatives with satisfactory observance and enforcement has failed to reduce the crash frequency; and

B. Five or more reported crashes, of types susceptible to correction by a traffic control signal, have occurred within a 12-month period, each crash involving personal injury or property damage apparently exceeding the applicable requirements for a reportable crash; and

C. For each of any 8 hours of an average day, the vehicles per hour (vph) given in both of the 80 percent columns of Condition A in Table 4C-1 (see Section 4C.02), or the vph in both of the 80 percent columns of Condition B in Table 4C-1 exists on the major-street and the higher-volume minor-street approach, respectively, to the intersection, or the volume of pedestrian traffic is not less than 80 percent of the requirements specified in the Pedestrian Volume warrant. These major-street and minor-street volumes shall be for the same 8 hours. On the minor street, the higher volume shall not be required to be on the same approach during each of the 8 hours.

There have only been five crashes in the last four years at the intersection. Thus, as there are not enough crashes to meet the minimum threshold for this warrant, **Warrant 7 is NOT SATISFIED.** Please note that only one crash involving a vehicle exiting the Moorings development occurred in those four years.

Warrant 8 – Roadway Network

This warrant is intended to determine if installing a traffic control signal will encourage concentration and organization of traffic flow on a roadway network. The need for a traffic control signal shall be considered if an engineering study finds that the common intersection of two or more major routes meets one or both of the following criteria:

A. The intersection has a total existing, or immediately projected entering volume of at least 1,000 vehicles per hour during the peak hour of a typical weekday and has 5-year projected traffic volumes, based on an engineering study, that meet one or more of Warrants 1, 2, and 3 during an average weekday; or

B. The intersection has a total existing or immediately projected entering volume of at least 1,000 vehicles per hour for each of any 5 hours of a non-normal business day (Saturday or Sunday).

A major route as used in this signal warrant shall have at least one of the following characteristics:

A. It is part of the street or highway system that serves as the principal roadway network for through traffic flow.

B. It includes rural or suburban highways outside, entering, or traversing a city.

C. It appears as a major route on an official plan, such as a major street plan in an urban area traffic and transportation study.

As was seen within the traffic volumes presented for the previous warrants, the traffic volumes both existing and what can reasonably be expected in the future are inadequate to meet the requirements of this warrant, thus **Warrant 8 is NOT SATISFIED.**

Warrant 9 – Intersection Near a Grade Crossing

This warrant is intended for use at a location where none of the conditions described in the other eight traffic signal warrants are met, but the proximity of the intersection to a grade crossing on an intersection approach controlled by a STOP or YIELD sign is the principal reason to consider installing a traffic signal control.

The nearest grade crossing is approximately 1.4 miles east of the intersection. As a result, this warrant is not applicable and thus **Warrant 9 is NOT SATISFIED.**

Conclusion

This traffic signal warrant study reveals that a signal at the intersection of Central Road at Dryden Place and The Moorings Entrance is not currently warranted. When additional development occurs at the campus, the need for a traffic signal will be revisited.

Copies of the crash data and HCS Warrant analysis are included in the **Appendix.**

6 - SUMMARY

This report summarizes the results of traffic and parking study for the expansion of the Moorings of Arlington Heights in Arlington Heights, Illinois. The findings of the study area:

- The volume of traffic generated by the development is minimal (8 to 12 vehicles per hour) due to the nature of the use.
- The net change in area traffic volumes is nominal.
- The Mooring's driveway does not require any additional roadway improvements for the additional traffic volumes. Crash data does not support the need got traffic improvements.
- A traffic signal is not currently warranted at the Mooring's driveway and Dryden Place and will not be warranted with the development. When additional development occurs at the campus, the need for a traffic signal will be revisited.
- There is adequate parking at the campus.
- The zoning requirement calculations assume that the resident fellowship hall is used by off-campus visitors. However, this space will primarily serve and support only our on-site residents for various activities and programs which will not generate any significant traffic or parking need from off-campus visitors.

Traffic and Parking Study Appendix

- 2014 Existing Traffic Counts
- 2009-2012 Crash Data
- Capacity Analyses
- MUTCD Signal Warrants

ERIKSSON ENGINEERING ASSOCIATES, LTD.

Intersection Traffic Counts

Central Road at Dryden Place and The Moorings Access

Arlington Heights, Illinois

ERIKSSON ENGINEERING ASSOCIATES, LTD.

Begin Time	Dryden Place Southbound			Central Road Westbound			Moorings Access Northbound			Central Road Eastbound			15 Minute Totals	60 Minute Totals	Peak Hour Factor	Mooring's Volumes		15 Minute Totals	60 Minute Totals
	Right Turn	Through	Left Turn	Right Turn	Through	Left Turn	Right Turn	Through	Left Turn	Right Turn	Through	Left Turn				IN	OUT		
	Thursday, November 13, 2014																		
7:00 AM	11	0	1	0	170	10	3	0	1	21	209	7	433	**2000**	**0.88**	31	4	35	**91**
7:15 AM	12	0	5	2	208	9	4	0	6	8	248	8	510	**2067**	**0.91**	17	10	27	**71**
7:30 AM	7	0	5	0	232	1	3	0	3	3	223	10	487	2052	0.90	4	6	10	58
7:45 AM	8	0	6	4	238	5	3	0	2	9	285	10	570	2017	0.88	14	5	19	64
8:00 AM	13	0	7	4	224	5	1	0	0	9	230	7	500	1961	0.95	14	1	15	65
8:15 AM	7	0	5	7	225	6	1	0	2	5	232	5	495			11	3	14	
8:30 AM	9	0	0	11	213	2	1	0	2	11	194	9	452			13	3	16	
8:45 AM	34	0	9	12	218	10	3	0	2	5	199	22	514			15	5	20	
Total	101	0	38	40	1728	48	19	0	18	71	1820	78							
7:15-8:15 AM	**40**	**0**	**23**	**10**	**902**	**20**	**11**	**0**	**11**	**29**	**986**	**35**	**2067**			**49**	**22**	**71**	
7:00-8:00 AM	**38**	**0**	**17**	**6**	**848**	**25**	**13**	**0**	**12**	**41**	**965**	**35**	**2000**			**66**	**25**	**91**	
	Thursday, November 13, 2014																		
4:00 PM	7	0	3	5	264	3	8	0	12	5	205	11	523	**2272**	**0.93**	8	20	28	**99**
4:15 PM	1	0	2	3	302	7	8	0	4	4	216	19	566	2409	0.91	11	12	23	92
4:30 PM	5	0	2	3	276	5	6	0	8	6	247	12	570	2498	0.95	11	14	25	86
4:45 PM	3	1	2	11	308	4	7	0	7	4	257	9	613	**2571**	**0.97**	9	14	23	**76**
5:00 PM	5	0	3	4	345	3	5	0	7	6	266	16	660	2515	0.95	9	12	21	67
5:15 PM	3	0	2	2	353	2	8	0	2	5	255	23	655			7	10	17	
5:30 PM	4	0	1	3	333	0	7	0	5	3	274	13	643			3	12	15	
5:45 PM	9	0	4	7	291	6	3	0	5	0	224	8	557			6	8	14	
Total	37	1	19	38	2472	30	52	0	50	33	1944	111							
4:45-5:45 PM	**15**	**1**	**8**	**20**	**1339**	**9**	**27**	**0**	**21**	**18**	**1052**	**61**	**2571**			**28**	**48**	**76**	
4:00-5:00 PM	**16**	**1**	**9**	**22**	**1150**	**19**	**29**	**0**	**31**	**19**	**925**	**51**	**2272**			**39**	**60**	**99**	

7:15-8:15 AM	Central Road Street Morning Peak-Hour
7:00-8:00 AM	Moorings Traffic Morning Peak-Hour
4:45-5:45 PM	Central Road Street Evening Peak-Hour
4:00-5:00 PM	Moorings Traffic Evening Peak-Hour

Illinois DOT

016 3751 Weekly Volume Report - Mon 06/21/2010 - Sun 06/27/2010

Location ID:	016 3751	**Type:**	LINK
Located On:	CENTRAL RD		
From Road:		**To Road:**	MP PW ENT
Direction	-		
Community:	ARLINGTON HEIGHTS	**Period:**	Mon 06/21/2010 - Sun 06/27/2010
AADT:	21200		

Start Time	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Avg
12:00 AM				157				157
1:00 AM				88				88
2:00 AM				59				59
3:00 AM				37				37
4:00 AM				100				100
5:00 AM			358					358
6:00 AM			1183					1183
7:00 AM			1783					1783
8:00 AM			1709					1709
9:00 AM			1329					1329
10:00 AM			1134					1134
11:00 AM			1362					1362
12:00 PM			1507					1507
1:00 PM			1486					1486
2:00 PM			1556					1556
3:00 PM			1875					1875
4:00 PM			2124					2124
5:00 PM			2489					2489
6:00 PM			1596					1596
7:00 PM			1041					1041
8:00 PM			780					780
9:00 PM			650					650
10:00 PM			467					467
11:00 PM			291					291
Total	**0**	**0**	**24720**	**441**	**0**	**0**	**0**	
24HrTotal				25161				25161
AM Pk Hr								
AM Peak								0
PM Pk Hr								
PM Peak								0
% Peak Hr								
% Peak Hr				9.89%				9.89%

Illinois Department of Transportation
Division of Traffic Safety

Coordinate Collision Diagram Report

1/1/2009 to 12/31/2012

For XCoordinate 2892791.562147 : YCoordinate 1974398.01617376 | Foot Tolerance : 30 | County : Cook | Intersection Related: Intersections | *See Notes at End of Report.

