University Avenue Mixed Use Development
Traffic Impact Study

CITY OF MADISON
DANE COUNTY, WISCONSIN

DATE SUBMITTED: AUGUST 7, 2017

PREPARED FOR:
Flad Development & Investment Corporation
3330 University Avenue, Ste. 206
Madison, Wisconsin 53705
Phone: (608) 833-8100
Contact Person: John Flad

PREPARED BY:
KL Engineering, Inc.
5400 King James Way, Suite 200
Madison, WI 53719
Phone: (608) 663-1218
Contact Person: Mike Scarmon

KL Engineering
[A] Better Experience

University Avenue Mixed Use Development
City of Madison, Dane County, Wisconsin
Traffic Impact Study

Table of Contents **Page**

1.0 Introduction 1
1.1 Study Purpose and Objective 1
1.2 Project Location and Study Area 1
2.0 Background Conditions 2
2.1 Existing Traffic Volumes 2
2.2 Existing Access Points 2
2.3 Existing Traffic Operations 2
3.0 Proposed Development 3
3.1 University Avenue Mixed Use Development 3
3.2 Proposed Access 3
3.3 Trip Generation 4
3.4 Trip Reductions 4
3.5 Trip Distribution and Assignment 5
3.6 Total Traffic 5
4.0 Proposed Conditions 5
4.1 Total Traffic Conditions 5
4.2 Neighborhood Traffic Impacts 6
4.3 Proposed Parking 6
5.0 Safety 7
5.1 Crash History 7
5.2 Access Changes 7
6.0 Improvements 7
6.1 University Avenue Intersection with Ridge Street and Marshall Court 7
6.2 Ridge Street Intersection with Harvey Street 8
7.0 Conclusions 8

Exhibits

Exhibit 1 – Project Location Map
Exhibit 2 – Existing Roadway Network
Exhibit 3 – Existing Traffic Volumes
Exhibit 4 – Existing Access Overview
Exhibit 5 – Existing 95th Percentile Queues
Exhibit 6 – Proposed Site Plan
Exhibit 7 – Proposed Access Overview
Exhibit 8 – Proposed Trip Distribution
Exhibit 9 – Proposed New Trips
Exhibit 10 – Proposed Pass-by Trips
Exhibit 11 – Proposed Driveway Trips
Exhibit 12 – Proposed Total Traffic
Exhibit 13 – Proposed 95th Percentile Queues

Appendices

Appendix A – Traffic Counts
Appendix B – Traffic Analysis Output

1.0 Introduction

Flad Development is proposing to construct a mixed use development containing apartment and commercial land uses on several parcels of land located at the southwest corner of the intersection of University Avenue with Ridge Street in Madison, Wisconsin. This is referred to as the University Avenue Mixed Use Development in this report.

KL Engineering was contacted by Flad Development and requested to perform a traffic impact study for the proposed development. This report was written to satisfy the City of Madison Traffic Engineering Department's Light TIA Requirement.

1.1 Study Purpose and Objective

The study included evaluation of traffic operations, access, and parking under existing conditions and full build out of the proposed development in order to determine impacts to the roadway network. Both weekday morning (AM) and evening (PM) peak hour traffic volumes were analyzed.

1.2 Project Location and Study Area

Project Location

The proposed development site is in Madison, WI, in the southwest quadrant of the intersection of University Avenue with Ridge Street. The site currently consists of a liquor store and three multi-family housing units and is bordered by University Avenue to the north, Ridge Street to the east, multi-family housing and a parking lot to the west, and Harvey Street to the south. A project location map is provided in **Exhibit 1**.

Study Area Roadways

The study area includes the following roadways:

University Avenue

University Avenue is classified by the City of Madison as a primary arterial, has a six-lane divided urban cross section, no bicycle lanes, no on-street parking within the study area, and speed limit of 35 miles per hour (mph). University Avenue is generally an east-west roadway within the study area and borders the north edge of the proposed University Avenue Mixed Use Development. University Avenue has an average weekday traffic (AWT) volume ranging from 53,300 to 54,400 vehicles per day (vpd) within the study area. Bus stops for several routes are located along University Avenue within the study area.

Ridge Street

Ridge Street is classified by the City of Madison as a local road, has a two-lane undivided compact cross section with on-street parking, no sidewalks, no curb or gutter, and a 25 mph speed limit. Pedestrians must walk in the roadway to travel along Ridge Street. This roadway runs north-south through a residential area and borders the east edge of the proposed development site. Ridge Street extends approximately 1,250 feet south from University Avenue where it ends and intersects with Bluff Street and Kendall Avenue. No daily traffic volume information is available for Ridge Street, however, peak hour traffic volumes along the roadway to the south of Harvey were found to be 130 vehicles per hour (vph).

Marshall Court

Marshall Court is classified by the City of Madison as a local road, has a two-lane undivided urban cross section, no on-street parking, and a 30 mph speed limit. Marshall Court is a north-south roadway within the study area and forms the leg opposite of Ridge Street at the intersection of Ridge Street and Marshall Court with University Avenue. Marshall Court continues approximately 300 feet north of University Avenue before intersecting with another roadway that continues to the east, also named Marshall Court, which provides access to several residential and commercial properties. No daily traffic information is available for Marshall Court, however, peak hour traffic volumes along the roadway were found to be 350 vph just north of University Avenue.

Harvey Street
Harvey Street is classified by the City of Madison as a local road, has a two-lane undivided compact cross section with on-street parking, no sidewalks, no curb or gutter, and a 25 mph speed limit. To the west of the study area, Harvey Street does have curb and gutter; some segments have sidewalk. Harvey Street runs east-west through a residential neighborhood and borders the south edge of the proposed development. Harvey Street extends approximately 300 feet east of Ridge Street, where it transitions into Franklin Court. No daily traffic information is available for Harvey Street, however, peak hour traffic volumes along the roadway were found to be 100 vph just west of Ridge Street.

Study Area Intersections
The study area roadways form the following study intersections:

University Avenue Intersection with Ridge Street and Marshall Court
The intersection of University Avenue with Ridge Street and Marshall Court is located on the northeast corner of the proposed development site. Marshall Court and Ridge Street form the north and south approaches, respectively. The intersection is controlled by a traffic signal; a median island restricts traffic movements to right-in, right-out, and left-in for the minor street approaches (Ridge Street and Marshall Court). Left turn lanes are provided on the University Avenue approaches. Signalized pedestrian crossings are provided across the south and east legs of the intersection, with a pedestrian refuge area within the median island on University Avenue. An additional signalized crosswalk is provided on the west leg of the intersection across only the eastbound lanes of University Avenue. An at-grade rail crossing exists across Marshall Court, immediately north of the intersection.

Ridge Street Intersection with Harvey Street
The intersection of Ridge Street and Harvey Street is located to the southeast of the proposed development. The intersection is stop-controlled on Harvey Street and free-flow on Ridge Street. No turn lanes are provided at the intersection.

An overview of the existing roadway network is provided in **Exhibit 2**.

2.0 Background Conditions

2.1 Existing Traffic Volumes

KL Engineering conducted turning movement counts at both study intersections during the week of July 9th, 2017. Traffic counts were taken for three hour periods during the morning and evening. Traffic count information is provided in **Appendix A.**

The morning and evening peak traffic volume hours at the study intersections were found to be 7:15 – 8:15 am and 4:00 – 5:00 pm. Existing traffic volumes based on the July 2017 counts are shown in **Exhibit 3**.

2.2 Existing Access Points

The development site currently has a combined total of five access points. Two full access points are located on Harvey Street related to multi-family housing. Two full access points are located on Ridge Street just south of University Avenue, one related to multi-family housing and one related to the liquor store. One right-in/right-out access point related to the liquor store is located on University Avenue. **Exhibit 4** includes an overview map of the existing access to the proposed development site.

2.3 Existing Traffic Operations

Existing traffic operations were analyzed using the software programs Synchro and SimTraffic. Existing traffic volumes, roadway geometrics, and intersection control devices were used for the analysis.

The analysis was used to quantify operations at each of the study intersections. For all delay and queuing analysis results at the intersection of Ridge Street with Harvey Street provided in this report, Synchro software was used

to implement the Highway Capacity Manual 2010 (HCM 2010) traffic analysis methodologies and estimate delays and queues for each vehicular movement. For all delay analysis results at the intersection of University Avenue with Ridge Street and Marshall Court provided in this report, the Synchro software methodology was used to estimate delays for each vehicular movement; SimTraffic software was used to simulate traffic operations and estimate 95th percentile queues for all vehicular movements. HCM 2010 was unable to be used to estimate delays at the intersection of University Avenue with Ridge Street and Marshall Court due to the unique nature of the traffic signal phasing at that intersection.

Estimated delays were used to assign a level of service (LOS) at each movement of each study intersection. Level of service is determined by taking delay levels from the mathematical models and assigning a letter grade meant to represent the operating conditions as perceived by the driver as specified in the HCM 2010. Existing levels of service are summarized in **Table 1**.

Table 1. Existing Level of Service by Movement

Intersection	Peak	Movement											
		Northbound			Southbound			Eastbound			Westbound		
		L	T	R	L	T	R	L	T	R	L	T	R
University Avenue & Ridge Street	AM	-	-	C	-	-	A	A	A	A	A	A	A
	PM	-	-	B	-	-	E	A	A	A	B	A	A
Ridge Street & Harvey Street	AM	A	A	A	A	A	A	A	A	A	A	A	A
	PM	A	A	A	A	A	A	A	A	A	B	B	B

Existing queues are shown in **Exhibit 5**. Analysis outputs are provided in **Appendix B**.

Most movements were found to operate at LOS C or better. The southbound right turn movement at the intersection of University Avenue with Ridge Street and Marshall Court was found to operation at LOS E. All existing 95th percentile queues were found to fall within available storage. The estimated westbound left 95th percentile queue at the intersection of University Avenue with Ridge Street and Marshall Court was 95 feet, however, observed queues were much shorter than this.

3.0 Proposed Development

3.1 University Avenue Mixed Use Development

The proposed University Avenue Mixed Use Development consists of a five-story building containing commercial and residential land uses. 10,700 square feet of commercial space and 52 apartment dwelling units are proposed along with 113 parking spaces. 71 below ground parking spaces and 42 surface spaces are proposed. The dwelling units are planned to be a mixture of efficiency and one and two bedroom apartments. See **Exhibit 6** for the proposed site plan.

No specific tenants for the commercial land use have been identified. For the purposes of trip generation, potential tenants of the commercial space are assumed to comprise of retail and foodservice establishments.

3.2 Proposed Access

A single full access point located on Ridge Street is proposed with the development. This access point is proposed at a location approximately 165 feet south of the intersection of University Avenue with Ridge Street, measured center to center.

Exhibit 7 includes an overview of the proposed site access.

3.3 Trip Generation

Based on the land use and size of the proposed development, expected trips were generated using the ITE Trip Generation Manual, 9th Edition, published by the Institute of Transportation Engineers. A summary of trip generation for the University Avenue Mixed Use Development is shown in **Table 2**.

Table 2. Trip Generation

Land Use	ITE Land Use Code	Size	Weekday Daily Trips (rate)	AM Peak In (%)	AM Peak Out (%)	AM Peak Total (rate)	PM Peak In (%)	PM Peak Out (%)	PM Peak Total (rate)
Apartment	220	52 Dwelling Units	440 (8.44)	5 (20%)	25 (80%)	30 (0.56)	30 (65%)	15 (35%)	45 (0.89)
Shopping Center	820	10.7 KSF	1,590 (148.47)	25 (62%)	15 (38%)	40 (3.73)	65 (48%)	70 (52%)	135 (12.53)
Total Generated Trips:			**2,030**	**30**	**40**	**70**	**95**	**85**	**180**
Linked Trip Reduction (10%) (Apartment Land Use)*			(130)	0	(10)	(10)	(10)	(5)	(15)
Multimodal Trip Reduction (20%) (Apartment Land Use)*									
Total Apartment Driveway Trips:			**310**	**5**	**15**	**20**	**20**	**10**	**30**
Multimodal Trip Reduction (20%) (Shopping Center Land Use)			(320)	(5)	(5)	(10)	(15)	(15)	(30)
Total Shopping Center Driveway Trips:			**1,270**	**20**	**10**	**30**	**50**	**55**	**105**
Total Driveway Trips:			**1,580**	**25**	**25**	**50**	**70**	**65**	**135**
Pass-by Trips (20%) (Shopping Center Land use)			(255)	(5)	(5)	(10)	(10)	(10)	(20)
Total New Trips:			**1,325**	**20**	**20**	**40**	**60**	**55**	**115**

*Combined in calculations for rounding purposes

Note: all results rounded to the nearest five trips.

Each trip represents either an entering or exiting vehicle to or from the development. Total trips generated were reduced using linked, multimodal, and pass-by trip reductions in order to determine the total number of new trips expected to be generated by the proposed development.

3.4 Trip Reductions

Linked trips are trips that would otherwise occur in two different places, but are combined in the case of land use combinations that satisfy the purpose of both trips. Linked trips are anticipated to occur between the apartment and commercial land uses. A 10% linked trip reduction was applied to the apartment land use trip generation.

Multimodal trips are those occurring via transit, pedestrian, or bicycle modes of transportation. Multimodal trips are expected to and from the proposed apartment and retail land uses due to the presence of bus stops, bike paths, and sidewalks connecting to major employers in the area. A 20% multimodal trip reduction was applied to the apartment and retail land use trip generation.

Pass-by trips are trips that were already present on the surrounding roadway network that are now expected to enter and exit the proposed land use before continuing in their original direction. The commercial land use is expected to have some proportion of pass-by trips due to the convenient location of the development and traffic volumes along University Avenue. A 20% pass-by trip reduction was applied to the commercial land use trip generation.

Driveway trips are those remaining once linked and multimodal trips have been removed from the total generated trips and are expected to utilize the development driveway. Total new trips are the driveway trips less the pass-by trips and represents the number of new trips added to the public transportation network.

The proposed development is expected to generate 1,580 driveway, and 1,325 new trips per day. Forty (40) new trips (20 entering/20 exiting) and 115 new trips (60 entering/55 exiting) are expected during the morning and

afternoon peak traffic hours, respectively. Ten (10) and 20 pass by trips are expected during the morning and evening peak traffic volume hours, respectively.

3.5 Trip Distribution and Assignment

Trip distribution was determined using a combination of local traffic counts available on the City of Madison website and consideration of major centers of employment in the area. The general trip distribution is expected to be 40% to/from the west on University Avenue, 50% to/from the east on University Avenue, and 10% to/from the south on Ridge Street. Trips entering the development are able to utilize the intersection of University Avenue with Ridge Street from either direction of travel. Trips exiting the development may utilize the intersection of University Avenue with Ridge Street to travel east, but not west. The restriction of northbound left turns at the intersection of University Avenue with Ridge Street requires that trips exiting to the west on University Avenue do so by first traveling west along Harvey Street and then use the signalized intersection at Hill Street. The proposed trip distribution pattern is shown in **Exhibit 8**.

New trips generated by the development were assigned to roadway network within the study area according to the trip distribution pattern. Proposed new trips are shown in **Exhibit 9**.

Pass-by trips were assigned in equal proportion to both directions of travel along University Avenue. This provides a conservatively high estimate of traffic added to the area to the south of the development due to westbound trips accessing University Avenue via Harvey Street. The increased travel time and complexity of a westbound pass-by trip will likely result in fewer trips completing this movement than estimated by this study. Pass-by trips are shown in **Exhibit 10**.

Driveway trips, the sum of new trips (Exhibit 9) and pass-by pass-by trips (Exhibit 10) are summarized in **Exhibit 11**. Driveway trips represent the total number of trips expected to enter or exit the development.

3.6 Total Traffic

Total traffic is determined by adding driveway trips (Exhibit 11) to existing traffic (Exhibit 3). Total traffic is traffic volume expected upon completion of the development. Total traffic is shown in **Exhibit 12**. Existing traffic volumes were not inflated for the total traffic condition upon buildout because full build out is expected to take place by the end of Year 2018.

4.0 Proposed Conditions

4.1 Total Traffic Conditions

Traffic operations were analyzed using the existing roadway network and conditions and proposed total traffic volumes. The analysis was used to determine expected delays and queues at each of the study intersections upon completion of the proposed development. Levels of service under the proposed conditions are summarized in **Table 3**.

Table 3. Proposed Level of Service by Movement

Intersection	Peak	Movement											
		Northbound			Southbound			Eastbound			Westbound		
		L	T	R	L	T	R	L	T	R	L	T	R
University Avenue & Ridge Street	AM	-	-	C	-	-	A	A	A	A	B	A	A
	PM	-	-	C	-	-	E	A	A	A	E	A	A
Ridge Street & Harvey Street	AM	A	A	A	A	A	A	A	A	A	B	B	B
	PM	A	A	A	A	A	A	A	A	A	B	B	B

Proposed queues are shown in **Exhibit 13**. Analysis outputs are provided in **Appendix B**.

Increased delays and corresponding decreases to level of service at the intersection of University Avenue with Ridge Street and Marshall Court are expected as a result of the proposed development. These delay increases are mostly limited to the westbound left and the northbound right turn movements. Queuing at the intersection of University Avenue with Ridge Street and Marshall Court is also expected to increase. The westbound left turn queue is estimated to increase to 125 feet as a result of the development during the evening peak traffic period. This queue would exceed the available storage capacity of 100 feet. Because observed queues were shorter than those estimated for existing traffic volumes with the traffic modelling software, queues under total conditions are anticipated to be shorter than estimated as well.

