LOYOLA ACADEMY PROPOSED PARKING LOTS

Traffic and Parking Study

Wilmette, Illinois

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Prepared for:

Loyola Academy

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1. INTRODUCTION

Loyola Academy is located on the east side of Laramie Avenue between Illinois Road and Lake Avenue in Wilmette, Illinois. The school is currently served by 627 on-site parking spaces and currently proposes the construction of two surface parking lots on school-owned parcels on the west side of Laramie Avenue at Thornwood Avenue. These parking lots would increase the Loyola Academy parking supply to 760 spaces. At the Village's request, Kimley-Horn has evaluated existing and future parking utilization on the Loyola Academy site and has also reviewed the area roadway network with regard to vehicular operation, pedestrian accommodations, and transit service. An aerial view of the study area is presented in **Exhibit 1**.

This report presents and documents Kimley-Horn's data collection and field observations of traffic, pedestrian, parking, and transit conditions in the surrounding area. The anticipated effect of the proposed project on these items is detailed, and recommendations to promote safe and efficient transportation conditions within the study area are identified.

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EXHIBIT 1
SITE LOCATION MAP

2. EXISTING CONDITIONS

Kimley-Horn conducted a field visit to collect relevant information pertaining to existing land uses in the surrounding area, the adjacent street system, current traffic volumes and operating conditions, lane configurations and traffic controls at nearby intersections, and other key roadway characteristics. This section of the report details information on these existing conditions.

2.1. Loyola Academy and Surrounding Land Uses

The Loyola Academy site is bound by Laramie Avenue on the west, Illinois Road on the north, Lake Avenue on the south, and Interstate 94 on the east. With approximately 2,000 students, Loyola Academy is currently operating at the maximum enrollment allowed by Village of Wilmette ordinance. No increase in enrollment is allowed without separate approval by the Village and, based on information provided by school officials, no increase in the student enrollment is planned. The school day begins at 7:45AM and ends at 3:00PM; faculty and staff are contractually obligated to arrive before 7:30AM and leave after 3:30PM. Some students may arrive later than 7:45AM or leave earlier than 3:30PM if they have a free period at the beginning or end of the school day.

The school is served by 627 parking spaces, including 10 handicap-accessible spaces and 30 spaces reserved for visitors, volunteers, and specific user groups. Student parking is allowed at the school on a permit-only basis. The school distributes 382 student parking permits to seniors only, using a lottery system. Access to Loyola Academy is currently provided via four access driveways on Laramie Avenue (including one outbound-only driveway (Access 3) and one driveway with outbound movements restricted to left turns only (Access 4) and two access driveways on Illinois Road. For the purpose of this study, the Laramie Avenue access driveways are numbered Access 1 through Access 4 from north to south.

Residential neighborhoods are located to the immediate north and west of the school. To the south, Lake Avenue frontage is occupied by a variety of commercial uses to the immediate west of Laramie Avenue, including an auto service center, Dairy Queen, a gas station, an office building with neighborhood ground-floor retail, and a Starbucks coffee shop. Additional retail and restaurant uses are also located nearby in the Edens Plaza shopping center, located on the east side of I-94 directly opposite Loyola Academy and accessible via both Lake Avenue and Skokie Boulevard. Beyond these commercial uses, the rest of the area is largely residential and recreational in nature.

2.2. Roadway Network

A field investigation was conducted within the study area and along the study segments of Laramie Avenue, Lake Avenue, Illinois Road, Thornwood Avenue, Greenwood Avenue, and Elmwood Avenue. Based on this approach and other information observed in the field, the following information was obtained about the existing roadway network.

Laramie Avenue is a north-south roadway that runs along the western edge of the Loyola Academy site. Throughout the study area, Laramie Avenue provides one travel lane in each direction and a center lane for left-turns. At its signalized intersection with Lake Avenue, Laramie Avenue provides a

dedicated left-turn lane, a shared through/right-turn lane, and a single receiving lane on the north and south approaches. Laramie Avenue meets Illinois Road at a T-intersection that operates under all-way stop control. At Illinois Road, Laramie Avenue provides separate left- and right-turn lanes for northbound traffic and a single receiving lane for southbound traffic. A 30 MPH speed limit is posted on Laramie Avenue, along with a 20 MPH School Zone speed limit in the southbound direction. Laramie Avenue is under the jurisdiction of the Village of Wilmette.

Lake Avenue is a four-lane, east-west roadway that runs along the southern edge of the Loyola Academy site. At its signalized intersection with Laramie Avenue, Lake Avenue provides a dedicated left-turn lane and two through lanes (with shared right-turn movement) on the west leg, while the east leg provides a dedicated left-turn lane, two through lanes, and an exclusive right-turn lane. Approximately 300 feet east of Laramie Avenue, Lake Avenue meets I-94 and provides access to/from the south via four directional ramps. A 35 MPH speed limit is posted within the study area. Lake Avenue is under the jurisdiction of the Cook County Department of Transportation and Highways (CCDOTH).

Illinois Road is a two-lane, east-west roadway located immediately north of the Loyola Academy site. At its all-way stop-controlled intersection with Laramie Avenue, Illinois Road provides a shared left-turn/through lane and a single receiving lane on the east leg. On the west leg, a shared through/right-turn lane and a single receiving lane is provided. A 30 MPH speed limit is posted in the vicinity. Illinois Road is under CCDOTH jurisdiction.

Thornwood Avenue, Greenwood Avenue, and Elmwood Avenue are east-west local roadways that extend west from Laramie Avenue near the Loyola Academy site and end at Manor Drive. All three roadways are bidirectional with a single travel lane in each direction. On-street parking is generally permitted on these roadways for vehicles with a residential parking permit. A 25 MPH speed limit is posted on Thornwood Avenue, Greenwood Avenue, and Elmwood Avenue. These roadways are under the jurisdiction of the Village of Wilmette.

2.3. Pedestrian Accommodations

The Laramie Avenue corridor currently includes sidewalks on the east and west sides extending from Illinois Road to south of Lake Avenue. Lake Avenue also provides sidewalks on both sides within the study area. Pedestrian crosswalks are provided on all legs of the Laramie Avenue/Illinois Road and Lake Avenue/Laramie Avenue intersections with pedestrian signal heads provided at Lake/Laramie. These pedestrian phases at Lake/Laramie are triggered manually via push buttons.

Marked crosswalks are provided on the west leg of every intersection on Laramie Avenue between Illinois Road and Lake Avenue, including Thornwood Avenue, Greenwood Avenue, and Elmwood Avenue. Across Laramie Avenue itself, a single mid-block crosswalk is striped immediately south of Access 2 (between Thornwood Avenue and Greenwood Avenue). This crosswalk uses continental-style (high-visibility) striping and connects the school to a Pace Bus shelter on the west side of the street.

2.4. Transit Service

The study area is serviced by three Pace Suburban Bus routes, as detailed below:

- Route 421: Weekday service along Laramie Avenue, including specific stops at Loyola Academy during the school arrival and dismissal peak periods.
- Route 422: Weekday service to Loyola Academy during school arrival and dismissal peaks only.
- Route 423: Weekday service to Loyola Academy during school arrival and dismissal peaks only.

These bus routes connect Loyola Academy to the Linden CTA Station (Purple Line service to/from Chicago), the Harlem CTA Station (Blue Line service to/from Chicago), and Metra service along the Union Pacific North Line (Wilmette and Winnetka Stations) and Milwaukee District North Line (Glenview Station), as well as providing service to the communities of Wilmette, Winnetka, Northfield, Northbrook, Glenview, Morton Grove, Niles, Skokie, Evanston, and Chicago.

3. DATA COLLECTION & OBSERVATIONS

In order to document existing transportation conditions within the study area, Kimley-Horn performed traffic and parking counts, observed during the school arrival and dismissal periods, and coordinated with appropriate agencies. Details of these data collection efforts are provided in the following sections.

3.1. Traffic Count Data Collection

In order to determine current traffic activity within the study area, turning movement count data was collected on Wednesday, December 9, 2015, at the following locations:

- Laramie Avenue/Illinois Road
- Laramie Avenue/Access 1
- Laramie Avenue/Thornwood Avenue
- Laramie Avenue/Access 2
- Laramie Avenue/Greenwood Avenue/Access 3
- Laramie Avenue/Elmwood Avenue/Access 4
- Lake Avenue/Laramie Avenue

The traffic counts were performed during the school arrival (6:00-8:00 AM) and dismissal (2:00-4:00 PM) periods in order to capture peak traffic volume at Loyola Academy. The resulting traffic counts indicate that the heaviest traveled hours occur from 7:00-8:00AM in the morning and from 3:00-4:00PM during dismissal. Existing peak hour vehicle traffic volumes during these two hours are presented in **Exhibit 2**.

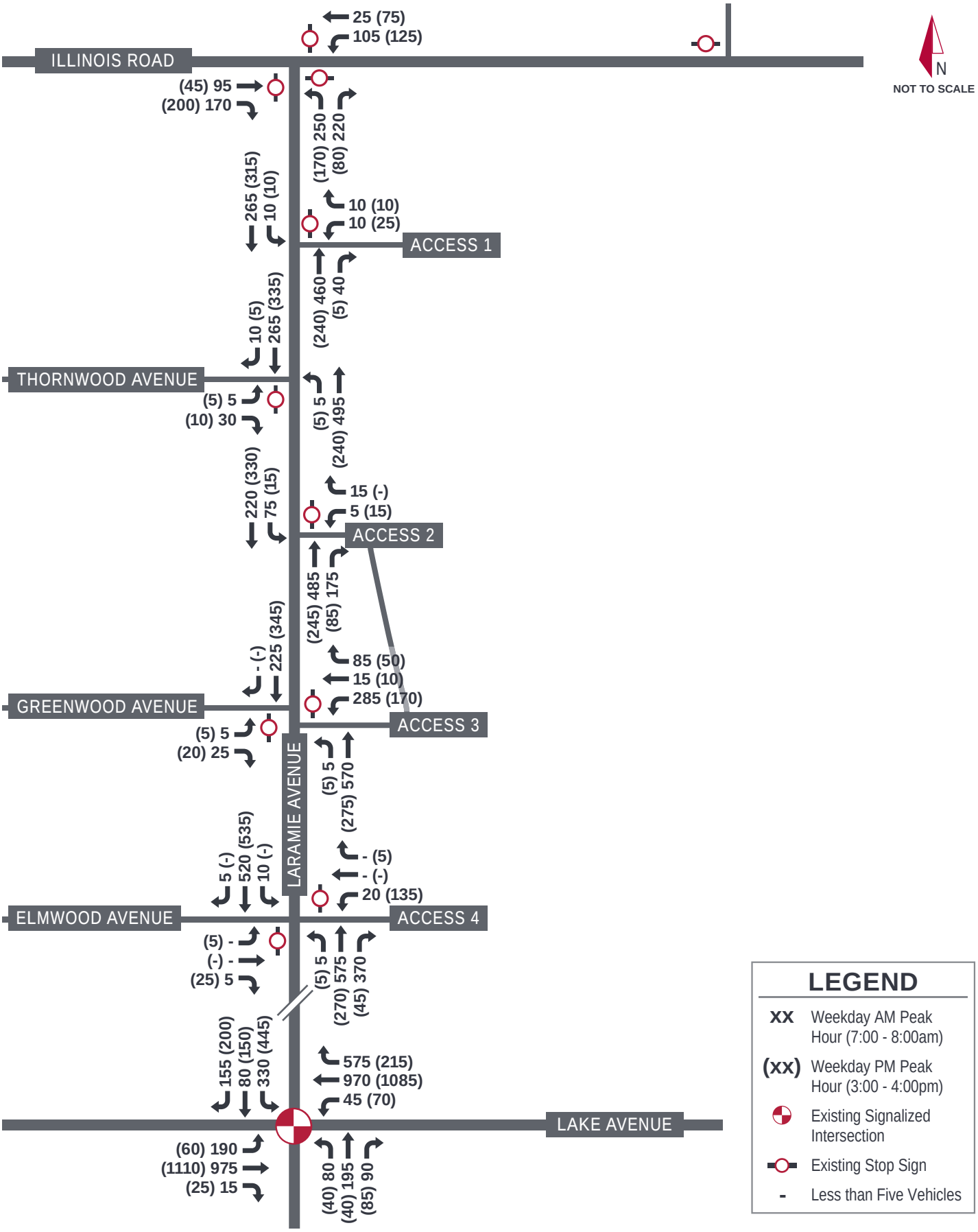

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EXHIBIT 2

EXISTING TRAFFIC VOLUMES

A review of the peak hour traffic volumes reveal several key details about travel patterns for Loyola-related vehicles and about the area roadway network. Of the traffic entering the Laramie Avenue corridor (Laramie Avenue between Illinois Road on the north and Lake Avenue on the south) during the morning arrival peak hour, 55 percent is entering the Loyola site. During the dismissal peak hour, 40 percent of the traffic exiting the Laramie Avenue corridor comes from the Loyola site. Also, a large majority of the traffic generated by Loyola Academy is oriented to/from that south. It can be assumed that a large portion of these vehicles are traveling to/from I-94 and other locations east of the school, as demonstrated by the heavy westbound right-turn at Lake/Laramie in the morning and the heavy southbound left-turn volume during school dismissal.

Traffic volumes turning onto and off Thornwood Avenue, Greenwood Avenue, and Elmwood Avenue at Laramie Avenue are relatively low, and the predominant movement on these roadways is the eastbound right turn to southbound Laramie Avenue. During the morning peak hour, these may consist of residents who are leaving home to travel to work and parents dropping off students. During the school dismissal peak hour, many of these trips may be student vehicles departing their parking space leased from an area resident (as will be addressed further in the *Parking Demand Survey* discussion) or parents picking up students off site. A small number of vehicles can be noted exiting Loyola Academy and traveling westbound from Access 3 onto Greenwood Avenue (roughly 15 vehicles in the morning and 10 vehicle during school dismissal). Only one vehicle was observed performing a similar movement from Access 4 onto Elmwood Avenue during each peak hour. The number of vehicles documented turning onto these local streets from Laramie Avenue range from 5 to 15 per roadway during each peak hour.

3.2. Parking Demand Survey

On Wednesday, December 9, 2015, Kimley-Horn documented the number of vehicles parked on site at two key times of day: after the first bell (approximately 8:00-9:00AM) and immediately before school dismissal (roughly 2:00-3:00PM). The results of this parking demand survey are presented in **Table 1**, and an illustration of the existing school parking supply is provided on **Exhibit 3**. It is important to note that the vehicle counts summarized below correspond to the parking lot in which each vehicle was counted and may not necessarily match the user type of the driver. For example, the shortage of staff parking on site may result in some staff vehicles overflowing into the student parking lot.