Date	Weather	Roadway	------ A	Injuries B	------ C	Killed	Type of Crash	Light Condition	Mile	XCoordinate YCoordinate	Vehicle Type	DIRP	Maneuver	Event 1	Loc 1	Event 2	Loc 2	Event 3	Loc 3	Unit
201101325661																				
8/26/2011 7:05 AM	Clear	Dry	0	0	0	0	Sideswipe Same Direction	Daylight	0.00	2892791.562147 1974398.01617376										
											Passenger	East	Straight Ahead	Motor Vehicle In Traffic	On Pavement (Roadway)	(UNK)	(UNK)	(UNK)	(UNK)	1
											Passenger	East	Slow/Stop - Left Turn	Motor Vehicle In Traffic	On Pavement (Roadway)	(UNK)	(UNK)	(UNK)	(UNK)	2
201001364660																				
10/12/2010 2:19 PM	Clear	Dry	0	0	0	0	Angle	Daylight	0.49	2892791.562147 1974398.01617376										
											Passenger	South	Straight Ahead	Motor Vehicle In Traffic	Intersection	(UNK)	(UNK)	(UNK)	(UNK)	1
											Passenger	West	Straight Ahead	Motor Vehicle In Traffic	Intersection	(UNK)	(UNK)	(UNK)	(UNK)	2
201001363430																				
10/17/2010 5:42 PM	Clear	Dry	0	1	0	0	Turning	Daylight	0.49	2892791.0201856 1974397.90507906										
											Passenger	North	Turning Left	Motor Vehicle In Traffic	On Pavement (Roadway)	(UNK)	(UNK)	(UNK)	(UNK)	1
											SUV	East	Straight Ahead	Motor Vehicle In Traffic	On Pavement (Roadway)	(UNK)	(UNK)	(UNK)	(UNK)	2
201001441743																				
12/3/2010 7:38 AM	Clear	Dry	0	0	0	0	Turning	Daylight	0.49	2892791.55671393 1974398.26486406										
											Passenger	South	Turning Left	Motor Vehicle In Traffic	On Pavement (Roadway)	(UNK)	(UNK)	(UNK)	(UNK)	1
											Passenger	West	Turning Left	Motor Vehicle In Traffic	On Pavement (Roadway)	(UNK)	(UNK)	(UNK)	(UNK)	2
200901073311																				
1/30/2009 8:15 AM	Clear	Dry	0	0	0	0	Turning	Daylight	0.58	2892791.562147 1974398.01617376										
											Passenger	West	Slow/Stop In Traffic	Motor Vehicle In Traffic	Intersection	(UNK)	(UNK)	(UNK)	(UNK)	2
											Passenger	South	Turning Left	Motor Vehicle In Traffic	Intersection	(UNK)	(UNK)	(UNK)	(UNK)	1

Illinois Department of Transportation
Division of Traffic Safety

Coordinate Collision Diagram Report

1/1/2009 to 12/31/2012

For XCoordinate 2892791.562147 : YCoordinate 1974398.01617376 | Foot Tolerance : 30 | County : Cook | Intersection Related: Intersections | *See Notes at End of Report.

TOTAL CRASHES	FATAL CRASHES	A INJURY CRASHES	B INJURY CRASHES	C INJURY CRASHES	PROPERTY DAMAGE CRASHES	TOTAL KILLED	TOTAL INJURED	A INJURIES	B INJURIES	C INJURIES
5	0	0	1	0	4	0	1	0	1	0

Type of Crash	*Total*	*%*
Angle	1	20.0%
Sideswipe Same Direction	1	20.0%
Turning	3	60.0%
TOTAL:	***5***	

Dayof Wk	*Total*	*%*
Tuesday	1	20.0%
Friday	3	60.0%
Sunday	1	20.0%
TOTAL:	***5***	

Hour of Day	*Total*	*%*
07 AM	2	40.0%
08 AM	1	20.0%
2 PM	1	20.0%
5 PM	1	20.0%
TOTAL:	***5***	

Vehicle Type	*Total*	*%*
Passenger	9	90.0%
SUV	1	10.0%
TOTAL:	***10***	

Weather Cond	*Total*	*%*
Clear	5	100.0%
TOTAL:	***5***	

Light Cond	*Total*	*%*
Daylight	5	100.0%
TOTAL:	***5***	

Road Surface	*Total*	*%*
Dry	5	100.0%
TOTAL:	***5***	

DIRP	*Total*	*%*
East	3	30.0%
North	1	10.0%
South	3	30.0%
West	3	30.0%
TOTAL:	***10***	

Illinois Department of Transportation
Division of Traffic Safety

Coordinate Collision Diagram Report

1/1/2009 to 12/31/2012

For XCoordinate 2892791.562147 : YCoordinate 1974398.01617376 | Foot Tolerance : 30 | County : Cook | Intersection Related: Intersections | *See Notes at End of Report.

Notes

Current year and previous year data are not yet complete and are subject to change as more information becomes available. Calendar date selections include data based on the date of the crash. Year selections include data based on the statistical year in which the crash was processed.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	35	965	51	32	848	10	15	0	16	17	0	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	265		0	150		0	75		75	0		0
Storage Lanes	1		0	1		0	0		1	0		0
Taper Length (ft)	175			125			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.992			0.998				0.850		0.906	
Flt Protected	0.950			0.950				0.950			0.985	
Satd. Flow (prot)	1770	3511	0	1770	3532	0	0	1770	1583	0	1662	0
Flt Permitted	0.950			0.950				0.950			0.985	
Satd. Flow (perm)	1770	3511	0	1770	3532	0	0	1770	1583	0	1662	0
Link Speed (mph)		40			40			25			25	
Link Distance (ft)		663			590			372			430	
Travel Time (s)		11.3			10.1			10.1			11.7	
Peak Hour Factor	0.88	0.88	0.88	0.89	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	40	1097	58	36	964	11	17	0	18	19	0	43
Shared Lane Traffic (%)												
Lane Group Flow (vph)	40	1155	0	36	975	0	0	17	18	0	62	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			15			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		0			0			23			23	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 45.7%		ICU Level of Service A	
Analysis Period (min) 15			

1: The Moorings/Dryden Place & Central Road Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SBL	SBR	All
Denied Del/Veh (s)	2.4	0.2	0.5	2.8	0.2	0.3	0.1	4.1	0.1	0.1	0.3
Total Del/Veh (s)	3.6	1.2	2.0	5.5	0.9	1.2	29.9	1.0	18.1	1.6	1.5

Intersection: 1: The Moorings/Dryden Place & Central Road

Movement	EB	WB	WB	NB	SB
Directions Served	L	L	TR	LT	LTR
Maximum Queue (ft)	28	47	44	53	53
Average Queue (ft)	16	12	1	13	17
95th Queue (ft)	36	34	14	40	48
Link Distance (ft)			570	319	377
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	265	150			
Storage Blk Time (%)					
Queuing Penalty (veh)					

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	35	965	54	34	848	10	16	0	17	17	0	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	265		0	150		0	75		75	0		0
Storage Lanes	1		0	1		0	0		1	0		0
Taper Length (ft)	175			125			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.992			0.998				0.850		0.906	
Flt Protected	0.950			0.950				0.950			0.985	
Satd. Flow (prot)	1770	3511	0	1770	3532	0	0	1770	1583	0	1662	0
Flt Permitted	0.950			0.950				0.950			0.985	
Satd. Flow (perm)	1770	3511	0	1770	3532	0	0	1770	1583	0	1662	0
Link Speed (mph)		40			40			25			25	
Link Distance (ft)		663			590			372			430	
Travel Time (s)		11.3			10.1			10.1			11.7	
Peak Hour Factor	0.88	0.88	0.88	0.89	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	40	1097	61	38	964	11	18	0	19	19	0	43
Shared Lane Traffic (%)												
Lane Group Flow (vph)	40	1158	0	38	975	0	0	18	19	0	62	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			15			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		0			0			23			23	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 45.7%		ICU Level of Service A	
Analysis Period (min) 15			

1: The Moorings/Dryden Place & Central Road Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SBL	SBR	All
Denied Del/Veh (s)	2.4	0.2	0.5	2.7	0.2	0.3	0.1	4.1	0.1	0.1	0.3
Total Del/Veh (s)	3.8	1.2	2.1	6.0	0.9	1.2	29.5	1.0	17.9	2.1	1.6

Intersection: 1: The Moorings/Dryden Place & Central Road

Movement	EB	WB	WB	NB	SB
Directions Served	L	L	TR	LT	LTR
Maximum Queue (ft)	28	47	44	53	54
Average Queue (ft)	17	11	1	15	18
95th Queue (ft)	36	33	14	42	49
Link Distance (ft)			570	319	377
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	265	150			
Storage Blk Time (%)					
Queuing Penalty (veh)					

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	35	986	36	25	902	10	14	0	14	23	0	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	265		0	150		0	75		75	0		0
Storage Lanes	1		0	1		0	0		1	0		0
Taper Length (ft)	175			125			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.995			0.998				0.850		0.914	
Flt Protected	0.950			0.950				0.950			0.982	
Satd. Flow (prot)	1770	3522	0	1770	3532	0	0	1770	1583	0	1672	0
Flt Permitted	0.950			0.950				0.950			0.982	
Satd. Flow (perm)	1770	3522	0	1770	3532	0	0	1770	1583	0	1672	0
Link Speed (mph)		40			40			25			25	
Link Distance (ft)		663			590			372			430	
Travel Time (s)		11.3			10.1			10.1			11.7	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	38	1084	40	27	991	11	15	0	15	25	0	44
Shared Lane Traffic (%)												
Lane Group Flow (vph)	38	1124	0	27	1002	0	0	15	15	0	69	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			15			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		0			0			23			23	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 46.2%		ICU Level of Service A	
Analysis Period (min) 15			

1: The Moorings/Dryden Place & Central Road Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SBL	SBR	All
Denied Del/Veh (s)	2.4	0.2	0.4	2.9	0.2	0.3	0.1	4.1	0.2	0.1	0.3
Total Del/Veh (s)	4.3	1.1	1.7	5.1	0.9	1.2	34.4	1.0	31.4	8.0	1.8

Intersection: 1: The Moorings/Dryden Place & Central Road

Movement	EB	WB	WB	NB	SB
Directions Served	L	L	TR	LT	LTR
Maximum Queue (ft)	49	28	44	53	72
Average Queue (ft)	17	6	1	15	26
95th Queue (ft)	38	24	14	41	61
Link Distance (ft)			570	319	377
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	265	150			
Storage Blk Time (%)					
Queuing Penalty (veh)					

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	35	986	38	27	902	10	15	0	15	23	0	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	265		0	150		0	75		75	0		0
Storage Lanes	1		0	1		0	0		1	0		0
Taper Length (ft)	175			125			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.994			0.998				0.850		0.914	
Flt Protected	0.950			0.950				0.950			0.982	
Satd. Flow (prot)	1770	3518	0	1770	3532	0	0	1770	1583	0	1672	0
Flt Permitted	0.950			0.950				0.950			0.982	
Satd. Flow (perm)	1770	3518	0	1770	3532	0	0	1770	1583	0	1672	0
Link Speed (mph)		40			40			25			25	
Link Distance (ft)		663			590			372			430	
Travel Time (s)		11.3			10.1			10.1			11.7	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	38	1084	42	30	991	11	16	0	16	25	0	44
Shared Lane Traffic (%)												
Lane Group Flow (vph)	38	1126	0	30	1002	0	0	16	16	0	69	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			15			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		0			0			23			23	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	

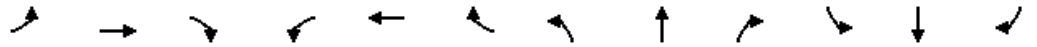
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 46.2%		ICU Level of Service A	
Analysis Period (min) 15			