4.2 Neighborhood Traffic Impacts

Traffic impacts to the neighborhood located south of the proposed development were considered in addition to the delay and queue analysis. Addition of development traffic is expected to result in a maximum hourly increase of 25 vph (25%) along Harvey Street to the west of the development and 10 vph (10%) along Ridge Street to the south of the development. This estimate of increased traffic volumes along Harvey Street is considered conservative because no existing traffic was removed from the roadway network to account for the land uses being replaced by the proposed development. Increased traffic volumes on Harvey Street are a result of westbound exiting vehicles traveling to the nearest signalized intersection (University Avenue intersection with Hill Street and Shorewood Boulevard) on University Avenue that will allow a northbound left turning movement, allowing them to travel westbound. Any portion of traffic choosing to first travel eastbound on University Avenue and make a U-turn will decrease the amount of traffic added to Harvey Street. This study assumes no vehicles exit the development eastbound on University Avenue and make a U-turn in order to maintain a conservative estimate of the incremental increase to traffic volumes along Harvey Street.

The increase in traffic along Harvey and Ridge Streets will increase the number of vehicle-pedestrian interactions due to the lack of sidewalks along both roadways in the vicinity of the proposed development. The proposed development does include the addition of sidewalks along the roads bordering the development where they are currently absent.

4.3 Proposed Parking

The proposed University Avenue Mixed Use Development includes a total of 113 parking spaces with 71 underground and 42 surface spaces. Parking generation was performed for the proposed development using ITE Parking Generation 4th Edition and is summarized in **Table 4.**

Table 4. Proposed Parking Occupancy

Land Use	ITE Land Use Code	Size	Independent Variable Units	Parking Spaces Generated		Notes
				Average (Rate)	85th Percentile (Rate)	
Low/Mid Rise Apartment Weekday, Urban Location	221*	52 Dwelling Units	Dwelling Units	60 (1.20)	85 (1.61)	Peak period between 10 pm and 5 am.
Low/Mid Rise Apartment Saturday, Urban Location				55 (1.03)	60 (1.14)	Peak period not well defined.
Shopping Center Friday (Non-December)	820	10.7 KSF	KSF	30 (2.94)	40 (3.90)	Peak period between 1 pm and 2 pm. Highest weekday used.
Shopping Center Saturday (Non-December)				30 (2.87)	35 (3.40)	Peak period between 1 pm and 2 pm.
Sum				90**	125**	Worst case (Friday)

* Data not available for land use 220 Apartment.

**Total of non coincidal peak demand periods. Combined peak demand expected to be lower.

Parking generation was estimated for both Friday and Saturday for both land uses. The highest parking demand generated was on a typical Friday where the average and 85th percentile parking demand was estimated to be 90 and 125 spaces, respectively.

The number of parking spaces proposed with the University Avenue Mixed Use Development is fewer than the estimated 85th percentile demand. The number of proposed parking spaces is considered reasonable however due to the following:

- Peak parking demand for each land use on both Friday and Saturday is not expected to be coincident.
- A number of trips (20%) to and from the development are expected to be served by transit as well as via pedestrian and bicycle modes of transportation.
- Friday is the worst case scenario weekday for Shopping Center parking generation. Other weekdays are expected to experience lower parking demand.

5.0 Safety

5.1 Crash History

An evaluation of crashes that occurred at the intersection of University Avenue with Ridge Street and Marshall Court as well as at the Ridge Street intersection with Harvey Street was performed as part of the study. Crashes that occurred between the years 2012 and 2016 were considered. Crash reports for the year 2017 are still considered preliminary at the time of writing and were not included in the evaluation.

A total of 36 crashes were reported at the intersection of University Avenue with Ridge Street and Marshall Court. This resulted in an estimated crash rate of less than one crash per million entering vehicles. 70% of the crashes that occurred were rear end collisions on University Avenue which is consistent with predominant crash types expected at signalized intersections. Eight percent of the crashes had confirmed, non-fatal injuries, while another eight percent had unconfirmed possible injuries. One fatal crash did occur. This crash involved a bicyclist traveling northbound on Ridge Street and a motorist traveling eastbound on University Avenue.

A total of 2 crashes were reported at the intersection of Ridge Street with Harvey Street. One crash had no reported injuries while the other crash had unconfirmed possible injuries. Both crashes were angle type with Harvey Street vehicles that failed to yield to Ridge Street traffic.

5.2 Access Changes

The proposed development will consolidate the existing five development parcel access points to one access point located on Ridge Street. No crash pattern related to access points was identified as part of the crash evaluation. However, consolidation of access points, removal of the existing University Avenue access point, and increased spacing between University Avenue and the nearest access point along Ridge Street are all expected to promote safe traffic operations on study area roadways.

6.0 Improvements

6.1 University Avenue Intersection with Ridge Street and Marshall Court

No significant impacts to existing delays or queues are expected at the intersection, therefore no improvements are required for mitigation. Traffic modeling software estimates that the 95th percentile queue for the westbound left turn movement is expected to increase to 125 feet upon completion of the proposed development, exceeding the available storage by 25 feet. However, observed traffic operations, when compared to existing conditions modelling, suggest that actual queue lengths may be shorter than those estimated by modelling software. Therefore, no increases to westbound left turn storage is proposed. Similarly, estimated delay for the westbound left turn movement results in a LOS E during the evening peak traffic period, changing from an existing LOS B, as a result of the proposed development. Due to comparisons between observed traffic operations and existing conditions modelling results, actual delay experienced by the westbound left turn movement is also expected to be less than what is estimated by the modelling software.

In the event that upon buildout of the development, westbound left turn queues do exceed storage capacity, two mitigation strategies have been identified. One strategy is to increase the amount of westbound left turn storage to prevent queues from spilling back into westbound through lanes. Another strategy is to add a protected westbound left turn phase. A protected westbound left turn phase could be implemented by reducing the amount of time currently utilized by eastbound through traffic, or by removing the east pedestrian crossing of eastbound University Avenue and providing the westbound left turn indication concurrent with the northbound right turn indication.

6.2 Ridge Street Intersection with Harvey Street

No significant impacts to existing delays or queues are expected at the intersection, therefore no improvements are required for mitigation.

The proposed University Avenue Mixed Use Development does include the addition of sidewalks along both Harvey and Ridge Streets as well as curb ramps at the intersection of Harvey Street with Ridge Street. These improvements will promote pedestrian safety and comfort and reduce the number of vehicle-pedestrian conflicts along Harvey and Ridge Streets. Changes to signing and marking in the vicinity of the intersection should be considered in order to integrate these new pedestrian facilities.

7.0 Conclusions

Information and analysis in this report document existing conditions near the proposed site location, expected traffic operations before and after completion of the proposed development, as well as expected parking demand. In summary, the findings of this study are as follows:

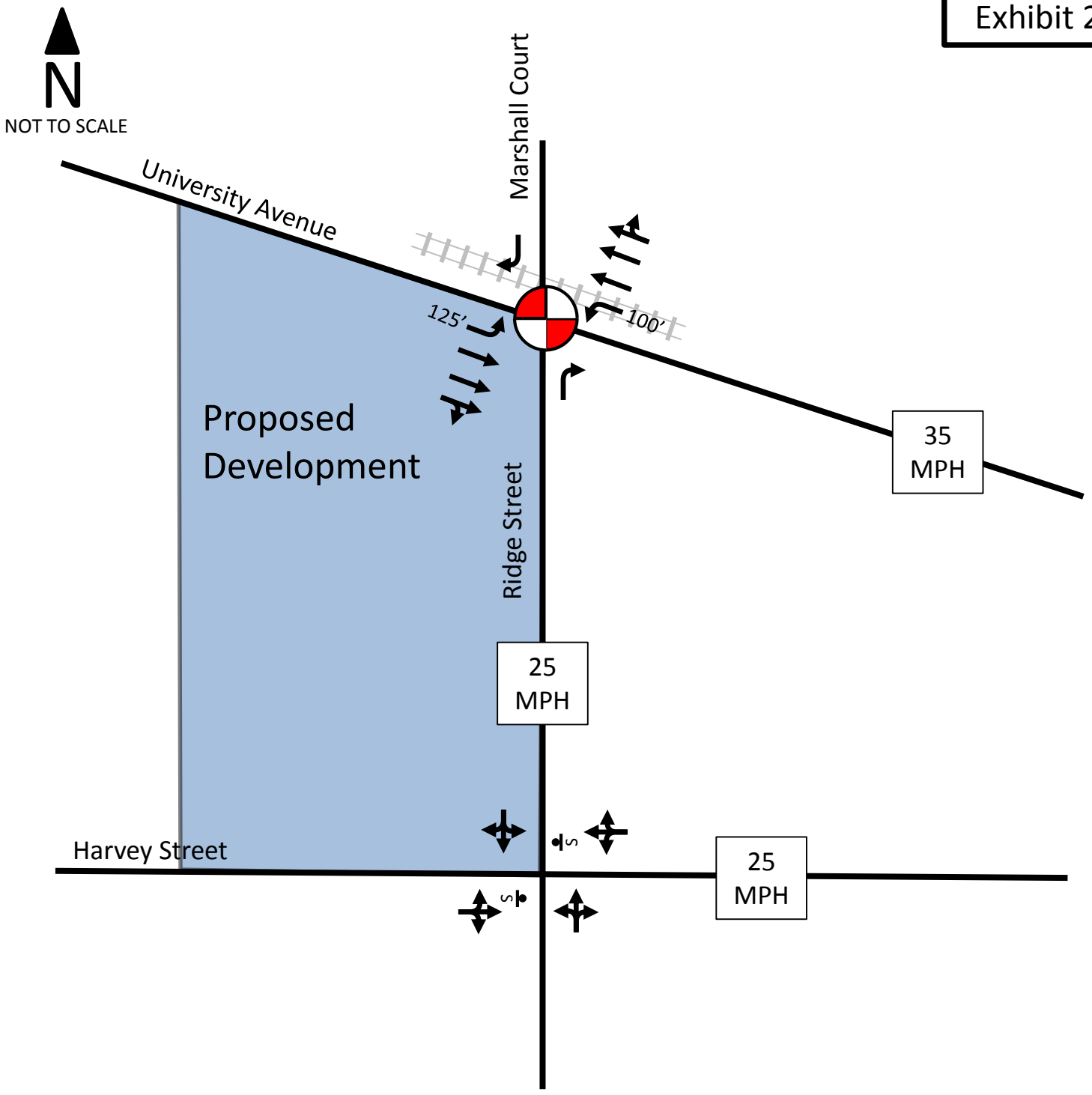
- Existing traffic operations are currently acceptable at both of the study intersections.
- The proposed development is expected to generate in a total of 50 and 135 trips during the morning and evening peak traffic volume hours, respectively, resulting in some additional delays and increased queues.
- New trips related to the proposed development will increase traffic volumes along Harvey and Ridge Streets by a maximum of approximately 25 and 10 vph, respectively.
- Access proposed with the development is expected to promote safe and efficient traffic operations within the study area.
- Parking capacity proposed with the development will meet anticipated parking demand.
- No roadway or traffic signal improvements are recommended to mitigate the impacts of proposed development.
- Pedestrian improvements proposed with the development are expected to promote pedestrian safety.

Exhibit 1

KL Engineering [A] Better Experience

Project Location Map

Exhibit 2



LEGEND

XX' = Available Storage Length

XX MPH = Posted Speed Limit

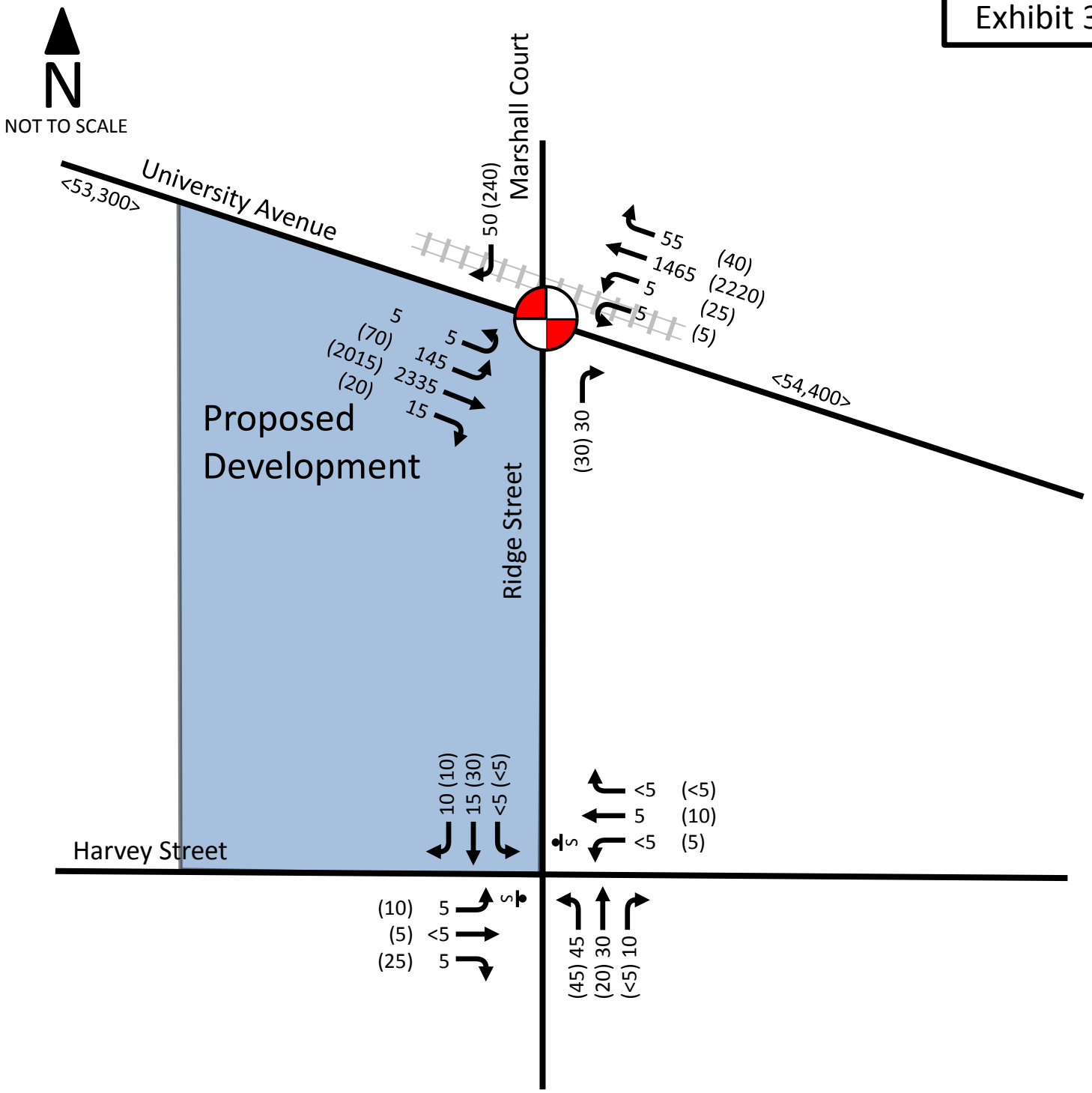
S = Stop Sign

= Traffic Signal

KL Engineering [A] Better Experience

Existing Roadway Network

Exhibit 3



LEGEND

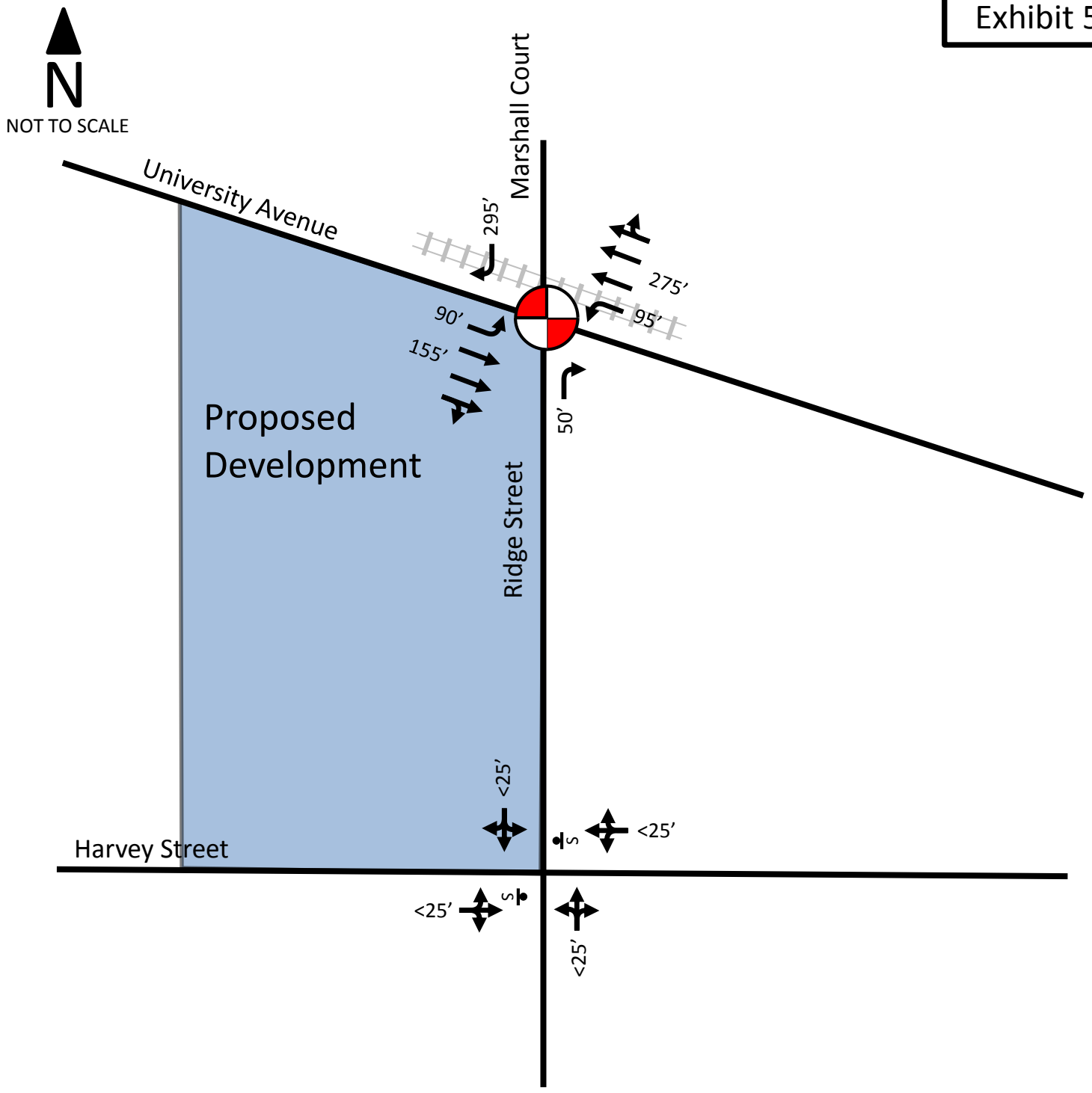
<XX> = Average Daily Traffic
XX = AM Peak (7:15-8:15 AM)
(XX) = PM Peak (4:00-5:00 PM)
S = Stop Sign
= Traffic Signal