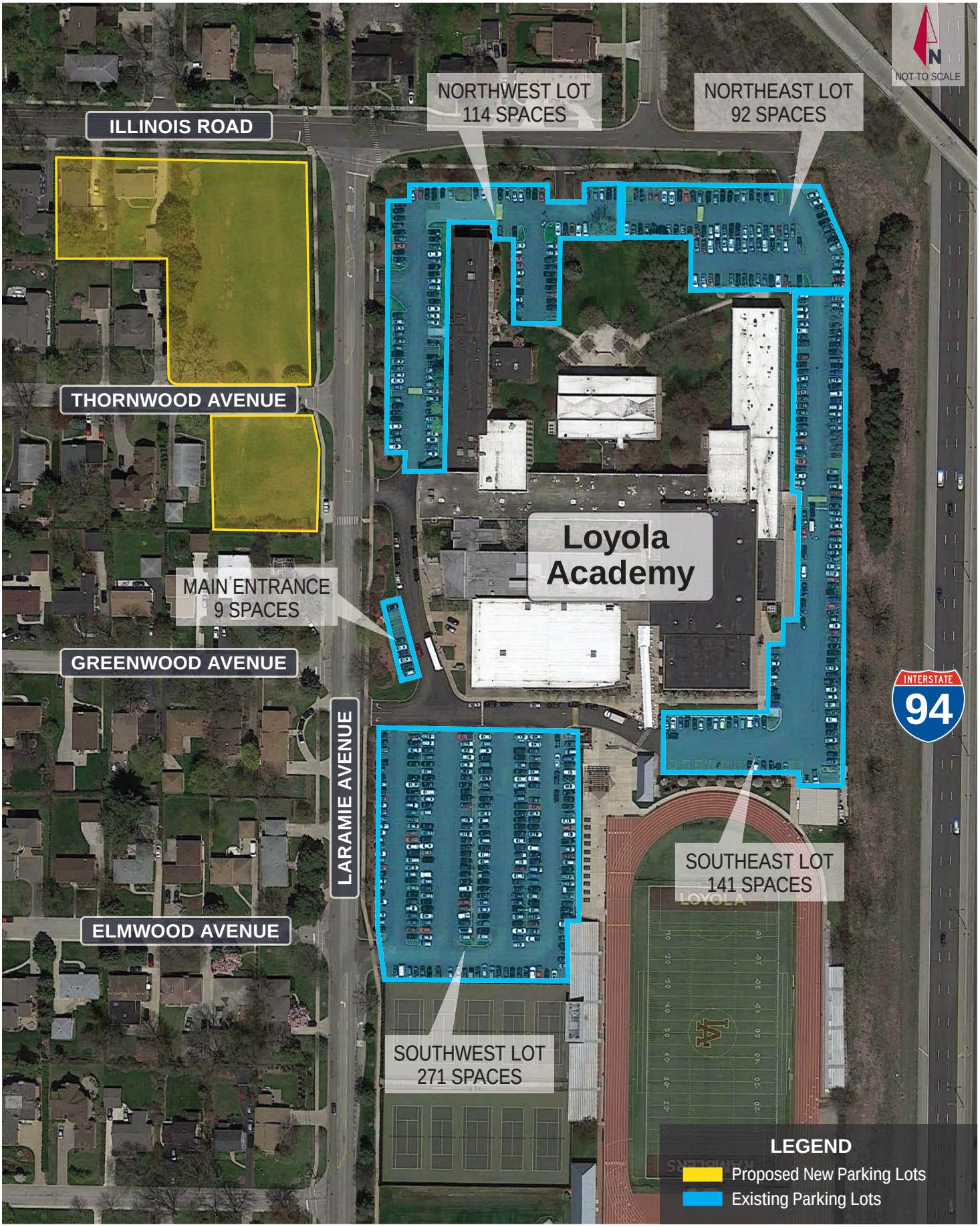

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EXHIBIT 3

LOYOLA ACADEMY PARKING SUPPLY

Table 1. Existing On-Site Parking Demand

Parking Space Designation	Location	Number of Spaces Provided	After First Bell (8:00AM Circuit)		Before Dismissal (2:00PM Circuit)	
			Number of Parked Vehicles	Occupancy	Number of Parked Vehicles	Occupancy
Staff	Northwest Lot	109	115	106%	115	106%
	Southeast Lot	115	117	102%	105	91%
	Subtotal	224	232	104%	220	98%
Student	Northeast Lot	92	93	101%	93	101%
	Southwest Lot	271	253	93%	280	103%
	Subtotal	363	346	95%	373	103%
Handicap-Accessible	Southeast Lot	7	1	14%	2	29%
	Main Entrance	3	1	33%	3	100%
	Subtotal	10	2	20%	5	50%
Reserved[1]	Northwest Lot	5	2	40%	5	100%
	Southeast Lot	19	20	105%	18	95%
	Subtotal	24	22	92%	23	96%
Volunteer	Main Entrance	6	6	100%	6	100%
Total		627	608	97%	627	100%

[1]The Loyola Academy parking supply includes parking spaces reserved for specific user groups, including Jesuits, maintenance staff, security staff, food service staff, and selected administrative positions.

As shown above, the existing on-site parking supply was heavily utilized immediately following the start of school and immediately prior to dismissal during the two time periods surveyed. Nearly all types of on-site parking are shown over 90 percent occupancy, and several categories are above 100 percent occupancy. In these instances when the parking demand exceeded the available supply, vehicles were observed parking in unmarked locations, such as the end of parking aisles or along the curb in areas not designated for parking. Some vehicles were also seen parked within drive aisles in a manner that blocked vehicles into marked parking spaces.

In addition to the parking demand documented above, it is Kimley-Horn's understanding that Loyola Academy has parent volunteers and other types of midday visitors arriving and departing in the middle of the day to participate in various activities.

Because of this midday schedule, which varies from day to day, volunteers' vehicles were not captured in the parking demand surveys documented in Table 1. A selected list of these activities is provided below in **Table 2**, along with each activity's relative frequency and the estimated parking demand for each.

Table 2. Estimated Parking Demand for Various Midday School Activities at Loyola Academy

Event/Club Name	Event/Meeting Frequency	Estimated Additional Parking Demand
Meetings and Events that Generate Parking Demand during a Specific Period		
Mothers' Club	8 meetings annually	70 vehicles
The Ramble Fundraising Event	Daily from February 1st until the first Saturday in May	30 vehicles
Women of Wisdom Speaker Series	6-8 meetings annually	70 vehicles
St. Nicholas Mass and Breakfast	Annually on one day in the first week of December	200 vehicles
Monthly All-School Mass	Once per month	10 vehicles
Daily Mass	Daily	5-7 vehicles
Meetings and Events that Generate Parking Demand throughout the Day		
Junior Parent College Counseling	Daily	12 vehicles
Athletic Dept. Office – Visits from Outside Coaches and College Recruiters	Daily	8-10 vehicles
Business Office – Visits from Outside Vendors and Parents	Daily	5 vehicles
Dean's Office – Visits from Parents	Daily	2-3 vehicles
Principal's Office – Visits from Outside Vendors and Parents	Daily	5-10 vehicles
President's Office – Various Visitors	Daily	5-10 vehicles

With the school parking supply at or near full occupancy at the start and end of the school day, volunteers and visitors related to the above activities have very limited options available for parking on site. As a result, vehicles arriving in the middle of the school day often park in the drive aisles (blocking in other parked cars) or along curbs that are not designated for parking. Thus, with the additional parking demand resulting from midday visitors, the parking utilization exceeds 100 percent of the parking supply on site.

Image 1 Vehicles park in a drive aisle in the southwest parking lot, blocking in vehicles that park in marked spaces

Image 2 Vehicles park along the curb at the northwest building entrance, an area not designated for parking

Image 3 Vehicles park in another drive aisle and block cars in spaces within the southwest parking lot

Image 4 Vehicles park along the curb in the northeast portion of the school in an area not designated for parking

In addition to the on-site parking demand documented as a part of this study, some Loyola students park at a number of proximate off-site locations under agreements that students individually make with nearby property owners. Loyola Academy is not party to these agreements and therefore cannot control the number of spaces available off site or the number of vehicles occupying these spaces. Because Loyola Academy has indicated that no new student parking permits will be issued after the proposed parking lots are completed (as will be addressed in greater detail in *Section 4. Proposed Parking Lot Plan*), this project is not expected to change the number of vehicles that park off site.

3.3. Peak Period Observations

Kimley-Horn was on site during the school arrival and dismissal peaks to observe traffic circulation and congestion, pick-up/drop-off behaviors, pedestrian activity, transit routing, and parking utilization. Observations were focused along Laramie Avenue and at the Laramie Avenue access driveways, but

also included the school's main entrance pick-up/drop-off area, the Lake Avenue/Laramie Avenue intersection, and Illinois Road. Key findings of these observations are summarized below:

Traffic Operation and Pick-up/Drop-off Behavior

Peak congestion on the Laramie Avenue corridor was observed from approximately 7:20-8:00AM during the school arrival period and from approximately 3:00-3:40PM during the school dismissal period. Concentrated congestion lasting for 20 to 30 minutes is common at schools, since the majority of users are arriving and departing at the same time. It should be noted that the Laramie Avenue corridor not only provides direct access to Loyola Academy, but is also a primary route for the New Trier High School Northfield Campus, located less than one mile to the northwest. While Kimley-Horn's observations were focused on the access driveways and traffic circulation for Loyola Academy, some of the background traffic volume observed within the study area is related to the nearby New Trier campus.

As noted previously, a significant portion of Loyola Academy-related vehicles are traveling to/from the south via Laramie Avenue and ultimately via I-94 and other locations east of school. This predominant travel pattern resulted in significant queues that were seen on northbound Laramie Avenue and extend onto westbound Lake Avenue during portions of the morning peak hour. The close proximity of the I-94 interchange on Lake Avenue further complicates the congestion at this location, since the tight spacing between the intersection and interchange ramps restricts the length of the westbound right-turn lane on Lake Avenue at Laramie Avenue. The short storage length provided for this turn lane can result in queue starvation during periods when heavy westbound commuter traffic is present, further exacerbating delay on westbound Lake Avenue. Because some students are dropped off at school, there was also a notable southbound queue of departing parents' vehicles on Laramie Avenue that extended as far as the Loyola Academy tennis courts and was observed from approximately 7:30-7:45AM.

Image 5 Looking east at traffic exiting Access 3 before school (7:26 AM)

Image 6 Looking north along Laramie Avenue from Elmwood Avenue before school (7:40 AM)

During school dismissal, Kimley-Horn observed parent vehicles parked near the main entrance as early as 2:20PM in anticipation of the 3:00PM release. Shortly before 3:00PM, more than 20 vehicles were staged near the main entrance, 15 vehicles were observed on Greenwood Avenue, and 17 cars were counted on Thornwood Avenue. After the school bell rang, the departure of parent and student vehicles from both on-site parking lots and from residential driveways to the west resulted in a highly concentrated volume of traffic on southbound Laramie Avenue, in particular. Because a significant portion of these southbound vehicles are making a left turn onto Lake Avenue, the signalized intersection at Lake/Laramie is a controlling factor in the release of traffic from southbound Laramie Avenue and the study area. For a period of nearly 20 minutes, southbound queues were observed extending from Lake Avenue to Illinois Road. Other factors affecting queues during the school dismissal period include the need for crossing guards to stop traffic on Laramie Avenue in order to allow pedestrians to cross and/or release traffic exiting the Loyola Academy site and local side streets. During observations, peak outbound movement from Loyola Academy was largely completed by 3:20PM and queues on Laramie Avenue had significantly subsided by 3:25PM.

Image 7 Vehicles staged for pick-up on Thornwood Avenue at dismissal (3:00 PM).

Image 8 The pick-up queuing on site in front of the main entrance south of Access 2 (3:01 PM)

Image 9 Students crossing Laramie Avenue using the marked crosswalk after dismissal (3:08 PM).

Image 10 Looking north along Laramie Avenue from Access 2 at the southbound queue after dismissal (3:13 PM)

Capacity analysis, using Synchro software, was performed for the weekday morning and school dismissal peak hours under existing conditions and for projected traffic volume after completion of the proposed project. In order to provide a side-by-side comparison of existing and future traffic operation, the findings of these analyses are presented on page 21 in *Section 5.2. Analysis and Recommendations—Traffic Operation*.

Pedestrian Activity

During the school dismissal period in particular, a high volume of Loyola students were observed crossing Laramie Avenue at a variety of locations along the school frontage. These students were seen walking to the Pace bus shelter on the west side of Laramie Avenue at Access 2, to awaiting vehicles both Thornwood and Greenwood Avenues, and to vehicles that park in area residential driveways during the school day. Traffic control aides were observed managing pedestrian crossings in order to concentrate the platoons of pedestrians to guarded locations and allow students to cross safely, as well as to minimize the frequency of disruptions to the heavy traffic volume on Laramie Avenue.

Because students have a variety of destinations to walk to after school, pedestrian crossing locations were not confined only to the marked crosswalk on Laramie Avenue at Access 2 or to locations that were managed by traffic aides. Observed pedestrian desire paths also include routes on the site near the main entrance across the pick-up/drop-off lanes, through the landscaping and parkway to Laramie Avenue and in various locations across Laramie Avenue north of Greenwood Avenue.

Transit Routing

Before the first bell, Pace buses were observed arriving sporadically at Loyola Academy. Stops took place on north- and southbound Laramie Avenue and within the Loyola Academy parking lot.

During school dismissal, five Pace buses from the three routes that serve Loyola Academy were seen staged on site waiting for students to be released. These buses all approached from the south via Laramie Avenue and entered at Access 2 to wait in the parking lot immediately north of this driveway. As shown in **Image 11** below, these buses did not obstruct pick-up activity. A school traffic aide manages the queuing for parent vehicles in the pick-up area in front of the main entrance so that vehicles to not block entry for the Pace buses at Access 2. Because these buses were staged in a parking lot designated for faculty and staff (who are contractually obligated to remain on site until 3:30PM), these buses also did not obstruct vehicles departing from the parking lot. After students had boarded, all five buses departed via Access 1, with four returning toward the south and one turning north.

Image 11 Pace buses stage on the west side of the school between Access 1 and Access 2 before school dismissal

3.4. Agency Coordination

On January 19, 2016, Pace Bus representatives visited the Loyola Academy site to discuss existing bus circulation and related infrastructure with Kimley-Horn and school officials. The outcome of this meeting were used to develop recommendations for improved transit accommodations on and near the school, as will be discussed in greater detail in *Section 5.5. Analysis and Recommendations—Transit Routing*.

Kimley-Horn also reached out to staff at CCDOTH to discuss the constraints, opportunities, and challenges that should be considered when exploring potential improvements at the intersection of Lake Avenue and Laramie Avenue. The results of this discussion are detailed alongside the results of Kimley-Horn's capacity analysis of the Lake/Laramie intersection, detailed in *Section 5.2. Analysis and Recommendations—Traffic Operation*.

4. PROPOSED PARKING LOT PLAN

As shown in the proposed parking lot design provided in the attached appendix, the two new parking lots on the west side of Laramie Avenue would collectively provide 138 additional parking spaces for Loyola Academy faculty and staff, bringing the total school parking supply to 765 spaces. In order to comply with the *Illinois Accessibility Code*, it is recommended that the number of handicap-accessible spaces be increased from 10 to 15 (two percent of the total). Based on the expectation that each new handicap-accessible space would displace two regular parking spaces, the adjusted total parking supply is expected to be 760 spaces.

Once construction is completed, Loyola Academy plans to designate the proposed lots for faculty and staff parking and will use the newly available parking supply on site to accommodate midday visitor parking detailed previously in Table 2 and provide a cushion for effective capacity. It should also be noted that student parking demand is expected to remain constant, per indications from Loyola Academy that school enrollment is capped and that the number of student parking permits (currently 382) will not be increased after this project is completed. In other words, the increased parking supply is expected to serve the following purposes:

- Alleviate the existing shortage of parking spaces available for faculty and staff, as demonstrated in Table 1.
- Allow Loyola Academy to provide a 10 percent cushion in parking supply. At facilities with relatively low vehicle turnover throughout the day—particularly those with a large number of parking spaces like Loyola Academy—it can be difficult for motorists to locate the last few available spaces when occupancy is high. For this reason, it is common in parking analyses to assume that the lot's effective capacity is reached at approximately 90 percent. The remaining 10 percent cushion is a standard recommendation to reduce vehicle circulation when the lot nears capacity, as well as providing flexibility for the loss of spaces due to snow storage and/or temporary infrastructure maintenance.
- Accommodate midday parking demand related to the visitors various Loyola Academy parent groups that generate volunteer activity during the school day.

Because no new parking permits will be issued to students as a part of this project, the number of vehicles that park on site today is not expected to change. Rather, the proposed parking supply is expected to provide improved functionality in a manner that is commensurate with the parking demand already present at the school.

As noted in *Section 3.3. Data Collection and Observations—Peak Period Observations*, there are numerous conflicts present today along the Laramie Avenue corridor: vehicles traveling through the area to destinations like New Trier High School versus vehicles turning onto and off of side streets and access driveways; vehicle-pedestrian conflicts at numerous locations along the corridor; and passenger cars versus transit buses, to name a few. As a best access management practice and in order to minimize the number of conflict points along Laramie Avenue, it is recommended that access to the new parking lots be provided via Thornwood Avenue. These access driveways should align directly opposite each other to consolidate the new curb cuts to a single point.

The parking lots' proximity to Laramie Avenue—combined with the observed reduction in Laramie Avenue congestion after 3:30PM, which is the earliest time that staff are contractually permitted to leave the school—provides little incentive for staff to travel west via Thornwood Avenue, especially given that a majority of school-generated traffic is traveling to I-94 and destinations east of the school. Loyola Academy intends to further designate the spaces to faculty and staff that reside in Chicago whose commute to/from the school is oriented to the south and east via the I-94 interchange. In order to reinforce the use of Laramie Avenue and deter cut-through traffic, Loyola Academy will post signage indicating that vehicles leaving the new parking lots may only turn toward Laramie Avenue.

5. ANALYSIS AND RECOMMENDATIONS

In order to assess the impact of the proposed parking lots, Kimley-Horn evaluated future operation from the perspectives of parking utilization, traffic volume and associated delay, school access and circulation patterns, pedestrian accommodations, and transit routing.