1: The Moorings/Dryden Place & Central Road Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SBL	SBR	All
Denied Del/Veh (s)	2.4	0.2	0.4	3.0	0.2	0.3	0.1	4.1	0.2	0.1	0.3
Total Del/Veh (s)	4.3	1.1	1.7	5.2	0.9	1.2	34.4	1.0	31.5	8.0	1.8

Intersection: 1: The Moorings/Dryden Place & Central Road

Movement	EB	WB	WB	NB	SB
Directions Served	L	L	TR	LT	LTR
Maximum Queue (ft)	49	28	44	53	72
Average Queue (ft)	17	8	1	15	26
95th Queue (ft)	38	26	14	41	61
Link Distance (ft)			570	319	377
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	265	150			
Storage Blk Time (%)					
Queuing Penalty (veh)					



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	61	925	25	23	1150	22	38	0	37	9	1	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	265		0	150		0	75		75	0		0
Storage Lanes	1		0	1		0	0		1	0		0
Taper Length (ft)	175			125			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.996			0.997				0.850		0.918	
Flt Protected	0.950			0.950				0.950			0.982	
Satd. Flow (prot)	1770	3525	0	1770	3529	0	0	1770	1583	0	1679	0
Flt Permitted	0.950			0.950				0.950			0.982	
Satd. Flow (perm)	1770	3525	0	1770	3529	0	0	1770	1583	0	1679	0
Link Speed (mph)		40			40			25			25	
Link Distance (ft)		663			590			372			430	
Travel Time (s)		11.3			10.1			10.1			11.7	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	66	995	27	25	1237	24	41	0	40	10	1	17
Shared Lane Traffic (%)												
Lane Group Flow (vph)	66	1022	0	25	1261	0	0	41	40	0	28	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			15			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		0			0			23			23	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 54.1%		ICU Level of Service A	
Analysis Period (min) 15			

1: The Moorings/Dryden Place & Central Road Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	2.6	0.2	0.2	2.5	0.2	0.3	0.2	4.2	0.2	0.1	0.1	0.3
Total Del/Veh (s)	8.0	1.0	1.8	5.6	1.2	1.2	67.6	1.8	32.1	18.0	5.4	2.3

Intersection: 1: The Moorings/Dryden Place & Central Road

Movement	EB	WB	WB	NB	NB	SB
Directions Served	L	L	TR	LT	R	LTR
Maximum Queue (ft)	54	26	47	75	95	54
Average Queue (ft)	27	5	2	31	6	14
95th Queue (ft)	47	21	16	69	42	41
Link Distance (ft)			570	319		377
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	265	150			75	
Storage Blk Time (%)				1	0	
Queuing Penalty (veh)				0	0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	61	925	27	24	1150	22	40	0	40	9	1	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	265		0	150		0	75		75	0		0
Storage Lanes	1		0	1		0	0		1	0		0
Taper Length (ft)	175			125			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.996			0.997				0.850		0.918	
Flt Protected	0.950			0.950				0.950			0.982	
Satd. Flow (prot)	1770	3525	0	1770	3529	0	0	1770	1583	0	1679	0
Flt Permitted	0.950			0.950				0.950			0.982	
Satd. Flow (perm)	1770	3525	0	1770	3529	0	0	1770	1583	0	1679	0
Link Speed (mph)		40			40			25			25	
Link Distance (ft)		663			590			372			430	
Travel Time (s)		11.3			10.1			10.1			11.7	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	66	995	29	26	1237	24	43	0	43	10	1	17
Shared Lane Traffic (%)												
Lane Group Flow (vph)	66	1024	0	26	1261	0	0	43	43	0	28	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			15			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		0			0			23			23	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 54.1%		ICU Level of Service A	
Analysis Period (min) 15			

1: The Moorings/Dryden Place & Central Road Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	2.5	0.2	0.2	2.0	0.2	0.2	0.2	4.2	0.2	0.1	0.1	0.3
Total Del/Veh (s)	8.2	1.0	2.1	6.0	1.2	1.2	63.1	1.8	33.9	18.0	5.1	2.3

Intersection: 1: The Moorings/Dryden Place & Central Road

Movement	EB	WB	WB	NB	NB	SB
Directions Served	L	L	TR	LT	R	LTR
Maximum Queue (ft)	54	27	47	73	79	54
Average Queue (ft)	26	5	2	33	3	14
95th Queue (ft)	47	21	16	68	26	42
Link Distance (ft)			570	319		377
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	265	150			75	
Storage Blk Time (%)				4	0	
Queuing Penalty (veh)				2	0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	51	1052	22	12	1339	20	27	0	33	8	1	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	265		0	150		0	75		75	0		0
Storage Lanes	1		0	1		0	0		1	0		0
Taper Length (ft)	175			125			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.997			0.998				0.850		0.916	
Flt Protected	0.950			0.950				0.950			0.984	
Satd. Flow (prot)	1770	3529	0	1770	3532	0	0	1770	1583	0	1679	0
Flt Permitted	0.950			0.950				0.950			0.984	
Satd. Flow (perm)	1770	3529	0	1770	3532	0	0	1770	1583	0	1679	0
Link Speed (mph)		40			40			25			25	
Link Distance (ft)		663			590			372			430	
Travel Time (s)		11.3			10.1			10.1			11.7	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	53	1085	23	12	1380	21	28	0	34	8	1	15
Shared Lane Traffic (%)												
Lane Group Flow (vph)	53	1108	0	12	1401	0	0	28	34	0	24	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			15			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		0			0			23			23	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	

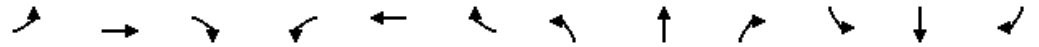
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 57.1%		ICU Level of Service B	
Analysis Period (min) 15			

1: The Moorings/Dryden Place & Central Road Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	2.3	0.2	0.3	2.6	0.3	0.3	0.4	4.0	0.1	0.1	0.1	0.3
Total Del/Veh (s)	8.9	1.0	1.9	5.6	1.3	1.3	85.7	1.8	28.8	17.3	0.5	2.3

Intersection: 1: The Moorings/Dryden Place & Central Road

Movement	EB	WB	NB	SB
Directions Served	L	L	LT	LTR
Maximum Queue (ft)	93	27	83	31
Average Queue (ft)	21	5	32	8
95th Queue (ft)	53	20	74	31
Link Distance (ft)			319	377
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	265	150		
Storage Blk Time (%)			4	
Queuing Penalty (veh)			1	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	51	1052	23	13	1339	20	29	0	35	8	1	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	265		0	150		0	75		75	0		0
Storage Lanes	1		0	1		0	0		1	0		0
Taper Length (ft)	175			125			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.997			0.998				0.850		0.916	
Flt Protected	0.950			0.950				0.950			0.984	
Satd. Flow (prot)	1770	3529	0	1770	3532	0	0	1770	1583	0	1679	0
Flt Permitted	0.950			0.950				0.950			0.984	
Satd. Flow (perm)	1770	3529	0	1770	3532	0	0	1770	1583	0	1679	0
Link Speed (mph)		40			40			25			25	
Link Distance (ft)		663			590			372			430	
Travel Time (s)		11.3			10.1			10.1			11.7	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	53	1085	24	13	1380	21	30	0	36	8	1	15
Shared Lane Traffic (%)												
Lane Group Flow (vph)	53	1109	0	13	1401	0	0	30	36	0	24	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			15			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		0			0			23			23	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 57.1%		ICU Level of Service B	
Analysis Period (min) 15			

1: The Moorings/Dryden Place & Central Road Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	2.3	0.2	0.2	2.6	0.3	0.3	0.4	4.0	0.1	0.1	0.1	0.3
Total Del/Veh (s)	8.8	1.1	1.9	5.9	1.3	1.3	125.2	5.0	70.5	17.3	10.2	3.0

Intersection: 1: The Moorings/Dryden Place & Central Road

Movement	EB	WB	NB	NB	SB
Directions Served	L	L	LT	R	LTR
Maximum Queue (ft)	93	27	118	100	74
Average Queue (ft)	21	5	39	13	13
95th Queue (ft)	53	20	96	67	45
Link Distance (ft)			319		377
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	265	150		75	
Storage Blk Time (%)			16	0	
Queuing Penalty (veh)			5	0	

CHAPTER 4C. TRAFFIC CONTROL SIGNAL NEEDS STUDIES

Section 4C.01 Studies and Factors for Justifying Traffic Control Signals

Standard:

01 **An engineering study of traffic conditions, pedestrian characteristics, and physical characteristics of the location shall be performed to determine whether installation of a traffic control signal is justified at a particular location.**

02 **The investigation of the need for a traffic control signal shall include an analysis of factors related to the existing operation and safety at the study location and the potential to improve these conditions, and the applicable factors contained in the following traffic signal warrants:**

Warrant 1, Eight-Hour Vehicular Volume
Warrant 2, Four-Hour Vehicular Volume
Warrant 3, Peak Hour
Warrant 4, Pedestrian Volume
Warrant 5, School Crossing
Warrant 6, Coordinated Signal System
Warrant 7, Crash Experience
Warrant 8, Roadway Network
Warrant 9, Intersection Near a Grade Crossing

03 **The satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal.**

Support:

04 Sections 8C.09 and 8C.10 contain information regarding the use of traffic control signals instead of gates and/or flashing-light signals at highway-rail grade crossings and highway-light rail transit grade crossings, respectively.

Guidance:

05 *A traffic control signal should not be installed unless one or more of the factors described in this Chapter are met.*

06 *A traffic control signal should not be installed unless an engineering study indicates that installing a traffic control signal will improve the overall safety and/or operation of the intersection.*

07 *A traffic control signal should not be installed if it will seriously disrupt progressive traffic flow.*

08 *The study should consider the effects of the right-turn vehicles from the minor-street approaches. Engineering judgment should be used to determine what, if any, portion of the right-turn traffic is subtracted from the minor-street traffic count when evaluating the count against the signal warrants listed in Paragraph 2.*

09 *Engineering judgment should also be used in applying various traffic signal warrants to cases where approaches consist of one lane plus one left-turn or right-turn lane. The site-specific traffic characteristics should dictate whether an approach is considered as one lane or two lanes. For example, for an approach with one lane for through and right-turning traffic plus a left-turn lane, if engineering judgment indicates that it should be considered a one-lane approach because the traffic using the left-turn lane is minor, the total traffic volume approaching the intersection should be applied against the signal warrants as a one-lane approach. The approach should be considered two lanes if approximately half of the traffic on the approach turns left and the left-turn lane is of sufficient length to accommodate all left-turn vehicles.*

10 *Similar engineering judgment and rationale should be applied to a street approach with one through/left-turn lane plus a right-turn lane. In this case, the degree of conflict of minor-street right-turn traffic with traffic on the major street should be considered. Thus, right-turn traffic should not be included in the minor-street volume if the movement enters the major street with minimal conflict. The approach should be evaluated as a one-lane approach with only the traffic volume in the through/left-turn lane considered.*

11 *At a location that is under development or construction and where it is not possible to obtain a traffic count that would represent future traffic conditions, hourly volumes should be estimated as part of an engineering study for comparison with traffic signal warrants. Except for locations where the engineering study uses the satisfaction of Warrant 8 to justify a signal, a traffic control signal installed under projected conditions should have an engineering study done within 1 year of putting the signal into stop-and-go operation to determine if the signal is justified. If not justified, the signal should be taken out of stop-and-go operation or removed.*

12 *For signal warrant analysis, a location with a wide median, even if the median width is greater than 30 feet, should be considered as one intersection.*

Option:

13 At an intersection with a high volume of left-turn traffic from the major street, the signal warrant analysis may be performed in a manner that considers the higher of the major-street left-turn volumes as the "minor-street" volume and the corresponding single direction of opposing traffic on the major street as the "major-street" volume.