KL Engineering [A] Better Experience

Existing Traffic Volumes


Exhibit 4
N
University Avenue
Marshall Court
130'
95'
Proposed Development
Ridge Street
Harvey Street
LEGEND
=Existing Access Point to be removed
KL Engineering
[A] Better Experience
Existing Access Overview

Exhibit 5



LEGEND

XX' = 95th Percentile Queue

S = Stop Sign

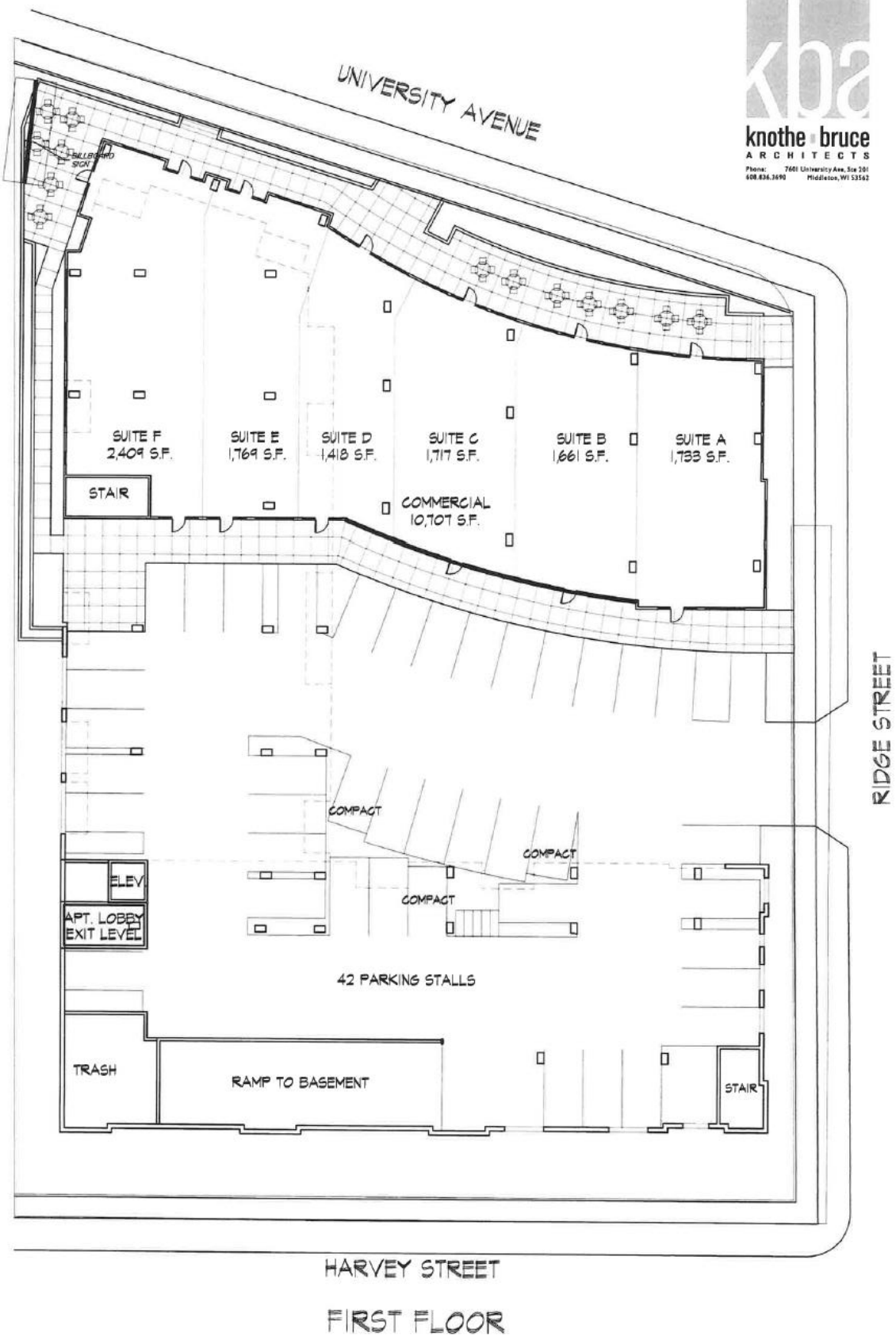
= Traffic Signal

KL Engineering [A] Better Experience

Existing 95th Percentile Queues

Exhibit 6

N

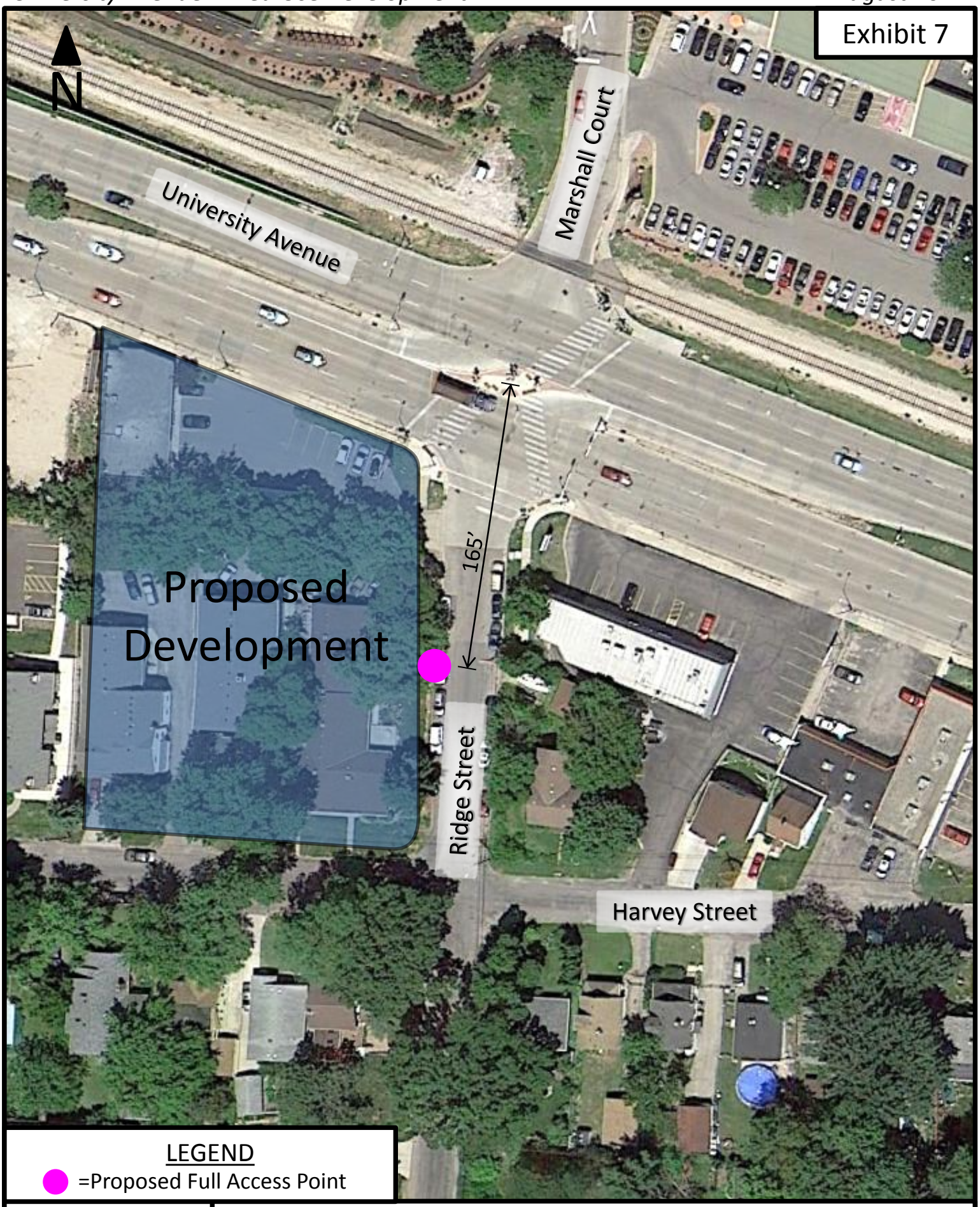


knothe bruce ARCHITECTS
Phone: 608.836.3690
7601 University Ave, Ste 201
Middleton, WI 53562

KL Engineering [A] Better Experience

Proposed Site Plan

Exhibit 7

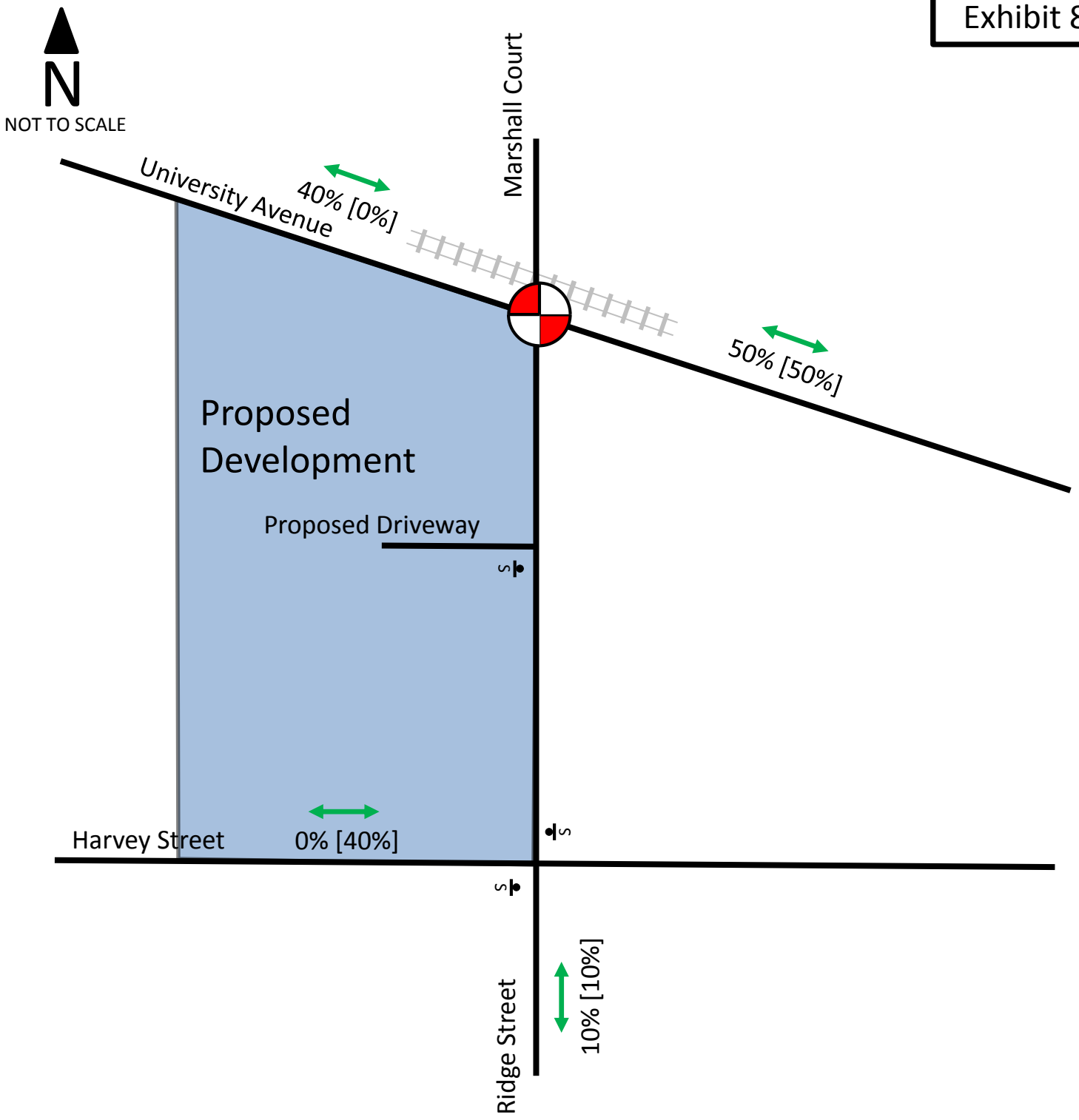


LEGEND
● =Proposed Full Access Point

KL Engineering [A] Better Experience

Proposed Access Overview

Exhibit 8



LEGEND

S = Stop Sign

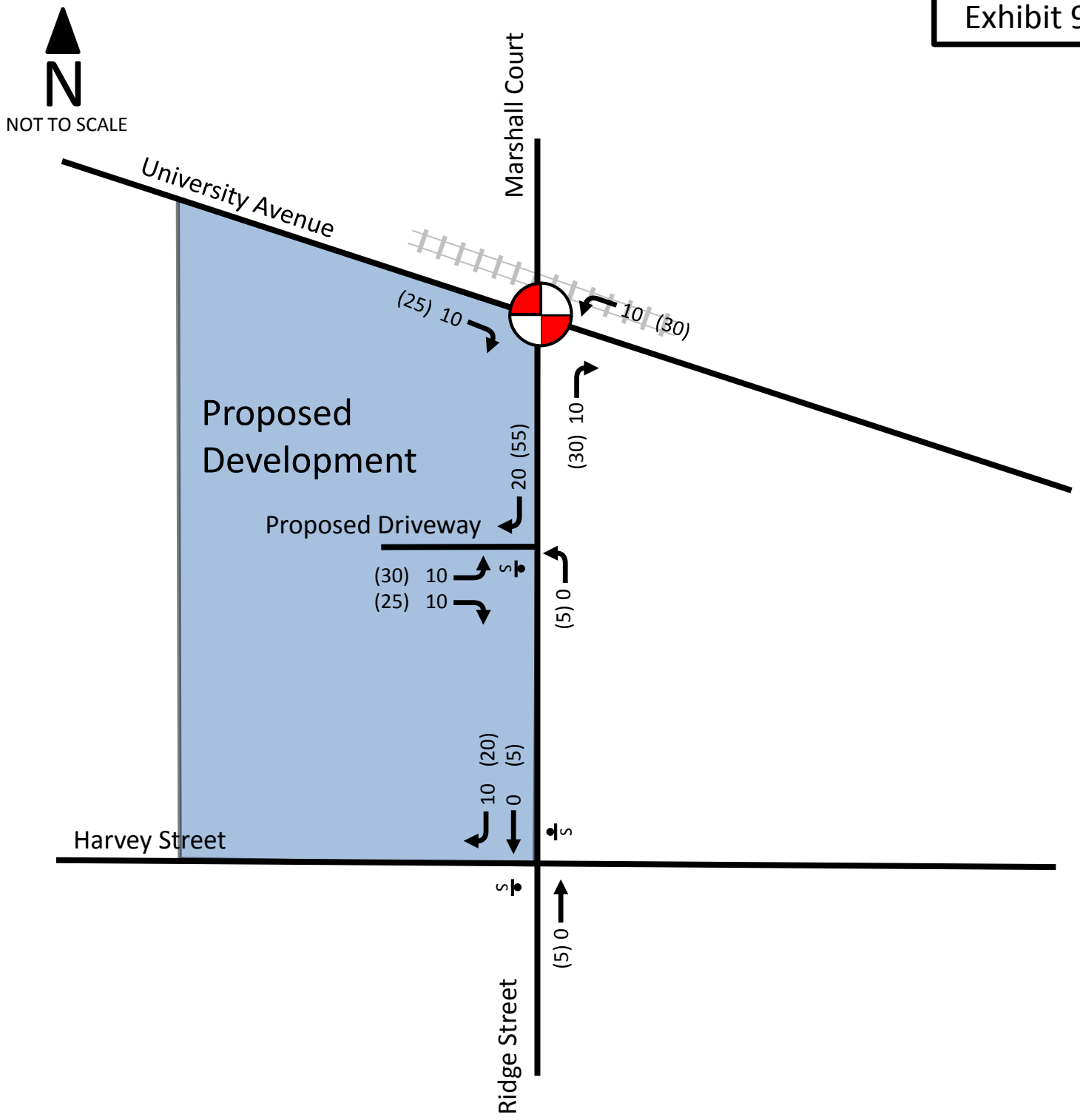
= Traffic Signal

XX% [XX%] = Trip Distribution – In [Out]