5.1. Future Parking Utilization

Based on the existing parking demand documented previously and the recommended 10 percent cushion in parking supply for typical daily operations, Kimley-Horn evaluated future parking occupancy as detailed in **Table 3** on the following page. Because the 2:00PM parking demand survey yielded a greater total than the 8:00AM survey, the afternoon period was used as the basis for this analysis in order to provide a more conservative approach. As noted previously in *Proposed Parking Lot Plan*, no new parking demand or peak hour traffic is expected to result from the new parking lots.

Based on the totals shown in Table 3, the proposed parking lot construction should significantly improve the functionality of the parking lots at Loyola Academy. The additional parking supply facilitates an increase in handicap-accessible spaces to meet regulatory requirements, allows Loyola Academy to provide a recommended 10 percent cushion to improve circulation on site, and yields enough capacity to support the majority of Loyola Academy's midday school visitor activities that were previously identified in Table 2. In order to accommodate the larger midday events (such as St. Nicholas Mass) or the simultaneous occurrence of multiple large events, it is recommended that Loyola Academy develop a special event parking plan that may be executed in conjunction with a valet parking and/or shuttle service to maximize the potential capacity of the school parking supply.

Table 3. Summary of Existing and Future Parking Supply

Parking Demand Scenario	Parking Supply			Remaining Parking Supply for non-ADA Users[1]	Parking Demand		Remaining Capacity for Visitors & Volunteers[3]
	Total Parking Supply	Handicap-Accessible Parking Supply	Ten Percent Effective Capacity Cushion		Staff/Reserved Parking Demand[2]	Student Parking Demand	
Existing Conditions							
On-Site Parking	627	10	63	554	243	373	-62
Proposed Conditions (Change from Existing)							
On-Site Parking Lot • Convert 10 regular spaces into 5 handicap-accessible spaces to meet standards in the *Illinois Accessibility Code*. Results in loss of 5 spaces in total parking supply. • Adjust value of recommended ten percent cushion to match new total	-5	+5	-1	-9	-124	–	+115
New Parking Lots • Shift faculty/staff parking from the on-site lot to the effective capacity of new lots	+138	–	+14	+124	+124	–	–
Future Parking Total	760	15	76	669	243	373	53

[1]Equals Total Parking Supply minus Handicap-Accessible Parking Supply (with the future value calculated per the *Illinois Accessibility Code*) minus the Ten Percent Cushion recommended for the Loyola Academy parking lots.
[2]Vehicles parked in reserved parking spaces were included in the Staff Parking Demand for the purpose of this calculation.
[3]Equivalent to the Remaining Parking Supply for non-ADA Users minus the Staff Parking Demand and the Student Parking Demand.

5.2. Traffic Operation

Key aspects of a typical traffic study include trip generation projections (estimating the quantity of traffic that a project may generate), trip distribution and assignment (estimating the routing patterns of that traffic), capacity analysis (quantifying the average vehicle delay experienced at area intersections), and a review of access and circulation. Each of these items are addressed in the following sections.

Projected Trip Generation

A standard traffic impact study typically includes an estimate of the volume of traffic that will be generated by the proposed project, an exercise called “trip generation.” In the case of a new development or building expansion, trip generation is often calculated based on the building square footage, the number of employees/students, and other factors that relate to the internal activities of that facility. In this case, Loyola Academy is not proposing a building expansion with additional floor area, new programming, or an increase in enrollment. The school will also be maintaining the number of student parking permits at its current level (382 permits). Thus, with activity levels and the number of parked cars remaining steady, no additional traffic is expected to be associated with the proposed parking lots during peak arrival and dismissal periods.

Trip Distribution and Assignment

For use in evaluating future traffic operation after completion of the proposed project, Kimley-Horn developed assumptions about how staff vehicles would reroute from the existing parking lots to the new lots on the west side of Laramie Avenue. To illustrate the purpose of this exercise, **Figures 1 and 2** compare the current travel pattern exhibited by most Loyola Academy staff to the travel pattern that would be expected once the new lots are in place.

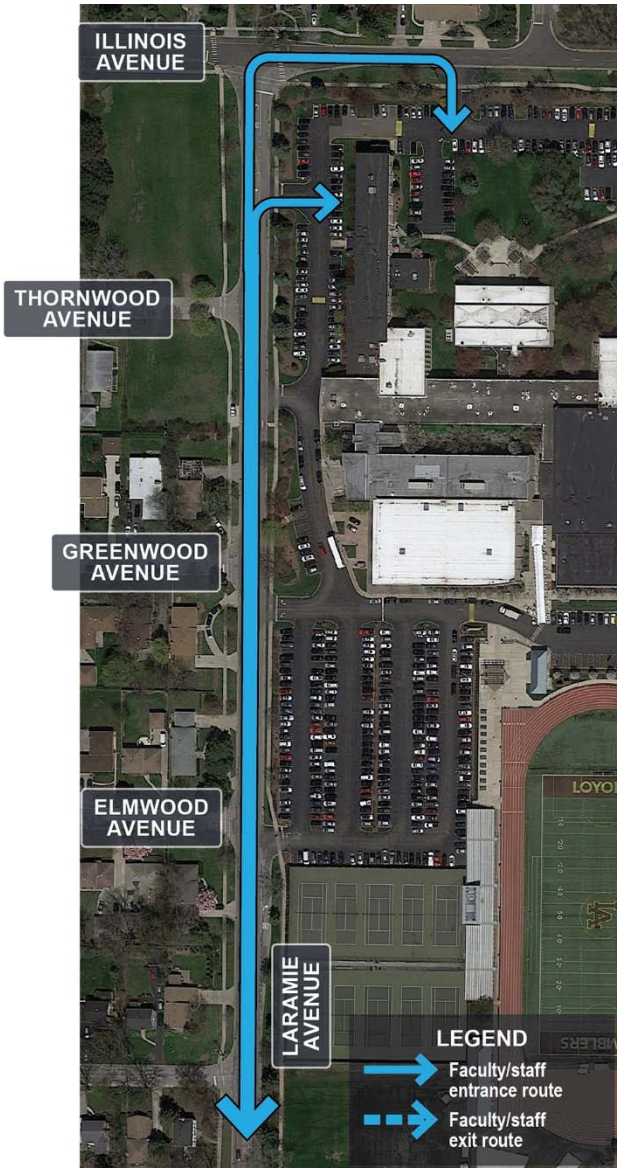

Figure 3 Existing faculty/staff entry/exit routes

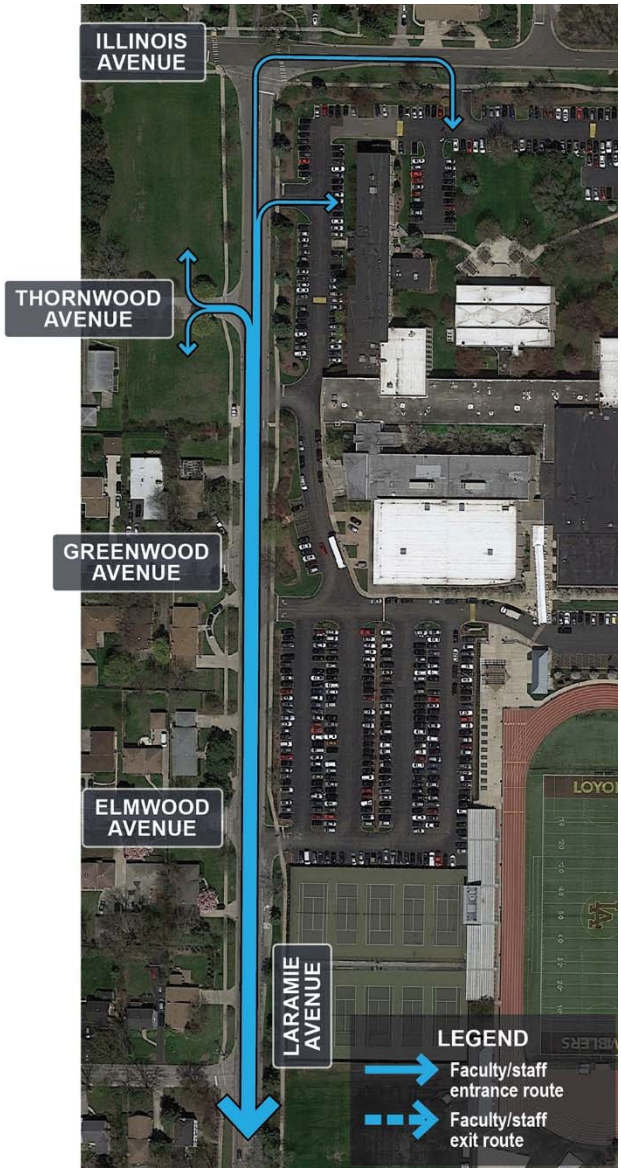

Figure 4 Proposed faculty/staff entry/exit routes

As noted previously in *Section 3.1. Data Collection and Observations—Traffic Count Data Collection*, A large majority of school traffic is oriented to/from the south. Further, with a designation of the proposed lots for faculty and staff residing in Chicago, it is assumed that their arrival and departure routes are to and from the south.

Based on a review of existing traffic counts, it was conservatively assumed that 80 percent of staff would arrive at school between 7:00 and 7:30AM, coinciding with the first half of the morning peak hour. With an estimated 124 vehicles parking in the proposed parking lots (as shown in Table 3), this equates to roughly 100 inbound vehicles during the morning peak hour. Furthermore, it was

conservatively assumed that all staff vehicles parked in the new lots would leave between 3:30 and 4:00PM (the second half of the school dismissal peak hour). Outbound traffic from the new parking lots during the school dismissal peak hour was therefore rounded to the nearest multiple of five, or 125 vehicles. These assumptions were used to reroute traffic from the existing Loyola Academy parking lots to the new parking lots, as demonstrated in **Exhibit 4**.

Capacity Analysis

The capacity of an intersection quantifies its ability to accommodate traffic volumes and is expressed in terms of level of service (LOS) according to the average delay per vehicle as it passes through the intersection. Levels of service range from A to F with LOS A as the highest (best traffic flow and least delay), LOS E as saturated or at-capacity conditions, and LOS F as the lowest (oversaturated conditions).

Capacity analysis was performed with the use of Synchro software, and the results are reported in **Table 4** by intersection and approach for the study periods for existing and future traffic conditions. It is important to note that Synchro evaluates traffic operation based on such characteristics as lane configuration, intersection control, and traffic volume in accordance with standard rules of the road. Due to the dynamic nature of intersection control under management by a crossing guard, Synchro may not yield results that are directly representative of traffic operation under these conditions. The results provided in this study do, however, provide a good comparison of the relative operational characteristics of the study area between existing and future conditions.

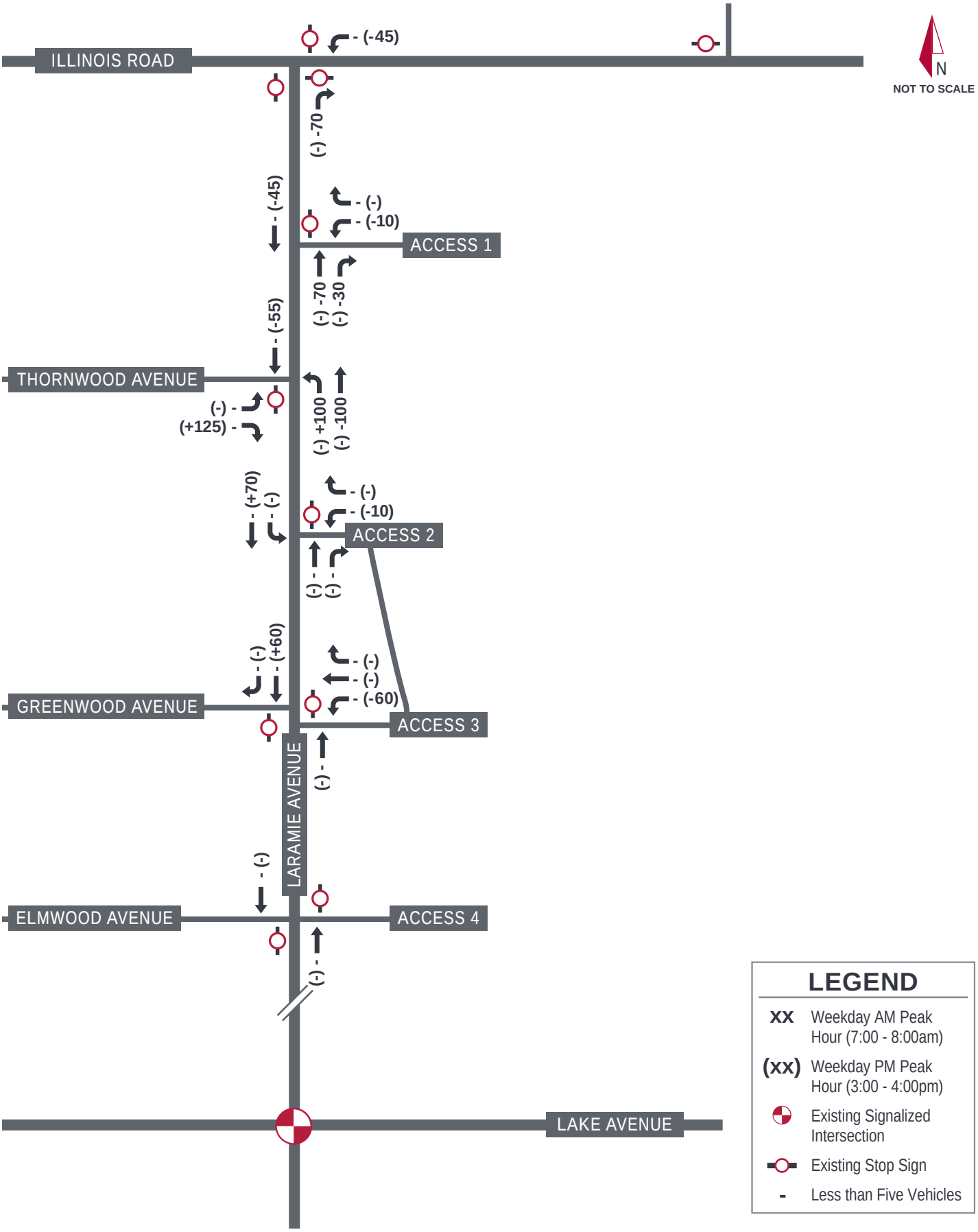

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EXHIBIT 4

ANTICIPATED REDISTRIBUTION OF STAFF TO NEW PARKING LOTS

Table 4. Intersection Levels of Service

Intersection	Existing Conditions				Future Conditions			
	AM Peak		PM Peak		AM Peak		PM Peak	
	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS
Laramie Ave at Illinois Ave ▲								
Northbound	15	B	12	B	14	B	12	B
Eastbound	18	C	12	B	17	C	11	B
Westbound	13	B	13	B	12	B	11	B
Intersection	*15+*	*C*	*12*	*B*	*15-*	*B*	*12*	*B*
Laramie Ave at Access 1 △								
Southbound (Left)	9	A	9	A	9	A	9	A
Westbound	15+	C	13	B	14	B	12	B
Laramie Ave at Thornwood Ave △								
Northbound (Left)	8	A	8	A	8	A	8	A
Eastbound	12	B	12	B	12	B	18	C
Laramie Ave at Access 2 △								
Southbound (Left)	10-	A	8	A	10-	A	8	A
Westbound	14	B	12	B	14	B	12	B
Laramie Ave at Greenwood Ave/Access 3 △								
Northbound (Left)	8	A	8	A	8	A	9	A
Eastbound	15+	C	13	B	15+	C	14	B
Westbound	> 120	F	24	C	> 120	F	18	C
Laramie Ave at Elmwood Ave/Access 4 △								
Northbound (Left)	10-	A	9	A	10-	A	9	A
Southbound (Left)	13	B	8	A	13	B	8	A
Eastbound	19	C	15+	C	19	C	15+	C
Westbound	22	C	> 120	F	22	C	> 120	F
Lake Avenue at Laramie Ave ★								
Northbound	44	D	17	B	44	D	17	B
Southbound	> 120	F	90	F	> 120	F	90	F
Eastbound	52	D	66	E	52	D	66	E
Westbound	57	E	35+	D	57	E	35+	D
Intersection	*67*	*E*	*58*	*E*	*67*	*E*	*58*	*E*

★ – Signalized Intersection
▲ – All-Way Stop-Controlled Intersection
△ – Minor-Leg Stop-Controlled Intersection

As shown in Table 4, there are few changes in traffic operation between existing and future conditions. Due to the redistribution of traffic for faculty and staff from the on-site parking on the east side of Laramie Avenue to the proposed lots on the west side of the street, some changes in delay are

anticipated at the north end of the study corridor. The largest change in delay can be noted on Thornwood Avenue during the school dismissal peak, which is projected to change from LOS B to LOS D. This increase in delay is expected to be most notable between 3:30 and 4:00PM when staff are expected to begin leaving Loyola Academy and departing the proposed parking lots.

