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Draft Traffic Impact Study

Rogers Elementary School
Chicago, Illinois
Date: November 2, 2018

Prepared for:

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SUBJECT: Draft Traffic Impact Study
Rogers Elementary School Annex and Reno Project
Neighborhood of West Ridge
Chicago, Illinois

DATE: 11/02/2018

This report summarizes the evaluation of existing, and proposed traffic conditions performed by Primera Engineers, Ltd., in anticipation of the proposed development of the Rogers Elementary School Annex for the Chicago Public School (CPS) system. The elementary school is located in the neighborhood of West Ridge, in the City of Chicago, Cook County, Illinois. The purpose of this study is to evaluate potential traffic impacts resulting from the development of the Rogers Elementary Annex and the increased student enrollment that will follow. Four intersections surrounding, and one parking lot within Rogers Elementary School formed the basis of the study area to be evaluated. The four key intersections where traffic data was collected as part of the traffic study are as follows:

1. W. Jarvis Avenue at N. Washtenaw Avenue
2. W. Jarvis Avenue at N. Rockwell Street
3. W. Jarlath Street at N. Washtenaw Avenue
4. W. Sherwin Avenue at N. Washtenaw Avenue

This information was collected on two consecutive days (Wednesday October 24, 2018, and Thursday October 25, 2018). No significant traffic issues were found at any of the intersections where existing traffic was counted and observed. The stop-controlled intersections that were studied allow existing traffic volumes to operate at a Level of Service (LOS) above the minimum acceptable standards. The Illinois Department of Transportation's Bureau of Local Roads manual (IDOT-BLR) identifies that the minimum LOS that is allowable for local roads is LOS D.

The existing traffic volumes have also been forecasted to a future year of 2020. Forecasting vehicle volumes out 2 years gives a conservative evaluation of potential traffic issues that may arise as traffic volumes increase over time. The forecasted vehicle volumes utilize the existing traffic patterns to display how traffic will operate in the future conditions.

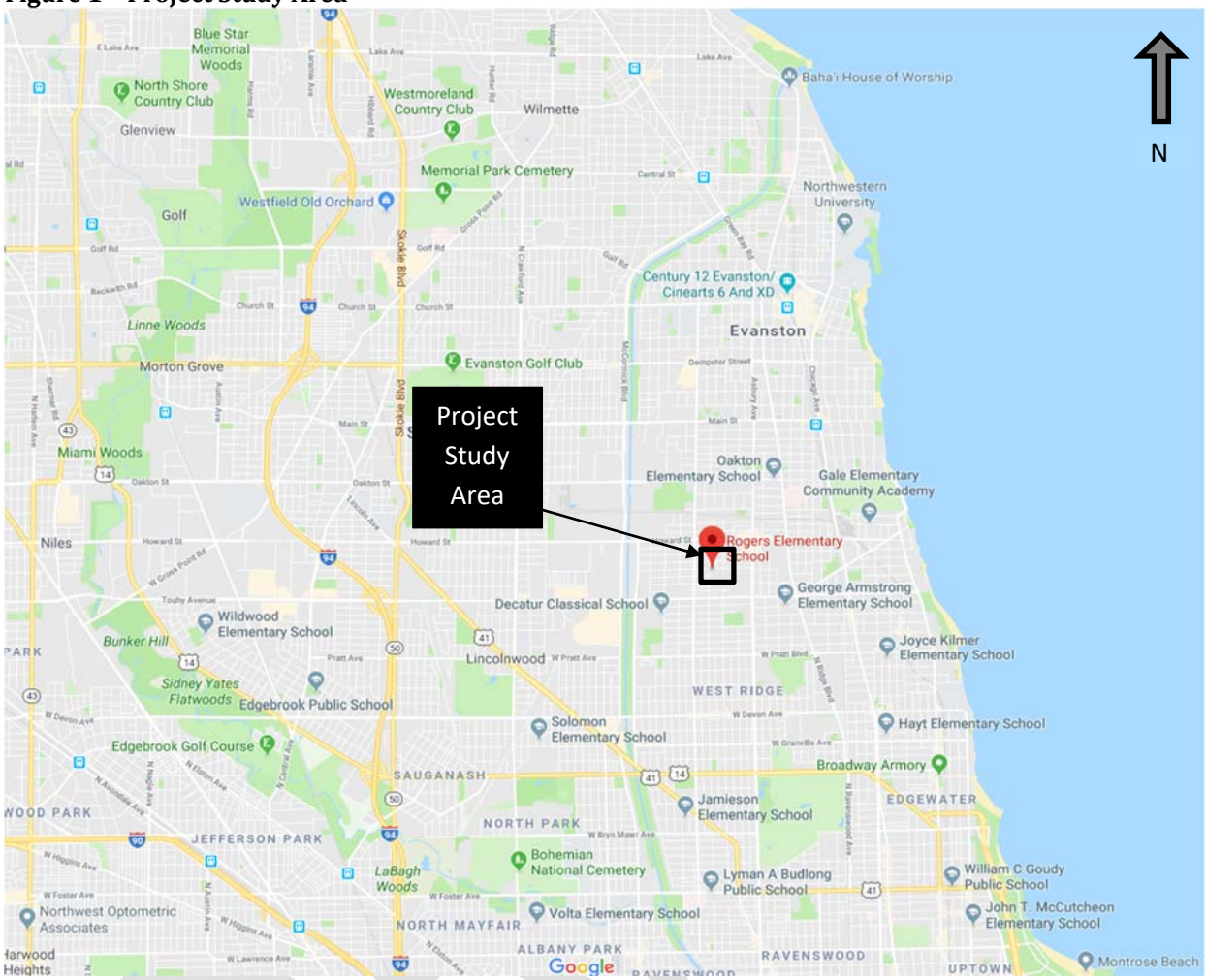
The Rogers Elementary Annex development is noted on the Proposed Annex plans to allow for an increase in student enrollment from the existing 782 students to a future value as high as 1,056, an increase of 274 students. The knowledge of increased enrollment allows Primera to further develop forecasted vehicle

volumes that will ingress and egress the project area during the future peak hour travel conditions. The future travel demand information is utilized to evaluate the existing roadway network in an effort to identify any traffic operations or safety issues. The forecasted traffic volumes highlight that all intersections within the project area will operate within an acceptable LOS in future traffic conditions. Based on this information, there is no apparent need to recommend improvements to vehicle operations. Recommendations to improve vehicular and pedestrian safety are necessary, and are covered in the subsequent sections of this report.

I. Existing Conditions

An analysis of the existing traffic conditions was performed to assess the presence of any safety and operational concerns, and identify potential traffic impacts resulting from the expected increase in Rogers Elementary School's student population from the site redevelopment. Traffic and geometric data in the project study area was collected through a site visit by Primera Engineers, Ltd. and data collection cameras. Information recorded included roadway characteristics, existing peak hour traffic volumes (vehicular, pedestrian, and bicycle), existing street parking conditions, potential causes of traffic queue formation, and any safety concerns present to both pedestrian and vehicular traffic. **Figure 1** provides the location of the project area in respect to the south side of Chicago.

Figure 1 – Project Study Area



- **General Background and Location**

Rogers Elementary School is located approximately 11,352 feet (2.15 miles) east of State Route 41 and approximately 9,240 feet (1.75 miles) north of State Route 14. The study limits are defined by Jarvis Avenue to the north, Rockwell Street to the east, Jarlath Street to the south, and Washtenaw Avenue to the west. The school is located on Washtenaw Avenue between the intersections of Jarvis Avenue and Sherwin Avenue. The school has one parking lot for faculty and staff located on the south end of the school off of Washtenaw Avenue, and forms the east leg of the intersection with Sherwin Avenue. This location is shown in **Figure 2**. Outside of the school boundaries, the adjacent land use is a mix of residential and recreational. All streets within the study limits are classified as local roads. Within a one-half mile radius of the Rogers Elementary School facility, there are total of four parks/recreational area and six schools.

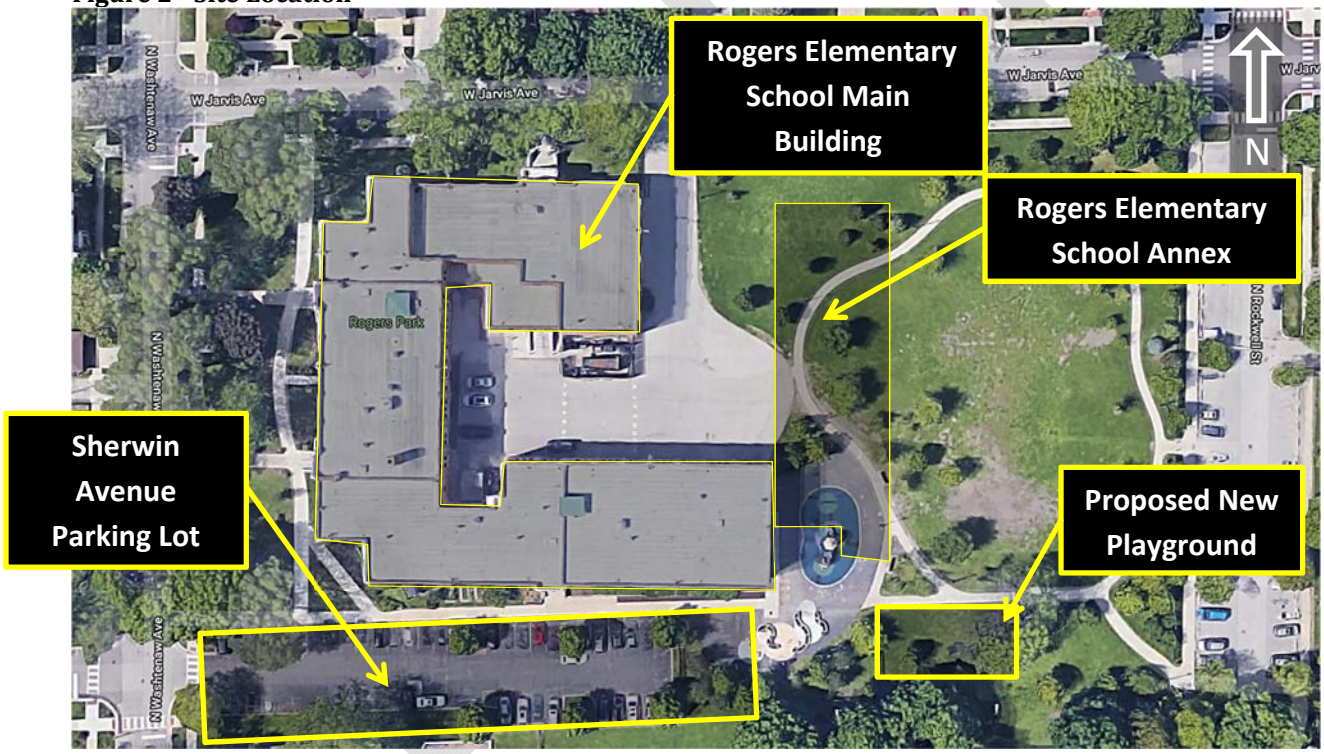
The park/recreational facilities include:

1. Dobson-Brummel Park
2. Rogers Park
3. Indian Boundary Zoo
4. Indian Boundary Park

The school facilities include:

1. St. Margaret Mary School
2. Benedictine Sisters of Chicago
3. St. Scholastica Academy
4. Chicago Ballet Arts
5. Blitstein Institute
6. Cheder Lubavitch Girls School

Figure 2 - Site Location



- **Existing Roadway Facilities**

An inventory of roadway characteristics for the study area can be found in **Figure 3** of the Appendix.