14 For signal warrants requiring conditions to be present for a certain number of hours in order to be satisfied, any four sequential 15-minute periods may be considered as 1 hour if the separate 1-hour periods used in the warrant analysis do not overlap each other and both the major-street volume and the minor-street volume are for the same specific one-hour periods.

15 For signal warrant analysis, bicyclists may be counted as either vehicles or pedestrians.

Support:

16 When performing a signal warrant analysis, bicyclists riding in the street with other vehicular traffic are usually counted as vehicles and bicyclists who are clearly using pedestrian facilities are usually counted as pedestrians.

Option:

17 Engineering study data may include the following:

A. The number of vehicles entering the intersection in each hour from each approach during 12 hours of an average day. It is desirable that the hours selected contain the greatest percentage of the 24-hour traffic volume.
B. Vehicular volumes for each traffic movement from each approach, classified by vehicle type (heavy trucks, passenger cars and light trucks, public-transit vehicles, and, in some locations, bicycles), during each 15-minute period of the 2 hours in the morning and 2 hours in the afternoon during which total traffic entering the intersection is greatest.
C. Pedestrian volume counts on each crosswalk during the same periods as the vehicular counts in Item B and during hours of highest pedestrian volume. Where young, elderly, and/or persons with physical or visual disabilities need special consideration, the pedestrians and their crossing times may be classified by general observation.
D. Information about nearby facilities and activity centers that serve the young, elderly, and/or persons with disabilities, including requests from persons with disabilities for accessible crossing improvements at the location under study. These persons might not be adequately reflected in the pedestrian volume count if the absence of a signal restrains their mobility.
E. The posted or statutory speed limit or the 85th-percentile speed on the uncontrolled approaches to the location.
F. A condition diagram showing details of the physical layout, including such features as intersection geometrics, channelization, grades, sight-distance restrictions, transit stops and routes, parking conditions, pavement markings, roadway lighting, driveways, nearby railroad crossings, distance to nearest traffic control signals, utility poles and fixtures, and adjacent land use.
G. A collision diagram showing crash experience by type, location, direction of movement, severity, weather, time of day, date, and day of week for at least 1 year.

18 The following data, which are desirable for a more precise understanding of the operation of the intersection, may be obtained during the periods described in Item B of Paragraph 17:

A. Vehicle-hours of stopped time delay determined separately for each approach.
B. The number and distribution of acceptable gaps in vehicular traffic on the major street for entrance from the minor street.
C. The posted or statutory speed limit or the 85th-percentile speed on controlled approaches at a point near to the intersection but unaffected by the control.
D. Pedestrian delay time for at least two 30-minute peak pedestrian delay periods of an average weekday or like periods of a Saturday or Sunday.
E. Queue length on stop-controlled approaches.

Section 4C.02 Warrant 1, Eight-Hour Vehicular Volume

Support:

01 The Minimum Vehicular Volume, Condition A, is intended for application at locations where a large volume of intersecting traffic is the principal reason to consider installing a traffic control signal.

02 The Interruption of Continuous Traffic, Condition B, is intended for application at locations where Condition A is not satisfied and where the traffic volume on a major street is so heavy that traffic on a minor intersecting street suffers excessive delay or conflict in entering or crossing the major street.

03 It is intended that Warrant 1 be treated as a single warrant. If Condition A is satisfied, then Warrant 1 is satisfied and analyses of Condition B and the combination of Conditions A and B are not needed. Similarly, if Condition B is satisfied, then Warrant 1 is satisfied and an analysis of the combination of Conditions A and B is not needed.

Standard:

04 **The need for a traffic control signal shall be considered if an engineering study finds that one of the following conditions exist for each of any 8 hours of an average day:**

A. The vehicles per hour given in both of the 100 percent columns of Condition A in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection; or

B. The vehicles per hour given in both of the 100 percent columns of Condition B in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection.

In applying each condition the major-street and minor-street volumes shall be for the same 8 hours. On the minor street, the higher volume shall not be required to be on the same approach during each of these 8 hours.

Option:

05 If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 40 mph, or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, the traffic volumes in the 70 percent columns in Table 4C-1 may be used in place of the 100 percent columns.

Guidance:

06 *The combination of Conditions A and B is intended for application at locations where Condition A is not satisfied and Condition B is not satisfied and should be applied only after an adequate trial of other alternatives that could cause less delay and inconvenience to traffic has failed to solve the traffic problems.*

Standard:

07 **The need for a traffic control signal shall be considered if an engineering study finds that both of the following conditions exist for each of any 8 hours of an average day:**

A. The vehicles per hour given in both of the 80 percent columns of Condition A in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection; and

B. The vehicles per hour given in both of the 80 percent columns of Condition B in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection.

These major-street and minor-street volumes shall be for the same 8 hours for each condition; however, the 8 hours satisfied in Condition A shall not be required to be the same 8 hours satisfied in Condition B. On the minor street, the higher volume shall not be required to be on the same approach during each of the 8 hours.

Table 4C-1. Warrant 1, Eight-Hour Vehicular Volume

Condition A—Minimum Vehicular Volume

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	1	500	400	350	280	150	120	105	84
2 or more	1	600	480	420	336	150	120	105	84
2 or more	2 or more	600	480	420	336	200	160	140	112
1	2 or more	500	400	350	280	200	160	140	112

Condition B—Interruption of Continuous Traffic

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	1	750	600	525	420	75	60	53	42
2 or more	1	900	720	630	504	75	60	53	42
2 or more	2 or more	900	720	630	504	100	80	70	56
1	2 or more	750	600	525	420	100	80	70	56

[a] Basic minimum hourly volume

[b] Used for combination of Conditions A and B after adequate trial of other remedial measures

[c] May be used when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000

[d] May be used for combination of Conditions A and B after adequate trial of other remedial measures when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000

Option:

08 If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 40 mph, or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, the traffic volumes in the 56 percent columns in Table 4C-1 may be used in place of the 80 percent columns.

Section 4C.03 Warrant 2, Four-Hour Vehicular Volume

Support:

01 The Four-Hour Vehicular Volume signal warrant conditions are intended to be applied where the volume of intersecting traffic is the principal reason to consider installing a traffic control signal.

Standard:

02 **The need for a traffic control signal shall be considered if an engineering study finds that, for each of any 4 hours of an average day, the plotted points representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor-street approach (one direction only) all fall above the applicable curve in Figure 4C-1 for the existing combination of approach lanes. On the minor street, the higher volume shall not be required to be on the same approach during each of these 4 hours.**

Option:

03 If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 40 mph, or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, Figure 4C-2 may be used in place of Figure 4C-1.

Section 4C.04 Warrant 3, Peak Hour

Support:

01 The Peak Hour signal warrant is intended for use at a location where traffic conditions are such that for a minimum of 1 hour of an average day, the minor-street traffic suffers undue delay when entering or crossing the major street.

Standard:

02 **This signal warrant shall be applied only in unusual cases, such as office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time.**

03 **The need for a traffic control signal shall be considered if an engineering study finds that the criteria in either of the following two categories are met:**

A. If all three of the following conditions exist for the same 1 hour (any four consecutive 15-minute periods) of an average day:

1. The total stopped time delay experienced by the traffic on one minor-street approach (one direction only) controlled by a STOP sign equals or exceeds: 4 vehicle-hours for a one-lane approach or 5 vehicle-hours for a two-lane approach; and

2. The volume on the same minor-street approach (one direction only) equals or exceeds 100 vehicles per hour for one moving lane of traffic or 150 vehicles per hour for two moving lanes; and

3. The total entering volume serviced during the hour equals or exceeds 650 vehicles per hour for intersections with three approaches or 800 vehicles per hour for intersections with four or more approaches.

B. The plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor-street approach (one direction only) for 1 hour (any four consecutive 15-minute periods) of an average day falls above the applicable curve in Figure 4C-3 for the existing combination of approach lanes.

Option:

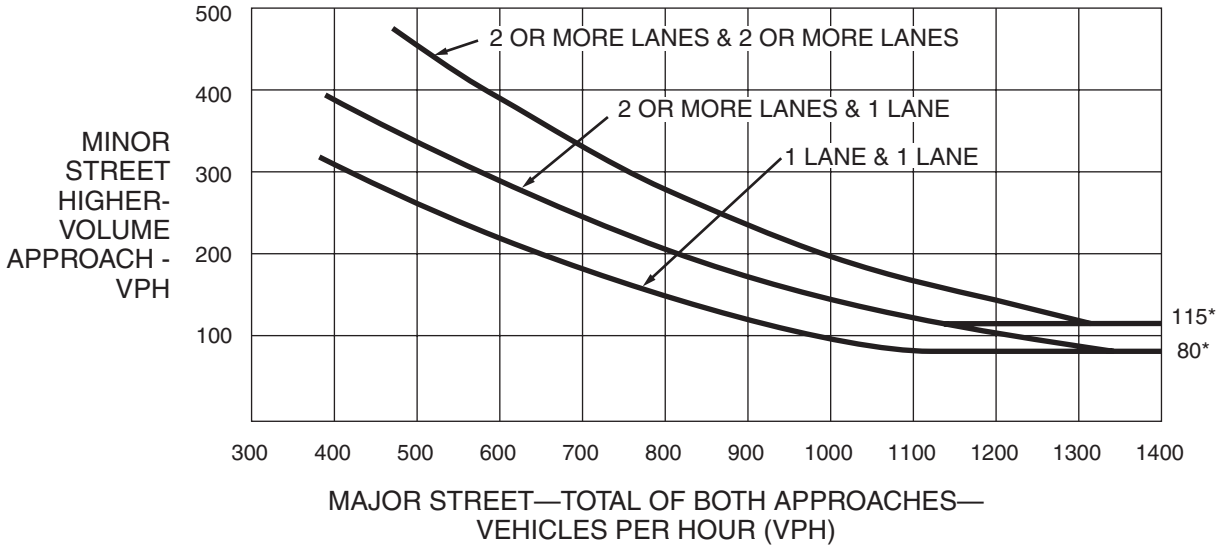
04 If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 40 mph, or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, Figure 4C-4 may be used in place of Figure 4C-3 to evaluate the criteria in the second category of the Standard.