Operation at the intersection of Lake Avenue and Laramie Avenue is expected to be unchanged from existing to future conditions. As shown, the southbound approach operates at over-capacity conditions (LOS F) during the morning and school dismissal peak hours, which mirrors the observations performed by Kimley-Horn in the field. Additionally, the east- and westbound approaches are at or near capacity during both peak hours. These high-delay approaches result in an overall LOS E at the Lake Avenue and Laramie Avenue intersection during the morning peak hour and school dismissal.

Given the existing operational issues observed at this intersection during field visits, Kimley-Horn reached out to staff at the CCDOTH to determine what constraints, opportunities, and challenges may exist with regard to future improvements at the Lake/Laramie intersection. Potential improvement opportunities that were raised by Kimley-Horn as a part of this correspondence included:

- Signal retiming to increase green time provided to southbound Laramie Avenue (particularly during the school dismissal period)
- Addition of a westbound right-turn overlap phase (a westbound right-turn arrow that would run simultaneous with northbound and southbound left-turn arrows) to move inbound school traffic from the east through the intersection more efficiently

While the County would require further study before considering these improvements, initial feedback from CCDOTH staff preliminarily indicated interest in widening Laramie Avenue to provide two lanes in each direction and potentially constructing dual left-turn lanes on southbound Laramie Avenue at Lake Avenue.

In order to further pursue potential timing changes at Lake Avenue/Laramie Avenue, it is anticipated that these infrastructure modifications would need to be fully evaluated in order to address the County's interest in these improvements. However, the County also expressed concern about the impact signal timing that adjustments would have on the interconnected traffic signal system along Lake Avenue that prioritizes east-west traffic flow along the County route.

It should be noted that widening Laramie Avenue in this manner would result in a cross-section that is similar to or wider than Lake Avenue today, causing impacts to both Loyola Academy and the commercial and residential properties on the west side of the street. Widening would also be required on Laramie Avenue south of Lake Avenue (to provide intersection symmetry) and on Lake Avenue east of Laramie Avenue (to provide enough width to receive traffic from dual southbound left-turn lanes.

With respect to dual southbound left-turn lanes, the proximity of the Lake Avenue/Laramie Avenue intersection to the southbound entrance ramp for I-94 creates a likely weaving issue. There is insufficient spacing available for students, faculty, and other motorists that are destined to southbound

I-94 from the inside turn lane and the weaving conflict is anticipated to create a traffic safety issue if vehicles attempt to access the ramp.

5.3. Access and Circulation

As observed during Kimley-Horn's field visits to the study area, there are numerous conflict points present along the Laramie Avenue corridor including school access driveways and residential streets. In an effort to improve traffic flow on site and within the area, three alternative access and circulation concepts were identified for the school arrival and dismissal peaks. **Figures 3 to 6** illustrate the current access and circulation pattern along with the three alternative concepts.

Alternative 1

This concept includes maintaining the current clockwise drop-off/pick-up circulation from Access 2 to Access 3. Parent drop-off/pick-up staging on neighborhood streets such as Thornwood Avenue and Greenwood Avenue would be prohibited. As an alternative access/circulation drop-off/pick-up route, vehicles would be directed to the school's east access on Illinois Road and clockwise around the east and south sides of the school.

Alternative 2

The second alternative includes converting Access 3 to entrance-only and reversing the drop-off/pick-up circulation between Access 2 and Access 3. This helps to alleviate the conflict between northbound traffic on Laramie Avenue (that currently enters at Access 2) and traffic exiting the school at Access 3. Similar to Alternative 1, parent drop-off/pick-up staging on Thornwood Avenue and Greenwood Avenue would be prohibited and if the drop-off/pick-up zone in front of the main entrance is full, drivers would be directed to the east access on Illinois Road to circulate and stage on the east and south sides of the school.

Alternative 3

Alternative 3 is similar to Alternative 2 except that Access 2 is relocated north to align opposite Thornwood Avenue to increase the drop-off/pick-up zone in front of the main entrance and consolidate offset intersections. Similar to Alternative 2, this concept helps to alleviate the conflict between northbound traffic on Laramie Avenue (that currently enters at Access 2) and traffic exiting the school at Access 3. Also similar to Alternatives 1 and 2, parent drop-off/pick-up staging on Thornwood Avenue and Greenwood Avenue would be prohibited and if the primary drop-off/pick-up zone is full, drivers would be directed to the east access on Illinois Road to circulate and stage on the east and south sides of the school.

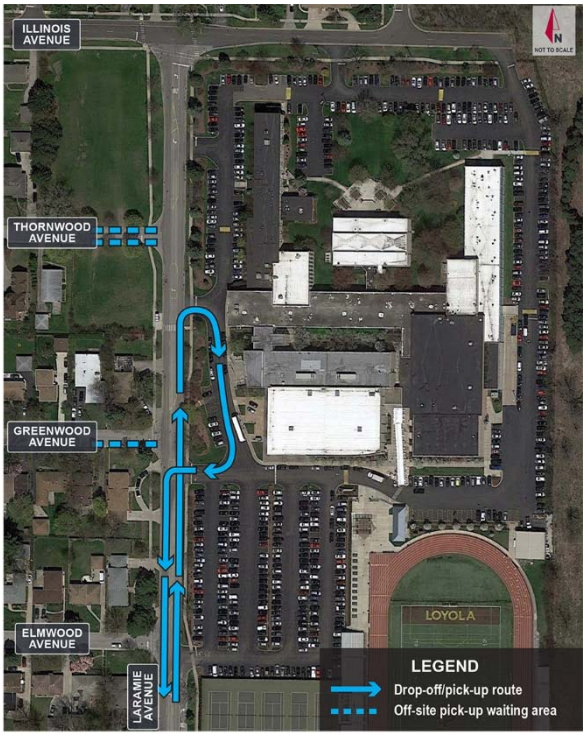


Figure 3 Existing drop-off/pick-up access and circulation

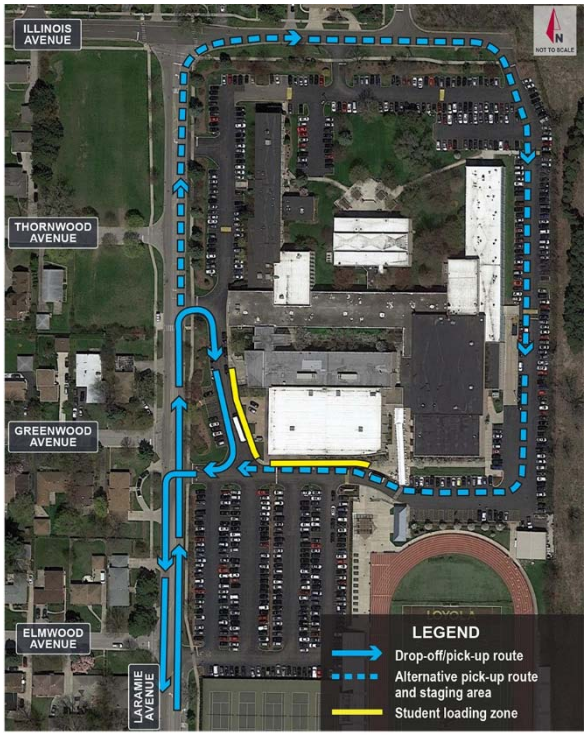


Figure 4 Alternative 1

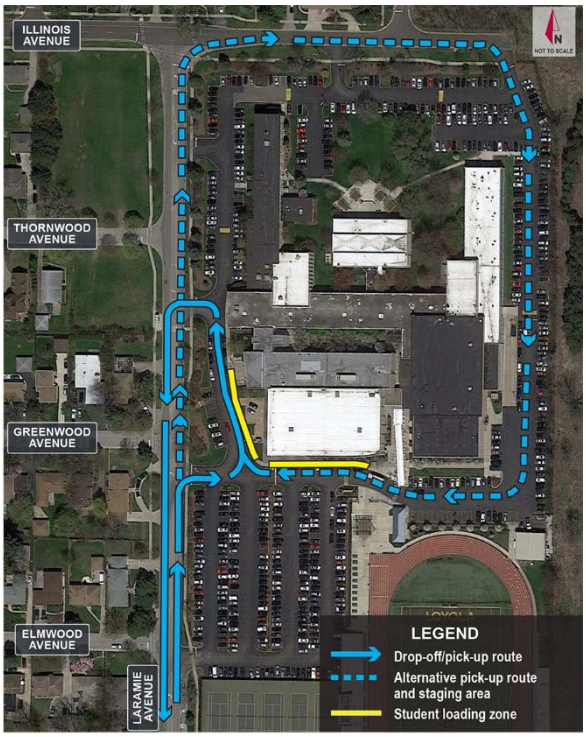


Figure 5 Alternative 2

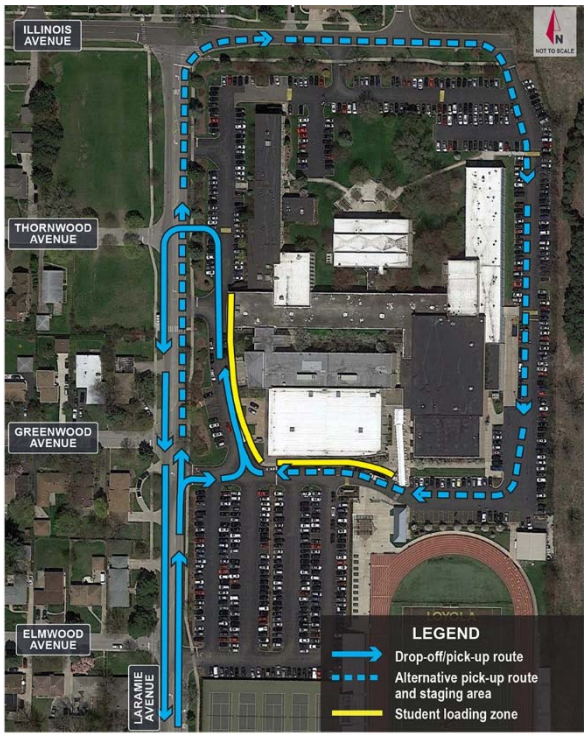


Figure 6 Alternative 3

A summary of pros (+) and cons (-) associated with each alternative are highlighted in **Table 5**.

Table 5. Review of Potential Traffic Circulation Pattern Alternatives

Review Criteria	Alternative 1	Alternative 2	Alternative 3
Pros	+ Eliminates pick-up/drop-off staging from neighborhood streets	+ Eliminates pick-up/drop-off staging from neighborhood streets + Alleviates existing conflict point between heavy northbound traffic on Laramie Avenue and outbound Loyola Academy traffic at Access 3	+ Eliminates pick-up/drop-off staging from neighborhood streets + Alleviates existing conflict point between heavy northbound traffic on Laramie Avenue and outbound Loyola Academy traffic at Access 3 + Increases on-site capacity for staged vehicles near main entrance during pick-up/drop-off activity + Reduces number of curb cuts on Laramie Avenue by aligning an access opposite Thornwood Avenue
Cons	- Maintains conflict point between heavy northbound traffic on Laramie Avenue and outbound Loyola Academy traffic at Access 3	- May require increased presence by traffic control personnel to redirect vehicles that currently exit via Access 3 from parking lots at the southern and eastern portions of the school	- Eliminates the existing staging area used by Pace buses to pick up Loyola students and turn around to return south on Laramie Avenue - May lose parking spaces on site to accommodate the extended drop-off/pick-up zone - May require increased presence by traffic control personnel to redirect vehicles that currently exit via Access 3 from parking lots at the southern and eastern portions of site

These alternative and their associated benefits and challenges can be considered by Loyola Academy in the short- and/or long-term to improve traffic circulation on site and reduce the impact of peak school traffic on the area roadway network.

5.4. Pedestrian Accommodations

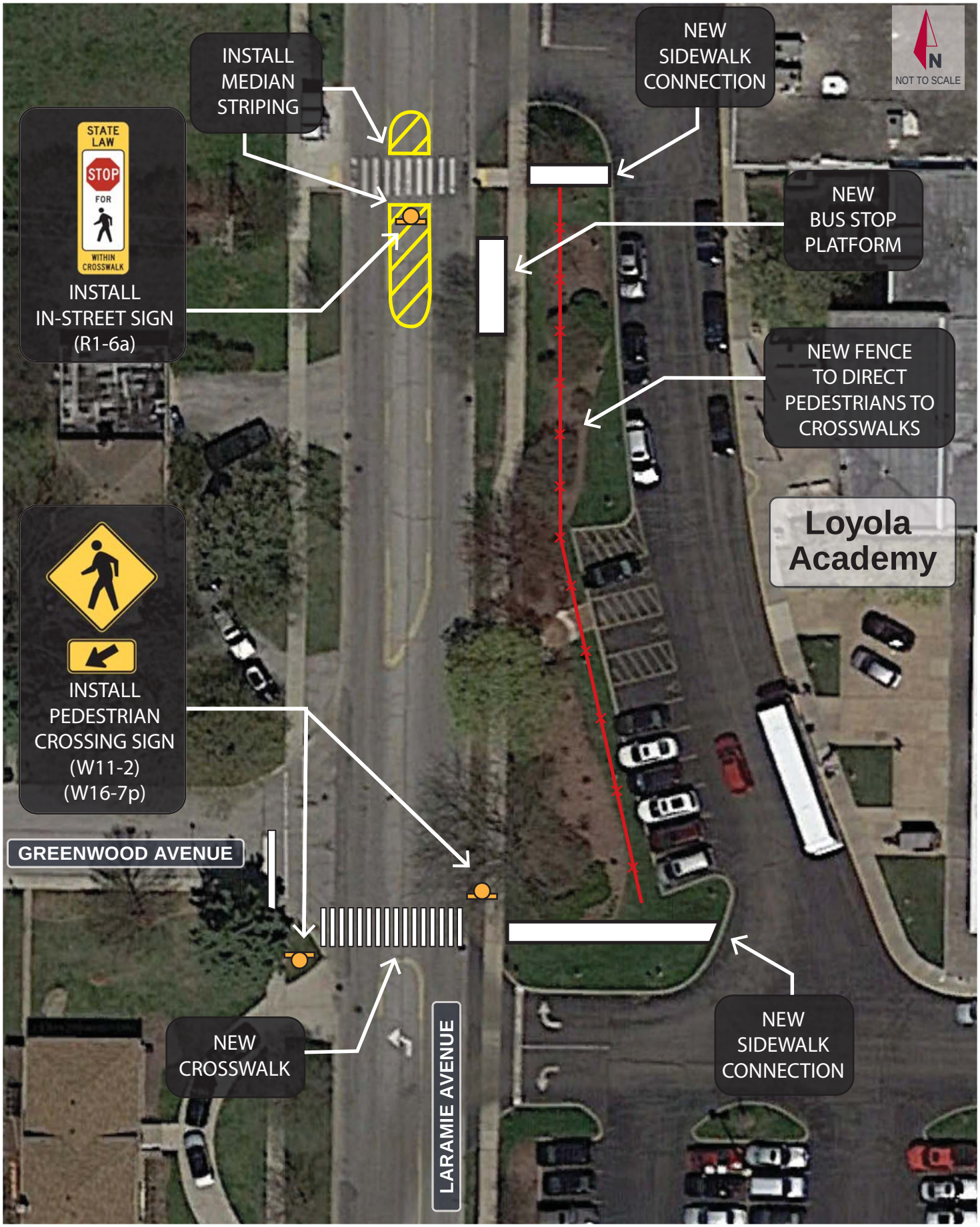
Field observations revealed that pedestrians cross Laramie Avenue at several locations along the Laramie Avenue frontage, including at the marked crosswalk near Access 2, at crossing guard-controlled intersections, and mid-block. In order to make pedestrians more visible to motorists and consolidate these pedestrian routes, it is recommended that additional markings and signage be provided at specific locations along the Laramie Avenue corridor. As illustrated on **Exhibit 5**, the existing crosswalk at Access 2 should be marked with an in-street "State Law—Stop for Pedestrians in Crosswalk" sign (MUTCD R1-6a) to increase awareness of the crosswalk and remind drivers that pedestrians have the right-of-way. A new crosswalk is recommended across Laramie Avenue between Access 3 and Greenwood Avenue. Because of this crosswalk's locations between two minor streets, an in-road sign could become an obstruction for left-turning vehicles from Laramie Avenue. Instead, it is recommended that a "Pedestrian Crossing" sign (MUTCD W11-2) with a downward-pointing arrow plaque (MUTCD W16-7p) be installed in each direction to draw motorists' attention to the presence of a crosswalk at this location. These signs may be supplemented with a Rapid Rectangle Flashing Beacon (RRFB) sign, which significantly increase crosswalk and pedestrian awareness in the future if observations of pedestrian crossings at this location suggest that additional indicators are needed. All additional signs and marking are subject to approval of the Village of Wilmette Transportation Commission.