KL Engineering [A] Better Experience

Proposed Trip Distribution

Exhibit 9



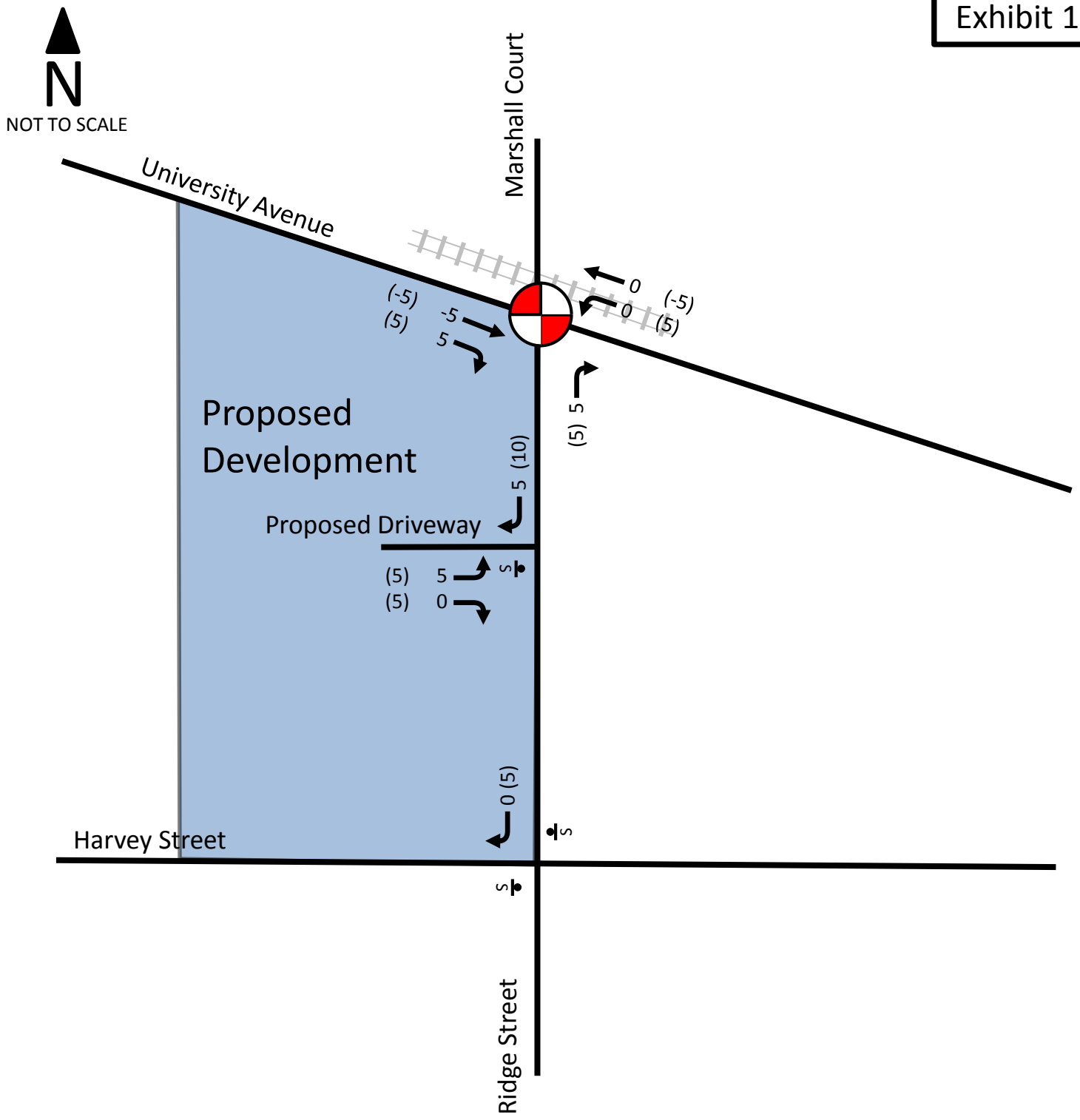
LEGEND

XX = AM Peak (7:15-8:15 AM)
(XX) = PM Peak (4:00-5:00 PM)
S = Stop Sign
= Traffic Signal

KL Engineering [A] Better Experience

Proposed New Trips

Exhibit 10



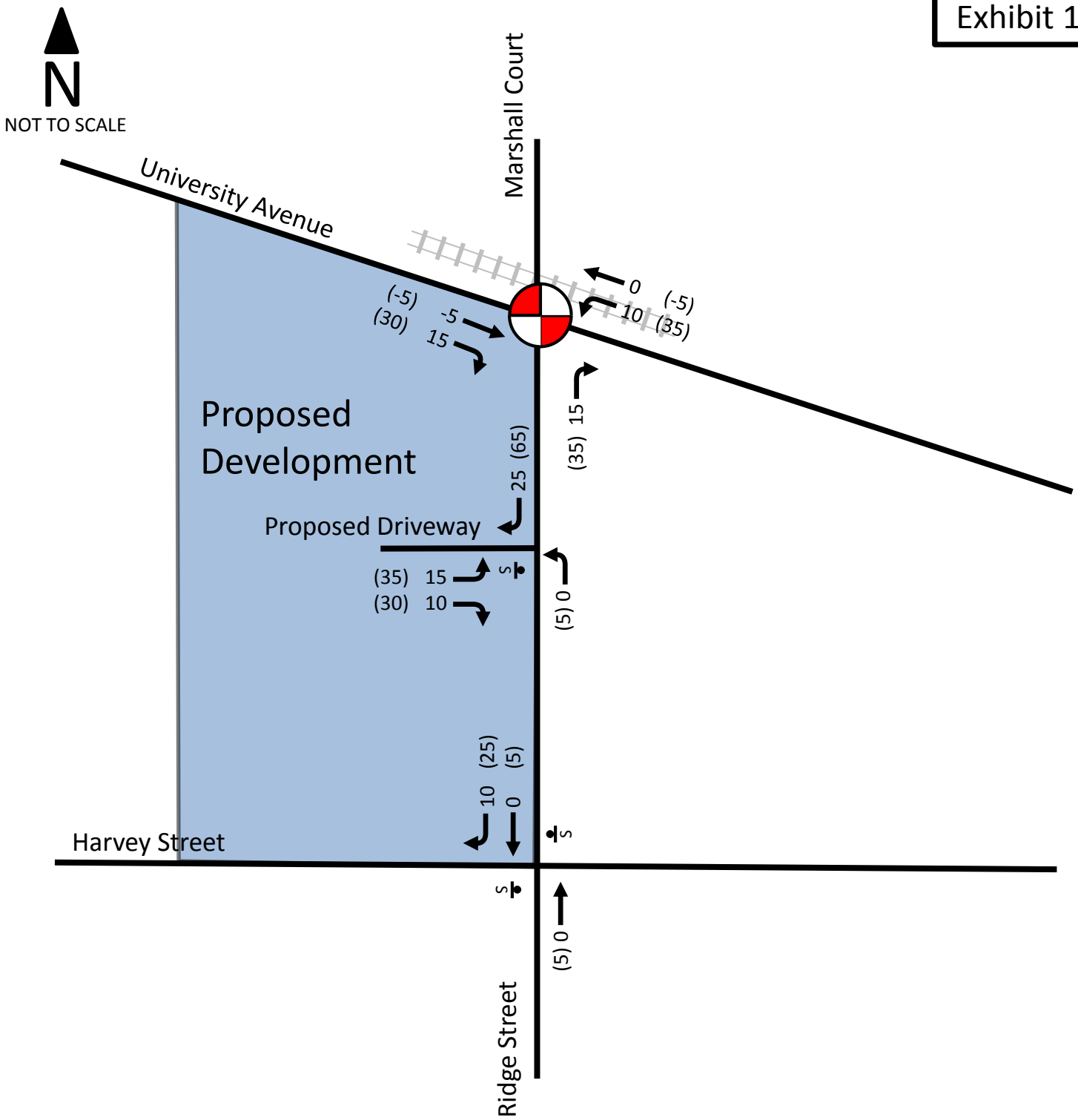
LEGEND

XX = AM Peak (7:15-8:15 AM)
(XX) = PM Peak (4:00-5:00 PM)
S = Stop Sign
= Traffic Signal

KL Engineering [A] Better Experience

Proposed Pass-by Trips

Exhibit 11



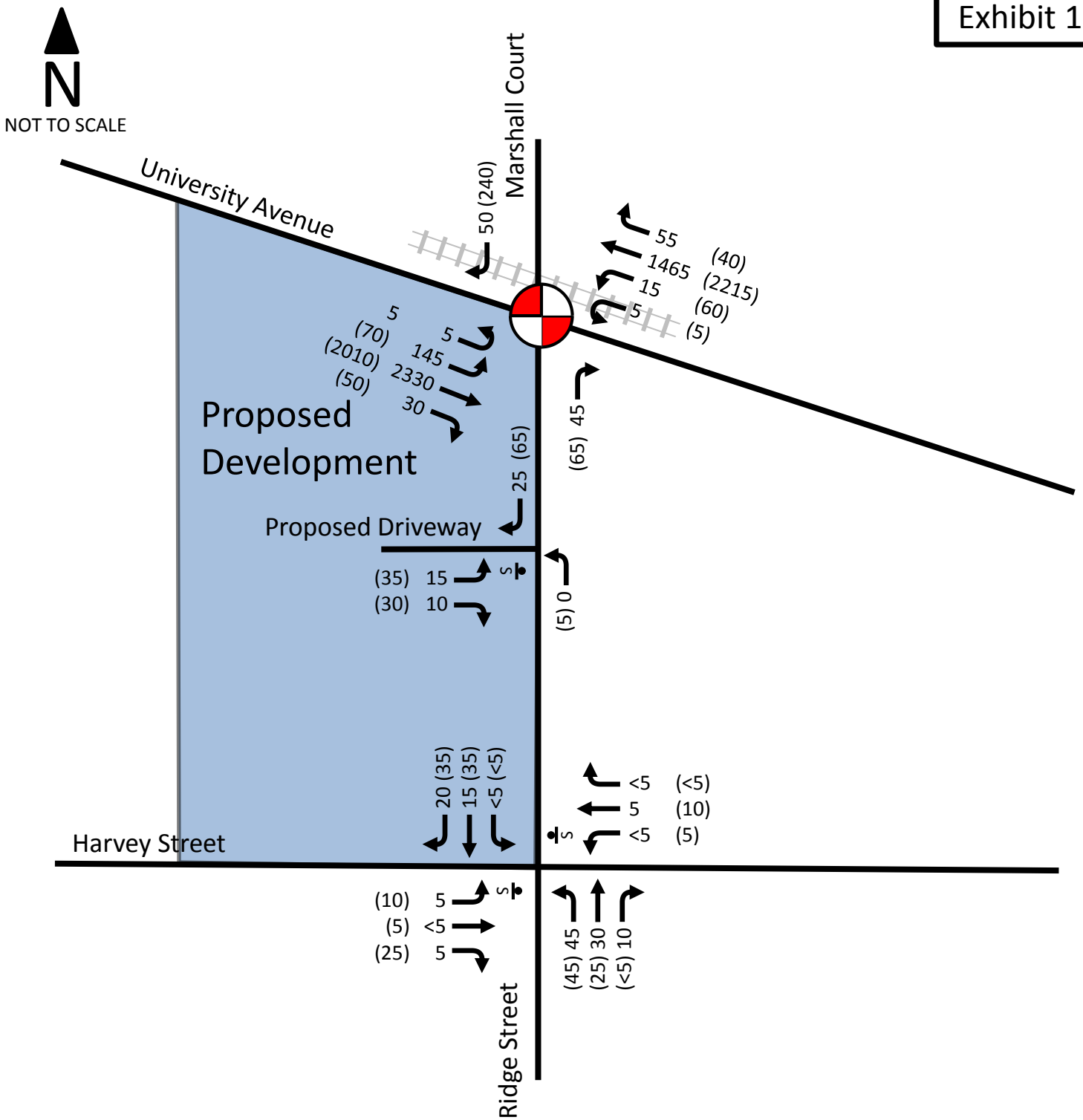
LEGEND

XX = AM Peak (7:15-8:15 AM)
(XX) = PM Peak (4:00-5:00 PM)
S = Stop Sign
= Traffic Signal

KL Engineering [A] Better Experience

Proposed Driveway Trips

Exhibit 12



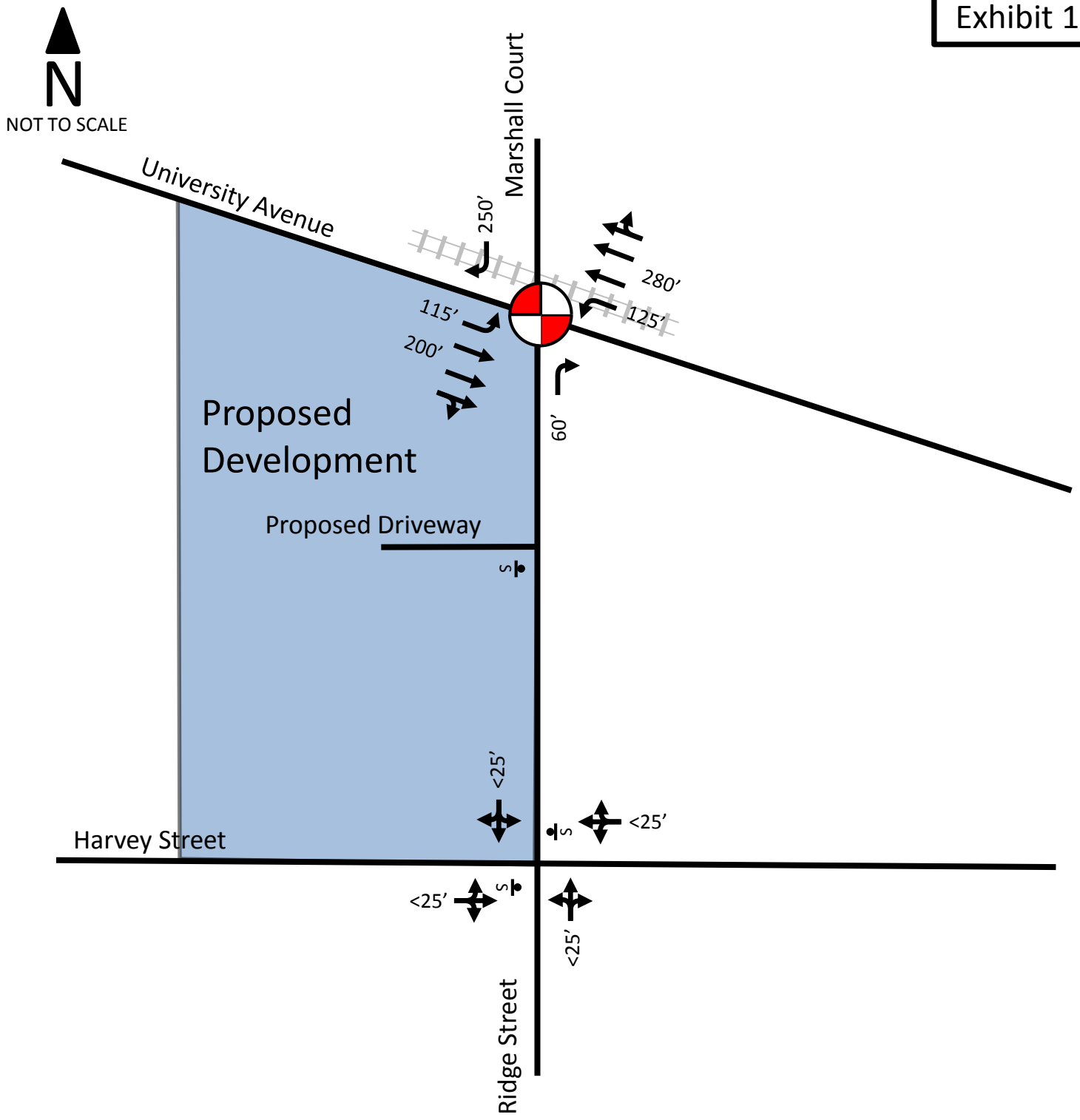
LEGEND

XX = AM Peak (7:15-8:15 AM)
(XX) = PM Peak (4:00-5:00 PM)
S = Stop Sign
= Traffic Signal

KL Engineering [A] Better Experience

Proposed Total Traffic

Exhibit 13



LEGEND

XX' = 95th Percentile Queue

S = Stop Sign

= Traffic Signal

KL Engineering [A] Better Experience

Proposed 95th Percentile Queues

APPENDIX A

Traffic Counts

Traffic Count Summary

Location: Ridge St & Harvey St
Madison, Dane Co, WI
Date: Tuesday, July 11, 2017

Traffic Control: Traffic Signal
Hours Counted: 6:00-9:00AM & 3:00-6:00PM
Counted By: C. Lanser