05 If this warrant is the only warrant met and a traffic control signal is justified by an engineering study, the traffic control signal may be operated in the flashing mode during the hours that the volume criteria of this warrant are not met.

Guidance:

06 *If this warrant is the only warrant met and a traffic control signal is justified by an engineering study, the traffic control signal should be traffic-actuated.*

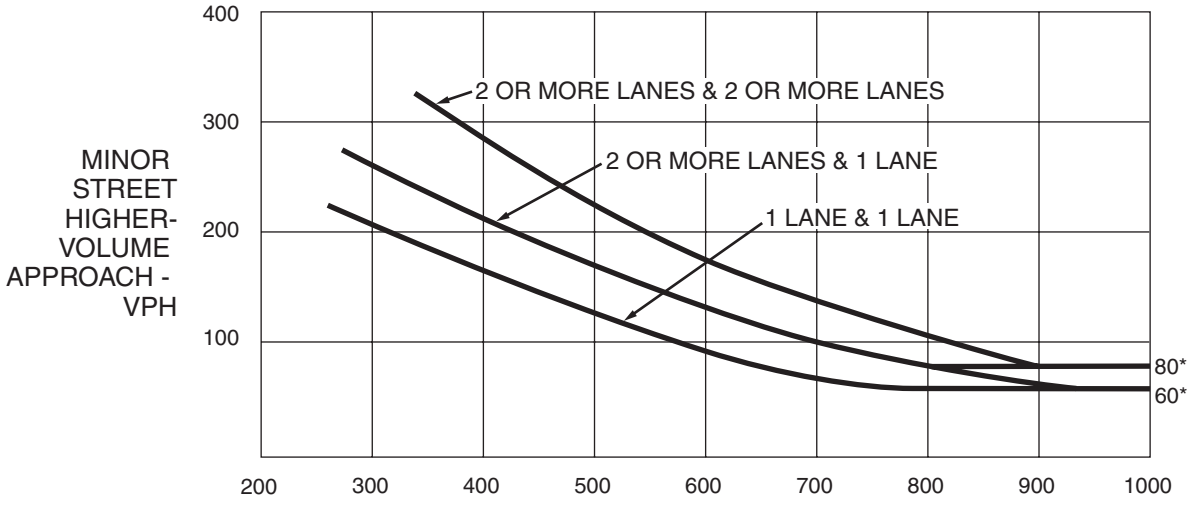
Figure 4C-1. Warrant 2, Four-Hour Vehicular Volume



*Note: 115 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 80 vph applies as the lower threshold volume for a minor-street approach with one lane.

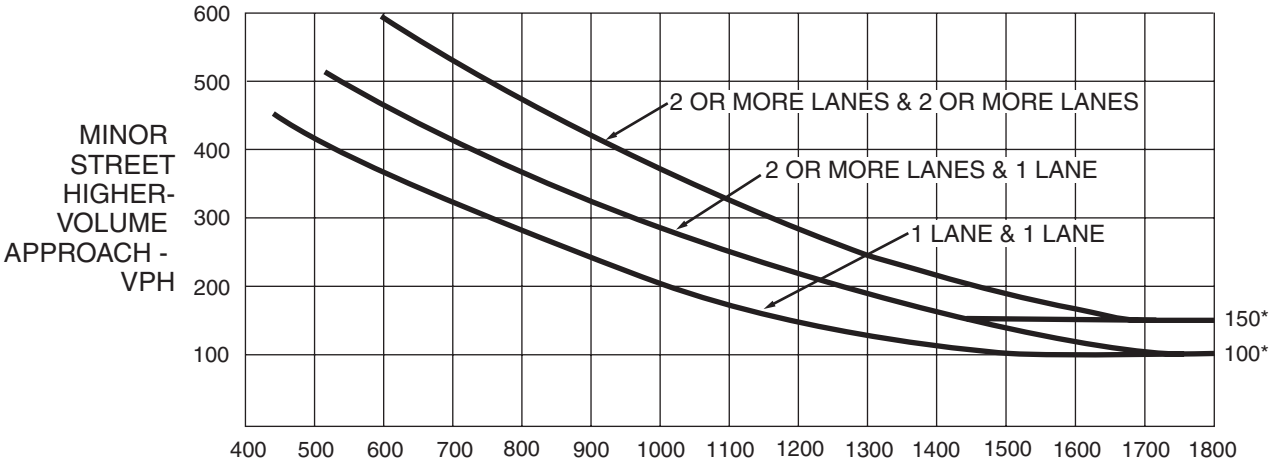
Figure 4C-2. Warrant 2, Four-Hour Vehicular Volume (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 80 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor-street approach with one lane.

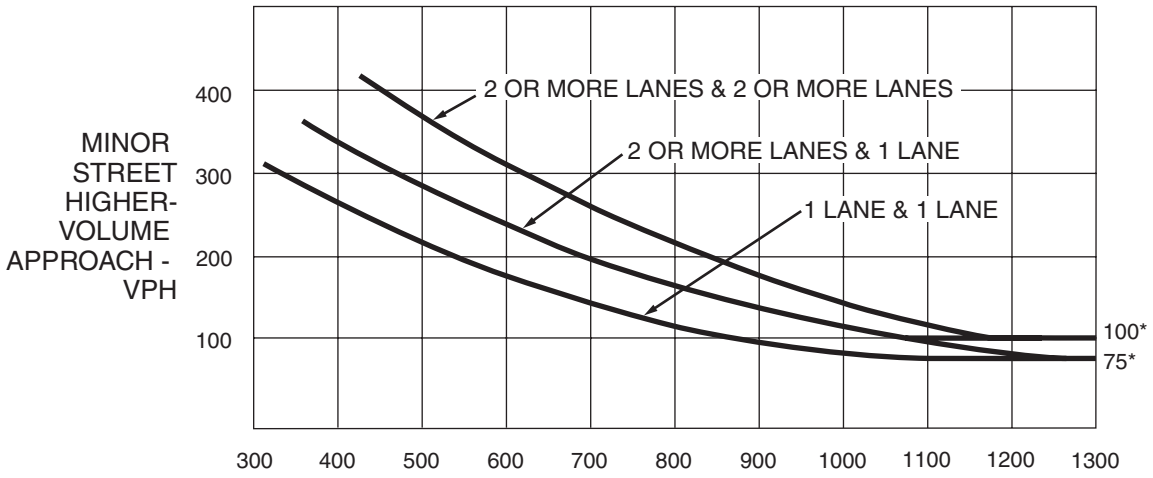
Figure 4C-3. Warrant 3, Peak Hour



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Section 4C.05 Warrant 4, Pedestrian Volume

Support:

01 The Pedestrian Volume signal warrant is intended for application where the traffic volume on a major street is so heavy that pedestrians experience excessive delay in crossing the major street.

Standard:

02 **The need for a traffic control signal at an intersection or midblock crossing shall be considered if an engineering study finds that one of the following criteria is met:**

- **A. For each of any 4 hours of an average day, the plotted points representing the vehicles per hour on the major street (total of both approaches) and the corresponding pedestrians per hour crossing the major street (total of all crossings) all fall above the curve in Figure 4C-5; or**
- **B. For 1 hour (any four consecutive 15-minute periods) of an average day, the plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding pedestrians per hour crossing the major street (total of all crossings) falls above the curve in Figure 4C-7.**

Option:

03 If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 35 mph, or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, Figure 4C-6 may be used in place of Figure 4C-5 to evaluate Criterion A in Paragraph 2, and Figure 4C-8 may be used in place of Figure 4C-7 to evaluate Criterion B in Paragraph 2.

Standard:

04 **The Pedestrian Volume signal warrant shall not be applied at locations where the distance to the nearest traffic control signal or STOP sign controlling the street that pedestrians desire to cross is less than 300 feet, unless the proposed traffic control signal will not restrict the progressive movement of traffic.**

05 **If this warrant is met and a traffic control signal is justified by an engineering study, the traffic control signal shall be equipped with pedestrian signal heads complying with the provisions set forth in Chapter 4E.**

Guidance:

06 *If this warrant is met and a traffic control signal is justified by an engineering study, then:*

- *A. If it is installed at an intersection or major driveway location, the traffic control signal should also control the minor-street or driveway traffic, should be traffic-actuated, and should include pedestrian detection.*
- *B. If it is installed at a non-intersection crossing, the traffic control signal should be installed at least 100 feet from side streets or driveways that are controlled by STOP or YIELD signs, and should be pedestrian-actuated. If the traffic control signal is installed at a non-intersection crossing, at least one of the signal faces should be over the traveled way for each approach, parking and other sight obstructions should be prohibited for at least 100 feet in advance of and at least 20 feet beyond the crosswalk or site accommodations should be made through curb extensions or other techniques to provide adequate sight distance, and the installation should include suitable standard signs and pavement markings.*
- *C. Furthermore, if it is installed within a signal system, the traffic control signal should be coordinated.*

Option:

07 The criterion for the pedestrian volume crossing the major street may be reduced as much as 50 percent if the 15th-percentile crossing speed of pedestrians is less than 3.5 feet per second.

08 A traffic control signal may not be needed at the study location if adjacent coordinated traffic control signals consistently provide gaps of adequate length for pedestrians to cross the street.