As previously noted in summary of peak period observations, students often walk from the main entrance, through the pick-up area, to Laramie Avenue where many cross the street in several various locations. In order to encourage and orient Loyola Academy students to use the existing and proposed marked crosswalks, another recommendation is to install a fence between Access 2 and Access 3 along the west edge of the parking area. By redirecting pedestrian traffic to these two marked crosswalks, it will be easier for crossing guards to facilitate students' safe crossing and to manage the needs of both pedestrians and vehicles more efficiently. Improved street lighting on Laramie Avenue at the crosswalk locations may also be considered to increase the visibility of pedestrians to motorists.

5.5. Transit Routing

During the previously noted on-site meeting with Pace staff, several considerations for improved transit service were discussed, including the potential for bus turnout lanes on one or both sides of Laramie Avenue near Loyola Academy. Turnout lanes were determined to be infeasible, both due to design constraints (i.e., required storage length and tapers, lane and sidewalk loading area width) and the anticipated impact on bus routing patterns (particularly related to how the buses maneuver to return southbound). Currently, Pace buses turn into the Loyola Academy parking lot to stage during the school dismissal period. This routing pattern allows buses (which all approach from the south and enter at Access 2) to easily return to the south (via Access 1) after students have boarded. The initial wave of students looking to ride Pace after school are also able to board the bus without having to cross Laramie Avenue. If turnout lanes were constructed, it would be necessary for these buses to extend their route in order to turn around either through the Loyola Academy parking lot or, less desirably, by traveling on local neighborhood streets. For these reasons, Pace expressed a preference for maintaining the current circulation pattern into the future.

Given this preferred transit routing pattern, the team identified some improvements that could be made to enhance transit accommodations within the study area. Northbound Pace buses on Laramie Avenue currently stop at various locations along the corridor, and so it is recommended that a signed bus stop be installed on northbound Laramie Avenue just south of Access 2 and the currently marked crosswalk, as shown on Exhibit 7. This stop should include appropriate signage and a concrete pad to allow pedestrians to wait, board, and alight effectively while providing ADA-accessible access. These bus stop improvements are expected to complement the proposed crosswalk improvements at Laramie Avenue/Access 2 for more cohesive transportation operation along Laramie Avenue.



Kimley»Horn

EXHIBIT 7

PEDESTRIAN AND TRANSIT IMPROVEMENTS

6. SUMMARY

As a part of the proposed parking lot project, Kimley-Horn performed a comprehensive review of transportation conditions at and near Loyola Academy. Informed by data collection and field observations, existing operation was reviewed and opportunities for improved traffic circulation, parking utilization, pedestrian facilities, and transit accommodations were explored. A summary of the recommended short-term improvements and potential long-term opportunities for future consideration are detailed in **Tables 6** and **7**, respectively, on the following pages.

The proposed parking lots are not expected to generate additional traffic along the Laramie Avenue corridor. With implementation of the short-term improvements as a part of the proposed parking lot project, it is anticipated that Loyola Academy will benefit from improved parking functionality and that the area roadway network will gain some improvements in safety and efficiency during the typical peak traffic activity surrounding school arrival and dismissal periods.

Table 6. Short-Term Recommendations and Benefits

Category	Recommendation	Anticipated Benefits
Parking Utilization and Lot Design	• For the proposed lots on the west side of Laramie Avenue, provide access directly via Thornwood Avenue. • Both access driveways should align directly across from each other. • Consider posting signage directing exiting traffic only toward Laramie Avenue.	• Limit the number of curb cuts and potential conflict points along Laramie Avenue. • Provide a consolidated access intersection on Thornwood Avenue for minimal disruption to traffic flow on Laramie Avenue. • Reinforce use of the shortest and most direct route to Lake Avenue via Laramie Avenue, rather than travel through the adjacent neighborhood.
Traffic Operation and Circulation	• Implement a new pick-up/drop-off plan that removes parents from staging on neighborhood streets and instead uses a clockwise circuit around the school as an alternative to pick-up/drop-off activity at the main entrance.	• Reduce pick-up/drop-off activity in the residential neighborhood to the west.
Pedestrian Accommodations	• Post an in-road "State Law—Stop for Pedestrian in Crosswalk" sign in the median on the south side of the marked crosswalk on Laramie Avenue just south of Access 2. • Stripe a high-visibility continental-style crosswalk across Laramie Avenue between Greenwood Avenue and Access 3. Post a "Pedestrian Crossing" sign in the parkway with a downward-pointing arrow plaque. • Install a fence between Access 2 and Access 3 along the west edge of the parking area. • Provide improved sidewalk connectivity that directs students from the main entrance around the fence to the marked crosswalks on Laramie.	• Increase the visibility of pedestrian crosswalks for improved safety and vehicle stop compliance. • Direct pedestrians to designated crosswalks in order to minimize mid-block crossings for improved safety and reduced disruptions to traffic flow.
Transit Routing	• Maintain existing Pace bus circulation in its current state. • Provide an improved northbound bus stop on the east side of Laramie Avenue immediately south of Access 2. • Both access driveways should align directly across from each other.	• Allow buses to circulate in the shortest and most efficient manner and minimize the potential for additional impacts to the study area with changes to the existing routing pattern. • Consolidate the location of northbound Pace bus pick-up and drop-off. • Improve the waiting area for passengers by providing a concrete pad for boarding and alighting.

Table 7. Long-Term Opportunities and Benefits

Category	Opportunity	Anticipated Benefits
Traffic Operation and Circulation	• Consider additional changes to pick-up/drop-off circulation (as detailed in Figures 4 to 6). • Explore improvements to the Lake Avenue/Laramie Avenue intersection through further study and coordination with Cook County and the Village of Wilmette.	• Increase the efficiency of traffic flow during the school arrival and dismissal periods. • Provide additional space on site for vehicle staging. Identify potential opportunities to improve operation at Lake Avenue and Laramie Avenue during school arrival and dismissal.
Pedestrian Accommodations	Consider installing street lighting near marked crosswalks.	Further increase pedestrian visibility to motorists.

APPENDIX

Proposed Parking Lot Site Plan 37

Existing Capacity Reports 39

Future Capacity Reports 56

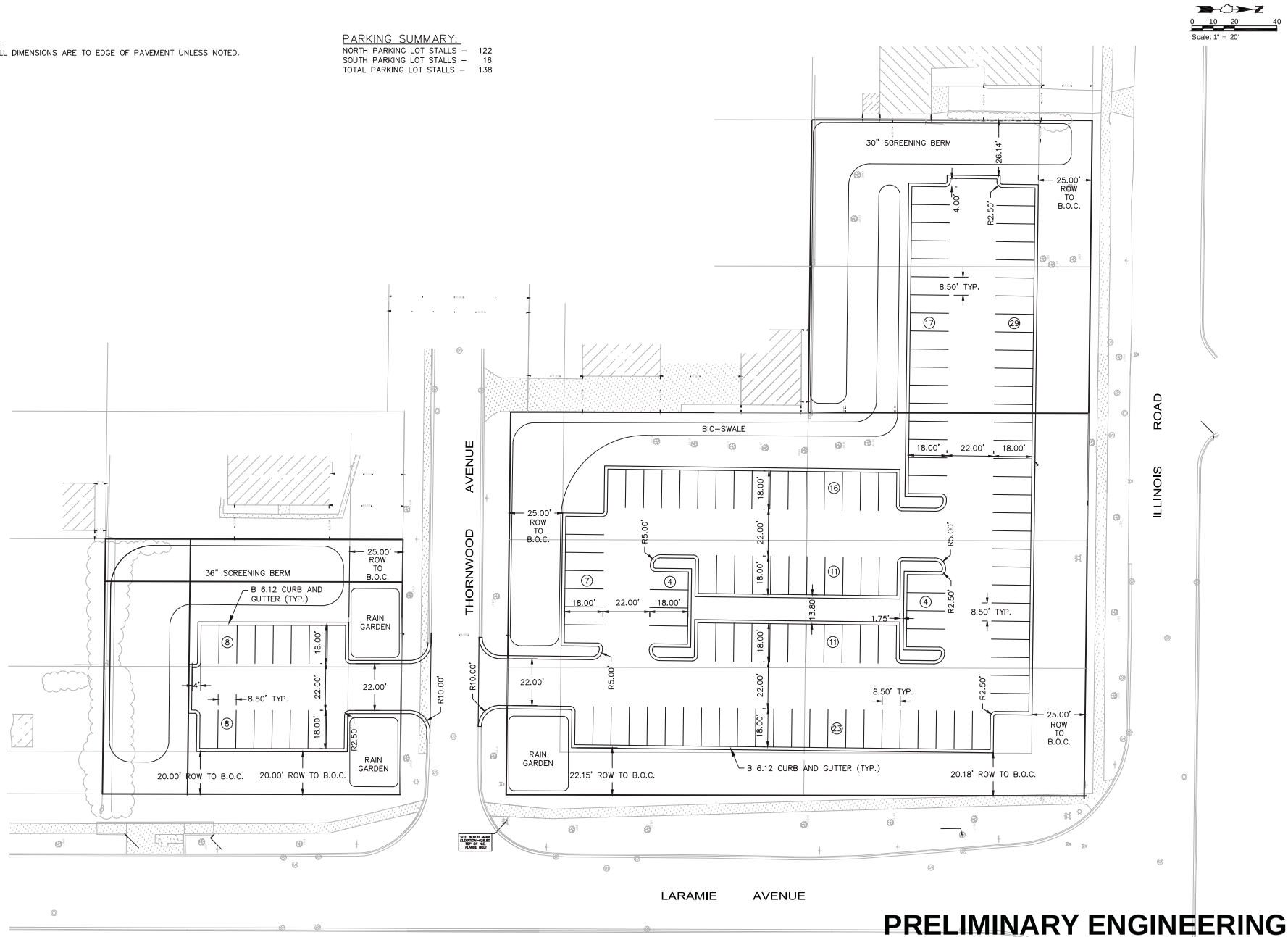
PROPOSED PARKING LOT SITE PLAN

NOTES:

1. ALL DIMENSIONS ARE TO EDGE OF PAVEMENT UNLESS NOTED.

PARKING SUMMARY:

NORTH PARKING LOT STALLS –	122
SOUTH PARKING LOT STALLS –	16
TOTAL PARKING LOT STALLS –	138



PRELIMINARY ENGINEERING
NOT FOR CONSTRUCTION

REVISIONS

NO.	DATE	MNGR	DESCRIPTION

K-PLUS ENGINEERING, LLC
WWW.KPLUS.COM
312.207.1600
329 W. 18TH STREET CHICAGO, IL 60616
15 SPINNING WHEEL ROAD HINSDALE, IL 60521

LOYOLA ACADEMY PARKING LOT
SITE PLAN
LOYOLA ACADEMY
1100 LARAMIE AVENUE WILMETTE, IL 60091

PROJ MGR:	MDB
PROJ ENG:	MLM
DATE:	02/24/16
PROJ NO.	25174

DRAWING NO:
3
OF 8 SHEETS

F:\CUSTOMERS\L\LOYOLA ACADEMY\PROJECTS\25174 – LOYOLA ACADEMY PARKING LOT DESIGN AND CONSTRUCTION\DWG\PLAN\25174 – SITE PLAN.DWG

EXISTING SYNCHRO CAPACITY REPORTS

Weekday Morning Peak Hour

Weekday School Dismissal Peak Hour

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	95	170	105	25	250	220
Future Volume (vph)	95	170	105	25	250	220
Peak Hour Factor	0.61	0.61	0.66	0.66	0.83	0.83
Hourly flow rate (vph)	156	279	159	38	301	265

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total (vph)	435	197	301	265
Volume Left (vph)	0	159	301	0
Volume Right (vph)	279	0	0	265
Hadj (s)	-0.34	0.20	0.57	-0.67
Departure Headway (s)	5.4	6.3	6.8	5.6
Degree Utilization, x	0.65	0.34	0.57	0.41
Capacity (veh/h)	650	539	505	621
Control Delay (s)	17.8	12.6	17.4	11.2
Approach Delay (s)	17.8	12.6	14.5	
Approach LOS	C	B	B	

Intersection Summary			
Delay	15.4		
Level of Service	C		
Intersection Capacity Utilization	47.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	10	10	460	40	10	265
Future Volume (Veh/h)	10	10	460	40	10	265
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.50	0.50	0.87	0.87	0.75	0.75
Hourly flow rate (vph)	20	20	529	46	13	353
Pedestrians	86					
Lane Width (ft)	15.0					
Walking Speed (ft/s)	3.5					
Percent Blockage	10					
Right turn flare (veh)						
Median type			TWLTL			TWLTL
Median storage veh)			2			2
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1017	638			661	
vC1, stage 1 conf vol	638					
vC2, stage 2 conf vol	379					
vCu, unblocked vol	1017	638			661	
tC, single (s)	6.7	6.4			4.1	
tC, 2 stage (s)	5.7					
tF (s)	3.8	3.5			2.2	
p0 queue free %	95	95			98	
cM capacity (veh/h)	380	400			832	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	40	575	13	353
Volume Left	20	0	13	0
Volume Right	20	46	0	0
cSH	390	1700	832	1700
Volume to Capacity	0.10	0.34	0.02	0.21
Queue Length 95th (ft)	9	0	1	0
Control Delay (s)	15.3	0.0	9.4	0.0
Lane LOS	C		A	
Approach Delay (s)	15.3	0.0	0.3	
Approach LOS	C			

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	37.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	30	5	495	265	10
Future Volume (Veh/h)	5	30	5	495	265	10
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.35	0.35	0.84	0.84	0.74	0.74
Hourly flow rate (vph)	14	86	6	589	358	14
Pedestrians	7			4		
Lane Width (ft)	12.0			11.0		
Walking Speed (ft/s)	3.5			3.5		
Percent Blockage	1			0		
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	973	376	379			
vC1, stage 1 conf vol	372					
vC2, stage 2 conf vol	601					
vCu, unblocked vol	973	376	379			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	87	99			
cM capacity (veh/h)	479	664	1172			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	100	6	589	372
Volume Left	14	6	0	0
Volume Right	86	0	0	14
cSH	630	1172	1700	1700
Volume to Capacity	0.16	0.01	0.35	0.22
Queue Length 95th (ft)	14	0	0	0
Control Delay (s)	11.8	8.1	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	11.8	0.1		0.0
Approach LOS	B			

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	37.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	5	15	485	175	75	220
Future Volume (Veh/h)	5	15	485	175	75	220
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.50	0.50	0.89	0.89	0.70	0.70
Hourly flow rate (vph)	10	30	545	197	107	314
Pedestrians						41
Lane Width (ft)						11.0
Walking Speed (ft/s)						3.5
Percent Blockage						4
Right turn flare (veh)						
Median type			TWLTL			TWLTL
Median storage veh)			2			2
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1172	684			742	
vC1, stage 1 conf vol	644					
vC2, stage 2 conf vol	528					
vCu, unblocked vol	1172	684			742	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	93			88	
cM capacity (veh/h)	400	432			865	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	40	742	107	314
Volume Left	10	0	107	0
Volume Right	30	197	0	0
cSH	424	1700	865	1700
Volume to Capacity	0.09	0.44	0.12	0.18
Queue Length 95th (ft)	8	0	11	0
Control Delay (s)	14.4	0.0	9.7	0.0
Lane LOS	B		A	
Approach Delay (s)	14.4	0.0	2.5	
Approach LOS	B			