Jarvis Avenue

Jarvis Avenue between Washtenaw Avenue and Rockwell Street is an eastbound/westbound two-way local road under the jurisdiction of the Chicago Department of Transportation (CDOT). The roadway cross-section is generally 28 feet wide. The presence of speed control systems in the form of speed humps are located at two points on Jarvis Avenue, one midway between Washtenaw Avenue and Talman Avenue and one midway between Talman Avenue and Rockwell Street, and both are adjacent to the school boundaries. Parking is not permitted during school hours (7 A.M. to 4:30 P.M.) along the south side of Jarvis Avenue adjacent to school boundaries between Washtenaw Avenue and Rockwell Street. Parking is permitted along the south side of the road outside of school hours. Parking is permitted at all times along the north side of the road except in close proximity to the intersections. The intersections at Washtenaw Avenue, Talman Avenue, and Rockwell Street are stop-controlled for both intersecting roads.

Washtenaw Avenue

Washtenaw Avenue between Jarvis Avenue and Jarlath Street is a northbound/southbound two-way local road under the jurisdiction of CDOT. The roadway cross-section is generally 28 feet wide. The presence of speed control systems in the form of a speed hump are located at two points on Washtenaw Avenue, one midway between Chase Avenue and Sherwin Avenue adjacent to Rogers Park boundaries, and one midway between Sherwin Avenue and Jarvis Avenue adjacent to the school boundaries. The school's faculty parking lot is located on the south end of the school at the intersection with Sherwin Avenue. Parking is not permitted during school hours (7 A.M. to 4:30 P.M.) along the east side of Washtenaw Avenue adjacent to school boundaries between Sherwin Avenue and Jarvis Avenue. Parking is permitted along the east side of Washtenaw Avenue outside of school hours. Parking is permitted along the west side of Washtenaw Avenue at all times except in close proximity to the intersections. The intersections at Jarvis Avenue, Sherwin Avenue, and Jarlath Street are stop-controlled for both intersecting roads. The intersection at Chase Avenue is stop-controlled only for Chase Avenue.

Rockwell Street

Rockwell Street between Howard Street and Jarvis Avenue is a northbound/southbound two-way local road under the jurisdiction of CDOT. The roadway cross-section is generally 28 feet wide. Parking is permitted on both sides of the road at all times. The intersection at Jarvis Avenue is all-way stop-controlled.

Jarlath Street

Jarlath Street between California Avenue and Rockwell Street is an eastbound/westbound two-way local road under the jurisdiction of CDOT. The roadway cross-section is generally 28 feet wide. Parking is permitted on both sides of the road at all times. The intersection at Washtenaw Avenue is all-way stop-controlled.

Sherwin Avenue

Sherwin Avenue between California Avenue and Washtenaw Avenue is an eastbound/westbound two-way local road under the jurisdiction of CDOT. The roadway cross-section is generally 28 feet wide. The presence of speed control systems in the form of speed humps are located at two points on Sherwin Avenue. There are no parking restrictions on either side of Sherwin Avenue. The intersection at Washtenaw Avenue is all-way stop-controlled.

Pedestrian, Bicycle, and Transit Facilities

Sidewalks are located on each side of all roadways within the study area. Depressed curb ramps are present at every intersection within the project area and appear to be in compliance with the most recent American with Disability Act (ADA) standards. Crosswalks were striped at all the intersections where pedestrian curb ramps were present, within the project area. Bicycle travel is permitted, but dedicated bike lanes are not present within the study area. Transit facilities do not directly access Rogers Elementary, but are located within walkable distances from the school property. More information on transit facilities is covered under the additional studies section of this report.

• Existing Peak Hour Traffic

Peak period traffic counts were performed to establish existing traffic volumes and patterns in the study area. Traffic data was collected on two consecutive days at the following four intersections to capture vehicle, pedestrian, and bicyclist travel patterns as a part of this study:

1. W. Jarvis Avenue at N. Washtenaw Avenue
2. W. Jarvis Avenue at N. Rockwell Street
3. W. Jarlath Street at N. Washtenaw Avenue
4. W. Sherwin Avenue at N. Washtenaw Avenue

Information received from personnel at the Public Building Commission of Chicago (PBC) identified that there are two peak hour periods in which traffic data should be captured. The morning peak hour traffic was counted between the hours of 7-9 A.M., and afternoon between 2-4 P.M. As noted previously, two consecutive days of traffic data was collected. The traffic volumes collected on Thursday October 25 were larger at all applicable intersections. In an effort to produce a conservative snapshot of the traffic volumes in the Rogers Elementary School project area, only the data collected on October 25, 2018 is discussed in this report, and represented in the exhibits. The peak hour for the morning was determined to be 7:30 to 8:30 A.M., and the peak hour for the afternoon was determined to be 2:45 to 3:45 P.M. A summary of the peak hour vehicle volumes can be found in **Figure 4**, pedestrian volumes in **Figure 5**, and bicycle volumes in **Figure 6,** in the Appendix. Additional traffic data was recorded in the early to evening hours, between the hours of 5:00 P.M. and 9:00 P.M., at the four intersections where the morning and afternoon peak hour counts were recorded. The busiest travel hour for the evening traffic volumes is between 5:00 P.M. and 6:00 P.M.

During the morning peak hour traffic times, only one bus was observed dropping off students (six) at Rogers ES. This bus arrived at approximately 7:35 A.M. travelling northbound along Washtenaw Avenue

and stopped near the main doors to the school. Seven other buses were observed traveling along Washtenaw Avenue and Jarvis Avenue between 7:00 A.M. and 8:00 A.M. that were picking up children for transport to other schools in the area. During the morning operations, the school buses were not observed impacting the existing travel and traffic patterns, and most arrived before the peak period from 7:45 A.M. to 8:15 A.M. when most of the vehicular drop offs of students occurred. The majority of students are driven to school in vehicles and dropped off along northbound Washtenaw. Traffic management staff were observed placing cones at the west half of the south leg of the intersection of Washtenaw Avenue and Jarvis Avenue at approximately 7:15 A.M. to prohibit vehicles from travelling southbound and allowing only northbound vehicles to travel along Washtenaw and drop off students. Northbound traffic queues were observed to build at approximately 7:50 A.M. and peak queues were observed between 7:55 and 8:00 A.M. with queues extending past Sherwin Avenue. The queues dissipated shortly after 8:00 A.M. and traffic management staff were observed picking up the cones at 8:05 A.M. to allow normal two-way traffic operations along Washtenaw.

In the afternoon peak hour, only one school bus was observed arriving to pick up students at Rogers ES. This bus arrived at approximately 2:45 P.M. and departed at approximately 3:00 P.M. Traffic management staff were observed placing cones at approximately 2:45 P.M. across the entire width of the roadway along Washtenaw Avenue at the south leg of the intersection with Jarvis Avenue and at the north leg of the intersection at Sherwin Avenue, to prohibit all traffic (except the bus) from traveling along this one block section adjacent to the front/main doors of the school. This forced vehicles to park and pickup students along other streets near the school including Washtenaw south of Sherwin, Sherwin west of Washtenaw, and along Jarvis. Also, approximately 40 to 50 vehicles parked to pick up students at the parking lot on the east side of the school. These vehicles dispersed over a 15-minute period and no traffic congestion was observed at the parking lot exit at the intersection of Jarvis Avenue and Rockwell Street. The cones along Washtenaw were removed by traffic management staff at approximately 3:10 P.M. after peak traffic diminished. Only 3 buses were observed after the peak traffic period dropping off students that were attending other schools.

II. Traffic Analysis

• Existing Daytime Peak Hour Traffic

Analysis of the existing traffic during the daytime peak hours was performed for the project study area where vehicle counts were performed. Capacity and delay were determined to assess the ability of the existing roadway system to handle the existing traffic volumes.

Capacity analysis was performed using Synchro 10 computer software which is based on methodologies developed in the Transportation Research Board's *Highway Capacity Manual (2010).* The modeling software included the existing parking configuration on all blocks, the presence of buses blocking traffic during the peak hours, bicycle and pedestrian travel, and traffic data recorded entering and exiting the school parking lots. As discussed in the Existing Peak Hour Traffic section of report, buses blocking vehicular traffic was not observed due to the timing of the buses and traffic management strategies.

The bus blocking is dependent on the total number of buses that dropped off students in the morning peak hour, and picked up students in the afternoon peak hour. For the entire project area, bus blockages never occurred due to the partial or full-closure of Washtenaw Avenue in the morning or afternoon peak hour times, respectively. The temporary closures of Washtenaw Avenue provides adequate spacing for one or more school busses to stop and await students, without impacting traffic.

The results of the intersection analysis shows that the four key intersections currently operate at or above LOS A. IDOT-BLR identifies that the minimum LOS that is allowable for local roads is LOS D. A breakdown of each intersection can be found in **Table 1**.

Table 1 – Existing Level of Service

Intersection	Morning Peak Hour		Afternoon Peak Hour	
	LOS	Delay	LOS	Delay
Jarvis and Washtenaw	A	8.9	A	8.2
Jarvis and Rockwell	A	7.8	A	8.1
Jarlath and Washtenaw	A	8.4	A	7.9
Sherwin and Washtenaw	A	9.4	A	7.7
LOS = Level of Service				
Delay in seconds				

Based on an analysis of the existing roadway network within the project limits, the proposed annex construction at Rogers Elementary School should not cause significant traffic impacts. The stop-controlled intersections that were studied currently manage the existing traffic volumes while providing an adequate LOS. These intersections are anticipated to adequately handle the increase in traffic volumes within the study area as a result of the proposed annex construction and increased student enrollment.