Section 4C.06 Warrant 5, School Crossing

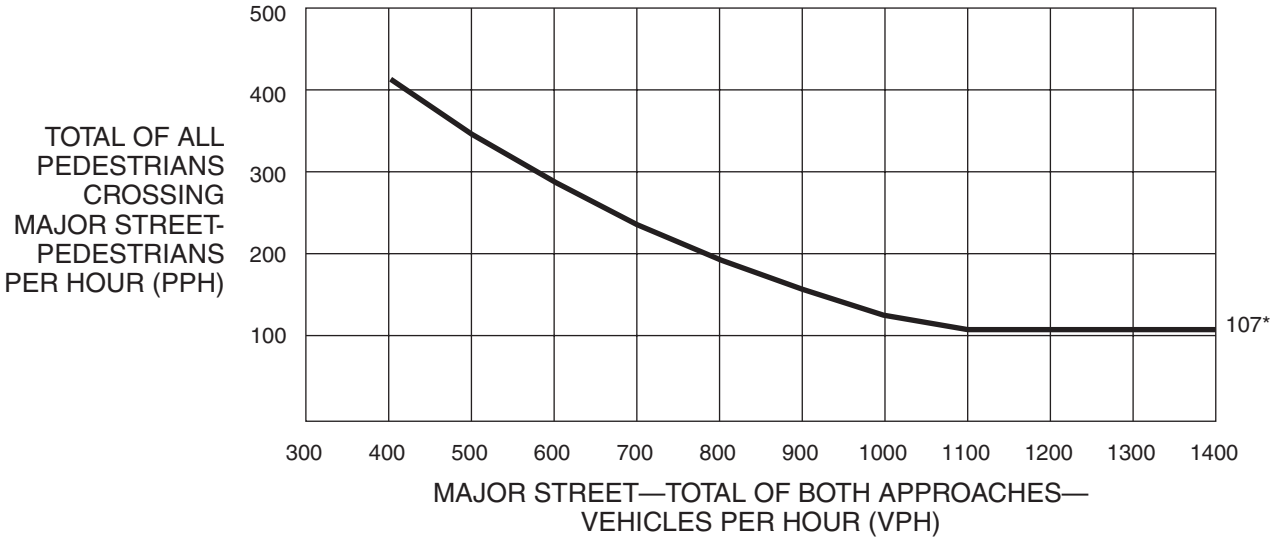
Support:

01 The School Crossing signal warrant is intended for application where the fact that schoolchildren cross the major street is the principal reason to consider installing a traffic control signal. For the purposes of this warrant, the word “schoolchildren” includes elementary through high school students.

Standard:

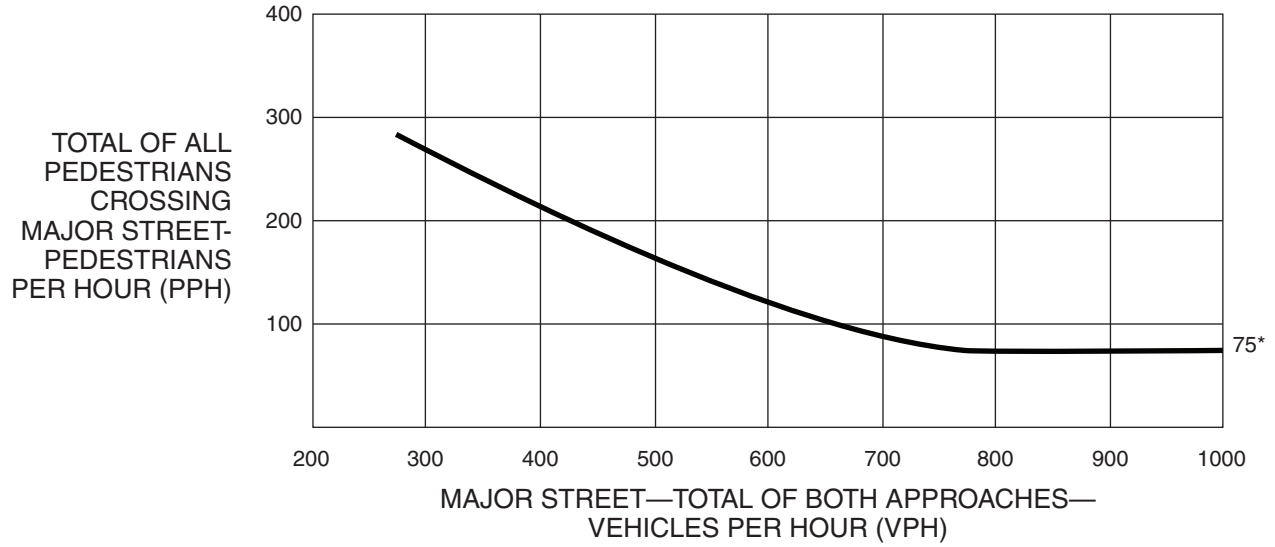
02 **The need for a traffic control signal shall be considered when an engineering study of the frequency and adequacy of gaps in the vehicular traffic stream as related to the number and size of groups of schoolchildren at an established school crossing across the major street shows that the number of adequate gaps in the traffic stream during the period when the schoolchildren are using the crossing is less than the number of minutes in the same period (see Section 7A.03) and there are a minimum of 20 schoolchildren during the highest crossing hour.**

Figure 4C-5. Warrant 4, Pedestrian Four-Hour Volume



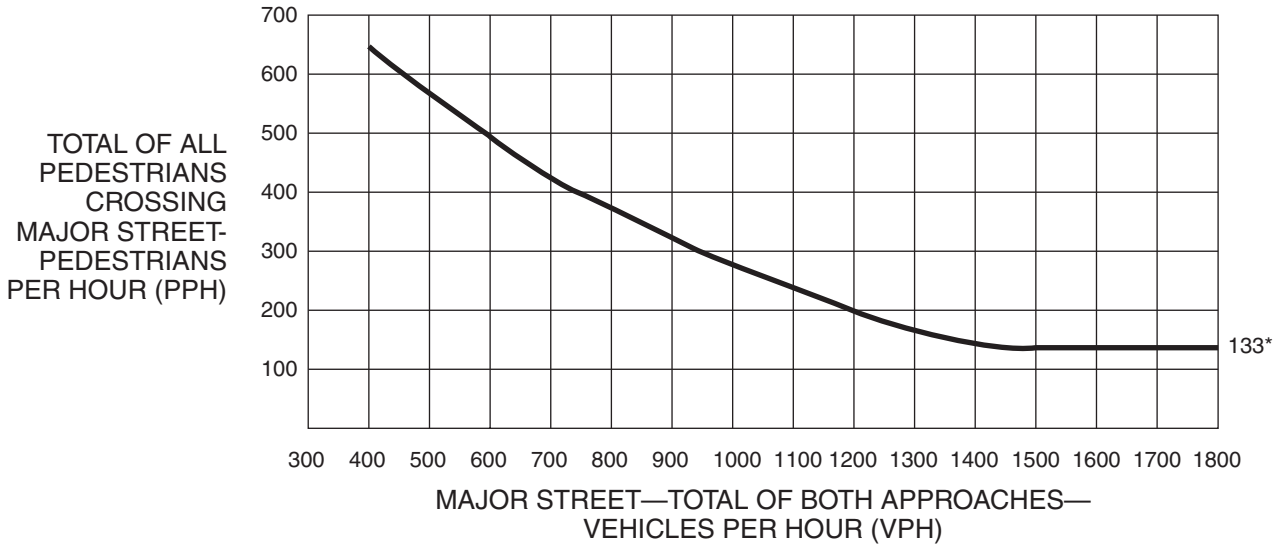
*Note: 107 pph applies as the lower threshold volume.

Figure 4C-6. Warrant 4, Pedestrian Four-Hour Volume (70% Factor)



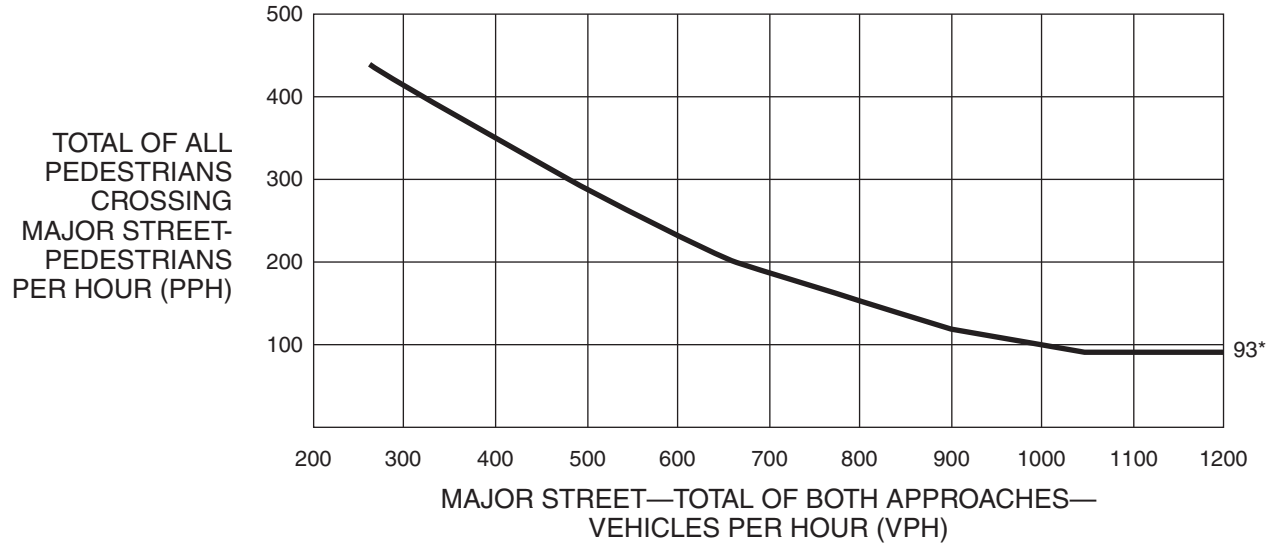
*Note: 75 pph applies as the lower threshold volume.

Figure 4C-7. Warrant 4, Pedestrian Peak Hour



*Note: 133 pph applies as the lower threshold volume.

Figure 4C-8. Warrant 4, Pedestrian Peak Hour (70% Factor)



*Note: 93 pph applies as the lower threshold volume.

03 **Before a decision is made to install a traffic control signal, consideration shall be given to the implementation of other remedial measures, such as warning signs and flashers, school speed zones, school crossing guards, or a grade-separated crossing.**

04 **The School Crossing signal warrant shall not be applied at locations where the distance to the nearest traffic control signal along the major street is less than 300 feet, unless the proposed traffic control signal will not restrict the progressive movement of traffic.**

Guidance:

05 *If this warrant is met and a traffic control signal is justified by an engineering study, then:*

A. If it is installed at an intersection or major driveway location, the traffic control signal should also control the minor-street or driveway traffic, should be traffic-actuated, and should include pedestrian detection.

B. If it is installed at a non-intersection crossing, the traffic control signal should be installed at least 100 feet from side streets or driveways that are controlled by STOP or YIELD signs, and should be pedestrian-actuated. If the traffic control signal is installed at a non-intersection crossing, at least one of the signal faces should be over the traveled way for each approach, parking and other sight obstructions should be prohibited for at least 100 feet in advance of and at least 20 feet beyond the crosswalk or site accommodations should be made through curb extensions or other techniques to provide adequate sight distance, and the installation should include suitable standard signs and pavement markings.

C. Furthermore, if it is installed within a signal system, the traffic control signal should be coordinated.

Section 4C.07 Warrant 6, Coordinated Signal System

Support:

01 Progressive movement in a coordinated signal system sometimes necessitates installing traffic control signals at intersections where they would not otherwise be needed in order to maintain proper platooning of vehicles.