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	61.2%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	0	25	285	15	85	5	570	0	0	225	2
Future Volume (Veh/h)	5	0	25	285	15	85	5	570	0	0	225	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.38	0.38	0.38	0.60	0.60	0.60	0.87	0.87	0.87	0.77	0.77	0.77
Hourly flow rate (vph)	13	0	66	475	25	142	6	655	0	0	292	3
Pedestrians		66			2			82				
Lane Width (ft)		12.0			15.0			11.0				
Walking Speed (ft/s)		3.5			3.5			3.5				
Percent Blockage		6			0			7				
Right turn flare (veh)												
Median type								TWLTL			TWLTL	
Median storage veh)								2			2	
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1181	1028	442	1110	1030	657	361			657		
vC1, stage 1 conf vol	360	360		669	669							
vC2, stage 2 conf vol	822	669		442	361							
vCu, unblocked vol	1181	1028	442	1110	1030	657	361			657		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	94	100	88	0	94	69	99			100		
cM capacity (veh/h)	227	396	532	346	395	464	1122			928		

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	79	475	167	6	655	295
Volume Left	13	475	0	6	0	0
Volume Right	66	0	142	0	0	3
cSH	436	346	452	1122	1700	1700
Volume to Capacity	0.18	1.37	0.37	0.01	0.39	0.17
Queue Length 95th (ft)	16	592	42	0	0	0
Control Delay (s)	15.1	216.0	17.6	8.2	0.0	0.0
Lane LOS	C	F	C	A		
Approach Delay (s)	15.1	164.4		0.1		0.0
Approach LOS	C	F				

Intersection Summary			
Average Delay	63.7		
Intersection Capacity Utilization	57.6%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	1	5	20	1	1	5	575	370	10	520	5
Future Volume (Veh/h)	2	1	5	20	1	1	5	575	370	10	520	5
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.44	0.44	0.44	0.67	0.67	0.67	0.73	0.73	0.73	0.66	0.66	0.66
Hourly flow rate (vph)	5	2	11	30	1	1	7	788	507	15	788	8
Pedestrians		66			36			2				
Lane Width (ft)		12.0			15.0			11.3				
Walking Speed (ft/s)		3.5			3.5			3.5				
Percent Blockage		6			4			0				
Right turn flare (veh)												
Median type								None			TWLTL	
Median storage veh)											2	
Upstream signal (ft)								1000				
pX, platoon unblocked												
vC, conflicting volume	1692	2233	860	1670	1730	824	862			1331		
vC1, stage 1 conf vol	888	888		838	838							
vC2, stage 2 conf vol	804	1345		832	892							
vCu, unblocked vol	1692	2233	860	1670	1730	824	862			1331		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	99	97	87	100	100	99			97		
cM capacity (veh/h)	234	165	333	239	245	357	731			496		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	18	32	7	788	507	15	796
Volume Left	5	30	7	0	0	15	0
Volume Right	11	1	0	0	507	0	8
cSH	270	242	731	1700	1700	496	1700
Volume to Capacity	0.07	0.13	0.01	0.46	0.30	0.03	0.47
Queue Length 95th (ft)	5	11	1	0	0	2	0
Control Delay (s)	19.3	22.1	10.0	0.0	0.0	12.5	0.0
Lane LOS	C	C	A			B	
Approach Delay (s)	19.3	22.1	0.1			0.2	
Approach LOS	C	C					

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	43.3%	ICU Level of Service	A
Analysis Period (min)	15		

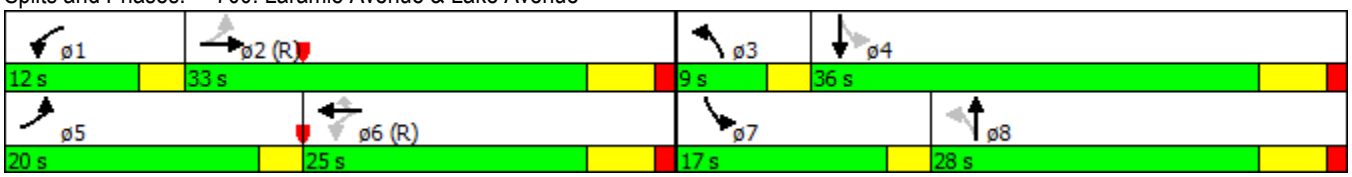
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	190	975	15	45	970	575	80	195	90	330	80	155
Future Volume (vph)	190	975	15	45	970	575	80	195	90	330	80	155
Ideal Flow (vphpl)	1900	1900	1900	1900	2000	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	12	11	12	12	11	15	12	11	12	12
Storage Length (ft)	250		0	90		125	75		0	430		0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (ft)	145			95			75			80		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00		0.98	0.99	0.98		0.99	0.98	
Frt		0.998				0.850		0.953			0.901	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1711	3346	0	1678	3725	1583	1711	1897	0	1711	1647	0
Flt Permitted	0.152			0.171			0.551			0.176		
Satd. Flow (perm)	274	3346	0	302	3725	1548	982	1897	0	314	1647	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2				343		24			116	
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		763			2594			773			1000	
Travel Time (s)		14.9			50.5			17.6			22.7	
Confl. Peds. (#/hr)	1		2	2		1	18		33	33		18
Peak Hour Factor	0.79	0.79	0.79	0.95	0.95	0.95	0.72	0.72	0.72	0.67	0.67	0.67
Heavy Vehicles (%)	2%	4%	7%	4%	2%	2%	2%	2%	6%	2%	2%	2%
Adj. Flow (vph)	241	1234	19	47	1021	605	111	271	125	493	119	231
Shared Lane Traffic (%)												
Lane Group Flow (vph)	241	1253	0	47	1021	605	111	396	0	493	350	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6		6	8			4		
Detector Phase	5	2		1	6	6	3	8		7	4	
Switch Phase												
Minimum Initial (s)	3.0	15.0		3.0	15.0	15.0	3.0	8.0		3.0	8.0	
Minimum Split (s)	6.0	21.0		6.0	21.0	21.0	6.0	14.0		6.0	14.0	
Total Split (s)	20.0	33.0		12.0	25.0	25.0	9.0	28.0		17.0	36.0	
Total Split (%)	22.2%	36.7%		13.3%	27.8%	27.8%	10.0%	31.1%		18.9%	40.0%	
Maximum Green (s)	17.0	27.0		9.0	19.0	19.0	6.0	22.0		14.0	30.0	
Yellow Time (s)	3.0	4.5		3.0	4.5	4.5	3.0	4.5		3.0	4.5	
All-Red Time (s)	0.0	1.5		0.0	1.5	1.5	0.0	1.5		0.0	1.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.0		3.0	6.0	6.0	3.0	6.0		3.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	7.0		3.0	7.0	7.0	3.0	4.0		3.0	4.0	
Recall Mode	None	C-Max		None	C-Max	C-Max	None	None		None	None	
Act Effct Green (s)	43.1	33.7		33.9	24.0	24.0	29.9	20.9		40.9	30.7	
Actuated g/C Ratio	0.48	0.37		0.38	0.27	0.27	0.33	0.23		0.45	0.34	
v/c Ratio	0.71	1.00		0.21	1.03	0.91	0.30	0.86		1.37	0.55	
Control Delay	28.6	56.6		16.4	71.7	35.4	17.0	51.0		207.0	19.7	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay	28.6	56.6		16.4	71.7	35.4	17.0	51.0		207.0	19.7	
LOS	C	E		B	E	D	B	D		F	B	
Approach Delay		52.1			57.0			43.6			129.2	
Approach LOS		D			E			D			F	
90th %ile Green (s)	17.0	27.4		8.6	19.0	19.0	6.0	22.0		14.0	30.0	
90th %ile Term Code	Max	Coord		Gap	Coord	Coord	Max	Max		Max	Hold	
70th %ile Green (s)	15.4	28.5		7.5	20.6	20.6	6.0	22.0		14.0	30.0	
70th %ile Term Code	Gap	Coord		Gap	Coord	Coord	Max	Max		Max	Hold	
50th %ile Green (s)	13.3	29.2		6.8	22.7	22.7	6.0	22.0		14.0	30.0	
50th %ile Term Code	Gap	Coord		Gap	Coord	Coord	Max	Max		Max	Hold	
30th %ile Green (s)	11.3	39.6		0.0	25.3	25.3	6.0	21.4		14.0	29.4	
30th %ile Term Code	Gap	Coord		Skip	Coord	Coord	Max	Gap		Max	Hold	
10th %ile Green (s)	8.6	43.9		0.0	32.3	32.3	0.0	17.1		14.0	34.1	
10th %ile Term Code	Gap	Coord		Skip	Coord	Coord	Skip	Gap		Max	Hold	
Queue Length 50th (ft)	82	~448		14	~346	160	35	201		~314	105	
Queue Length 95th (ft)	124	#488		33	#518	#405	51	228		#305	114	
Internal Link Dist (ft)		683			2514			693			920	
Turn Bay Length (ft)	250			90		125	75			430		
Base Capacity (vph)	402	1254		258	992	663	374	481		359	640	
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.60	1.00		0.18	1.03	0.91	0.30	0.82		1.37	0.55	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.37
Intersection Signal Delay: 67.4 Intersection LOS: E
Intersection Capacity Utilization 87.6% ICU Level of Service E
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 700: Laramie Avenue & Lake Avenue



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	45	200	125	75	170	80
Future Volume (vph)	45	200	125	75	170	80
Peak Hour Factor	0.82	0.82	0.75	0.75	0.64	0.64
Hourly flow rate (vph)	55	244	167	100	266	125

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total (vph)	299	267	266	125
Volume Left (vph)	0	167	266	0
Volume Right (vph)	244	0	0	125
Hadj (s)	-0.44	0.16	0.55	-0.67
Departure Headway (s)	5.0	5.6	6.5	5.3
Degree Utilization, x	0.42	0.42	0.48	0.18
Capacity (veh/h)	682	610	520	641
Control Delay (s)	11.5	12.6	14.3	8.3
Approach Delay (s)	11.5	12.6	12.4	
Approach LOS	B	B	B	

Intersection Summary			
Delay	12.2		
Level of Service	B		
Intersection Capacity Utilization	49.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	25	10	240	5	10	315
Future Volume (Veh/h)	25	10	240	5	10	315
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.77	0.77	0.67	0.67	0.83	0.83
Hourly flow rate (vph)	32	13	358	7	12	380
Pedestrians	68					
Lane Width (ft)	15.0					
Walking Speed (ft/s)	3.5					
Percent Blockage	8					
Right turn flare (veh)						
Median type			TWLTL			TWLTL
Median storage veh)			2			2
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	834	430			433	
vC1, stage 1 conf vol	430					
vC2, stage 2 conf vol	404					
vCu, unblocked vol	834	430			433	
tC, single (s)	6.5	6.3			4.1	
tC, 2 stage (s)	5.5					
tF (s)	3.6	3.4			2.2	
p0 queue free %	93	98			99	
cM capacity (veh/h)	489	561			1035	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	45	365	12	380
Volume Left	32	0	12	0
Volume Right	13	7	0	0
cSH	508	1700	1035	1700
Volume to Capacity	0.09	0.21	0.01	0.22
Queue Length 95th (ft)	7	0	1	0
Control Delay (s)	12.8	0.0	8.5	0.0
Lane LOS	B		A	
Approach Delay (s)	12.8	0.0	0.3	
Approach LOS	B			

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	26.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	10	5	240	335	5
Future Volume (Veh/h)	5	10	5	240	335	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.27	0.27	0.68	0.68	0.83	0.83
Hourly flow rate (vph)	19	37	7	353	404	6
Pedestrians	7				1	
Lane Width (ft)	12.0				11.0	
Walking Speed (ft/s)	3.5				3.5	
Percent Blockage	1				0	
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	782	414	417			
vC1, stage 1 conf vol	414					
vC2, stage 2 conf vol	368					
vCu, unblocked vol	782	414	417			
tC, single (s)	6.6	6.2	4.1			
tC, 2 stage (s)	5.6					
tF (s)	3.7	3.3	2.2			
p0 queue free %	96	94	99			
cM capacity (veh/h)	526	634	1134			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	56	7	353	410
Volume Left	19	7	0	0
Volume Right	37	0	0	6
cSH	593	1134	1700	1700
Volume to Capacity	0.09	0.01	0.21	0.24
Queue Length 95th (ft)	8	0	0	0
Control Delay (s)	11.7	8.2	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	11.7	0.2		0.0
Approach LOS	B			

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	27.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	15	1	245	85	15	330
Future Volume (Veh/h)	15	1	245	85	15	330
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.67	0.67	0.80	0.80	0.83	0.83
Hourly flow rate (vph)	22	1	306	106	18	398
Pedestrians	9		1			80
Lane Width (ft)	15.0		11.0			11.0
Walking Speed (ft/s)	3.5		3.5			3.5
Percent Blockage	1		0			7
Right turn flare (veh)						
Median type			TWLTL			TWLTL
Median storage veh)			2			2
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	803	448			421	
vC1, stage 1 conf vol	368					
vC2, stage 2 conf vol	435					
vCu, unblocked vol	803	448			421	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	96	100			98	
cM capacity (veh/h)	544	562			1126	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	23	412	18	398
Volume Left	22	0	18	0
Volume Right	1	106	0	0
cSH	545	1700	1126	1700
Volume to Capacity	0.04	0.24	0.02	0.23
Queue Length 95th (ft)	3	0	1	0
Control Delay (s)	11.9	0.0	8.2	0.0
Lane LOS	B		A	
Approach Delay (s)	11.9	0.0	0.4	
Approach LOS	B			

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	37.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	0	20	170	10	50	5	275	0	0	345	1
Future Volume (Veh/h)	5	0	20	170	10	50	5	275	0	0	345	1
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.36	0.36	0.36	0.61	0.61	0.61	0.84	0.84	0.84	0.81	0.81	0.81
Hourly flow rate (vph)	14	0	56	279	16	82	6	327	0	0	426	1
Pedestrians		24			35						68	
Lane Width (ft)		12.0			15.0						11.0	
Walking Speed (ft/s)		3.5			3.5						3.5	
Percent Blockage		2			4						6	
Right turn flare (veh)												
Median type								TWLTL			TWLTL	
Median storage veh)								2			2	
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	948	824	450	856	825	430	451			362		
vC1, stage 1 conf vol	450	450		374	374							
vC2, stage 2 conf vol	497	374		482	451							
vCu, unblocked vol	948	824	450	856	825	430	451			362		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	96	100	91	35	97	85	99			100		
cM capacity (veh/h)	371	466	595	432	463	564	1084			1147		

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	70	279	98	6	327	427
Volume Left	14	279	0	6	0	0
Volume Right	56	0	82	0	0	1
cSH	531	432	544	1084	1700	1700
Volume to Capacity	0.13	0.65	0.18	0.01	0.19	0.25
Queue Length 95th (ft)	11	111	16	0	0	0
Control Delay (s)	12.8	27.3	13.1	8.3	0.0	0.0
Lane LOS	B	D	B	A		
Approach Delay (s)	12.8	23.6		0.2		0.0
Approach LOS	B	C				

Intersection Summary			
Average Delay	8.2		
Intersection Capacity Utilization	41.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	1	25	135	1	5	5	270	45	1	535	2
Future Volume (Veh/h)	5	1	25	135	1	5	5	270	45	1	535	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.31	0.31	0.31	0.36	0.36	0.36	0.85	0.85	0.85	0.98	0.98	0.98
Hourly flow rate (vph)	16	3	81	375	3	14	6	318	53	1	546	2
Pedestrians		63			35			3			1	
Lane Width (ft)		12.0			15.0			11.3			11.0	
Walking Speed (ft/s)		3.5			3.5			3.5			3.5	
Percent Blockage		6			4			0			0	
Right turn flare (veh)												
Median type								None			TWLTL	
Median storage veh)											2	
Upstream signal (ft)								1000				
pX, platoon unblocked												
vC, conflicting volume	958	1030	613	998	978	354	611			406		
vC1, stage 1 conf vol	612	612		365	365							
vC2, stage 2 conf vol	346	418		634	613							
vCu, unblocked vol	958	1030	613	998	978	354	611			406		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	96	99	82	0	99	98	99			100		
cM capacity (veh/h)	399	390	462	340	397	660	910			1105		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	100	392	6	318	53	1	548
Volume Left	16	375	6	0	0	1	0
Volume Right	81	14	0	0	53	0	2
cSH	448	346	910	1700	1700	1105	1700
Volume to Capacity	0.22	1.13	0.01	0.19	0.03	0.00	0.32
Queue Length 95th (ft)	21	384	0	0	0	0	0
Control Delay (s)	15.3	124.1	9.0	0.0	0.0	8.3	0.0
Lane LOS	C	F	A			A	
Approach Delay (s)	15.3	124.1	0.1			0.0	
Approach LOS	C	F					