All Vehicles

AM Peak

Roadway	Ridge St						Harvey St						Ridge St						Harvey St						Intersection	
Approach	Southbound						Westbound						Northbound						Eastbound							
Time	L	T	R	U	Peds	Bikes	L	T	R	U	Peds	Bikes	L	T	R	U	Peds	Bikes	L	T	R	U	Peds	Bikes	Sum	PHF
7:15 AM	0	1	1	0	0	0	0	1	0	0	0	0	10	3	4	0	1	0	1	1	1	0	2	0	23	
7:30 AM	1	6	3	0	0	0	1	1	0	0	2	0	6	6	2	0	1	0	0	0	2	0	0	0	28	0.87
7:45 AM	1	3	1	0	0	0	0	1	0	0	1	0	16	9	1	0	0	0	1	0	0	0	6	0	33	
8:00 AM	0	4	4	0	1	0	0	0	1	0	2	0	11	10	1	0	0	0	1	1	1	0	1	0	34	
Movement Total	2	14	9	0	1	0	1	3	1	0	5	0	43	28	8	0	2	0	3	2	4	0	9	0	Total: 118	
Approach Total	25						5						79						9							

Mid Peak

Approach	Southbound						Westbound						Northbound						Eastbound						Intersection	
Time	L	T	R	U	Peds	Bikes	L	T	R	U	Peds	Bikes	L	T	R	U	Peds	Bikes	L	T	R	U	Peds	Bikes	Sum	PHF
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	#DIV/0!
1:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Movement Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Total: 0	
Approach Total	0						0						0						0							

PM Peak

Approach	Southbound						Westbound						Northbound						Eastbound						Intersection	
Time	L	T	R	U	Peds	Bikes	L	T	R	U	Peds	Bikes	L	T	R	U	Peds	Bikes	L	T	R	U	Peds	Bikes	Sum	PHF
4:00 PM	0	3	3	0	0	0	1	3	2	0	3	0	13	7	0	0	0	0	1	2	8	0	2	0	43	
4:15 PM	0	8	1	0	0	0	1	2	0	0	2	0	14	2	0	0	0	0	1	1	5	1	2	0	36	0.82
4:30 PM	1	9	3	0	0	0	1	2	0	0	6	0	8	7	0	0	0	0	2	0	7	0	5	0	40	
4:45 PM	1	12	5	0	0	0	0	3	0	0	1	0	12	6	0	0	0	0	4	2	7	0	2	0	52	
Movement Total	2	32	12	0	0	0	3	10	2	0	12	0	47	22	0	0	0	0	8	5	27	1	11	0	Total: 171	
Approach Total	46						15						69						41							

Heavy Vehicles

AM Peak

Roadway	Ridge St				Harvey St				Ridge St				Harvey St			
Approach	Southbound				Westbound				Northbound				Eastbound			
Time	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R	U
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Movement Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Approach Total	0				0				0				0			
Heavy Vehicle %	0.0%				0.0%				0.0%				0.0%			

Mid Peak

Approach	Southbound				Westbound				Northbound				Eastbound			
Time	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R	U
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Movement Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Approach Total	0				0				0				0			
Heavy Vehicle %	#DIV/0!				#DIV/0!				#DIV/0!				#DIV/0!			

PM Peak

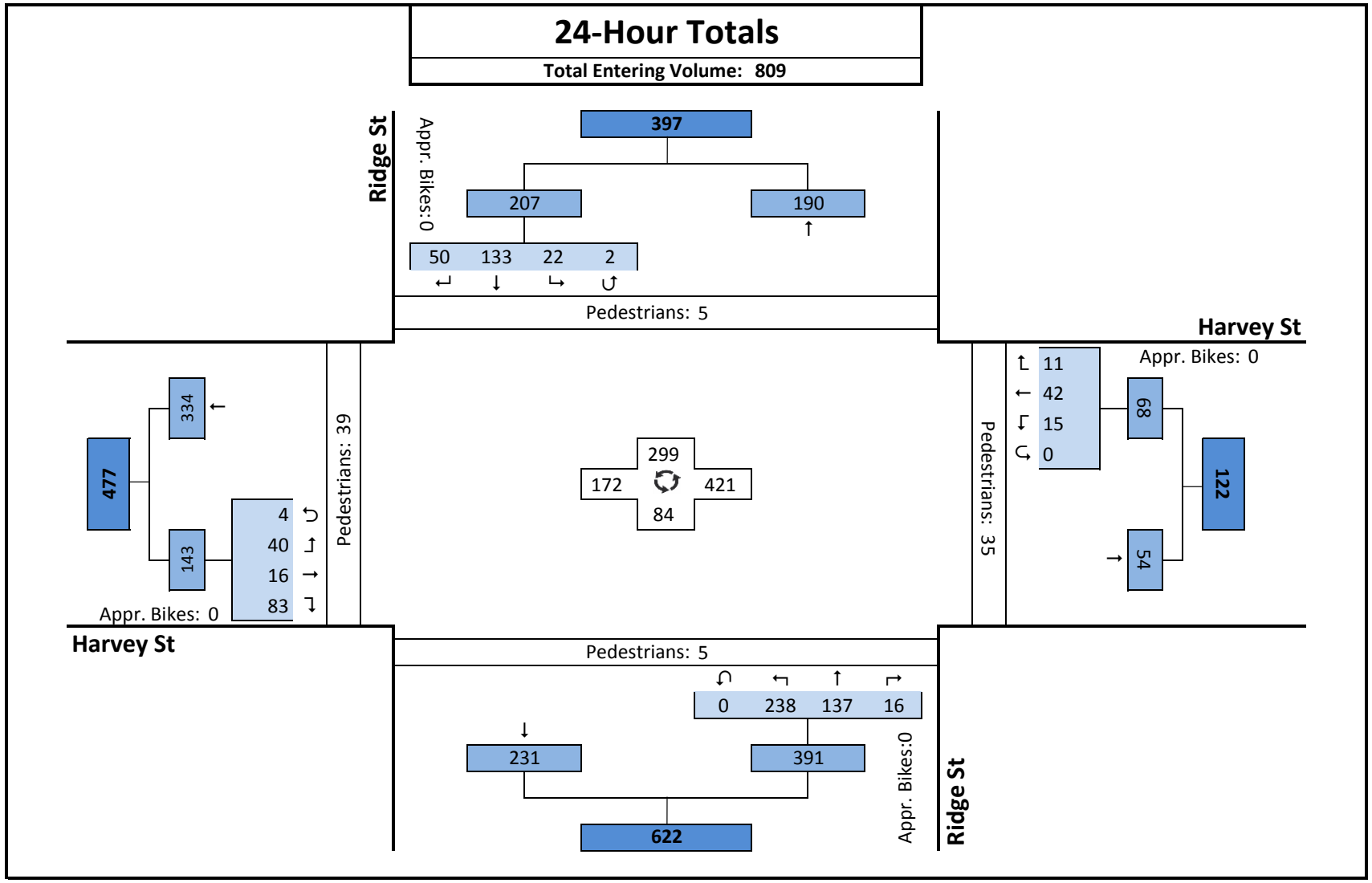
Approach	Southbound				Westbound				Northbound				Eastbound			
Time	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R	U
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Movement Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Approach Total	0				0				0				0			
Heavy Vehicle %	0.0%				0.0%				0.0%				0.0%			

KL Engineering
[A] Better Experience

Turning Movement Diagram

Location: Ridge St & Harvey St
Madison, Dane Co, WI
Date: #

Traffic Control: Traffic Signal
Hours Counted: 6:00-9:00AM & 3:00-6:0
Counted By: C. Lanser

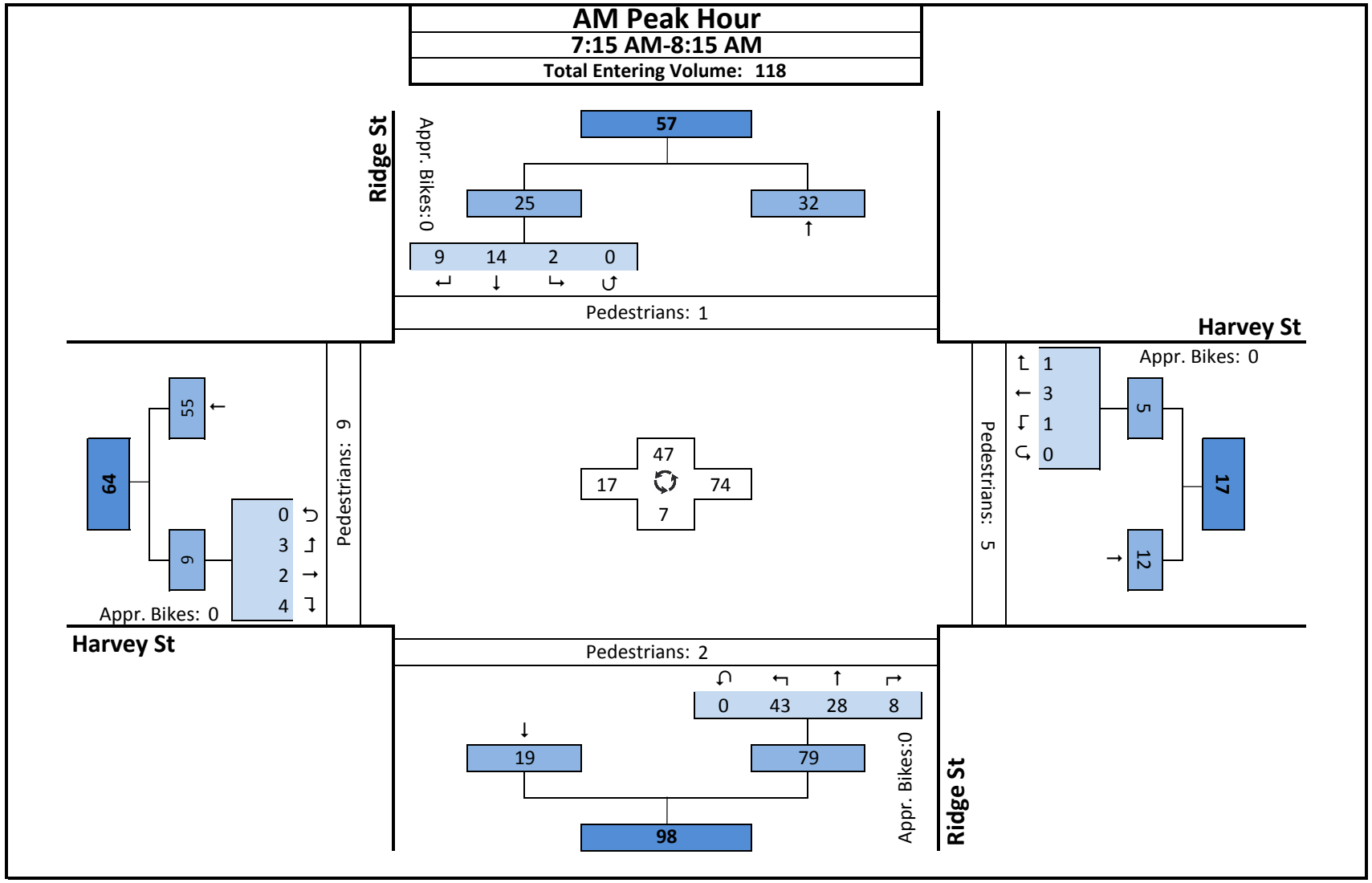


KL Engineering
[A] Better Experience

Turning Movement Diagram

Location: Ridge St & Harvey St
Madison, Dane Co, WI
Date: #

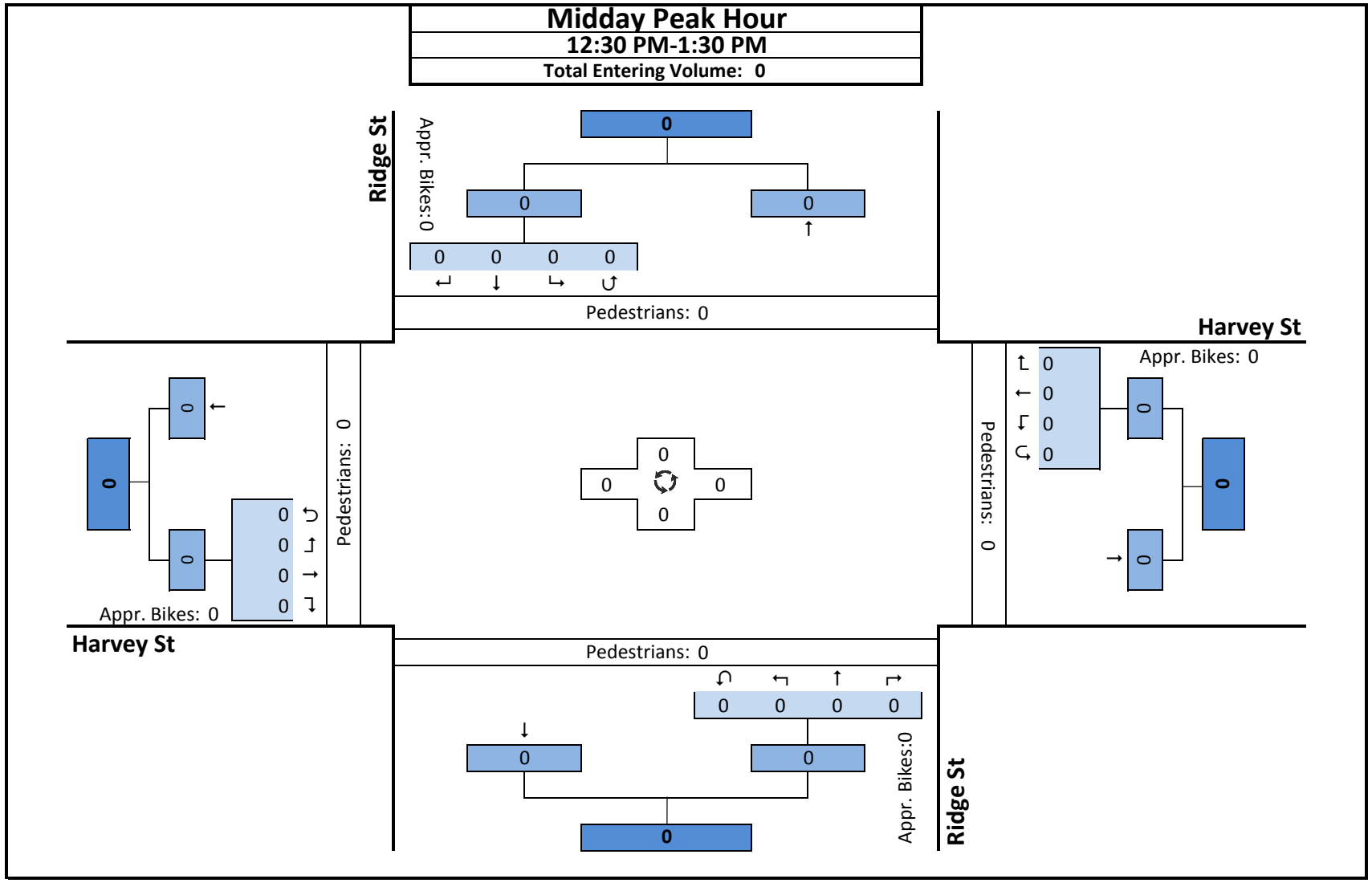
Traffic Control: Traffic Signal
Hours Counted: 6:00-9:00AM & 3:00-6:0
Counted By: C. Lanser