Standard:

02 **The need for a traffic control signal shall be considered if an engineering study finds that one of the following criteria is met:**

A. On a one-way street or a street that has traffic predominantly in one direction, the adjacent traffic control signals are so far apart that they do not provide the necessary degree of vehicular platooning.

B. On a two-way street, adjacent traffic control signals do not provide the necessary degree of platooning and the proposed and adjacent traffic control signals will collectively provide a progressive operation.

Guidance:

03 *The Coordinated Signal System signal warrant should not be applied where the resultant spacing of traffic control signals would be less than 1,000 feet.*

Section 4C.08 Warrant 7, Crash Experience

Support:

01 The Crash Experience signal warrant conditions are intended for application where the severity and frequency of crashes are the principal reasons to consider installing a traffic control signal.

Standard:

02 **The need for a traffic control signal shall be considered if an engineering study finds that all of the following criteria are met:**

A. Adequate trial of alternatives with satisfactory observance and enforcement has failed to reduce the crash frequency; and

B. Five or more reported crashes, of types susceptible to correction by a traffic control signal, have occurred within a 12-month period, each crash involving personal injury or property damage apparently exceeding the applicable requirements for a reportable crash; and

C. For each of any 8 hours of an average day, the vehicles per hour (vph) given in both of the 80 percent columns of Condition A in Table 4C-1 (see Section 4C.02), or the vph in both of the 80 percent columns of Condition B in Table 4C-1 exists on the major-street and the higher-volume minor-street approach, respectively, to the intersection, or the volume of pedestrian traffic is not less than 80 percent of the requirements specified in the Pedestrian Volume warrant. These major-street and minor-street volumes shall be for the same 8 hours. On the minor street, the higher volume shall not be required to be on the same approach during each of the 8 hours.

Option:

03 If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 40 mph, or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, the traffic volumes in the 56 percent columns in Table 4C-1 may be used in place of the 80 percent columns.

Section 4C.09 Warrant 8, Roadway Network

Support:

01 Installing a traffic control signal at some intersections might be justified to encourage concentration and organization of traffic flow on a roadway network.

Standard:

02 **The need for a traffic control signal shall be considered if an engineering study finds that the common intersection of two or more major routes meets one or both of the following criteria:**

- **A. The intersection has a total existing, or immediately projected, entering volume of at least 1,000 vehicles per hour during the peak hour of a typical weekday and has 5-year projected traffic volumes, based on an engineering study, that meet one or more of Warrants 1, 2, and 3 during an average weekday; or**
- **B. The intersection has a total existing or immediately projected entering volume of at least 1,000 vehicles per hour for each of any 5 hours of a non-normal business day (Saturday or Sunday).**

03 **A major route as used in this signal warrant shall have at least one of the following characteristics:**

- **A. It is part of the street or highway system that serves as the principal roadway network for through traffic flow.**
- **B. It includes rural or suburban highways outside, entering, or traversing a city.**
- **C. It appears as a major route on an official plan, such as a major street plan in an urban area traffic and transportation study.**

Section 4C.10 Warrant 9, Intersection Near a Grade Crossing

Support:

01 The Intersection Near a Grade Crossing signal warrant is intended for use at a location where none of the conditions described in the other eight traffic signal warrants are met, but the proximity to the intersection of a grade crossing on an intersection approach controlled by a STOP or YIELD sign is the principal reason to consider installing a traffic control signal.

Guidance:

02 *This signal warrant should be applied only after adequate consideration has been given to other alternatives or after a trial of an alternative has failed to alleviate the safety concerns associated with the grade crossing. Among the alternatives that should be considered or tried are:*

- *A. Providing additional pavement that would enable vehicles to clear the track or that would provide space for an evasive maneuver, or*
- *B. Reassigning the stop controls at the intersection to make the approach across the track a non-stopping approach.*

Standard:

03 **The need for a traffic control signal shall be considered if an engineering study finds that both of the following criteria are met:**

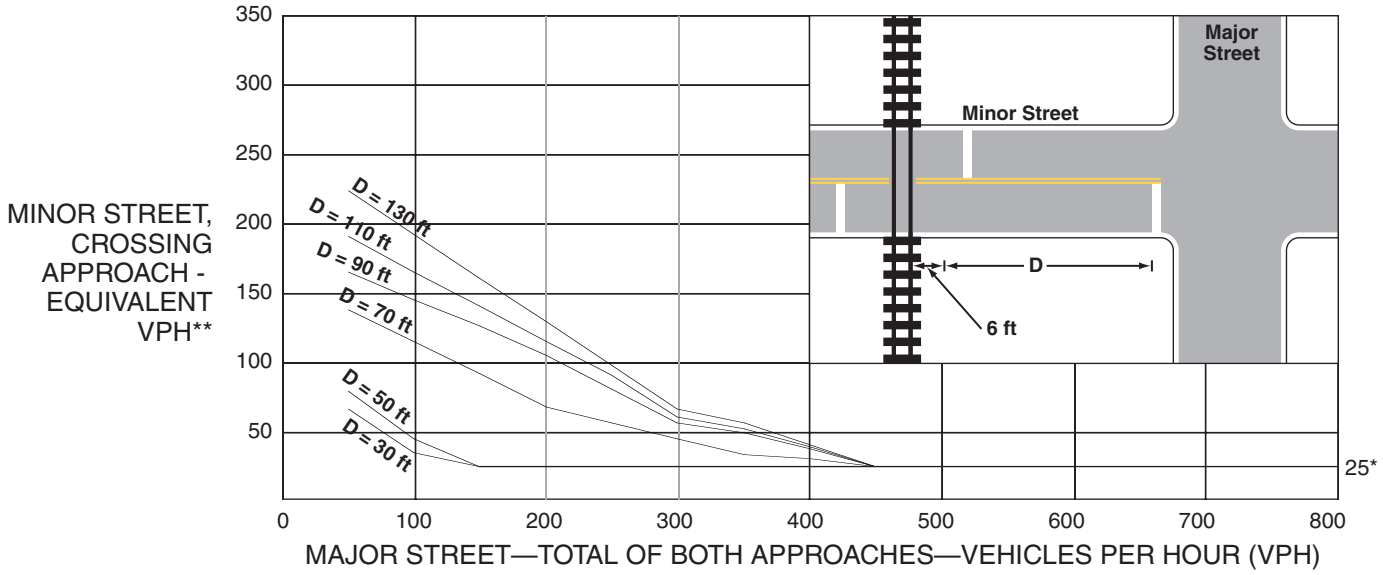
- **A. A grade crossing exists on an approach controlled by a STOP or YIELD sign and the center of the track nearest to the intersection is within 140 feet of the stop line or yield line on the approach; and**
- **B. During the highest traffic volume hour during which rail traffic uses the crossing, the plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the minor-street approach that crosses the track (one direction only, approaching the intersection) falls above the applicable curve in Figure 4C-9 or 4C-10 for the existing combination of approach lanes over the track and the distance D, which is the clear storage distance as defined in Section 1A.13.**

Guidance:

04 *The following considerations apply when plotting the traffic volume data on Figure 4C-9 or 4C-10:*

- *A. Figure 4C-9 should be used if there is only one lane approaching the intersection at the track crossing location and Figure 4C-10 should be used if there are two or more lanes approaching the intersection at the track crossing location.*

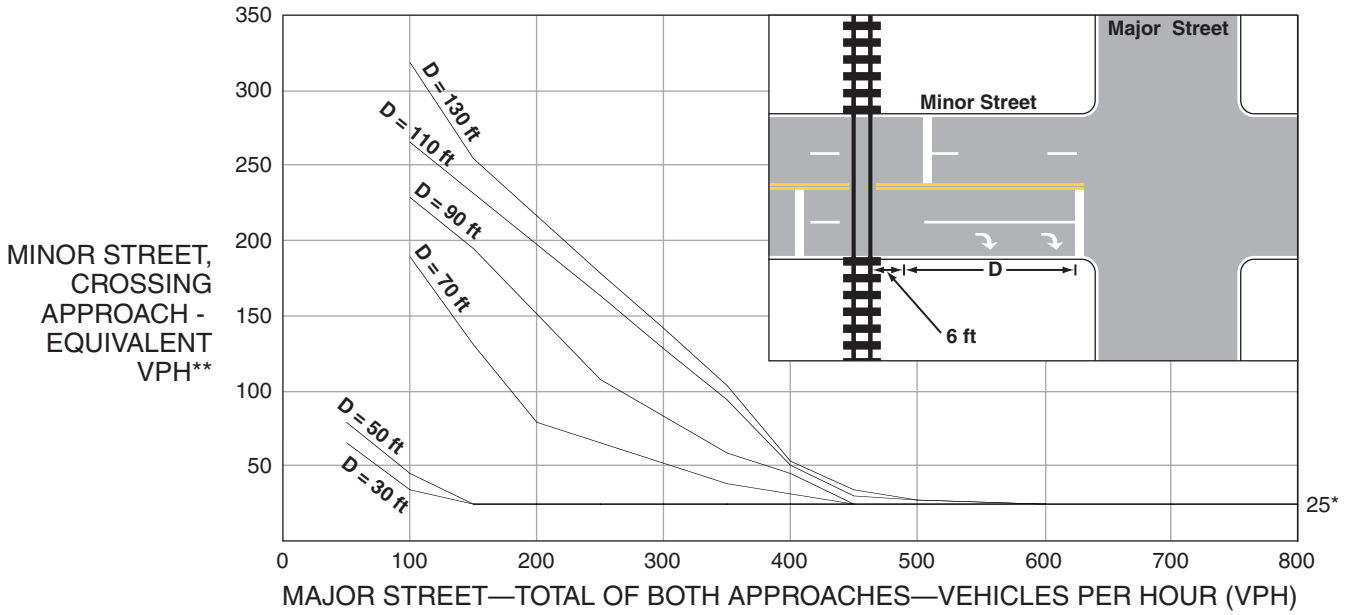
Figure 4C-9. Warrant 9, Intersection Near a Grade Crossing (One Approach Lane at the Track Crossing)



* 25 vph applies as the lower threshold volume

** VPH after applying the adjustment factors in Tables 4C-2, 4C-3, and/or 4C-4, if appropriate

Figure 4C-10. Warrant 9, Intersection Near a Grade Crossing (Two or More Approach Lanes at the Track Crossing)



* 25 vph applies as the lower threshold volume

** VPH after applying the adjustment factors in Tables 4C-2, 4C-3, and/or 4C-4, if appropriate

B. After determining the actual distance D, the curve for the distance D that is nearest to the actual distance D should be used. For example, if the actual distance D is 95 feet, the plotted point should be compared to the curve for D = 90 feet.