Intersection Summary				
Average Delay	35.4			
Intersection Capacity Utilization	49.5%	ICU Level of Service	A	
Analysis Period (min)	15			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	60	1110	25	70	1085	215	40	40	85	445	150	200
Future Volume (vph)	60	1110	25	70	1085	215	40	40	85	445	150	200
Ideal Flow (vphpl)	1900	1900	1900	1900	2000	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	12	11	12	12	11	15	12	11	12	12
Storage Length (ft)	250		0	90		125	75		0	430		0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (ft)	145			95			75			80		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00		0.95	0.99	0.98		0.99	0.98	
Frt		0.997				0.850		0.898			0.914	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1616	3409	0	1694	3654	1583	1711	1806	0	1711	1660	0
Flt Permitted	0.131			0.131			0.315			0.421		
Satd. Flow (perm)	222	3409	0	234	3654	1509	560	1806	0	754	1660	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2				145		118			81	
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		763			1387			773			1000	
Travel Time (s)		14.9			27.0			17.6			22.7	
Confl. Peds. (#/hr)	14		2	2		14	37		14	14		37
Peak Hour Factor	0.91	0.91	0.91	0.95	0.95	0.95	0.54	0.54	0.54	0.74	0.74	0.74
Heavy Vehicles (%)	8%	2%	2%	3%	4%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	66	1220	27	74	1142	226	74	74	157	601	203	270
Shared Lane Traffic (%)												
Lane Group Flow (vph)	66	1247	0	74	1142	226	74	231	0	601	473	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6		6	8			4		
Detector Phase	5	2		1	6	6	3	8		7	4	
Switch Phase												
Minimum Initial (s)	3.0	15.0		3.0	15.0	15.0	3.0	8.0		3.0	8.0	
Minimum Split (s)	6.0	21.0		6.0	21.0	21.0	6.0	14.0		6.0	14.0	
Total Split (s)	12.0	29.0		12.0	29.0	29.0	12.0	31.0		18.0	37.0	
Total Split (%)	13.3%	32.2%		13.3%	32.2%	32.2%	13.3%	34.4%		20.0%	41.1%	
Maximum Green (s)	9.0	23.0		9.0	23.0	23.0	9.0	25.0		15.0	31.0	
Yellow Time (s)	3.0	4.5		3.0	4.5	4.5	3.0	4.5		3.0	4.5	
All-Red Time (s)	0.0	1.5		0.0	1.5	1.5	0.0	1.5		0.0	1.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.0		3.0	6.0	6.0	3.0	6.0		3.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	7.0		3.0	7.0	7.0	3.0	4.0		3.0	4.0	
Recall Mode	None	C-Max		None	C-Max	C-Max	None	None		None	None	
Act Effct Green (s)	41.1	31.7		41.3	31.9	31.9	29.9	19.4		40.4	28.7	
Actuated g/C Ratio	0.46	0.35		0.46	0.35	0.35	0.33	0.22		0.45	0.32	
v/c Ratio	0.31	1.04		0.32	0.88	0.36	0.26	0.48		1.21	0.81	
Control Delay	18.8	68.8		18.8	40.7	12.2	15.3	17.0		133.7	35.1	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay	18.8	68.8		18.8	40.7	12.2	15.3	17.0		133.7	35.1	
LOS	B	E		B	D	B	B	B		F	D	
Approach Delay		66.3			35.1			16.6			90.3	
Approach LOS		E			D			B			F	
90th %ile Green (s)	9.0	23.0		9.0	23.0	23.0	9.0	25.0		15.0	31.0	
90th %ile Term Code	Max	Coord		Max	Coord	Coord	Max	Hold		Max	Max	
70th %ile Green (s)	8.6	23.2		8.8	23.4	23.4	8.3	25.0		15.0	31.7	
70th %ile Term Code	Gap	Coord		Gap	Coord	Coord	Gap	Hold		Max	Max	
50th %ile Green (s)	7.5	27.5		7.7	27.7	27.7	7.6	21.8		15.0	29.2	
50th %ile Term Code	Gap	Coord		Gap	Coord	Coord	Gap	Hold		Max	Gap	
30th %ile Green (s)	6.5	33.0		6.7	33.2	33.2	6.9	17.3		15.0	25.4	
30th %ile Term Code	Gap	Coord		Gap	Coord	Coord	Gap	Hold		Max	Gap	
10th %ile Green (s)	0.0	52.0		0.0	52.0	52.0	0.0	8.0		15.0	26.0	
10th %ile Term Code	Skip	Coord		Skip	Coord	Coord	Skip	Min		Max	Hold	
Queue Length 50th (ft)	20	~458		23	~350	34	22	52		~335	204	
Queue Length 95th (ft)	48	#647		51	#552	101	25	40		#341	228	
Internal Link Dist (ft)		683			1307			693			920	
Turn Bay Length (ft)	250			90		125	75			430		
Base Capacity (vph)	242	1203		255	1293	627	310	586		498	627	
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.27	1.04		0.29	0.88	0.36	0.24	0.39		1.21	0.75	

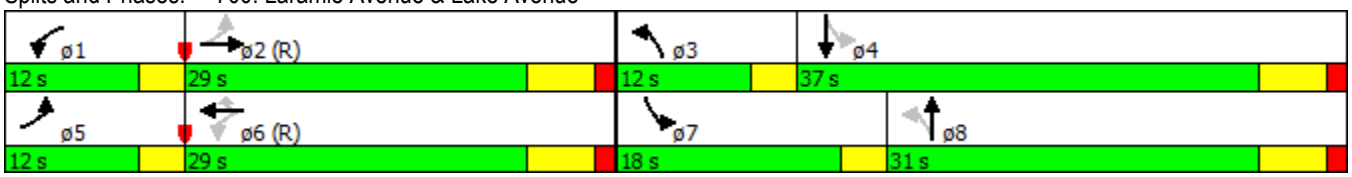
Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.21
Intersection Signal Delay: 58.0 Intersection LOS: E
Intersection Capacity Utilization 85.0% ICU Level of Service E
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 700: Laramie Avenue & Lake Avenue



FUTURE SYNCHRO CAPACITY REPORTS

Weekday Morning Peak Hour

Weekday School Dismissal Peak Hour

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	95	170	105	25	250	150
Future Volume (vph)	95	170	105	25	250	150
Peak Hour Factor	0.61	0.61	0.66	0.66	0.83	0.83
Hourly flow rate (vph)	156	279	159	38	301	181

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total (vph)	435	197	301	181
Volume Left (vph)	0	159	301	0
Volume Right (vph)	279	0	0	181
Hadj (s)	-0.34	0.20	0.57	-0.67
Departure Headway (s)	5.3	6.1	6.8	5.6
Degree Utilization, x	0.63	0.34	0.57	0.28
Capacity (veh/h)	664	551	506	620
Control Delay (s)	16.9	12.2	17.2	9.5
Approach Delay (s)	16.9	12.2	14.3	
Approach LOS	C	B	B	

Intersection Summary			
Delay	15.0		
Level of Service	B		
Intersection Capacity Utilization	47.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	10	10	390	10	10	265
Future Volume (Veh/h)	10	10	390	10	10	265
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.50	0.50	0.87	0.87	0.75	0.75
Hourly flow rate (vph)	20	20	448	11	13	353
Pedestrians	86					
Lane Width (ft)	15.0					
Walking Speed (ft/s)	3.5					
Percent Blockage	10					
Right turn flare (veh)						
Median type			TWLTL			TWLTL
Median storage veh)			2			2
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	918	540			545	
vC1, stage 1 conf vol	540					
vC2, stage 2 conf vol	379					
vCu, unblocked vol	918	540			545	
tC, single (s)	6.7	6.4			4.1	
tC, 2 stage (s)	5.7					
tF (s)	3.8	3.5			2.2	
p0 queue free %	95	96			99	
cM capacity (veh/h)	417	457			919	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	40	459	13	353
Volume Left	20	0	13	0
Volume Right	20	11	0	0
cSH	436	1700	919	1700
Volume to Capacity	0.09	0.27	0.01	0.21
Queue Length 95th (ft)	8	0	1	0
Control Delay (s)	14.1	0.0	9.0	0.0
Lane LOS	B		A	
Approach Delay (s)	14.1	0.0	0.3	
Approach LOS	B			

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	31.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	30	105	395	265	10
Future Volume (Veh/h)	5	30	105	395	265	10
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.35	0.35	0.84	0.84	0.74	0.74
Hourly flow rate (vph)	14	86	125	470	358	14
Pedestrians	7			4		
Lane Width (ft)	12.0			11.0		
Walking Speed (ft/s)	3.5			3.5		
Percent Blockage	1			0		
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1092	376	379			
vC1, stage 1 conf vol	372					
vC2, stage 2 conf vol	720					
vCu, unblocked vol	1092	376	379			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	87	89			
cM capacity (veh/h)	394	664	1172			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	100	125	470	372
Volume Left	14	125	0	0
Volume Right	86	0	0	14
cSH	605	1172	1700	1700
Volume to Capacity	0.17	0.11	0.28	0.22
Queue Length 95th (ft)	15	9	0	0
Control Delay (s)	12.1	8.4	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	12.1	1.8		0.0
Approach LOS	B			

Intersection Summary			
Average Delay	2.1		
Intersection Capacity Utilization	35.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	5	15	485	175	75	220
Future Volume (Veh/h)	5	15	485	175	75	220
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.50	0.50	0.89	0.89	0.70	0.70
Hourly flow rate (vph)	10	30	545	197	107	314
Pedestrians						41
Lane Width (ft)						11.0
Walking Speed (ft/s)						3.5
Percent Blockage						4
Right turn flare (veh)						
Median type			TWLTL			TWLTL
Median storage veh)			2			2
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1172	684			742	
vC1, stage 1 conf vol	644					
vC2, stage 2 conf vol	528					
vCu, unblocked vol	1172	684			742	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	93			88	
cM capacity (veh/h)	400	432			865	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	40	742	107	314
Volume Left	10	0	107	0
Volume Right	30	197	0	0
cSH	424	1700	865	1700
Volume to Capacity	0.09	0.44	0.12	0.18
Queue Length 95th (ft)	8	0	11	0
Control Delay (s)	14.4	0.0	9.7	0.0
Lane LOS	B		A	
Approach Delay (s)	14.4	0.0	2.5	
Approach LOS	B			

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	61.2%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	0	25	285	15	85	5	570	0	0	225	2
Future Volume (Veh/h)	5	0	25	285	15	85	5	570	0	0	225	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.38	0.38	0.38	0.60	0.60	0.60	0.87	0.87	0.87	0.77	0.77	0.77
Hourly flow rate (vph)	13	0	66	475	25	142	6	655	0	0	292	3
Pedestrians		66			2			82				
Lane Width (ft)		12.0			15.0			11.0				
Walking Speed (ft/s)		3.5			3.5			3.5				
Percent Blockage		6			0			7				
Right turn flare (veh)												
Median type								TWLTL			TWLTL	
Median storage veh)								2			2	
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1181	1028	442	1110	1030	657	361			657		
vC1, stage 1 conf vol	360	360		669	669							
vC2, stage 2 conf vol	822	669		442	361							
vCu, unblocked vol	1181	1028	442	1110	1030	657	361			657		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	94	100	88	0	94	69	99			100		
cM capacity (veh/h)	227	396	532	346	395	464	1122			928		

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	79	475	167	6	655	295
Volume Left	13	475	0	6	0	0
Volume Right	66	0	142	0	0	3
cSH	436	346	452	1122	1700	1700
Volume to Capacity	0.18	1.37	0.37	0.01	0.39	0.17
Queue Length 95th (ft)	16	592	42	0	0	0
Control Delay (s)	15.1	216.0	17.6	8.2	0.0	0.0
Lane LOS	C	F	C	A		
Approach Delay (s)	15.1	164.4		0.1		0.0
Approach LOS	C	F				

Intersection Summary			
Average Delay	63.7		
Intersection Capacity Utilization	57.6%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	1	5	20	1	1	5	575	370	10	520	5
Future Volume (Veh/h)	2	1	5	20	1	1	5	575	370	10	520	5
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.44	0.44	0.44	0.67	0.67	0.67	0.73	0.73	0.73	0.66	0.66	0.66
Hourly flow rate (vph)	5	2	11	30	1	1	7	788	507	15	788	8
Pedestrians		66			36			2				
Lane Width (ft)		12.0			15.0			11.3				
Walking Speed (ft/s)		3.5			3.5			3.5				
Percent Blockage		6			4			0				
Right turn flare (veh)												
Median type								None			TWLTL	
Median storage veh)											2	
Upstream signal (ft)								1000				
pX, platoon unblocked												
vC, conflicting volume	1692	2233	860	1670	1730	824	862			1331		
vC1, stage 1 conf vol	888	888		838	838							
vC2, stage 2 conf vol	804	1345		832	892							
vCu, unblocked vol	1692	2233	860	1670	1730	824	862			1331		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	99	97	87	100	100	99			97		
cM capacity (veh/h)	234	165	333	239	245	357	731			496		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	18	32	7	788	507	15	796
Volume Left	5	30	7	0	0	15	0
Volume Right	11	1	0	0	507	0	8
cSH	270	242	731	1700	1700	496	1700
Volume to Capacity	0.07	0.13	0.01	0.46	0.30	0.03	0.47
Queue Length 95th (ft)	5	11	1	0	0	2	0
Control Delay (s)	19.3	22.1	10.0	0.0	0.0	12.5	0.0
Lane LOS	C	C	A			B	
Approach Delay (s)	19.3	22.1	0.1			0.2	
Approach LOS	C	C					

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	43.3%	ICU Level of Service	A
Analysis Period (min)	15		

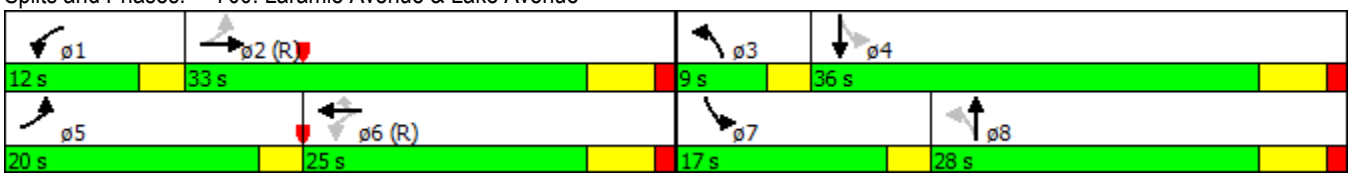
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	190	975	15	45	970	575	80	195	90	330	80	155
Future Volume (vph)	190	975	15	45	970	575	80	195	90	330	80	155
Ideal Flow (vphpl)	1900	1900	1900	1900	2000	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	12	11	12	12	11	15	12	11	12	12
Storage Length (ft)	250		0	90		125	75		0	430		0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (ft)	145			95			75			80		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00		0.98	0.99	0.98		0.99	0.98	
Frt		0.998				0.850		0.953			0.901	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1711	3346	0	1678	3725	1583	1711	1897	0	1711	1647	0
Flt Permitted	0.152			0.171			0.551			0.176		
Satd. Flow (perm)	274	3346	0	302	3725	1548	982	1897	0	314	1647	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2				343		24			116	
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		763			2594			773			1000	
Travel Time (s)		14.9			50.5			17.6			22.7	
Confl. Peds. (#/hr)	1		2	2		1	18		33	33		18
Peak Hour Factor	0.79	0.79	0.79	0.95	0.95	0.95	0.72	0.72	0.72	0.67	0.67	0.67
Heavy Vehicles (%)	2%	4%	7%	4%	2%	2%	2%	2%	6%	2%	2%	2%
Adj. Flow (vph)	241	1234	19	47	1021	605	111	271	125	493	119	231
Shared Lane Traffic (%)												
Lane Group Flow (vph)	241	1253	0	47	1021	605	111	396	0	493	350	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6		6	8			4		
Detector Phase	5	2		1	6	6	3	8		7	4	
Switch Phase												
Minimum Initial (s)	3.0	15.0		3.0	15.0	15.0	3.0	8.0		3.0	8.0	
Minimum Split (s)	6.0	21.0		6.0	21.0	21.0	6.0	14.0		6.0	14.0	
Total Split (s)	20.0	33.0		12.0	25.0	25.0	9.0	28.0		17.0	36.0	
Total Split (%)	22.2%	36.7%		13.3%	27.8%	27.8%	10.0%	31.1%		18.9%	40.0%	
Maximum Green (s)	17.0	27.0		9.0	19.0	19.0	6.0	22.0		14.0	30.0	
Yellow Time (s)	3.0	4.5		3.0	4.5	4.5	3.0	4.5		3.0	4.5	
All-Red Time (s)	0.0	1.5		0.0	1.5	1.5	0.0	1.5		0.0	1.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.0		3.0	6.0	6.0	3.0	6.0		3.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	7.0		3.0	7.0	7.0	3.0	4.0		3.0	4.0	
Recall Mode	None	C-Max		None	C-Max	C-Max	None	None		None	None	
Act Effct Green (s)	43.1	33.7		33.9	24.0	24.0	29.9	20.9		40.9	30.7	
Actuated g/C Ratio	0.48	0.37		0.38	0.27	0.27	0.33	0.23		0.45	0.34	
v/c Ratio	0.71	1.00		0.21	1.03	0.91	0.30	0.86		1.37	0.55	
Control Delay	28.6	56.6		16.4	71.7	35.4	17.0	51.0		207.0	19.7	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay	28.6	56.6		16.4	71.7	35.4	17.0	51.0		207.0	19.7	
LOS	C	E		B	E	D	B	D		F	B	
Approach Delay		52.1			57.0			43.6			129.2	
Approach LOS		D			E			D			F	
90th %ile Green (s)	17.0	27.4		8.6	19.0	19.0	6.0	22.0		14.0	30.0	
90th %ile Term Code	Max	Coord		Gap	Coord	Coord	Max	Max		Max	Hold	
70th %ile Green (s)	15.4	28.5		7.5	20.6	20.6	6.0	22.0		14.0	30.0	
70th %ile Term Code	Gap	Coord		Gap	Coord	Coord	Max	Max		Max	Hold	
50th %ile Green (s)	13.3	29.2		6.8	22.7	22.7	6.0	22.0		14.0	30.0	
50th %ile Term Code	Gap	Coord		Gap	Coord	Coord	Max	Max		Max	Hold	
30th %ile Green (s)	11.3	39.6		0.0	25.3	25.3	6.0	21.4		14.0	29.4	
30th %ile Term Code	Gap	Coord		Skip	Coord	Coord	Max	Gap		Max	Hold	
10th %ile Green (s)	8.6	43.9		0.0	32.3	32.3	0.0	17.1		14.0	34.1	
10th %ile Term Code	Gap	Coord		Skip	Coord	Coord	Skip	Gap		Max	Hold	
Queue Length 50th (ft)	82	~448		14	~346	160	35	201		~314	105	
Queue Length 95th (ft)	124	#488		33	#518	#405	51	228		#305	114	
Internal Link Dist (ft)		683			2514			693			920	
Turn Bay Length (ft)	250			90		125	75			430		
Base Capacity (vph)	402	1254		258	992	663	374	481		359	640	
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.60	1.00		0.18	1.03	0.91	0.30	0.82		1.37	0.55	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.37
Intersection Signal Delay: 67.4 Intersection LOS: E
Intersection Capacity Utilization 87.6% ICU Level of Service E
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 700: Laramie Avenue & Lake Avenue