KL Engineering
[A] Better Experience

Turning Movement Diagram

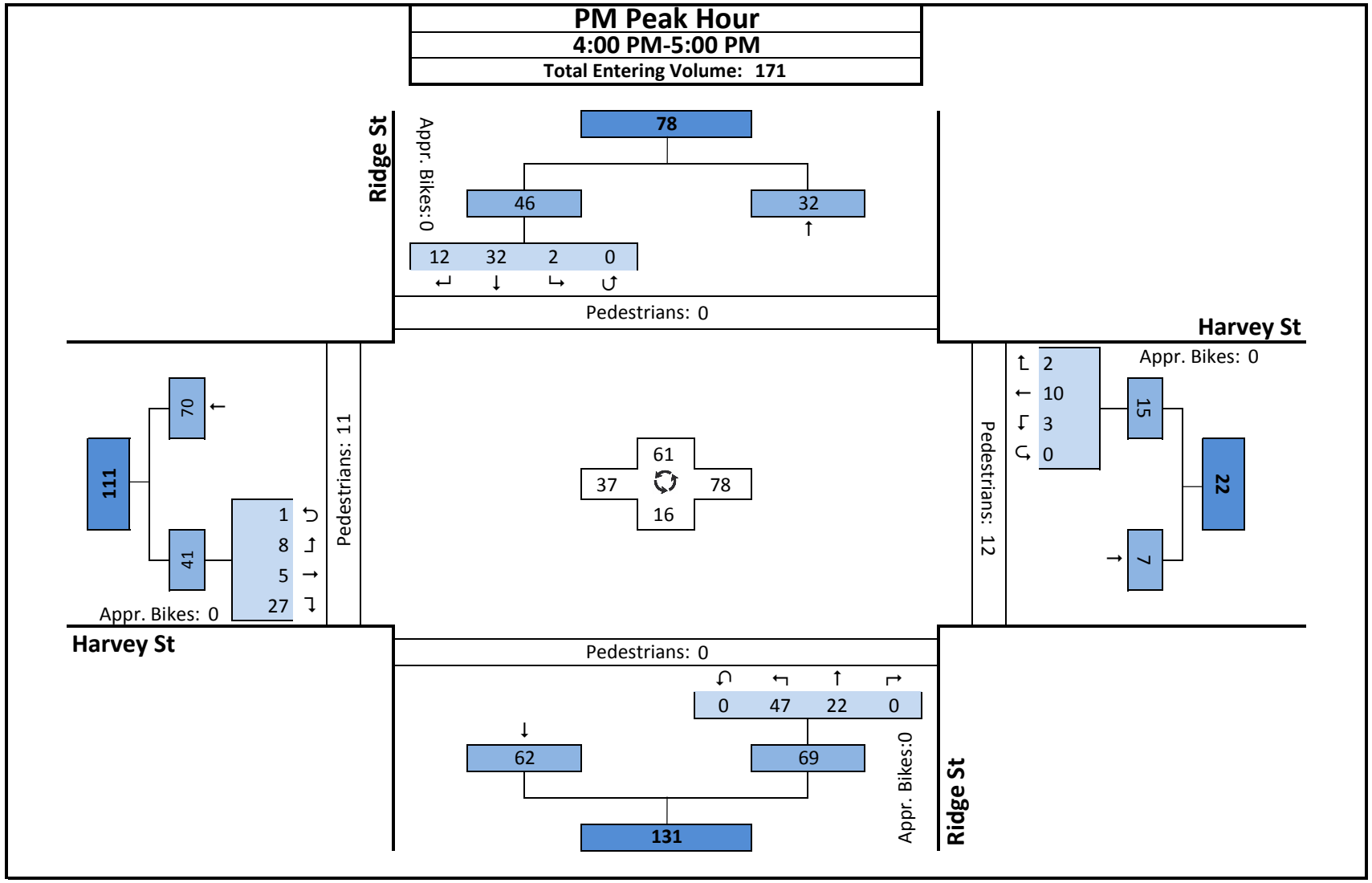
Location:	Ridge St & Harvey St Madison, Dane Co, WI	Traffic Control:	Traffic Signal
Date:	#	Hours Counted:	6:00-9:00AM & 3:00-6:0(
		Counted By:	C. Lanser



KL Engineering
[A] Better Experience

Turning Movement Diagram

Location:	Ridge St & Harvey St Madison, Dane Co, WI	Traffic Control:	Traffic Signal
Date:	#	Hours Counted:	6:00-9:00AM & 3:00-6:0(
		Counted By:	C. Lanser



KL Engineering
[A] Better Experience

Raw Traffic Count Data

Location: Ridge St & Harvey St
Madison, Dane Co, WI
Date: Tuesday, July 11, 2017

Traffic Control: Traffic Signal
Hours Counted: 6:00-9:00AM & 3:00-6:00PM
Counted By: C. Lanser

All Vehicles

	Southbound							Westbound							Northbound							Eastbound							
	L	T	R	U	Ped	Bikes	Total	L	T	R	U	Ped	Bikes	Total	L	T	R	U	Ped	Bikes	Total	L	T	R	U	Ped	Bikes	Total	Int Total
5:00:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:00:00 AM	0	1	0	0	1	0	2	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1	0	0	0	0	2	5
6:15:00 AM	0	0	1	0	0	0	1	0	1	0	0	0	0	1	1	3	0	0	0	0	4	2	0	1	1	2	0	6	12
6:30:00 AM	1	2	0	0	1	0	4	0	1	0	0	1	0	2	3	1	1	0	0	0	5	1	0	0	1	0	0	2	13
6:45:00 AM	0	1	1	0	0	0	2	1	1	0	0	0	0	2	7	6	0	0	1	0	14	1	0	0	0	0	0	1	19
Total	1	4	2	0	2	0	9	1	3	0	0	1	0	5	11	11	1	0	1	0	24	5	1	1	2	2	0	11	49
7:00:00 AM	1	3	2	0	1	0	7	0	2	0	0	2	0	4	8	5	0	0	0	0	13	1	2	2	0	1	0	6	30
7:15:00 AM	0	1	1	0	0	0	2	0	1	0	0	0	0	1	10	3	4	0	1	0	18	1	1	1	0	2	0	5	26
7:30:00 AM	1	6	3	0	0	0	10	1	1	0	0	2	0	4	6	6	2	0	1	0	15	0	0	2	0	0	0	2	31
7:45:00 AM	1	3	1	0	0	0	5	0	1	0	0	1	0	2	16	9	1	0	0	0	26	1	0	0	0	6	0	7	40
Total	3	13	7	0	1	0	24	1	5	0	0	5	0	11	40	23	7	0	2	0	72	3	3	5	0	9	0	20	127
8:00:00 AM	0	4	4	0	1	0	9	0	0	1	0	2	0	3	11	10	1	0	0	0	22	1	1	1	0	1	0	4	38
8:15:00 AM	2	1	5	0	0	0	8	0	1	3	0	1	0	5	11	4	1	0	0	0	16	2	1	5	0	0	0	8	37
8:30:00 AM	1	3	0	0	0	0	4	2	0	0	0	2	0	4	11	12	2	0	0	0	25	0	0	2	0	3	0	5	38
8:45:00 AM	0	2	1	1	0	0	4	0	2	0	0	3	0	5	14	4	0	0	0	0	18	0	0	1	1	2	0	4	31
Total	3	10	10	1	1	0	25	2	3	4	0	8	0	17	47	30	4	0	0	0	81	3	2	9	1	6	0	21	144
9:00:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:15:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:30:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:45:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Raw Traffic Count Data

Location: Ridge St & Harvey St
Madison, Dane Co, WI
Date: Tuesday, July 11, 2017

Traffic Control: Traffic Signal
Hours Counted: 6:00-9:00AM & 3:00-6:00PM
Counted By: C. Lanser

All Vehicles

	Southbound							Westbound							Northbound							Eastbound							
	L	T	R	U	Ped	Bikes	Total	L	T	R	U	Ped	Bikes	Total	L	T	R	U	Ped	Bikes	Total	L	T	R	U	Ped	Bikes	Total	Int Total
3:00:00 PM	2	8	4	1	0	0	15	3	3	1	0	0	0	7	11	8	1	0	0	0	20	2	1	4	0	1	0	8	50
3:15:00 PM	0	9	2	0	0	0	11	0	3	0	0	0	0	3	8	4	0	0	0	0	12	2	2	5	0	1	0	10	36
3:30:00 PM	0	7	1	0	0	0	8	2	5	1	0	6	0	14	9	4	0	0	0	0	13	4	0	2	0	1	0	7	42
3:45:00 PM	1	4	2	0	0	0	7	0	2	1	0	1	0	4	15	6	2	0	0	0	23	3	0	5	0	1	0	9	43
Total	3	28	9	1	0	0	41	5	13	3	0	7	0	28	43	22	3	0	0	0	68	11	3	16	0	4	0	34	171
4:00:00 PM	0	3	3	0	0	0	6	1	3	2	0	3	0	9	13	7	0	0	0	0	20	1	2	8	0	2	0	13	48
4:15:00 PM	0	8	1	0	0	0	9	1	2	0	0	2	0	5	14	2	0	0	0	0	16	1	1	5	1	2	0	10	40
4:30:00 PM	1	9	3	0	0	0	13	1	2	0	0	6	0	9	8	7	0	0	0	0	15	2	0	7	0	5	0	14	51
4:45:00 PM	1	12	5	0	0	0	18	0	3	0	0	1	0	4	12	6	0	0	0	0	18	4	2	7	0	2	0	15	55
Total	2	32	12	0	0	0	46	3	10	2	0	12	0	27	47	22	0	0	0	0	69	8	5	27	1	11	0	52	194
5:00:00 PM	4	12	3	0	1	0	20	0	5	1	0	0	0	6	9	7	1	0	0	0	17	1	1	11	0	0	0	13	56
5:15:00 PM	4	20	6	0	0	0	30	2	3	1	0	0	0	6	13	11	0	0	0	0	24	6	0	6	0	3	0	15	75
5:30:00 PM	1	6	0	0	0	0	7	1	0	0	0	1	0	2	15	4	0	0	0	0	19	0	0	4	0	2	0	6	34
5:45:00 PM	1	8	1	0	0	0	10	0	0	0	0	1	0	1	13	7	0	0	2	0	22	3	1	4	0	2	0	10	43
Total	10	46	10	0	1	0	67	3	8	2	0	2	0	15	50	29	1	0	2	0	82	10	2	25	0	7	0	44	208
6:00:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:15:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Traffic Count Summary

Location: University Ave & Ridge St
Madison, Dane Co, WI
Date: Tuesday, July 11, 2017

Traffic Control: Traffic Signal
Hours Counted: 6:00-9:00AM & 3:00-6:00PM
Counted By: C. Lanser

All Vehicles

AM Peak

Roadway	Marshall Ct						University Ave						Ridge St						University Ave						Intersection	
Approach	Southbound						Westbound						Northbound						Eastbound							
Time	L	T	R	U	Peds	Bikes	L	T	R	U	Peds	Bikes	L	T	R	U	Peds	Bikes	L	T	R	U	Peds	Bikes	Sum	PHF
7:15 AM	0	0	9	0	0	0	2	316	9	1	2	2	0	0	3	0	0	0	32	588	2	3	6	0	965	0.95
7:30 AM	0	0	14	0	0	0	0	398	10	0	4	1	0	0	6	0	0	0	41	604	7	0	5	2	1080	
7:45 AM	0	0	15	0	0	0	0	396	20	0	9	4	0	0	10	0	0	0	38	595	4	1	5	1	1079	
8:00 AM	0	0	14	0	0	0	2	357	18	2	9	2	0	0	9	0	0	1	33	548	4	3	1	0	990	
Movement Total	0	0	52	0	0	0	4	1467	57	3	24	9	0	0	28	0	0	1	144	2335	17	7	17	3	Total: 4114	
Approach Total	52						1531						28						2503							

Mid Peak

Approach	Southbound						Westbound						Northbound						Eastbound						Intersection	
Time	L	T	R	U	Peds	Bikes	L	T	R	U	Peds	Bikes	L	T	R	U	Peds	Bikes	L	T	R	U	Peds	Bikes	Sum	PHF
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	#DIV/0!
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Movement Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Total: 0	
Approach Total	0						0						0						0							

PM Peak

Approach	Southbound						Westbound						Northbound						Eastbound						Intersection	
Time	L	T	R	U	Peds	Bikes	L	T	R	U	Peds	Bikes	L	T	R	U	Peds	Bikes	L	T	R	U	Peds	Bikes	Sum	PHF
4:00 PM	0	0	60	0	0	0	2	546	7	2	3	0	0	0	7	0	0	0	15	494	2	0	12	0	1135	0.98
4:15 PM	0	0	52	0	0	0	7	558	10	1	3	0	0	0	3	0	0	0	18	501	4	1	8	0	1155	
4:30 PM	0	0	68	0	0	0	4	555	12	1	6	0	0	0	6	0	0	0	16	525	6	3	18	0	1196	
4:45 PM	0	0	61	0	0	0	12	562	11	1	7	0	0	0	13	0	0	1	22	496	6	1	5	4	1185	
Movement Total	0	0	241	0	0	0	25	2221	40	5	19	0	0	0	29	0	0	1	71	2016	18	5	43	4	Total: 4671	
Approach Total	241						2291						29						2110							

Heavy Vehicles

AM Peak

Roadway	Marshall Ct				University Ave				Ridge St				University Ave			
Approach	Southbound				Westbound				Northbound				Eastbound			
Time	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R	U
7:15 AM	0	0	0	0	0	12	0	0	0	0	0	0	1	12	0	0
7:30 AM	0	0	0	0	0	14	0	0	0	0	0	0	1	9	0	0
7:45 AM	0	0	0	0	0	15	0	0	0	0	0	0	3	16	0	0
8:00 AM	0	0	0	0	0	18	1	0	0	0	0	0	1	15	0	0
Movement Total	0	0	0	0	0	59	1	0	0	0	0	0	6	52	0	0
Approach Total	0				60				0				58			
Heavy Vehicle %	0.0%				3.9%				0.0%				2.3%			

Mid Peak

Approach	Southbound				Westbound				Northbound				Eastbound			
Time	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R	U
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Movement Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Approach Total	0				0				0				0			
Heavy Vehicle %	#DIV/0!				#DIV/0!				#DIV/0!				#DIV/0!			

PM Peak

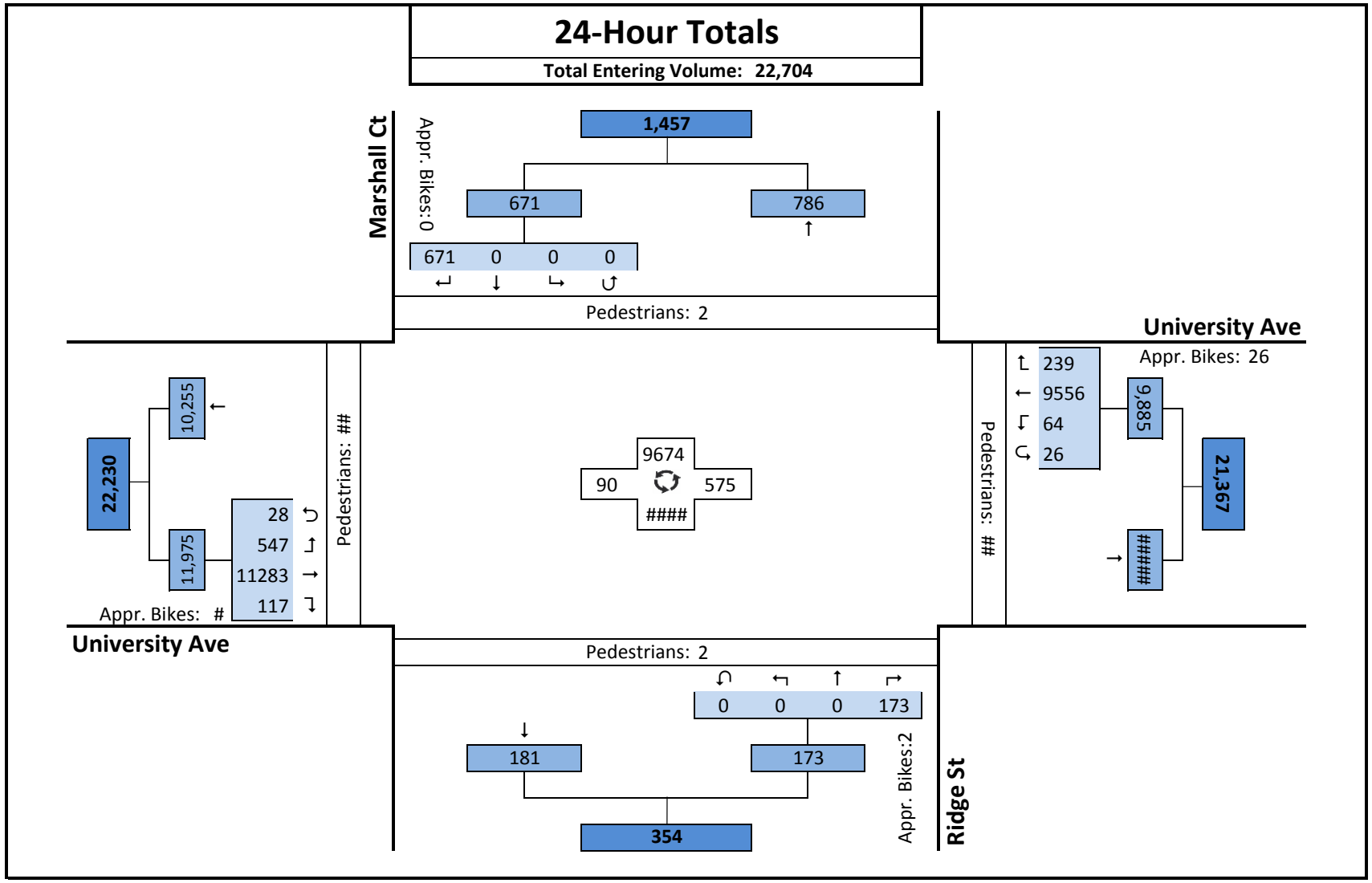
Approach	Southbound				Westbound				Northbound				Eastbound			
Time	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R	U
4:00 PM	0	0	0	0	0	12	0	0	0	0	0	0	1	12	0	0
4:15 PM	0	0	1	0	0	8	0	0	0	0	0	0	1	6	0	0
4:30 PM	0	0	0	0	0	17	0	0	0	0	0	0	2	10	0	0
4:45 PM	0	0	0	0	0	9	0	0	0	0	0	0	1	9	0	0
Movement Total	0	0	1	0	0	46	0	0	0	0	0	0	5	37	0	0
Approach Total	1				46				0				42			
Heavy Vehicle %	0.4%				2.0%				0.0%				2.0%			

KL Engineering
[A] Better Experience

Turning Movement Diagram

Location: University Ave & Ridge St
Madison, Dane Co, WI
Date: #

Traffic Control: Traffic Signal
Hours Counted: 6:00-9:00AM & 3:00-6:0(
Counted By: C. Lanser