- ## Existing Traffic Distribution

An investigation into how traffic ingress and egress the project area was completed to determine how the roadway network is utilized. The total traffic entering and exiting the project area was recorded during the peak hour traffic counts, and used to develop trip distribution. A breakdown of the trip distribution can be found in **Table 2.** Developing the traffic distribution is helpful in identifying how traffic patterns will be redistributed as the parking structure redevelopment will relocate traffic origins and destinations.

Table 2 – Existing Trip Distribution

Street	Intersecting Street	One Way / Two Way Traffic	Travel Direction	Trip Distribution	
				In	Out
Jarvis Ave.	Washtenaw Ave.	Two Way	EB/WB	18%	19%
Washtenaw Ave.	Jarvis Ave.	Two Way	NB/SB	13%	11%
Jarvis Ave.	Rockwell St.	Two Way	EB/WB	13%	20%
Rockwell St.	Jarvis Ave.	Two Way	NB/SB	6%	5%
Sherwin Ave.	Washtenaw Ave.	Two Way	EB/WB	7%	7%
E. Jarlath Ave.	Washtenaw Ave.	Two Way	EB/WB	15%	11%
Washtenaw Ave.	Jarlath Ave.	Two Way	NB/SB	19%	20%
W. Jarlath Ave.	Washtenaw Ave.	Two Way	EB/WB	9%	7%

A schematic representation of the existing traffic trip distribution can be found in **Figure 8**, in the appendix.

- ## Existing Traffic Volumes – Evening

The existing traffic conditions analysis included observing and recording traffic data in the evening hours at the four intersections where the morning and afternoon peak hour counts were recorded. This required collecting traffic counts between the hours of 5:00 P.M. and 9:00 P.M. The traffic counts produced traffic volumes that were typically larger than those recorded in the afternoon peak hours 2:45 P.M. and 3:45 P.M. By obtaining turning movement information for each intersection, Primera was able to identify that all intersections still operate at LOS A. The busiest travel hour for the evening traffic volumes is between 5:00 P.M. and 6:00 P.M. For more information see **Table 3**.

Table 3 - Evening Peak Hour Volume Comparison

Intersection	Morning Peak Hour Total Intersection Volume (Vehicles per Hour)	Afternoon Peak Hour Total Intersection Volume (Vehicles per Hour)	Evening Peak Hour Total Intersection Volume (Vehicles per Hour)
Jarvis Avenue @ Washtenaw Avenue	320	215	239
Jarvis Avenue @ Rockwell Street	197	195	152
Jarlath Avenue @ Washtenaw Avenue	296	184	271
Washtenaw Avenue @ Sherwin Avenue	266	134	170

Note: During the evening traffic counts, any remaining staff vehicles found in the Rogers Elementary School parking lots are departing during the 5:00 P.M. to 6:00 P.M. time frame. The increased enrollment is not anticipated to negatively impact traffic operations within the project area.

- **Forecasted Peak Hour Traffic**

In order to accurately evaluate how the project area operates beyond 2018, the existing traffic volumes collected must be forecasted to a set year in the future and reassessed. For the purpose of this report, the redistributed traffic volumes were used along with the following formula:

$$F = P\ x\ (1 + i)^n$$

Where F is the forecasted traffic volume based on P, the present day traffic volume. The characters i, and n represent the growth rate, and the number of years from the present year to the forecasted year, respectively. For these calculations, i was set to 2.0% and n was set to 2 years. Once the existing vehicle volumes have been forecasted out to 2020, the additional vehicles from the anticipated increase in enrollment are added to develop an accurate model of traffic behavior in future travel conditions.

As to be expected, the growth in traffic volumes leads to a decrease in LOS for the key intersections in the project area. Again, the modeling software included parking configuration, parking maneuvers, and pedestrian and bicycle travel within the project area and during the peak hours. The strain of the increased traffic volumes on the roadway network causes a noticeable reduction in capacity and operations in the peak hours. However, all the intersections still operate with a satisfactory LOS. A breakdown in LOS for each intersection can be found in **Table 4**.

It should be noted that the increased traffic volumes from increased enrollment does not noticeably impact the intersection of Montvale Avenue at Rogers Street, or the access points to the school parking lots.

Table 4 – Forecasted Level of Service (2019)

Intersection	A.M. Peak Hour		P.M. Peak Hour	
	LOS	Delay	LOS	Delay
Jarvis and Washtenaw	B	12.1	A	8.7
Jarvis and Rockwell	A	8.7	A	8.1
Jarlath and Washtenaw	A	9.2	A	8.7
Sherwin and Washtenaw	B	13.2	A	9.6
LOS = Level of Service				
Delay in seconds				

A summary of the forecasted peak hour vehicle volumes can be found in **Figure 9**, in the appendix.

III. Summary of Findings

- **Existing Peak Hour Traffic**

The existing traffic conditions in the project area are observed to operate adequately during the peak hour traffic times. All intersections operate at LOS A, which may be expected due to the low traffic volumes.

There is some evidence of traffic queueing along Jarvis and Washtenaw Avenues due to students arriving and departing from school. However, these impacts to operations appear to be relatively minor and are already being managed by the existing temporary traffic control system in place for the morning and afternoon peak hour travel times.

- **Existing Traffic Volumes – Evening**

The existing traffic conditions in the evening time frame produce vehicular volumes that are similar to the volumes found during the morning peak hour conditions. This correlates to the elementary school's location near Roger's Park, which can be attributed as a significant origin/destination location. The traffic volumes produce satisfactory LOS (LOS A) for each intersection that was studied.

- **Forecasted Peak Hour Traffic**

Forecasting the existing traffic volumes to the year 2020, and applying an increase in vehicles due to the increased enrollment, the resulting intersection evaluation yields that all the intersections will operate at LOS A in future travel conditions. The relatively low volumes of vehicular, pedestrian, and bicyclist traffic during the peak hours are all adequately conveyed by the existing traffic controls, temporary traffic control system, and roadway geometry. Due to this, no geometric improvements to the existing roadways or intersections are warranted to be included with the proposed development and construction of the Rogers Elementary School Annex building.

IV. Additional Studies

- **Chicago Transit Authority Applications**

Currently, The Chicago Transit Authority (CTA), does not employ bus or train routes that directly access the Rogers Elementary School zone. However, there are four CTA and two PACE bus lines that pass near the school on roadways adjacent to the project area.

The CTA bus routes consist of:

1. Route 49B; North Western
2. Route 93; California/Dodge
3. Route 96; Lunt
4. Route 97; Skokie

The 49B bus route is a northbound/southbound route that connects Howard Avenue to the Western Avenue Brown Line train station. This route travels near Rogers Elementary by way of Western Avenue and currently has bus stops at the intersections with Chase Avenue and Jarvis Avenue. Western Avenue at Chase Avenue is a three-legged intersection that allows Western Avenue to be free-flow. Chase Avenue is a one-way in an eastern direction at this intersection. Western Avenue at Jarvis Avenue is a signalized intersection. The 49B bus route could be modified to allow for an additional stop at Rogers Elementary. However, the route modification would add approximately 3,878 feet (0.73 miles) to the route for the southbound and northbound directions. The existing stops could still be located at the intersections of

Rockwell Street and Jarvis Avenue. The existing stops could still be located at the intersections of Western Avenue with Jarvis Avenue or Howard Street, but the stop location may require a reorientation at each intersection. Prior to installing this stop, substantial geometric and pavement improvements will be needed on Jarvis Avenue and Rockwell Street.

The 93 bus route is a northbound/southbound route that connects the Davis Street Purple Line and Metra train stations to the Kimball Street Brown Line train station. This route travels near Rogers Elementary by way of California Avenue and currently has bus stops at the intersections with Chase Avenue and Jarvis Avenue. California Avenue at Chase Avenue is a two-way stop-controlled intersection that allows Western Avenue to be free-flow. California Avenue at Jarvis Avenue is a four-way stop-controlled intersection. The 93 bus route could be modified to allow for an additional stop at Rogers Elementary. However, the route modification would add approximately 2,597 feet (0.49 miles) to the route for the southbound and northbound directions. The existing stops could still be located at the intersections of California Avenue with Jarvis Avenue or Howard Street, but the stop location may require a reorientation at each intersection. Prior to installing this stop, substantial geometric and pavement improvements will be needed on Jarvis Avenue and Rockwell Street.

The 96 bus route is an eastbound/westbound route that connects the Morse Red Line train station to the Lincolnwood Town Center. This route travels near Rogers Elementary by way of Touhy Avenue and currently has a bus stop at the intersection with California Avenue. Touhy Avenue at California Avenue is a signalized intersection. The 96 bus route could be modified to allow for an additional stop at Rogers Elementary. However, the route modification would add approximately 4,616 feet (0.87 miles) to the route for the eastbound and westbound directions. The existing stops could still be located at the intersections of Touhy Avenue with California Avenue and Lunt Avenue with Washtenaw Avenue, but the stop location may require a reorientation at each intersection. Prior to installing this stop, substantial geometric and pavement improvements will be needed on Jarvis Avenue and Washtenaw Avenue.

The 97 bus route is an eastbound/westbound route that connects the Howard Street Red, Yellow, and Purple Line train stations to the Westfield-Old Orchard Mall. This route travels near Rogers Elementary by way of Howard Street and currently has bus stops at the intersections with Rockwell Street and Washtenaw Avenue. Howard Street at Rockwell Street is a two-way stop-controlled intersection that allows Howard Street to be free-flow. Howard Street at Washtenaw Avenue is a three-legged intersection that allows Howard Street to be free-flow. The 97 bus route could be modified to allow for an additional stop at Rogers Elementary. However, the route modification would add approximately 3,256 feet (0.62 miles) to the route for the eastbound and westbound directions. The existing stops could still be located at the intersections of Howard Street with California Avenue or Washtenaw Avenue, but the stop location may require a reorientation at each intersection. Prior to installing this stop, substantial geometric and pavement improvements will be needed on Jarvis Avenue and Washtenaw Avenue.

The PACE bus routes consist of:

1. Route 215; Crawford-Howard
2. Route 290; Touhy Avenue

The 215 bus route is an eastbound/westbound route that connects the Howard Street Red, Yellow, and Purple Line train stations to the Westfield-Old Orchard Mall. This route travels near Rogers Elementary by way of Howard Street and currently has bus stops at the intersections with Rockwell Street and Washtenaw Avenue. Howard Street at Rockwell Street is a two-way stop-controlled intersection that allows Howard Street to be free-flow. Howard Street at Washtenaw Avenue is a three-legged intersection that allows Howard Street to be free-flow. The 215 bus route could be modified to allow for an additional stop at Rogers Elementary. However, the route modification would add approximately 3,256 feet (0.62 miles) to the route for the eastbound and westbound directions. The existing stops could still be located at the intersections of Howard Street with California Avenue or Washtenaw Avenue, but the stop location may require a reorientation at each intersection. Prior to installing this stop, substantial geometric and pavement improvements will be needed on Jarvis Avenue and Washtenaw Avenue.