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	45	200	80	75	170	80
Future Volume (vph)	45	200	80	75	170	80
Peak Hour Factor	0.82	0.82	0.75	0.75	0.64	0.64
Hourly flow rate (vph)	55	244	107	100	266	125

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total (vph)	299	207	266	125
Volume Left (vph)	0	107	266	0
Volume Right (vph)	244	0	0	125
Hadj (s)	-0.44	0.14	0.55	-0.67
Departure Headway (s)	4.9	5.6	6.4	5.1
Degree Utilization, x	0.41	0.32	0.47	0.18
Capacity (veh/h)	700	612	535	665
Control Delay (s)	11.2	11.1	13.7	8.1
Approach Delay (s)	11.2	11.1	11.9	
Approach LOS	B	B	B	

Intersection Summary			
Delay	11.5		
Level of Service	B		
Intersection Capacity Utilization	46.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	15	10	240	5	10	270
Future Volume (Veh/h)	15	10	240	5	10	270
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.77	0.77	0.67	0.67	0.83	0.83
Hourly flow rate (vph)	19	13	358	7	12	325
Pedestrians	68					
Lane Width (ft)	15.0					
Walking Speed (ft/s)	3.5					
Percent Blockage	8					
Right turn flare (veh)						
Median type			TWLTL			TWLTL
Median storage veh)			2			2
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	778	430			433	
vC1, stage 1 conf vol	430					
vC2, stage 2 conf vol	349					
vCu, unblocked vol	778	430			433	
tC, single (s)	6.6	6.3			4.1	
tC, 2 stage (s)	5.6					
tF (s)	3.7	3.4			2.2	
p0 queue free %	96	98			99	
cM capacity (veh/h)	489	561			1035	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	32	365	12	325
Volume Left	19	0	12	0
Volume Right	13	7	0	0
cSH	516	1700	1035	1700
Volume to Capacity	0.06	0.21	0.01	0.19
Queue Length 95th (ft)	5	0	1	0
Control Delay (s)	12.4	0.0	8.5	0.0
Lane LOS	B		A	
Approach Delay (s)	12.4	0.0	0.3	
Approach LOS	B			

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	24.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	135	5	240	280	5
Future Volume (Veh/h)	5	135	5	240	280	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.33	0.33	0.68	0.68	0.83	0.83
Hourly flow rate (vph)	15	409	7	353	337	6
Pedestrians	7				1	
Lane Width (ft)	12.0				11.0	
Walking Speed (ft/s)	3.5				3.5	
Percent Blockage	1				0	
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	715	347	350			
vC1, stage 1 conf vol	347					
vC2, stage 2 conf vol	368					
vCu, unblocked vol	715	347	350			
tC, single (s)	6.6	6.2	4.1			
tC, 2 stage (s)	5.6					
tF (s)	3.7	3.3	2.2			
p0 queue free %	97	41	99			
cM capacity (veh/h)	552	691	1201			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	424	7	353	343
Volume Left	15	7	0	0
Volume Right	409	0	0	6
cSH	685	1201	1700	1700
Volume to Capacity	0.62	0.01	0.21	0.20
Queue Length 95th (ft)	108	0	0	0
Control Delay (s)	18.4	8.0	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	18.4	0.2		0.0
Approach LOS	C			

Intersection Summary			
Average Delay	7.0		
Intersection Capacity Utilization	30.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	5	1	245	85	15	400
Future Volume (Veh/h)	5	1	245	85	15	400
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.67	0.67	0.80	0.80	0.83	0.83
Hourly flow rate (vph)	7	1	306	106	18	482
Pedestrians	9		1			80
Lane Width (ft)	15.0		11.0			11.0
Walking Speed (ft/s)	3.5		3.5			3.5
Percent Blockage	1		0			7
Right turn flare (veh)						
Median type			TWLTL			TWLTL
Median storage veh)			2			2
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	887	448			421	
vC1, stage 1 conf vol	368					
vC2, stage 2 conf vol	519					
vCu, unblocked vol	887	448			421	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	100			98	
cM capacity (veh/h)	509	562			1126	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	8	412	18	482
Volume Left	7	0	18	0
Volume Right	1	106	0	0
cSH	515	1700	1126	1700
Volume to Capacity	0.02	0.24	0.02	0.28
Queue Length 95th (ft)	1	0	1	0
Control Delay (s)	12.1	0.0	8.2	0.0
Lane LOS	B		A	
Approach Delay (s)	12.1	0.0	0.3	
Approach LOS	B			

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	40.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	0	20	110	10	50	5	275	0	0	405	1
Future Volume (Veh/h)	5	0	20	110	10	50	5	275	0	0	405	1
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.36	0.36	0.36	0.61	0.61	0.61	0.84	0.84	0.84	0.81	0.81	0.81
Hourly flow rate (vph)	14	0	56	180	16	82	6	327	0	0	500	1
Pedestrians		24			35						68	
Lane Width (ft)		12.0			15.0						11.0	
Walking Speed (ft/s)		3.5			3.5						3.5	
Percent Blockage		2			4						6	
Right turn flare (veh)												
Median type								TWLTL			TWLTL	
Median storage veh)								2			2	
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1022	898	524	930	899	430	525			362		
vC1, stage 1 conf vol	524	524		374	374							
vC2, stage 2 conf vol	497	374		556	525							
vCu, unblocked vol	1022	898	524	930	899	430	525			362		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	96	100	90	55	96	85	99			100		
cM capacity (veh/h)	356	441	540	398	438	564	1018			1147		

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	70	180	98	6	327	501
Volume Left	14	180	0	6	0	0
Volume Right	56	0	82	0	0	1
cSH	489	398	538	1018	1700	1700
Volume to Capacity	0.14	0.45	0.18	0.01	0.19	0.29
Queue Length 95th (ft)	12	57	16	0	0	0
Control Delay (s)	13.6	21.3	13.2	8.6	0.0	0.0
Lane LOS	B	C	B	A		
Approach Delay (s)	13.6	18.4		0.2		0.0
Approach LOS	B	C				

Intersection Summary			
Average Delay	5.2		
Intersection Capacity Utilization	41.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	1	25	135	1	5	5	270	45	1	535	2
Future Volume (Veh/h)	5	1	25	135	1	5	5	270	45	1	535	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.31	0.31	0.31	0.36	0.36	0.36	0.85	0.85	0.85	0.98	0.98	0.98
Hourly flow rate (vph)	16	3	81	375	3	14	6	318	53	1	546	2
Pedestrians		63			35			3			1	
Lane Width (ft)		12.0			15.0			11.3			11.0	
Walking Speed (ft/s)		3.5			3.5			3.5			3.5	
Percent Blockage		6			4			0			0	
Right turn flare (veh)												
Median type								None			TWLTL	
Median storage veh)											2	
Upstream signal (ft)								1000				
pX, platoon unblocked												
vC, conflicting volume	958	1030	613	998	978	354	611			406		
vC1, stage 1 conf vol	612	612		365	365							
vC2, stage 2 conf vol	346	418		634	613							
vCu, unblocked vol	958	1030	613	998	978	354	611			406		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	96	99	82	0	99	98	99			100		
cM capacity (veh/h)	399	390	462	340	397	660	910			1105		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	100	392	6	318	53	1	548
Volume Left	16	375	6	0	0	1	0
Volume Right	81	14	0	0	53	0	2
cSH	448	346	910	1700	1700	1105	1700
Volume to Capacity	0.22	1.13	0.01	0.19	0.03	0.00	0.32
Queue Length 95th (ft)	21	384	0	0	0	0	0
Control Delay (s)	15.3	124.1	9.0	0.0	0.0	8.3	0.0
Lane LOS	C	F	A			A	
Approach Delay (s)	15.3	124.1	0.1			0.0	
Approach LOS	C	F					

Intersection Summary				
Average Delay	35.4			
Intersection Capacity Utilization	49.5%	ICU Level of Service	A	
Analysis Period (min)	15			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	60	1110	25	70	1085	215	40	40	85	445	150	200
Future Volume (vph)	60	1110	25	70	1085	215	40	40	85	445	150	200
Ideal Flow (vphpl)	1900	1900	1900	1900	2000	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	12	11	12	12	11	15	12	11	12	12
Storage Length (ft)	250		0	90		125	75		0	430		0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (ft)	145			95			75			80		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00		0.95	0.99	0.98		0.99	0.98	
Frt		0.997				0.850		0.898			0.914	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1616	3409	0	1694	3654	1583	1711	1806	0	1711	1660	0
Flt Permitted	0.131			0.131			0.315			0.421		
Satd. Flow (perm)	222	3409	0	234	3654	1509	560	1806	0	754	1660	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2				145		118			81	
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		763			1387			773			1000	
Travel Time (s)		14.9			27.0			17.6			22.7	
Confl. Peds. (#/hr)	14		2	2		14	37		14	14		37
Peak Hour Factor	0.91	0.91	0.91	0.95	0.95	0.95	0.54	0.54	0.54	0.74	0.74	0.74
Heavy Vehicles (%)	8%	2%	2%	3%	4%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	66	1220	27	74	1142	226	74	74	157	601	203	270
Shared Lane Traffic (%)												
Lane Group Flow (vph)	66	1247	0	74	1142	226	74	231	0	601	473	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6		6	8			4		
Detector Phase	5	2		1	6	6	3	8		7	4	
Switch Phase												
Minimum Initial (s)	3.0	15.0		3.0	15.0	15.0	3.0	8.0		3.0	8.0	
Minimum Split (s)	6.0	21.0		6.0	21.0	21.0	6.0	14.0		6.0	14.0	
Total Split (s)	12.0	29.0		12.0	29.0	29.0	12.0	31.0		18.0	37.0	
Total Split (%)	13.3%	32.2%		13.3%	32.2%	32.2%	13.3%	34.4%		20.0%	41.1%	
Maximum Green (s)	9.0	23.0		9.0	23.0	23.0	9.0	25.0		15.0	31.0	
Yellow Time (s)	3.0	4.5		3.0	4.5	4.5	3.0	4.5		3.0	4.5	
All-Red Time (s)	0.0	1.5		0.0	1.5	1.5	0.0	1.5		0.0	1.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.0		3.0	6.0	6.0	3.0	6.0		3.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	7.0		3.0	7.0	7.0	3.0	4.0		3.0	4.0	
Recall Mode	None	C-Max		None	C-Max	C-Max	None	None		None	None	
Act Effct Green (s)	41.1	31.7		41.3	31.9	31.9	29.9	19.4		40.4	28.7	
Actuated g/C Ratio	0.46	0.35		0.46	0.35	0.35	0.33	0.22		0.45	0.32	
v/c Ratio	0.31	1.04		0.32	0.88	0.36	0.26	0.48		1.21	0.81	
Control Delay	18.8	68.8		18.8	40.7	12.2	15.3	17.0		133.7	35.1	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay	18.8	68.8		18.8	40.7	12.2	15.3	17.0		133.7	35.1	
LOS	B	E		B	D	B	B	B		F	D	
Approach Delay		66.3			35.1			16.6			90.3	
Approach LOS		E			D			B			F	
90th %ile Green (s)	9.0	23.0		9.0	23.0	23.0	9.0	25.0		15.0	31.0	
90th %ile Term Code	Max	Coord		Max	Coord	Coord	Max	Hold		Max	Max	
70th %ile Green (s)	8.6	23.2		8.8	23.4	23.4	8.3	25.0		15.0	31.7	
70th %ile Term Code	Gap	Coord		Gap	Coord	Coord	Gap	Hold		Max	Max	
50th %ile Green (s)	7.5	27.5		7.7	27.7	27.7	7.6	21.8		15.0	29.2	
50th %ile Term Code	Gap	Coord		Gap	Coord	Coord	Gap	Hold		Max	Gap	
30th %ile Green (s)	6.5	33.0		6.7	33.2	33.2	6.9	17.3		15.0	25.4	
30th %ile Term Code	Gap	Coord		Gap	Coord	Coord	Gap	Hold		Max	Gap	
10th %ile Green (s)	0.0	52.0		0.0	52.0	52.0	0.0	8.0		15.0	26.0	
10th %ile Term Code	Skip	Coord		Skip	Coord	Coord	Skip	Min		Max	Hold	
Queue Length 50th (ft)	20	~458		23	~350	34	22	52		~335	204	
Queue Length 95th (ft)	48	#647		51	#552	101	25	40		#341	228	
Internal Link Dist (ft)		683			1307			693			920	
Turn Bay Length (ft)	250			90		125	75			430		
Base Capacity (vph)	242	1203		255	1293	627	310	586		498	627	
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.27	1.04		0.29	0.88	0.36	0.24	0.39		1.21	0.75	

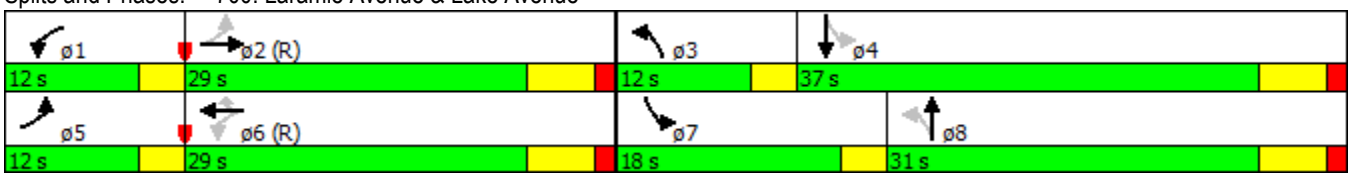
Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.21
Intersection Signal Delay: 58.0 Intersection LOS: E
Intersection Capacity Utilization 85.0% ICU Level of Service E
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 700: Laramie Avenue & Lake Avenue



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