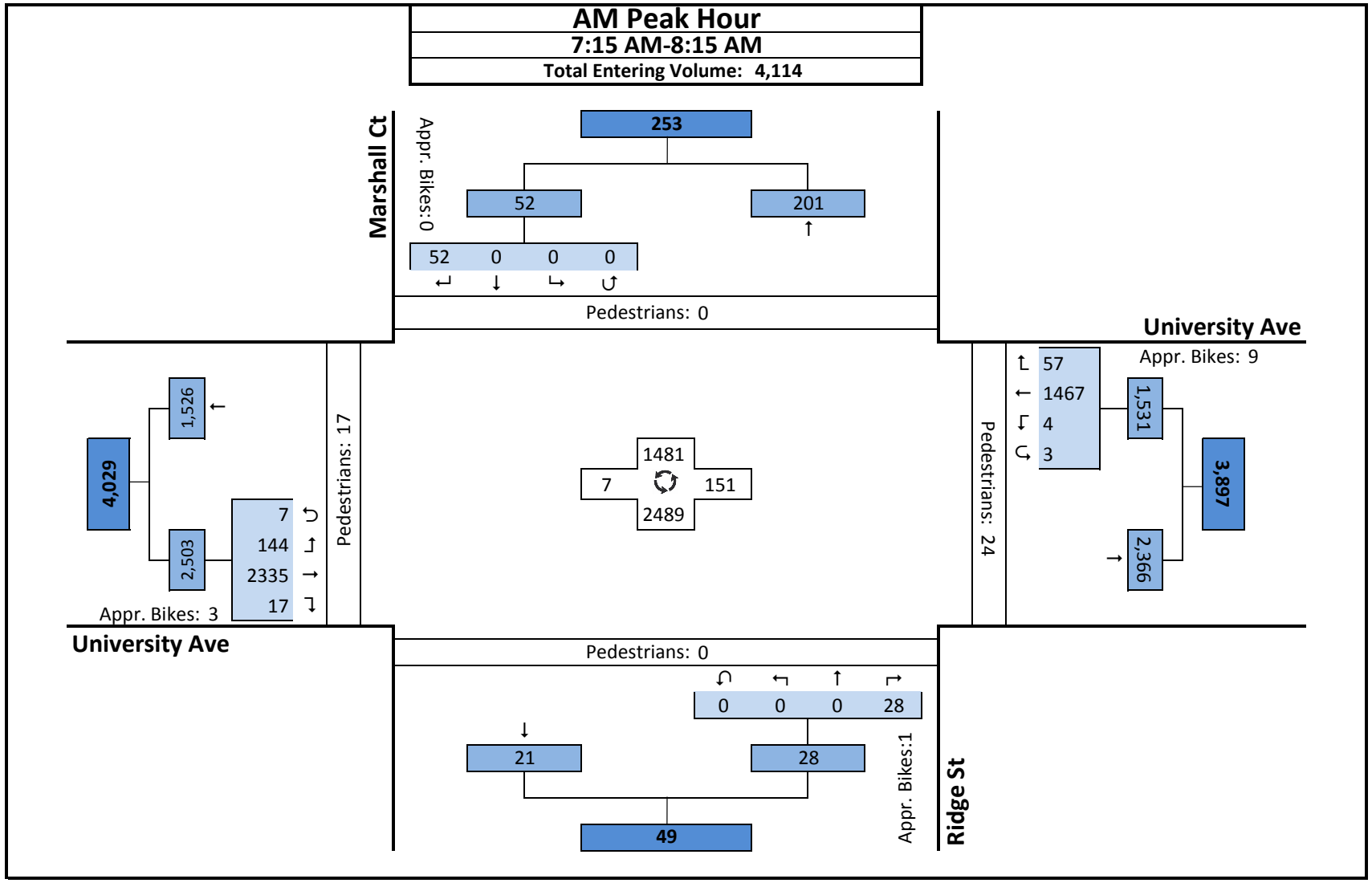


KL Engineering
[A] Better Experience

Turning Movement Diagram

Location: University Ave & Ridge St
Madison, Dane Co, WI
Date: #

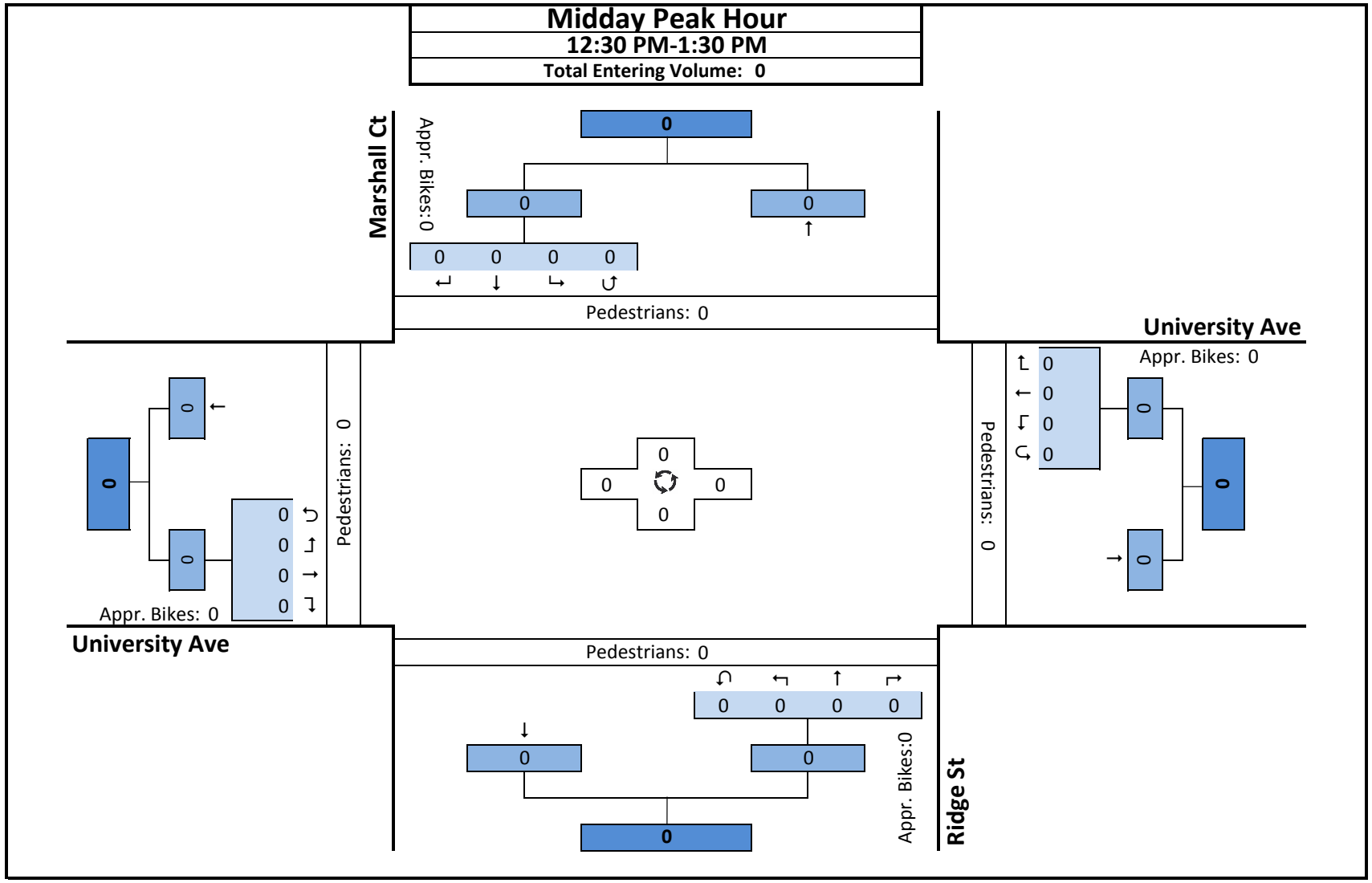
Traffic Control: Traffic Signal
Hours Counted: 6:00-9:00AM & 3:00-6:0(
Counted By: C. Lanser



KL Engineering
[A] Better Experience

Turning Movement Diagram

Location:	University Ave & Ridge St Madison, Dane Co, WI	Traffic Control:	Traffic Signal
Date:	#	Hours Counted:	6:00-9:00AM & 3:00-6:0
		Counted By:	C. Lanser

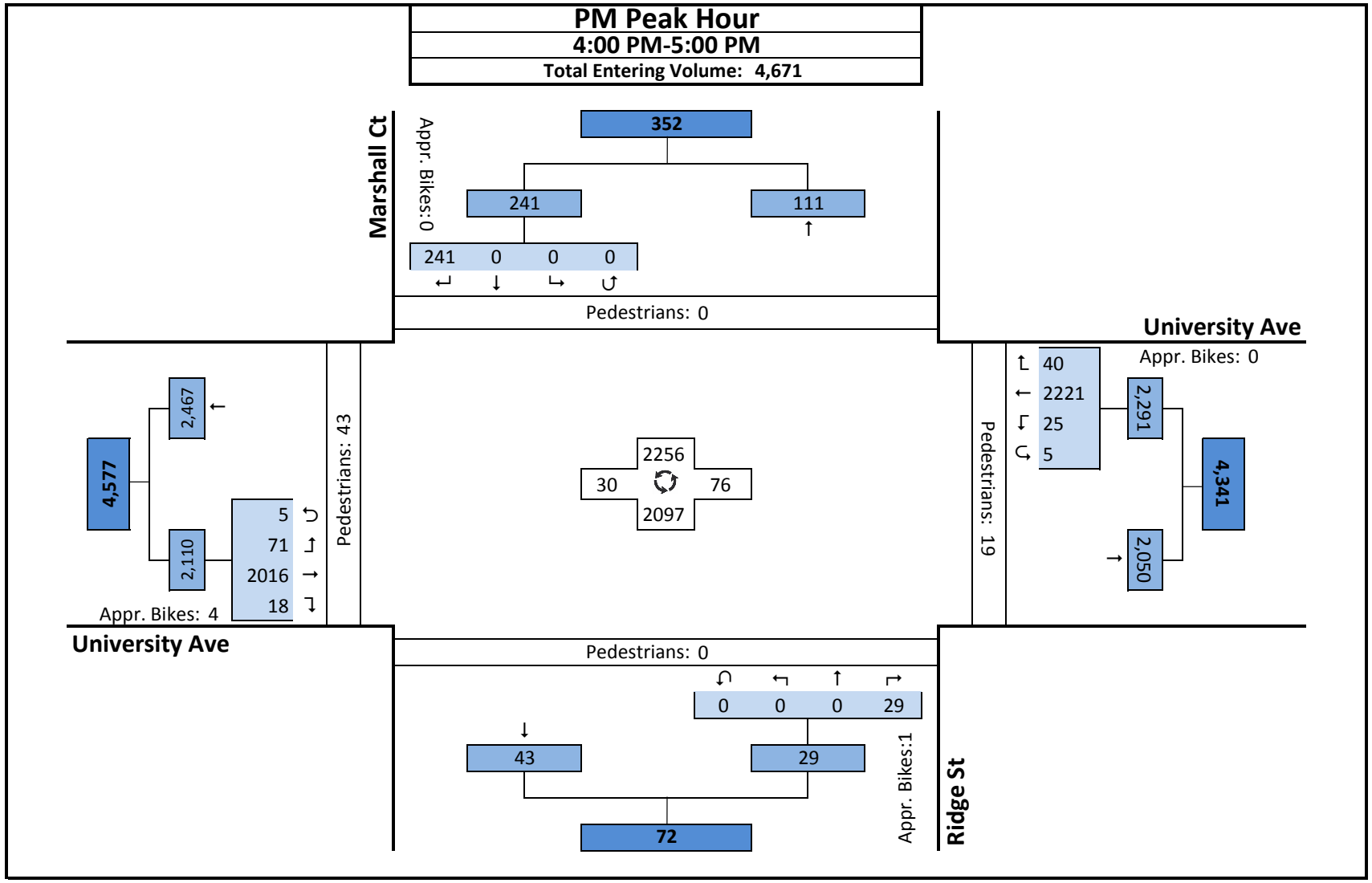


KL Engineering
[A] Better Experience

Turning Movement Diagram

Location: University Ave & Ridge St
Madison, Dane Co, WI
Date: #

Traffic Control: Traffic Signal
Hours Counted: 6:00-9:00AM & 3:00-6:0
Counted By: C. Lanser



KL Engineering
[A] Better Experience

Raw Traffic Count Data

Location: University Ave & Ridge St
Madison, Dane Co, WI
Date: Tuesday, July 11, 2017

Traffic Control: Traffic Signal
Hours Counted: 6:00-9:00AM & 3:00-6:00PM
Counted By: C. Lanser

All Vehicles

	Southbound							Westbound							Northbound							Eastbound							
	L	T	R	U	Ped	Bikes	Total	L	T	R	U	Ped	Bikes	Total	L	T	R	U	Ped	Bikes	Total	L	T	R	U	Ped	Bikes	Total	Int Total
5:00:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:00:00 AM	0	0	1	0	1	0	2	0	104	2	0	4	0	110	0	0	2	0	0	0	2	6	193	1	1	1	0	202	316
6:15:00 AM	0	0	3	0	0	0	3	0	115	2	0	2	0	119	0	0	5	0	0	0	5	10	313	1	0	0	0	324	451
6:30:00 AM	0	0	3	0	0	0	3	3	123	3	1	7	1	138	0	0	4	0	1	0	5	14	405	2	2	0	0	423	569
6:45:00 AM	0	0	3	0	0	0	3	0	213	3	0	4	1	221	0	0	5	0	0	0	5	19	454	1	2	0	0	476	705
Total	0	0	10	0	1	0	11	3	555	10	1	17	2	588	0	0	16	0	1	0	17	49	1365	5	5	1	0	1425	2041
7:00:00 AM	0	0	4	0	0	0	4	1	264	6	1	9	2	283	0	0	6	0	0	0	6	23	451	6	2	1	0	483	776
7:15:00 AM	0	0	9	0	0	0	9	2	316	9	1	2	2	332	0	0	3	0	0	0	3	32	588	2	3	6	0	631	975
7:30:00 AM	0	0	14	0	0	0	14	0	398	10	0	4	1	413	0	0	6	0	0	0	6	41	604	7	0	5	2	659	1092
7:45:00 AM	0	0	15	0	0	0	15	0	396	20	0	9	4	429	0	0	10	0	0	0	10	38	595	4	1	5	1	644	1098
Total	0	0	42	0	0	0	42	3	1374	45	2	24	9	1457	0	0	25	0	0	0	25	134	2238	19	6	17	3	2417	3941
8:00:00 AM	0	0	14	0	0	0	14	2	357	18	2	9	2	390	0	0	9	0	0	1	10	33	548	4	3	1	0	589	1003
8:15:00 AM	0	0	23	0	0	0	23	2	287	13	1	11	2	316	0	0	9	0	0	0	9	40	569	5	2	1	0	617	965
8:30:00 AM	0	0	15	0	0	0	15	0	355	12	3	4	1	375	0	0	10	0	0	0	10	32	576	4	0	1	0	613	1013
8:45:00 AM	0	0	18	0	0	0	18	3	339	10	1	2	4	359	0	0	8	0	0	0	8	31	553	3	0	1	0	588	973
Total	0	0	70	0	0	0	70	7	1338	53	7	26	9	1440	0	0	36	0	0	1	37	136	2246	16	5	4	0	2407	3954
9:00:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:15:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:30:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:45:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Raw Traffic Count Data

Location: University Ave & Ridge St
Madison, Dane Co, WI
Date: Tuesday, July 11, 2017

Traffic Control: Traffic Signal
Hours Counted: 6:00-9:00AM & 3:00-6:00PM
Counted By: C. Lanser

All Vehicles

	Southbound							Westbound							Northbound							Eastbound							
	L	T	R	U	Ped	Bikes	Total	L	T	R	U	Ped	Bikes	Total	L	T	R	U	Ped	Bikes	Total	L	T	R	U	Ped	Bikes	Total	Int Total
3:00:00 PM	0	0	42	0	0	0	42	4	421	17	0	7	0	449	0	0	10	0	0	0	10	13	391	6	0	0	0	410	911
3:15:00 PM	0	0	38	0	0	0	38	5	487	17	0	7	2	518	0	0	6	0	0	0	6	22	376	6	3	0	0	407	969
3:30:00 PM	0	0	45	0	1	0	46	5	522	10	0	10	0	547	0	0	7	0	0	0	7	24	383	3	0	3	0	413	1013
3:45:00 PM	0	0	47	0	0	0	47	1	532	9	1	6	1	550	0	0	9	0	0	0	9	18	428	2	0	3	0	451	1057
Total	0	0	172	0	1	0	173	15	1962	53	1	30	3	2064	0	0	32	0	0	0	32	77	1578	17	3	6	0	1681	3950
4:00:00 PM	0	0	60	0	0	0	60	2	546	7	2	3	0	560	0	0	7	0	0	0	7	15	494	2	0	12	0	523	1150
4:15:00 PM	0	0	52	0	0	0	52	7	558	10	1	3	0	579	0	0	3	0	0	0	3	18	501	4	1	8	0	532	1166
4:30:00 PM	0	0	68	0	0	0	68	4	555	12	1	6	0	578	0	0	6	0	0	0	6	16	525	6	3	18	0	568	1220
4:45:00 PM	0	0	61	0	0	0	61	12	562	11	1	7	0	593	0	0	13	0	0	1	14	22	496	6	1	5	4	534	1202
Total	0	0	241	0	0	0	241	25	2221	40	5	19	0	2310	0	0	29	0	0	1	30	71	2016	18	5	43	4	2157	4738
5:00:00 PM	0	0	52	0	0	0	52	3	529	9	2	4	2	549	0	0	6	0	1	0	7	17	485	12	0	9	1	524	1132
5:15:00 PM	0	0	31	0	0	0	31	4	570	11	1	1	0	587	0	0	16	0	0	0	16	23	482	19	1	9	0	534	1168
5:30:00 PM	0	0	30	0	0	0	30	3	535	6	5	2	0	551	0	0	4	0	0	0	4	16	411	3	2	7	3	442	1027
5:45:00 PM	0	0	23	0	0	0	23	1	472	12	2	1	1	489	0	0	9	0	0	0	9	24	462	8	1	5	1	501	1022
Total	0	0	136	0	0	0	136	11	2106	38	10	8	3	2176	0	0	35	0	1	0	36	80	1840	42	4	30	5	2001	4349
6:00:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:15:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX B