C. If the rail traffic arrival times are unknown, the highest traffic volume hour of the day should be used.

Option:

05 The minor-street approach volume may be multiplied by up to three adjustment factors as provided in Paragraphs 6 through 8.

06 Because the curves are based on an average of four occurrences of rail traffic per day, the vehicles per hour on the minor-street approach may be multiplied by the adjustment factor shown in Table 4C-2 for the appropriate number of occurrences of rail traffic per day.

07 Because the curves are based on typical vehicle occupancy, if at least 2% of the vehicles crossing the track are buses carrying at least 20 people, the vehicles per hour on the minor-street approach may be multiplied by the adjustment factor shown in Table 4C-3 for the appropriate percentage of high-occupancy buses.

08 Because the curves are based on tractor-trailer trucks comprising 10% of the vehicles crossing the track, the vehicles per hour on the minor-street approach may be multiplied by the adjustment factor shown in Table 4C-4 for the appropriate distance and percentage of tractor-trailer trucks.

Standard:

09 **If this warrant is met and a traffic control signal at the intersection is justified by an engineering study, then:**

A. The traffic control signal shall have actuation on the minor street;

B. Preemption control shall be provided in accordance with Sections 4D.27, 8C.09, and 8C.10; and

C. The grade crossing shall have flashing-light signals (see Chapter 8C).

Guidance:

10 *If this warrant is met and a traffic control signal at the intersection is justified by an engineering study, the grade crossing should have automatic gates (see Chapter 8C).*

Table 4C-2. Warrant 9, Adjustment Factor for Daily Frequency of Rail Traffic

Rail Traffic per Day	Adjustment Factor
1	0.67
2	0.91
3 to 5	1.00
6 to 8	1.18
9 to 11	1.25
12 or more	1.33

Table 4C-3. Warrant 9, Adjustment Factor for Percentage of High-Occupancy Buses

% of High-Occupancy Buses* on Minor-Street Approach	Adjustment Factor
0%	1.00
2%	1.09
4%	1.19
6% or more	1.32

* A high-occupancy bus is defined as a bus occupied by at least 20 people.

Table 4C-4. Warrant 9, Adjustment Factor for Percentage of Tractor-Trailer Trucks

% of Tractor-Trailer Trucks on Minor-Street Approach	Adjustment Factor	
	D less than 70 feet	D of 70 feet or more
0% to 2.5%	0.50	0.50
2.6% to 7.5%	0.75	0.75
7.6% to 12.5%	1.00	1.00
12.6% to 17.5%	2.30	1.15
17.6% to 22.5%	2.70	1.35
22.6% to 27.5%	3.28	1.64
More than 27.5%	4.18	2.09

Warrants Volume

Information

Analyst	SBC	Intersection	Central/Dryden/Moorings
Agency/Co	Eriksson Engineering	Jurisdiction	IDOT/Arlington Hts/Private
Date Performed	3/15/2015	Units	U.S. Customary
Project ID		Time Period Analyzed	Total Traffic Volumes
East/West Street	Central Road	North/South Street	Dryden Place/Moorings Drive
File Name	Signal Analysis	Major Street	East-West

Project Description

Warrant 1

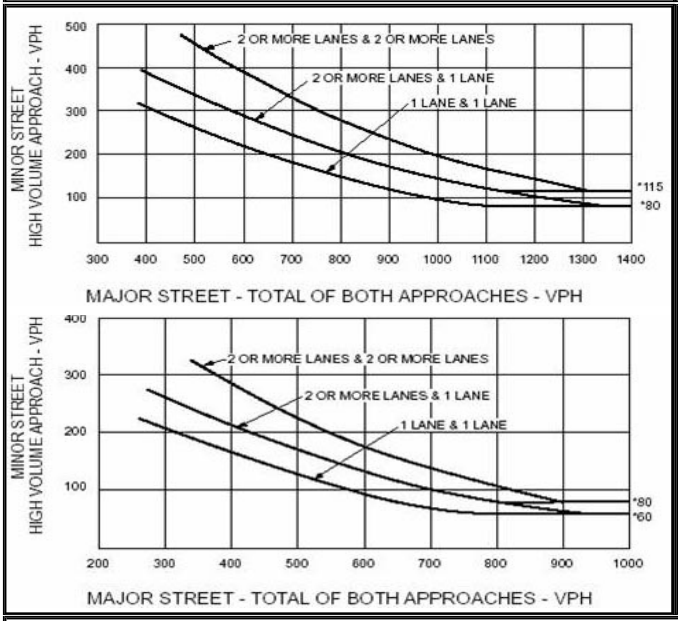
Condition A—Minimum Vehicular Volume

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%	80%	70%	56%	100%	80%	70%	56%
1	1	500	400	350	280	150	120	105	84
2 or more	1	600	480	420	336	150	120	105	84
2 or more	2 or more	600	480	420	336	200	160	140	112
1	2 or more	500	400	350	280	200	160	140	112

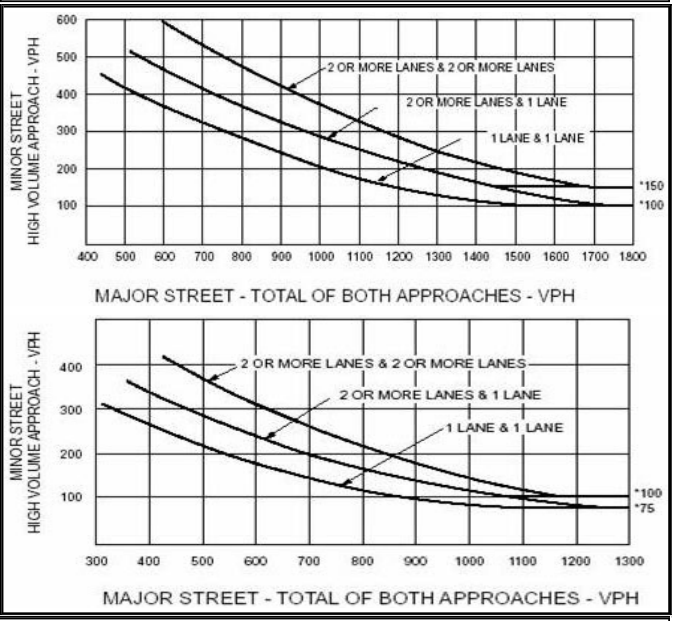
Condition B—Interruption of Continuous Traffic

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%	80%	70%	56%	100%	80%	70%	56%
1	1	750	600	525	420	75	60	53	42
2 or more	1	900	720	630	504	75	60	53	42
2 or more	2 or more	900	720	630	504	100	80	70	56
1	2 or more	750	600	525	420	100	80	70	56

Warrant 2



Warrant 3



Volume Summary

Major Street Lanes 2+ **Minor Street Lanes** 2+ **Speed** 40 **Population** 10000+

Hours	Major Volume	Minor Volume	Total Volume	1A (100%)	1A (80%)	1B (100%)	1B (80%)	2 (100%)	3A (100%)	3B (100%)
07-08	1920	55	1999	No	No	No	No	No	No	No
08-09	1865	84	1961	No	No	No	Yes	No	No	No
09-10	1330	0	1330	No	No	No	No	No	No	No
10-11	1134	0	1134	No	No	No	No	No	No	No
11-12	1362	0	1362	No	No	No	No	No	No	No
12-13	1508	0	1508	No	No	No	No	No	No	No
13-14	1486	0	1486	No	No	No	No	No	No	No
14-15	1556	0	1556	No	No	No	No	No	No	No
15-16	1876	0	1876	No	No	No	No	No	No	No
16-17	2186	60	2272	No	No	No	No	No	No	No
17-18	2442	42	2515	No	No	No	No	No	No	No
18-19	1042	0	1042	No	No	No	No	No	No	No
Totals	19707	241	20041	0	0	0	1	0	0	0

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Warrants Summary

Information			
Analyst	SBC	Intersection	Central/Dryden/Moorings
Agency/Co	Eriksson Engineering	Jurisdiction	IDOT/Arlington Hts/Private
Date Performed	3/15/2015	Units	U.S. Customary
Project ID		Time Period Analyzed	Total Traffic Volumes
East/West Street	Central Road	North/South Street	Dryden Place/Moorings Drive
File Name	Signal Analysis	Major Street	East-West

Project Description

General				Roadway Network	
Major Street Speed (mph)	40	☐	Population < 10,000	Two Major Routes	☐
Nearest Signal (ft)	1300	☐	Coordinated Signal System	Weekend Count	☐
Crashes (per year)	2	☐	Adequate Trials of Alternatives	5-yr Growth Factor	0

Geometry and Traffic	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N	1	2	0	1	2	0	0	1	1	0	1	0
Lane usage	L	TR		L	TR			LT	R		LTR	
Vehicle Volume Averages (vph)	15	784	8	6	820	6	6	0	5	4	0	11
Peds (ped/h) / Gaps (gaps/h)	--	0 / 0	--	--	0 / 0	--	--	0 / 0	--	--	0 / 0	--
Delay (s/veh) / (veh-hr)	--	0 / 0	--	--	0 / 0	--	--	0 / 0	--	--	0 / 0	--

Warrant 1: Eight-Hour Vehicular Volume	☐
1 A. Minimum Vehicular Volumes (Both major approaches --and-- higher minor approach) --or--	☐
1 B. Interruption of Continuous Traffic (Both major approaches --and-- higher minor approach) --or--	☐
1 (80%) Vehicular --and-- Interruption Volumes (Both major approaches --and-- higher minor approach)	☐
Warrant 2: Four-Hour Vehicular Volume	☐
2 A. Four-Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	☐
Warrant 3: Peak Hour	☐
3 A. Peak-Hour Conditions (Minor delay --and-- minor volume --and-- total volume) --or--	☐
3 B. Peak- Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	☐
Warrant 4: Pedestrian Volume	☐
4 A. Four Hour Volumes --or--	☐
4 B. One-Hour Volumes	☐
Warrant 5: School Crossing	☐
5. Student Volumes --and--	☐
5. Gaps Same Period	☐
Warrant 6: Coordinated Signal System	☐
6. Degree of Platooning (Predominant direction or both directions)	☐
Warrant 7: Crash Experience	☐
7 A. Adequate trials of alternatives, observance and enforcement failed --and--	☐
7 B. Reported crashes susceptible to correction by signal (12-month period) --and--	☐

7 C. (80%) Volumes for Warrants 1A, 1B --or-- 4 are satisfied	☐
Warrant 8: Roadway Network	☐
8 A. Weekday Volume (Peak hour total --and-- projected warrants 1, 2 or 3) --or--	☐
8 B. Weekend Volume (Five hours total)	☐
Warrant 9: Grade Crossing	☐
9 A. Grade Crossing within 140 ft --and--	☐
9 B. Peak-Hour Vehicular Volumes	☐