The 290 bus route is an eastbound/westbound route that connects the Howard Street Red, Yellow, and Purple Line train stations to the Cumberland Blue Line train station. This route travels near Rogers Elementary by way of Touhy Avenue and currently has bus stops at the intersections with Rockwell Street and Washtenaw Avenue. Touhy Avenue at Rockwell Street is a four-way stop-controlled intersection that allows Touhy Avenue to be free-flow. Touhy Avenue at Washtenaw Avenue is a signalized intersection. The 290 bus route could be modified to allow for an additional stop at Rogers Elementary. However, the route modification would add approximately 3,313 feet (0.63 miles) to the route for the eastbound and westbound directions. The existing stops could still be located at the intersections of Touhy Avenue with California Avenue or Washtenaw Avenue, but the stop location may require a reorientation at each intersection. Prior to installing this stop, substantial geometric and pavement improvements will be needed on Jarvis Avenue and Washtenaw Avenue.

Due to the proximity of the CTA and PACE Bus Routes to Rogers Elementary, a modification to the existing routes is not recommended.

- **Pedestrian and Vehicular Safety**

It is assumed that due to the land use types, and the low volume of vehicles, that the number of serious injury crashes is significantly low during any five year period, near the elementary school facility. During the field visit to collect traffic and roadway data, the engineer witnessed zero crashes and did not observe any ‘near-misses’ or ‘close-calls.’ Due to this, it is anticipated that a crash analysis is not necessary for the traffic impact study.

In review of the pedestrian facilities within the project area, the engineers noted that all pedestrian crossings were in compliance with the state ADA requirements. Each intersection contained an appropriate ADA ramp, complete with detectable warning plates, and cross walk striping that was in good

condition. During the morning peak hour traffic times, the southbound lane of Washtenaw Avenue between Jarvis and Jarlath Avenues is blocked off to through traffic to create an improvisational one-way roadway on Washtenaw Avenue. The temporary traffic control method provides a safer route for pedestrian mid-block crossing and students alighting transport vehicles. During the afternoon peak hour traffic times, the entire block of Washtenaw Avenue between Jarvis and Jarlath Avenues is completed blocked off to any through moving vehicles to provide a safe route for all pedestrian and student mid-block crossing. There is a parking lot located on N. Rockwell Street, east of Rogers Elementary School, where parents and guardians can park and wait for students after the school day has ended. In both the morning and afternoon peak hours, crossing guards are posted at all intersections where student crossing are prevalent (See Figure 3).

Figure 3: Temporary Traffic Controls in the morning and afternoon peak hours

In review of the vehicular facilities, the engineer noted that 'school speed limit' and restrictive parking signage is present on the two blocks surrounding the school facility to warn motorists of the potential for students crossing the road. This information is further highlighted by 'student crossing ahead' signs on Jarvis and Washtenaw Avenues, in the vicinity of the school. The presence of speed humps further accentuates the enforcement of reduced speeds on the roadways directly adjacent to the school facility.

- ## Traffic Operations

"No-Parking" Locations

The existing 'no-parking' signs located on Jarvis Avenue and Washtenaw Avenue clearly delineate that parking is not allowed near Rogers Elementary during school day hours. The engineers observed that these signs were adequately enforcing the no-parking requirement. This allows for student pick-ups and drop-offs to be completed whether the mode of transportation is small vehicle (car, van) or large vehicle (school bus). The 'no-parking' signs do not appear to be impacting the residences adjacent to the school. Due to this, no improvements to the existing 'no-parking' signage is required.

Parking Impacts

The current traffic operating conditions pose no impacts to the existing parking conditions found on any of the roads within the project area. The available street parking areas are exclusively used by the residences located adjacent to the elementary school. Nearly all the residences have a private parking garage that is utilized along with street parking. Rogers Park is located immediately adjacent to the school, and provides a parking lot that is utilized by parents/guardians of students during student drop off and pick up. Due to this, there is ample street parking found on every roadway within the project area. There are no recommendations warranted for improving the street parking at this time.

Traffic Signal Warrant

The intersections found in the project area are comprised of all-way or minor-leg (Chase Avenue) stop-controlled traffic control. The existing and the forecasted traffic volumes are adequately conveyed through all the intersections within the project area, and produce LOS A. Based on existing traffic conditions and operations, it is reasonable to assume that traffic signal warrants as set forth in the MUTCD would not be met, and the installation of traffic signals would not improve the overall safety and operations of the project area intersections.

• Traffic Management Plan

A Traffic Management Plan (TMP) typically identifies traffic, parking, and pedestrian management techniques to mitigate any and all anticipated problems during special events. In the case of Rogers Elementary School, a special event will require full use of school grounds and facilities to hold special events or festivals. In the situation where a special event is being held at Rogers Elementary, it is recommended that members of the Chicago Police Department (CPD) be present throughout the lifespan of the event. A police presence will aid in enforcing the travel, parking, and pedestrian regulations.

Vehicular traffic management techniques may not be required during special events at Rogers Elementary. The roadway network is comprised of low-volume, local two-way streets that connect to Major Collector or Minor Arterial roadways within 2,000’ of the school grounds. Vehicles traveling to and from the school are exposed to surface parking lots or locations where street parking is allowed. However, during special events, it is recommended to cover the school day ‘no-parking’ signs. This will allow for additional street parking locations to be utilized by vehicles attending special events at the school. The presence of the CPD for a special event will enforce safe traveling operations and regulate parking by ticketing and towing vehicles illegally parked too close to intersections or driveways.

Pedestrian travel conditions and crossing areas are well marked and delineated on each roadway and intersection within the project area. Additional management techniques may not be necessary during special events. However, additional street lighting may be installed during events held in the afternoon/evening hours to improve pedestrian visibility to motorists.

V. Recommendations

- **Intersection Improvements**

The existing intersections located within the project limits have demonstrated operation within acceptable Levels of Service during the existing and forecasted peak hour travel times. Due to this, no significant improvements to the intersections are necessary as part of the development of the Rogers Elementary Annex building.

- **Pedestrian Improvements**

Since the ADA crossing areas meet state requirements, improvements to the pedestrian travel ways within the project area are not necessary at this time. Currently, there are crossing-guards and staff at the busy intersections to aid in pedestrian crossing during peak hours. A potential improvement that may replace the speed humps found on Washtenaw Avenue and Jarvis Avenue, are raised crosswalks. Raised crosswalks function similar to a speed hump in reducing motorist speeds, and providing an area for students to cross the street mid-block.

- **Bicyclist Improvements:**

The volume of bicyclist traffic is significantly low during the peak hour travel times. Currently there is no signage or pavement marking to alert motorists to the presence of bicyclists on the roadway. In order to promote safe bicyclist travel on city roads, it is recommended to install “vehicular traffic warning signs” combined with “share the road” plaques and painted shared lane markings, or “sharrows.” Additional guidance on the installation of bicyclist signage and pavement marking can be found in the Manual on Uniform Traffic Control Devices (MUTCD), Chapter 2. These improvements will identify the roadways adjacent to the school as safe travel ways for bicyclists to motorists and pedestrians and may promote increased bicyclist travel to and from the school.

VI. Summary

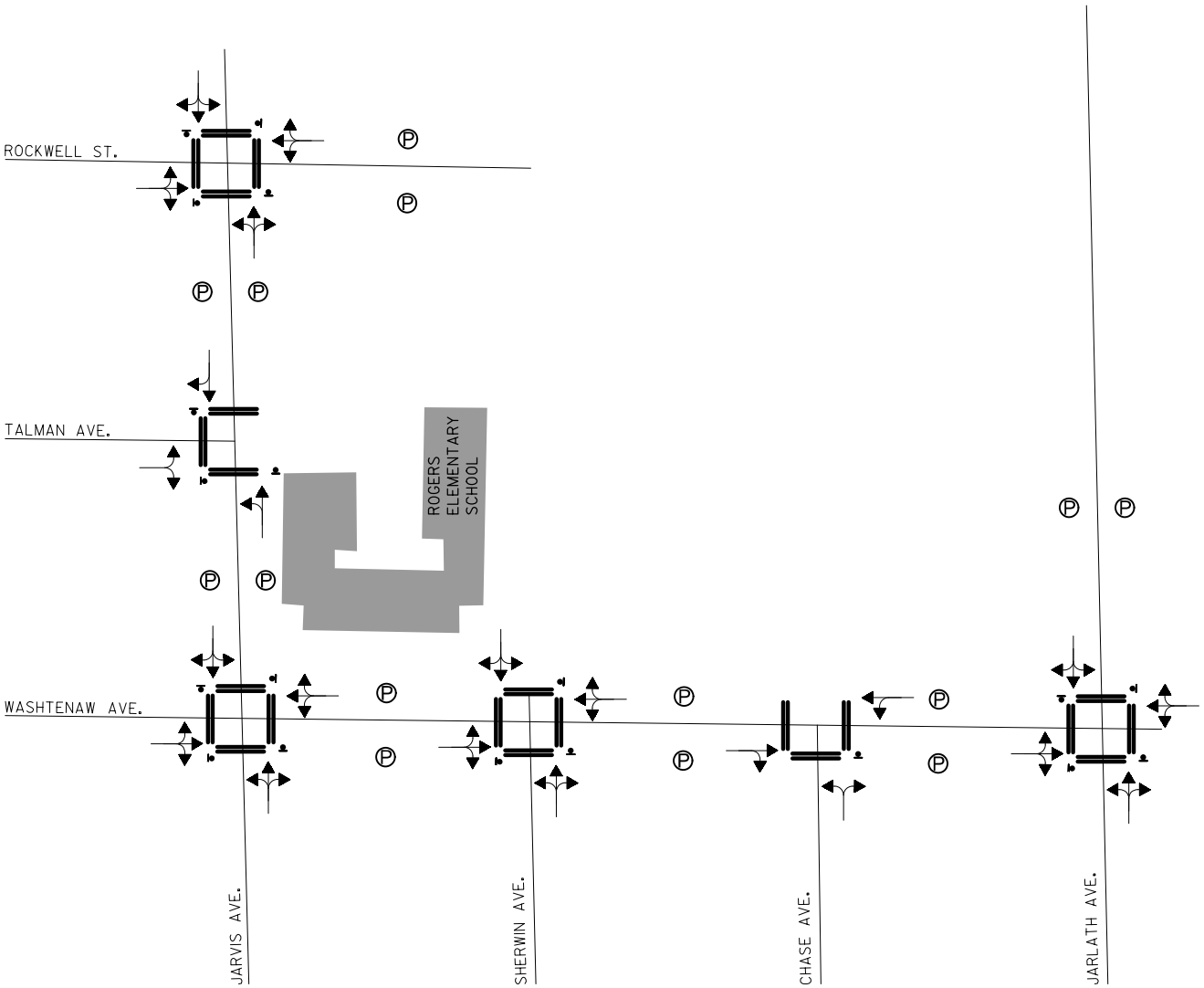
In review of the existing and forecasted traffic volumes in the project area, there does not appear to be a need to improve the existing roadway geometry around the elementary school. The intersections within the project area have demonstrated the ability to convey the forecasted peak hour traffic volumes adequately. The existing pedestrian facilities within the project area are in good condition and do not require improvements or modifications. Even though the presence of bicyclists is significantly low, installing bicycle pavement marking and signage will improve bicyclist safety and promote bicyclist travel.

APPENDIX

Appendix A-1 – Figures

Primera

NOT TO SCALE



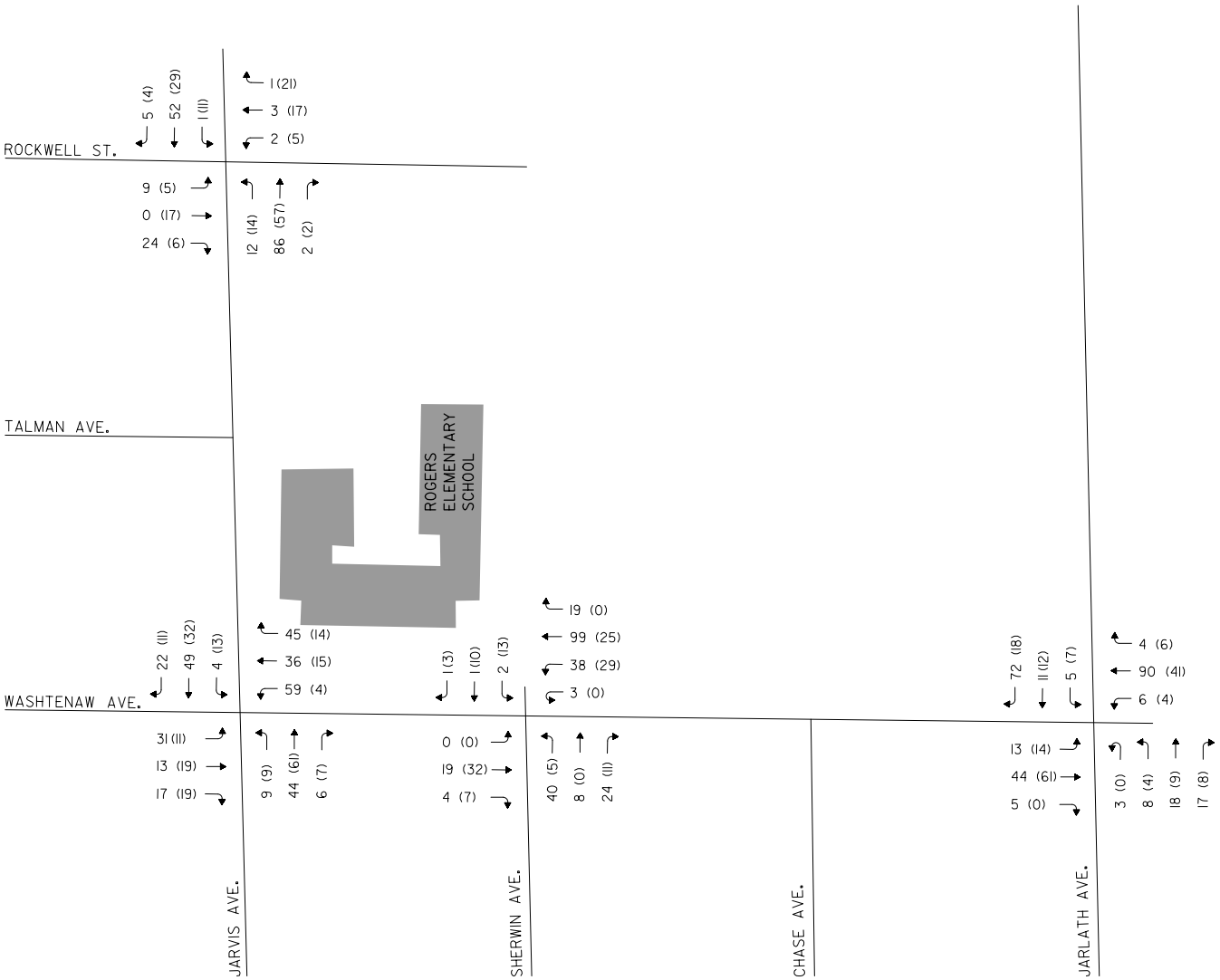
LEGEND
- TRAVEL DIRECTION
- CROSSWALK
- STREET PARKING
- STOP SIGN
- TRAFFIC SIGNAL

Site Location:
Rogers Elementary School Annex
West Ridge
Chicago Public Schools
Chicago, Illinois

Title:
Existing Roadway Characteristics
Figure 3

Primera

NOT TO SCALE



LEGEND

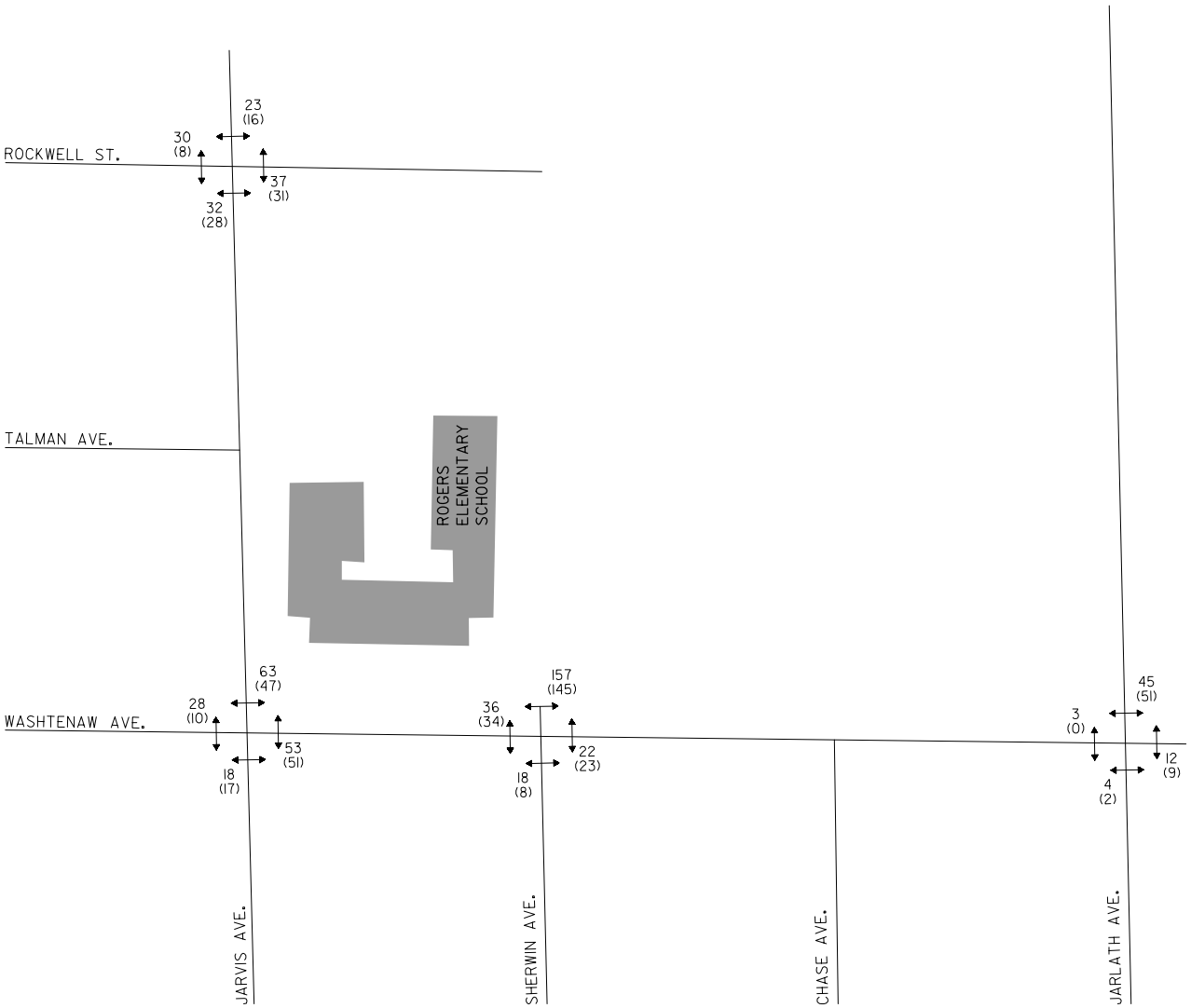
00 - AM PEAK HOUR

(00) - PM PEAK HOUR

Site Location:	Title:
Rogers Elementary School Annex West Ridge Chicago Public Schools Chicago, Illinois	Existing Vehicle Volumes Figure 4

Primera

NOT TO SCALE



LEGEND

00 - AM PEAK HOUR

(00) - PM PEAK HOUR

↔ - CROSSWALK

Site Location:

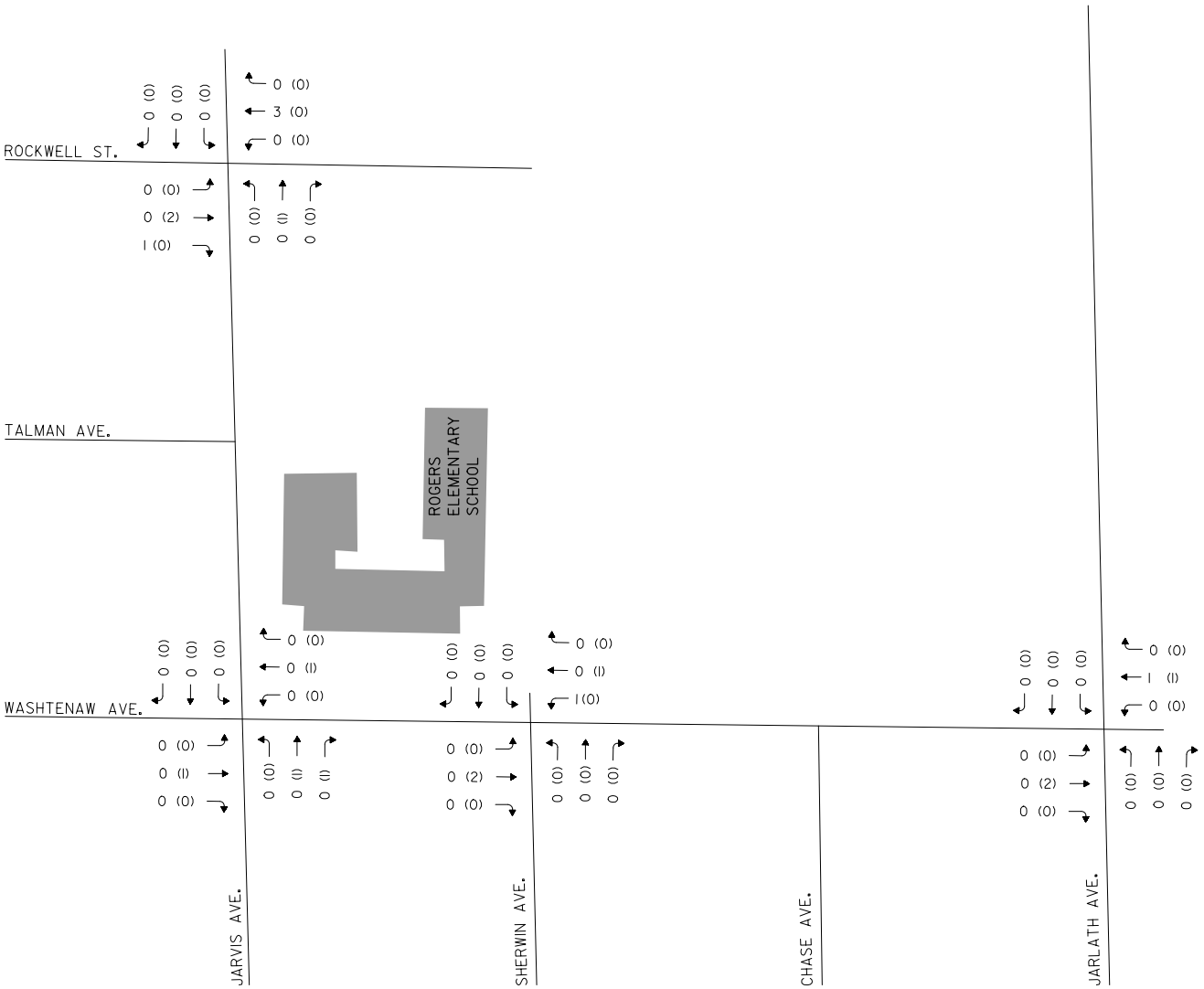
Rogers Elementary School Annex
West Ridge
Chicago Public Schools
Chicago, Illinois

Title:

Existing Pedestrian Volumes
Figure 5

Primera

NOT TO SCALE



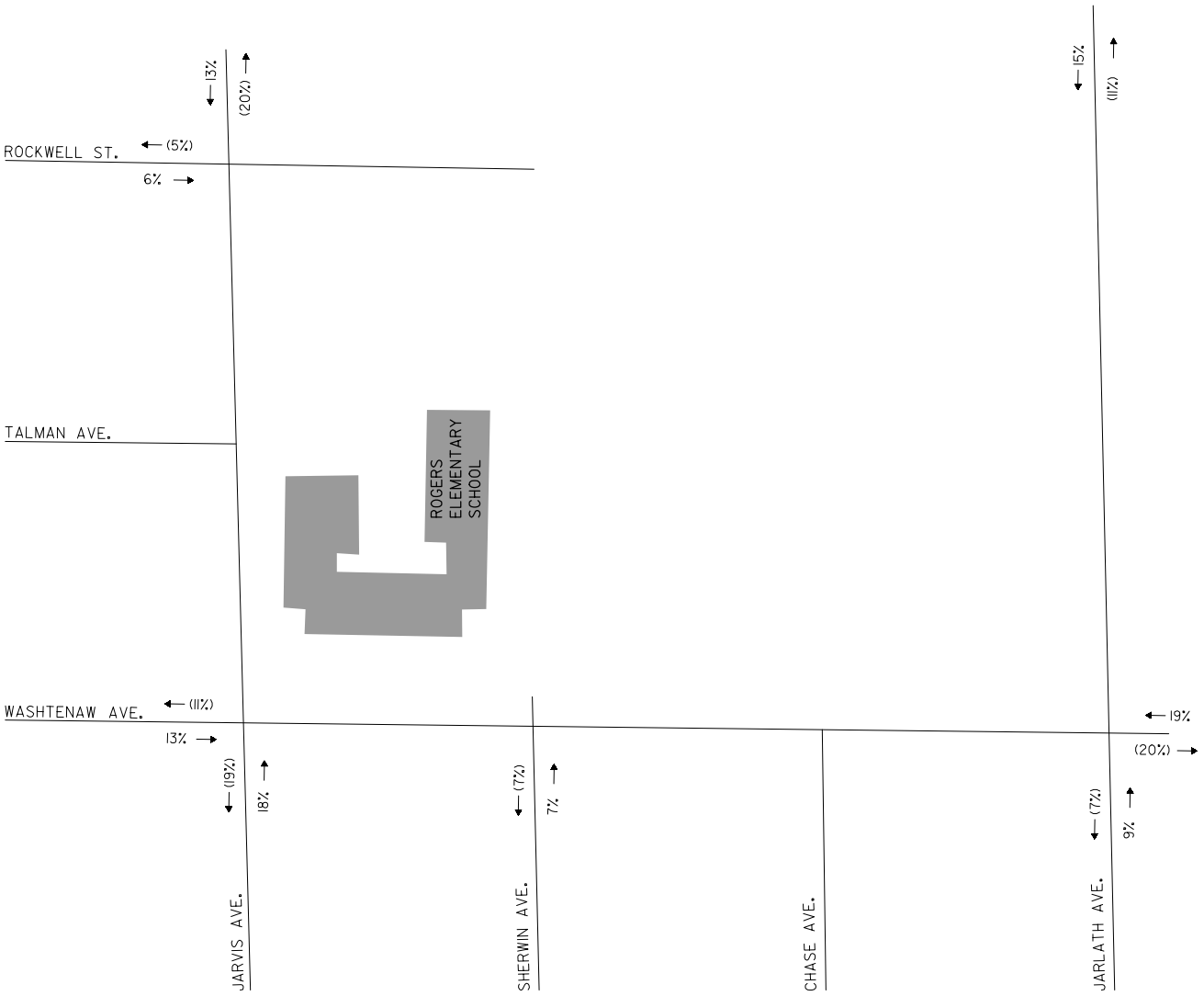
LEGEND

00 - AM PEAK HOUR
(00) - PM PEAK HOUR

Site Location:	Title:
Rogers Elementary School Annex West Ridge Chicago Public Schools Chicago, Illinois	Existing Bicycle Volumes Figure 6

Primera

NOT TO SCALE



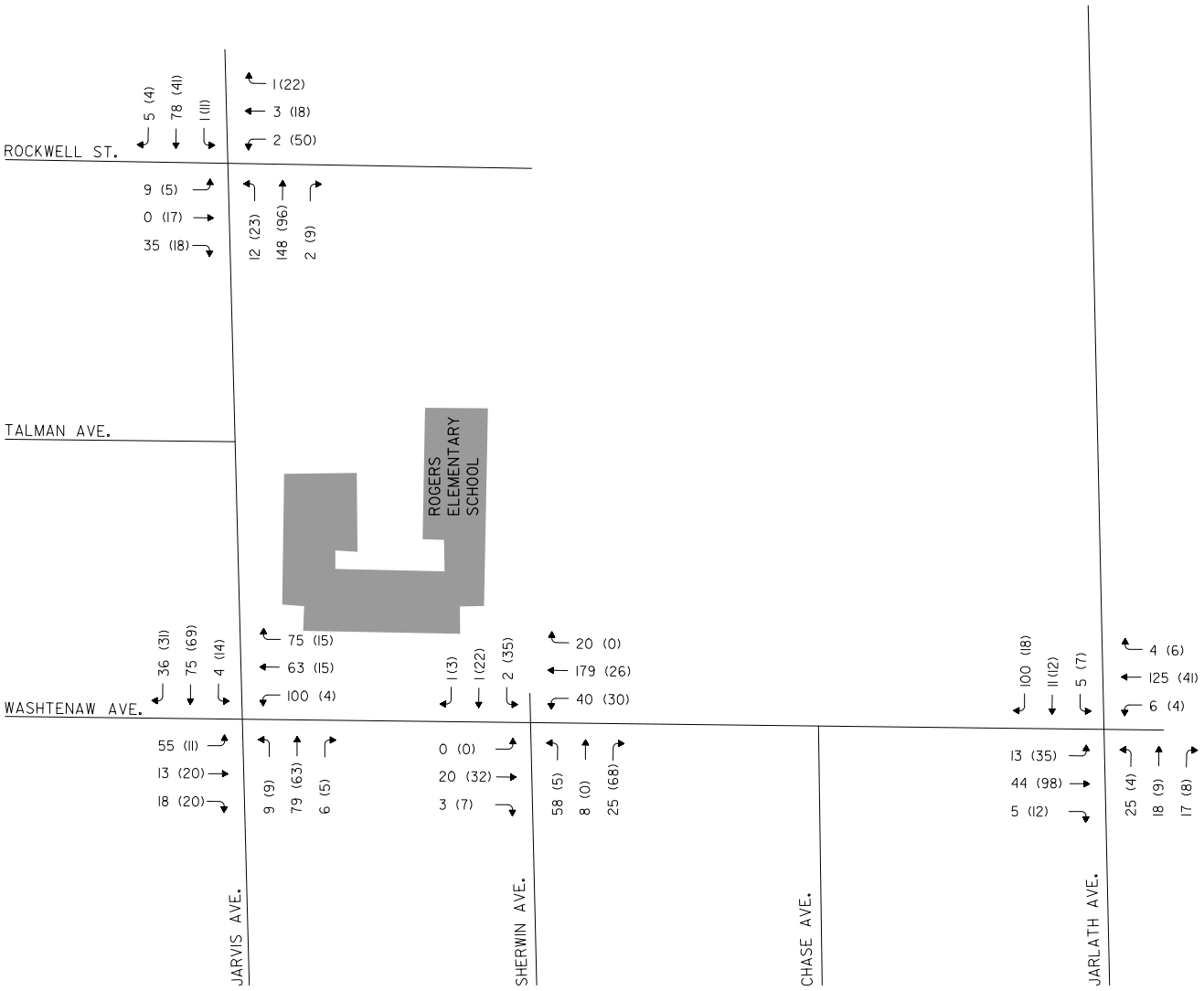
LEGEND

00 % - ENTERING TRAFFIC
(00%) - EXITING TRAFFIC

Site Location:	Title:
Rogers Elementary School Annex West Ridge Chicago Public Schools Chicago, Illinois	Existing Trip Distribution Figure 8

Primera

NOT TO SCALE



LEGEND

00 - AM PEAK HOUR

(00) - PM PEAK HOUR

Site Location:	Title:
Rogers Elementary School Annex West Ridge Chicago Public Schools Chicago, Illinois	Forecasted Vehicle Volumes Figure 9

Appendix A-2 – HCS Output Files

- Morning Peak Hour – 2018 (A-2.1)
- Afternoon Peak Hour – 2018 (A-2.2)
- Morning Peak Hour – 2020 (A-2.3)
- Afternoon Peak Hour – 2020 (A-2.4)

Intersection	
Intersection Delay, s/veh	8.9
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	9	44	6	4	49	22	59	36	45	31	13	17
Future Vol, veh/h	9	44	6	4	49	22	59	36	45	31	13	17
Peak Hour Factor	0.45	0.85	0.33	0.50	0.68	0.42	0.55	0.65	0.63	0.65	0.50	0.53
Heavy Vehicles, %	2	11	2	2	2	2	2	3	7	2	2	2
Mvmt Flow	20	52	18	8	72	52	107	55	71	48	26	32
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8.6	8.7	9.4	8.5
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	42%	15%	5%	51%
Vol Thru, %	26%	75%	65%	21%
Vol Right, %	32%	10%	29%	28%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	140	59	75	61
LT Vol	59	9	4	31
Through Vol	36	44	49	13
RT Vol	45	6	22	17
Lane Flow Rate	234	90	132	106
Geometry Grp	1	1	1	1
Degree of Util (X)	0.292	0.121	0.172	0.137
Departure Headway (Hd)	4.484	4.852	4.666	4.671
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	801	736	767	766
Service Time	2.519	2.899	2.709	2.714
HCM Lane V/C Ratio	0.292	0.122	0.172	0.138
HCM Control Delay	9.4	8.6	8.7	8.5
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	1.2	0.4	0.6	0.5

Intersection	
Intersection Delay, s/veh	9.4
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations													
Traffic Vol, veh/h	40	8	24	2	1	1	3	38	99	19	0	19	4
Future Vol, veh/h	40	8	24	2	1	1	3	38	99	19	0	19	4
Peak Hour Factor	0.45	0.50	0.60	0.50	0.25	0.25	0.56	0.67	0.48	0.38	0.92	0.53	0.50
Heavy Vehicles, %	2	2	2	2	2	2	2	8	4	2	2	2	2
Mvmt Flow	89	16	40	4	4	4	5	57	206	50	0	36	8
Number of Lanes	0	1	0	0	1	0	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8.8	8	10	7.8
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	24%	56%	50%	0%
Vol Thru, %	63%	11%	25%	83%
Vol Right, %	12%	33%	25%	17%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	159	72	4	23
LT Vol	39	40	2	0
Through Vol	101	8	1	19
RT Vol	19	24	1	4
Lane Flow Rate	318	145	12	44
Geometry Grp	1	1	1	1
Degree of Util (X)	0.384	0.188	0.016	0.055
Departure Headway (Hd)	4.339	4.682	4.892	4.553
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	831	766	731	786
Service Time	2.358	2.707	2.926	2.582
HCM Lane V/C Ratio	0.383	0.189	0.016	0.056
HCM Control Delay	10	8.8	8	7.8
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	1.8	0.7	0	0.2

Intersection	
Intersection Delay, s/veh	8.4
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations													
Traffic Vol, veh/h	3	8	18	7	5	11	72	6	90	4	13	44	5
Future Vol, veh/h	3	8	18	7	5	11	72	6	90	4	13	44	5
Peak Hour Factor	0.75	0.67	0.50	0.53	0.42	0.69	0.55	0.50	0.73	0.33	0.65	0.55	0.42
Heavy Vehicles, %	2	2	2	6	2	2	3	17	3	2	2	2	2
Mvmt Flow	4	12	36	13	12	16	131	12	123	12	20	80	12
Number of Lanes	0	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8.1	8.1	9	8.4
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	6%	24%	6%	21%
Vol Thru, %	90%	55%	12%	71%
Vol Right, %	4%	21%	82%	8%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	100	36	88	62
LT Vol	6	9	5	13
Through Vol	90	20	11	44
RT Vol	4	8	72	5
Lane Flow Rate	147	65	159	112
Geometry Grp	1	1	1	1
Degree of Util (X)	0.197	0.084	0.183	0.143
Departure Headway (Hd)	4.799	4.656	4.158	4.599
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	747	769	864	779
Service Time	2.829	2.686	2.183	2.63
HCM Lane V/C Ratio	0.197	0.085	0.184	0.144
HCM Control Delay	9	8.1	8.1	8.4
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.7	0.3	0.7	0.5

Intersection	
Intersection Delay, s/veh	7.8
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	12	86	2	1	52	5	2	3	1	9	0	24
Future Vol, veh/h	12	86	2	1	52	5	2	3	1	9	0	24
Peak Hour Factor	0.60	0.63	0.50	0.25	0.77	0.63	0.25	0.38	0.25	0.45	0.92	0.67
Heavy Vehicles, %	2	9	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	20	137	4	4	68	8	8	8	4	20	0	36
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8.1	7.6	7.6	7.4
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	33%	12%	2%	27%
Vol Thru, %	50%	86%	90%	0%
Vol Right, %	17%	2%	9%	73%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	6	100	58	33
LT Vol	2	12	1	9
Through Vol	3	86	52	0
RT Vol	1	2	5	24
Lane Flow Rate	20	161	79	56
Geometry Grp	1	1	1	1
Degree of Util (X)	0.025	0.185	0.091	0.064
Departure Headway (Hd)	4.49	4.14	4.142	4.103
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	802	860	854	878
Service Time	2.492	2.199	2.22	2.104
HCM Lane V/C Ratio	0.025	0.187	0.093	0.064
HCM Control Delay	7.6	8.1	7.6	7.4
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.1	0.7	0.3	0.2

Intersection	
Intersection Delay, s/veh	8.2
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	9	61	7	13	32	11	4	15	14	11	19	19
Future Vol, veh/h	9	61	7	13	32	11	4	15	14	11	19	19
Peak Hour Factor	0.56	0.69	0.58	0.41	0.57	0.55	0.33	0.58	0.35	0.55	0.68	0.48
Heavy Vehicles, %	11	3	2	2	2	2	25	2	14	2	2	2
Mvmt Flow	16	88	12	32	56	20	12	26	40	20	28	40
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8.4	8.1	8.3	7.9
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	12%	12%	23%	22%
Vol Thru, %	45%	79%	57%	39%
Vol Right, %	42%	9%	20%	39%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	33	77	56	49
LT Vol	4	9	13	11
Through Vol	15	61	32	19
RT Vol	14	7	11	19
Lane Flow Rate	78	117	108	88
Geometry Grp	1	1	1	1
Degree of Util (X)	0.102	0.148	0.131	0.106
Departure Headway (Hd)	4.711	4.562	4.382	4.358
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	762	788	820	824
Service Time	2.732	2.579	2.401	2.378
HCM Lane V/C Ratio	0.102	0.148	0.132	0.107
HCM Control Delay	8.3	8.4	8.1	7.9
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.3	0.5	0.4	0.4

Intersection	
Intersection Delay, s/veh	7.7
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	0	11	13	10	3	29	25	0	0	32	7
Future Vol, veh/h	5	0	11	13	10	3	29	25	0	0	32	7
Peak Hour Factor	0.63	0.92	0.55	0.54	0.50	0.38	0.43	0.48	0.92	0.92	0.78	0.88
Heavy Vehicles, %	2	2	2	2	2	2	2	8	2	2	2	2
Mvmt Flow	8	0	20	24	20	8	67	52	0	0	41	8
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	7.1	7.7	8	7.4
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	54%	31%	50%	0%
Vol Thru, %	46%	0%	38%	82%
Vol Right, %	0%	69%	12%	18%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	54	16	26	39
LT Vol	29	5	13	0
Through Vol	25	0	10	32
RT Vol	0	11	3	7
Lane Flow Rate	120	28	52	49
Geometry Grp	1	1	1	1
Degree of Util (X)	0.14	0.031	0.062	0.055
Departure Headway (Hd)	4.218	4.017	4.278	4.056
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	845	896	824	872
Service Time	2.271	2.017	2.371	2.13
HCM Lane V/C Ratio	0.142	0.031	0.063	0.056
HCM Control Delay	8	7.1	7.7	7.4
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.5	0.1	0.2	0.2

Intersection	
Intersection Delay, s/veh	7.9
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	9	8	7	12	18	4	41	6	14	61	0
Future Vol, veh/h	4	9	8	7	12	18	4	41	6	14	61	0
Peak Hour Factor	0.50	0.56	0.67	0.58	0.50	0.75	0.33	0.47	0.75	0.70	0.49	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	5	2	2	2	2
Mvmt Flow	8	16	12	12	24	24	12	87	8	20	124	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	7.6	7.6	7.9	8.2
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	8%	19%	19%	19%
Vol Thru, %	80%	43%	32%	81%
Vol Right, %	12%	38%	49%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	51	21	37	75
LT Vol	4	4	7	14
Through Vol	41	9	12	61
RT Vol	6	8	18	0
Lane Flow Rate	107	36	60	144
Geometry Grp	1	1	1	1
Degree of Util (X)	0.124	0.044	0.071	0.169
Departure Headway (Hd)	4.156	4.37	4.28	4.22
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	848	824	842	838
Service Time	2.252	2.372	2.282	2.305
HCM Lane V/C Ratio	0.126	0.044	0.071	0.172
HCM Control Delay	7.9	7.6	7.6	8.2
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.4	0.1	0.2	0.6

Intersection	
Intersection Delay, s/veh	8.1
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	14	57	2	11	29	4	5	17	21	5	17	6
Future Vol, veh/h	14	57	2	11	29	4	5	17	21	5	17	6
Peak Hour Factor	0.58	0.84	0.75	0.34	0.60	0.50	0.42	0.27	0.31	0.63	0.33	0.38
Heavy Vehicles, %	2	4	2	2	2	2	2	2	2	20	2	2
Mvmt Flow	24	68	3	32	48	8	12	63	68	8	52	16
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8.2	8.1	8	8.3
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	12%	19%	25%	18%
Vol Thru, %	40%	78%	66%	61%
Vol Right, %	49%	3%	9%	21%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	43	73	44	28
LT Vol	5	14	11	5
Through Vol	17	57	29	17
RT Vol	21	2	4	6
Lane Flow Rate	143	95	89	75
Geometry Grp	1	1	1	1
Degree of Util (X)	0.166	0.12	0.112	0.099
Departure Headway (Hd)	4.184	4.551	4.532	4.73
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	859	789	792	759
Service Time	2.202	2.572	2.553	2.751
HCM Lane V/C Ratio	0.166	0.12	0.112	0.099
HCM Control Delay	8	8.2	8.1	8.3
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.6	0.4	0.4	0.3

Intersection	
Intersection Delay, s/veh	12.1
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	9	79	6	4	75	36	100	63	75	55	13	18
Future Vol, veh/h	9	79	6	4	75	36	100	63	75	55	13	18
Peak Hour Factor	0.45	0.85	0.33	0.50	0.68	0.42	0.55	0.65	0.63	0.65	0.50	0.53
Heavy Vehicles, %	2	11	2	2	2	2	2	3	7	2	2	2
Mvmt Flow	20	93	18	8	110	86	182	97	119	85	26	34
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	10.2	10.8	14.1	10.1
HCM LOS	B	B	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	42%	10%	3%	64%
Vol Thru, %	26%	84%	65%	15%
Vol Right, %	32%	6%	31%	21%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	238	94	115	86
LT Vol	100	9	4	55
Through Vol	63	79	75	13
RT Vol	75	6	36	18
Lane Flow Rate	398	131	204	145
Geometry Grp	1	1	1	1
Degree of Util (X)	0.553	0.207	0.306	0.22
Departure Headway (Hd)	5.006	5.696	5.408	5.477
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	720	629	663	655
Service Time	3.036	3.74	3.448	3.516
HCM Lane V/C Ratio	0.553	0.208	0.308	0.221
HCM Control Delay	14.1	10.2	10.8	10.1
HCM Lane LOS	B	B	B	B
HCM 95th-tile Q	3.4	0.8	1.3	0.8

Intersection	
Intersection Delay, s/veh	13.2
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	58	8	25	2	1	1	40	179	20	0	20	3
Future Vol, veh/h	58	8	25	2	1	1	40	179	20	0	20	3
Peak Hour Factor	0.45	0.50	0.60	0.50	0.25	0.25	0.67	0.48	0.38	0.92	0.53	0.50
Heavy Vehicles, %	2	2	2	2	2	2	8	4	2	2	2	2
Mvmt Flow	129	16	42	4	4	4	60	373	53	0	38	6
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	10.1	8.6	14.9	8.3
HCM LOS	B	A	B	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	17%	64%	50%	0%
Vol Thru, %	75%	9%	25%	87%
Vol Right, %	8%	27%	25%	13%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	239	91	4	23
LT Vol	40	58	2	0
Through Vol	179	8	1	20
RT Vol	20	25	1	3
Lane Flow Rate	485	187	12	44
Geometry Grp	1	1	1	1
Degree of Util (X)	0.619	0.268	0.018	0.06
Departure Headway (Hd)	4.594	5.165	5.42	4.941
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	786	692	655	719
Service Time	2.635	3.223	3.501	3.008
HCM Lane V/C Ratio	0.617	0.27	0.018	0.061
HCM Control Delay	14.9	10.1	8.6	8.3
HCM Lane LOS	B	B	A	A
HCM 95th-tile Q	4.4	1.1	0.1	0.2

Intersection	
Intersection Delay, s/veh	9.2
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	25	18	17	5	11	100	6	125	4	13	44	5
Future Vol, veh/h	25	18	17	5	11	100	6	125	4	13	44	5
Peak Hour Factor	0.67	0.50	0.53	0.42	0.69	0.55	0.50	0.73	0.33	0.65	0.55	0.42
Heavy Vehicles, %	2	2	6	2	2	3	17	3	2	2	2	2
Mvmt Flow	37	36	32	12	16	182	12	171	12	20	80	12
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8.7	8.8	10	8.8
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	4%	42%	4%	21%
Vol Thru, %	93%	30%	9%	71%
Vol Right, %	3%	28%	86%	8%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	135	60	116	62
LT Vol	6	25	5	13
Through Vol	125	18	11	44
RT Vol	4	17	100	5
Lane Flow Rate	195	105	210	112
Geometry Grp	1	1	1	1
Degree of Util (X)	0.273	0.142	0.252	0.152
Departure Headway (Hd)	5.029	4.86	4.328	4.895
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	711	734	826	727
Service Time	3.088	2.918	2.376	2.959
HCM Lane V/C Ratio	0.274	0.143	0.254	0.154
HCM Control Delay	10	8.7	8.8	8.8
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	1.1	0.5	1	0.5

Intersection	
Intersection Delay, s/veh	8.7
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	22	148	2	1	78	5	2	3	1	9	0	35
Future Vol, veh/h	22	148	2	1	78	5	2	3	1	9	0	35
Peak Hour Factor	0.60	0.63	0.50	0.25	0.77	0.63	0.25	0.38	0.25	0.45	0.92	0.67
Heavy Vehicles, %	2	9	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	37	235	4	4	101	8	8	8	4	20	0	52
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	9.3	8.1	8	7.8
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	33%	13%	1%	20%
Vol Thru, %	50%	86%	93%	0%
Vol Right, %	17%	1%	6%	80%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	6	172	84	44
LT Vol	2	22	1	9
Through Vol	3	148	78	0
RT Vol	1	2	5	35
Lane Flow Rate	20	276	113	72
Geometry Grp	1	1	1	1
Degree of Util (X)	0.027	0.322	0.138	0.088
Departure Headway (Hd)	4.855	4.2	4.399	4.386
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	740	841	819	821
Service Time	2.866	2.299	2.409	2.394
HCM Lane V/C Ratio	0.027	0.328	0.138	0.088
HCM Control Delay	8	9.3	8.1	7.8
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.1	1.4	0.5	0.3

Intersection	
Intersection Delay, s/veh	8.7
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	9	63	5	14	69	31	4	15	15	11	20	20
Future Vol, veh/h	9	63	5	14	69	31	4	15	15	11	20	20
Peak Hour Factor	0.56	0.69	0.58	0.41	0.57	0.55	0.33	0.58	0.35	0.55	0.68	0.48
Heavy Vehicles, %	11	3	2	2	2	2	25	2	14	2	2	2
Mvmt Flow	16	91	9	34	121	56	12	26	43	20	29	42
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8.6	8.9	8.6	8.2
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	12%	12%	12%	22%
Vol Thru, %	44%	82%	61%	39%
Vol Right, %	44%	6%	27%	39%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	34	77	114	51
LT Vol	4	9	14	11
Through Vol	15	63	69	20
RT Vol	15	5	31	20
Lane Flow Rate	81	116	212	91
Geometry Grp	1	1	1	1
Degree of Util (X)	0.111	0.152	0.256	0.116
Departure Headway (Hd)	4.944	4.721	4.349	4.594
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	724	760	827	779
Service Time	2.98	2.75	2.374	2.63
HCM Lane V/C Ratio	0.112	0.153	0.256	0.117
HCM Control Delay	8.6	8.6	8.9	8.2
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.4	0.5	1	0.4

Intersection	
Intersection Delay, s/veh	8.1
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	0	68	35	22	3	30	26	0	0	32	7
Future Vol, veh/h	5	0	68	35	22	3	30	26	0	0	32	7
Peak Hour Factor	0.63	0.92	0.55	0.54	0.50	0.38	0.43	0.48	0.92	0.92	0.78	0.88
Heavy Vehicles, %	2	2	2	2	2	2	2	8	2	2	2	2
Mvmt Flow	8	0	124	65	44	8	70	54	0	0	41	8
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	7.6	8.4	8.5	7.8
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	54%	7%	58%	0%
Vol Thru, %	46%	0%	37%	82%
Vol Right, %	0%	93%	5%	18%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	56	73	60	39
LT Vol	30	5	35	0
Through Vol	26	0	22	32
RT Vol	0	68	3	7
Lane Flow Rate	124	132	117	49
Geometry Grp	1	1	1	1
Degree of Util (X)	0.16	0.144	0.148	0.061
Departure Headway (Hd)	4.636	3.933	4.563	4.514
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	775	913	788	793
Service Time	2.659	1.951	2.583	2.54
HCM Lane V/C Ratio	0.16	0.145	0.148	0.062
HCM Control Delay	8.5	7.6	8.4	7.8
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.6	0.5	0.5	0.2

Intersection	
Intersection Delay, s/veh	8.7
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	9	8	7	12	18	4	41	6	35	98	12
Future Vol, veh/h	4	9	8	7	12	18	4	41	6	35	98	12
Peak Hour Factor	0.50	0.56	0.67	0.58	0.50	0.75	0.33	0.47	0.75	0.70	0.49	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	5	2	2	2	2
Mvmt Flow	8	16	12	12	24	24	12	87	8	50	200	13
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	7.9	7.9	8	9.2
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	8%	19%	19%	24%
Vol Thru, %	80%	43%	32%	68%
Vol Right, %	12%	38%	49%	8%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	51	21	37	145
LT Vol	4	4	7	35
Through Vol	41	9	12	98
RT Vol	6	8	18	12
Lane Flow Rate	107	36	60	263
Geometry Grp	1	1	1	1
Degree of Util (X)	0.13	0.046	0.076	0.313
Departure Headway (Hd)	4.374	4.638	4.545	4.285
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	821	772	789	844
Service Time	2.394	2.663	2.567	2.285
HCM Lane V/C Ratio	0.13	0.047	0.076	0.312
HCM Control Delay	8	7.9	7.9	9.2
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.4	0.1	0.2	1.3

Intersection	
Intersection Delay, s/veh	9.6
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	23	96	9	11	41	4	50	18	22	5	17	18
Future Vol, veh/h	23	96	9	11	41	4	50	18	22	5	17	18
Peak Hour Factor	0.58	0.84	0.75	0.34	0.60	0.50	0.42	0.27	0.31	0.63	0.33	0.38
Heavy Vehicles, %	2	4	2	2	2	2	2	2	2	20	2	2
Mvmt Flow	40	114	12	32	68	8	119	67	71	8	52	47
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	9.5	9	10.2	8.9
HCM LOS	A	A	B	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	56%	18%	20%	12%
Vol Thru, %	20%	75%	73%	43%
Vol Right, %	24%	7%	7%	45%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	90	128	56	40
LT Vol	50	23	11	5
Through Vol	18	96	41	17
RT Vol	22	9	4	18
Lane Flow Rate	257	166	109	107
Geometry Grp	1	1	1	1
Degree of Util (X)	0.336	0.228	0.152	0.148
Departure Headway (Hd)	4.717	4.946	5.026	4.996
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	757	722	709	712
Service Time	2.772	3.008	3.094	3.063
HCM Lane V/C Ratio	0.339	0.23	0.154	0.15
HCM Control Delay	10.2	9.5	9	8.9
HCM Lane LOS	B	A	A	A
HCM 95th-tile Q	1.5	0.9	0.5	0.5