Traffic Analysis Output

Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%				0%			0%			0%
Storage Length (ft)	125		0		100		0	0		0	0	
Storage Lanes	1		0		1		0	0		1	0	
Taper Length (ft)	100				100			100			100	
Lane Util. Factor	1.00	0.91	0.91	0.91	1.00	0.91	0.91	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.999				0.995				0.865		
Flt Protected	0.950				0.950							
Satd. Flow (prot)	1770	5080	0	0	1736	4963	0	0	0	1611	0	0
Flt Permitted	0.134				0.048							
Satd. Flow (perm)	250	5080	0	0	88	4963	0	0	0	1611	0	0
Right Turn on Red			Yes				Yes			Yes		
Satd. Flow (RTOR)		2				13				19		
Link Speed (mph)		40				40			30			30
Link Distance (ft)		634				648			272			544
Travel Time (s)		10.8				11.0			6.2			12.4

Intersection Summary	
Area Type:	Other

Lane Group	SBR
Lane Configurations	
Ideal Flow (vphpl)	1900
Lane Width (ft)	12
Grade (%)	
Storage Length (ft)	0
Storage Lanes	1
Taper Length (ft)	
Lane Util. Factor	1.00
Ped Bike Factor	
Frt	0.865
Flt Protected	
Satd. Flow (prot)	1611
Flt Permitted	
Satd. Flow (perm)	1611
Right Turn on Red	Yes
Satd. Flow (RTOR)	65
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	

Intersection Summary

Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Traffic Volume (vph)	150	2335	15	5	5	1465	55	0	0	30	0	0
Future Volume (vph)	150	2335	15	5	5	1465	55	0	0	30	0	0
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	4%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%				0%			0%			0%
Adj. Flow (vph)	158	2458	16	5	5	1542	58	0	0	32	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	158	2474	0	0	10	1600	0	0	0	32	0	0

Intersection Summary

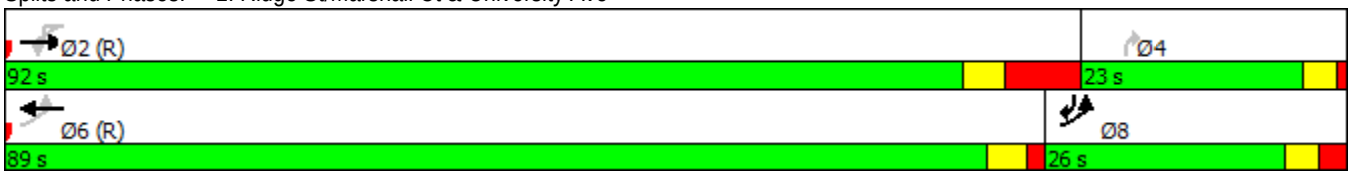
Lane Group	SBR
Traffic Volume (vph)	50
Future Volume (vph)	50
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	0.95
Growth Factor	100%
Heavy Vehicles (%)	2%
Bus Blockages (#/hr)	0
Parking (#/hr)	
Mid-Block Traffic (%)	
Adj. Flow (vph)	53
Shared Lane Traffic (%)	
Lane Group Flow (vph)	53

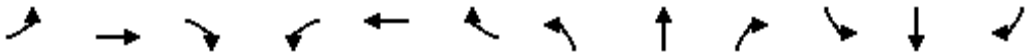
Intersection Summary

Lane Group	EBL	EBT	WBU	WBL	WBT	NBR	SBR
Lane Configurations							
Traffic Volume (vph)	150	2335	5	5	1465	30	50
Future Volume (vph)	150	2335	5	5	1465	30	50
Turn Type	D.P+P	NA	D.Pm	D.Pm	NA	Perm	Over
Protected Phases	8	2			6		8
Permitted Phases	6		2	2		4	
Detector Phase	8	2			6	4	8
Switch Phase							
Minimum Initial (s)	8.0	15.0	15.0	15.0	15.0	6.0	8.0
Minimum Split (s)	25.5	39.0	39.0	39.0	20.0	22.0	25.5
Total Split (s)	26.0	92.0	92.0	92.0	89.0	23.0	26.0
Total Split (%)	22.6%	80.0%	80.0%	80.0%	77.4%	20.0%	22.6%
Yellow Time (s)	3.0	3.5	3.5	3.5	3.5	3.0	3.0
All-Red Time (s)	2.5	6.5	6.5	6.5	1.5	1.0	2.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	10.0		10.0	5.0	4.0	5.5
Lead/Lag							
Lead-Lag Optimize?							
Recall Mode	None	C-Max	C-Max	C-Max	C-Max	None	None
Act Effct Green (s)	104.0	97.9		97.9	91.7	11.1	12.8
Actuated g/C Ratio	0.90	0.85		0.85	0.80	0.10	0.11
v/c Ratio	0.40	0.57		0.13	0.40	0.19	0.22
Control Delay	4.7	5.6		9.6	4.3	27.0	9.6
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0
Total Delay	4.7	5.6		9.6	4.3	27.0	9.6
LOS	A	A		A	A	C	A
Approach Delay		5.6			4.3		
Approach LOS		A			A		

Intersection Summary	
Cycle Length: 115	
Actuated Cycle Length: 115	
Offset: 45 (39%), Referenced to phase 2:EBWB and 6:EBWB, Start of 1st Green	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.57	
Intersection Signal Delay: 5.3	Intersection LOS: A
Intersection Capacity Utilization 82.9%	ICU Level of Service E
Analysis Period (min) 15	

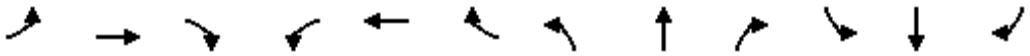
Splits and Phases: 1: Ridge St/Marshall Ct & University Ave





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.938			0.983			0.985			0.949	
Flt Protected		0.977			0.994			0.974			0.998	
Satd. Flow (prot)	0	1707	0	0	1820	0	0	1787	0	0	1764	0
Flt Permitted		0.977			0.994			0.974			0.998	
Satd. Flow (perm)	0	1707	0	0	1820	0	0	1787	0	0	1764	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		534			324			252			272	
Travel Time (s)		12.1			7.4			5.7			6.2	

Intersection Summary	
Area Type:	Other



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume (vph)	5	1	5	1	5	1	45	30	10	1	15	10
Future Volume (vph)	5	1	5	1	5	1	45	30	10	1	15	10
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	6	1	6	1	6	1	52	34	11	1	17	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	13	0	0	8	0	0	97	0	0	29	0

Intersection Summary

Intersection	
Int Delay, s/veh	4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	5	1	5	1	5	1	45	30	10	1	15	10
Future Vol, veh/h	5	1	5	1	5	1	45	30	10	1	15	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	87	87	87	87	87	87	87	87	87	87	87	87
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	6	1	6	1	6	1	52	34	11	1	17	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	172	174	23	173	175	40	29	0	0	46	0	0
Stage 1	25	25	-	144	144	-	-	-	-	-	-	-
Stage 2	147	149	-	29	31	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	791	719	1054	790	718	1031	1584	-	-	1562	-	-
Stage 1	993	874	-	859	778	-	-	-	-	-	-	-
Stage 2	856	774	-	988	869	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	764	694	1054	764	693	1031	1584	-	-	1562	-	-
Mov Cap-2 Maneuver	764	694	-	764	693	-	-	-	-	-	-	-
Stage 1	959	873	-	830	752	-	-	-	-	-	-	-
Stage 2	820	748	-	980	868	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.2	9.9	3.9	0.3
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1584	-	-	864	737	1562	-	-
HCM Lane V/C Ratio	0.033	-	-	0.015	0.011	0.001	-	-
HCM Control Delay (s)	7.3	0	-	9.2	9.9	7.3	0	-
HCM Lane LOS	A	A	-	A	A	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0	0	0	-	-

Intersection: 1: Ridge St/Marshall Ct & University Ave

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	SB
Directions Served	L	T	T	TR	UL	T	T	TR	R	R
Maximum Queue (ft)	119	168	153	87	27	216	165	98	45	123
Average Queue (ft)	48	17	12	7	3	93	57	19	17	48
95th Queue (ft)	92	94	78	45	16	181	138	60	42	103
Link Distance (ft)		604	604	604		601	601	601	174	486
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	125				100					
Storage Blk Time (%)	0	1				5				
Queuing Penalty (veh)	4	1				1				

Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%				0%			0%			0%
Storage Length (ft)	125		0		100		0	0		0	0	
Storage Lanes	1		0		1		0	0		1	0	
Taper Length (ft)	100				100			100			100	
Lane Util. Factor	1.00	0.91	0.91	0.91	1.00	0.91	0.91	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.999				0.997				0.865		
Flt Protected	0.950				0.950							
Satd. Flow (prot)	1770	5080	0	0	1736	4973	0	0	0	1611	0	0
Flt Permitted	0.057				0.071							
Satd. Flow (perm)	106	5080	0	0	130	4973	0	0	0	1611	0	0
Right Turn on Red			Yes				Yes			Yes		
Satd. Flow (RTOR)		3				6				22		
Link Speed (mph)		40				40			30			30
Link Distance (ft)		634				648			272			544
Travel Time (s)		10.8				11.0			6.2			12.4

Intersection Summary

Area Type: Other

Lane Group	SBR
Lane Configurations	
Ideal Flow (vphpl)	1900
Lane Width (ft)	12
Grade (%)	
Storage Length (ft)	0
Storage Lanes	1
Taper Length (ft)	
Lane Util. Factor	1.00
Ped Bike Factor	
Frt	0.865
Flt Protected	
Satd. Flow (prot)	1611
Flt Permitted	
Satd. Flow (perm)	1611
Right Turn on Red	Yes
Satd. Flow (RTOR)	22
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	

Intersection Summary

Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Traffic Volume (vph)	75	2015	20	5	25	2220	40	0	0	30	0	0
Future Volume (vph)	75	2015	20	5	25	2220	40	0	0	30	0	0
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	4%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%				0%			0%			0%
Adj. Flow (vph)	79	2121	21	5	26	2337	42	0	0	32	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	79	2142	0	0	31	2379	0	0	0	32	0	0

Intersection Summary

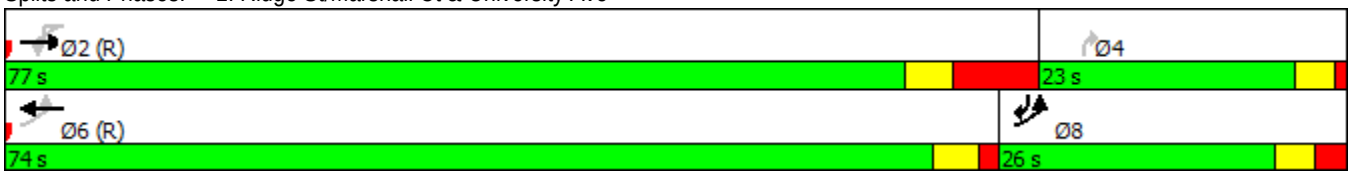
Lane Group	SBR
Traffic Volume (vph)	240
Future Volume (vph)	240
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	0.95
Growth Factor	100%
Heavy Vehicles (%)	2%
Bus Blockages (#/hr)	0
Parking (#/hr)	
Mid-Block Traffic (%)	
Adj. Flow (vph)	253
Shared Lane Traffic (%)	
Lane Group Flow (vph)	253

Intersection Summary

Lane Group	EBL	EBT	WBU	WBL	WBT	NBR	SBR
Lane Configurations							
Traffic Volume (vph)	75	2015	5	25	2220	30	240
Future Volume (vph)	75	2015	5	25	2220	30	240
Turn Type	D.P+P	NA	D.Pm	D.Pm	NA	Perm	Over
Protected Phases	8	2			6		8
Permitted Phases	6		2	2		4	
Detector Phase	8	2			6	4	8
Switch Phase							
Minimum Initial (s)	8.0	15.0	15.0	15.0	15.0	6.0	8.0
Minimum Split (s)	25.5	25.0	25.0	25.0	36.0	22.0	25.5
Total Split (s)	26.0	77.0	77.0	77.0	74.0	23.0	26.0
Total Split (%)	26.0%	77.0%	77.0%	77.0%	74.0%	23.0%	26.0%
Yellow Time (s)	3.0	3.5	3.5	3.5	3.5	3.0	3.0
All-Red Time (s)	2.5	6.5	6.5	6.5	1.5	1.0	2.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	10.0		10.0	5.0	4.0	5.5
Lead/Lag							
Lead-Lag Optimize?							
Recall Mode	None	C-Max	C-Max	C-Max	C-Max	None	None
Act Effct Green (s)	89.0	80.3		80.3	71.4	13.7	18.1
Actuated g/C Ratio	0.89	0.80		0.80	0.71	0.14	0.18
v/c Ratio	0.20	0.53		0.30	0.67	0.13	0.82
Control Delay	7.2	6.9		16.6	9.4	19.2	56.8
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0
Total Delay	7.2	6.9		16.6	9.4	19.2	56.8
LOS	A	A		B	A	B	E
Approach Delay		6.9			9.5		
Approach LOS		A			A		

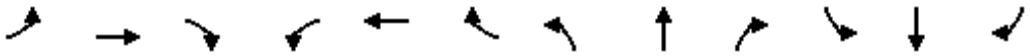
Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 8 (8%), Referenced to phase 2:EBWB and 6:EBWB, Start of 1st Green	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.82	
Intersection Signal Delay: 10.8	Intersection LOS: B
Intersection Capacity Utilization 76.9%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 1: Ridge St/Marshall Ct & University Ave



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.915			0.992			0.998			0.968	
Flt Protected		0.988			0.984			0.967			0.999	
Satd. Flow (prot)	0	1684	0	0	1818	0	0	1798	0	0	1801	0
Flt Permitted		0.988			0.984			0.967			0.999	
Satd. Flow (perm)	0	1684	0	0	1818	0	0	1798	0	0	1801	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		534			324			252			272	
Travel Time (s)		12.1			7.4			5.7			6.2	

Intersection Summary	
Area Type:	Other



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume (vph)	10	5	25	5	10	1	45	20	1	1	30	10
Future Volume (vph)	10	5	25	5	10	1	45	20	1	1	30	10
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	11	6	29	6	11	1	52	23	1	1	34	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	46	0	0	18	0	0	76	0	0	46	0

Intersection Summary

Intersection	
Int Delay, s/veh	5.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	10	5	25	5	10	1	45	20	1	1	30	10
Future Vol, veh/h	10	5	25	5	10	1	45	20	1	1	30	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	87	87	87	87	87	87	87	87	87	87	87	87
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	11	6	29	6	11	1	52	23	1	1	34	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	176	171	40	187	175	24	46	0	0	24	0	0
Stage 1	43	43	-	127	127	-	-	-	-	-	-	-
Stage 2	133	128	-	60	48	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	786	722	1031	774	718	1052	1562	-	-	1591	-	-
Stage 1	971	859	-	877	791	-	-	-	-	-	-	-
Stage 2	870	790	-	951	855	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	755	697	1031	728	693	1052	1562	-	-	1591	-	-
Mov Cap-2 Maneuver	755	697	-	728	693	-	-	-	-	-	-	-
Stage 1	938	858	-	847	764	-	-	-	-	-	-	-
Stage 2	827	763	-	917	854	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.2	10.1	5	0.2
HCM LOS	A	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1562	-	-	896	719	1591	-	-
HCM Lane V/C Ratio	0.033	-	-	0.051	0.026	0.001	-	-
HCM Control Delay (s)	7.4	0	-	9.2	10.1	7.3	0	-
HCM Lane LOS	A	A	-	A	B	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.2	0.1	0	-	-

Intersection: 1: Ridge St/Marshall Ct & University Ave

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	SB
Directions Served	L	T	T	TR	UL	T	T	TR	R	R
Maximum Queue (ft)	104	251	218	150	168	310	265	216	56	347
Average Queue (ft)	32	34	26	11	27	188	146	79	20	171
95th Queue (ft)	72	157	129	77	95	277	240	170	48	297
Link Distance (ft)		604	604	604		601	601	601	174	486
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	125				100					
Storage Blk Time (%)	0	2			1	14				
Queuing Penalty (veh)	0	1			5	4				

Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%				0%			0%			0%
Storage Length (ft)	125		0		100		0	0		0	0	
Storage Lanes	1		0		1		0	0		1	0	
Taper Length (ft)	100				100			100			100	
Lane Util. Factor	1.00	0.91	0.91	0.91	1.00	0.91	0.91	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.998				0.995				0.865		
Flt Protected	0.950				0.950							
Satd. Flow (prot)	1770	5075	0	0	1736	4963	0	0	0	1611	0	0
Flt Permitted	0.135				0.047							
Satd. Flow (perm)	251	5075	0	0	86	4963	0	0	0	1611	0	0
Right Turn on Red			Yes				Yes			Yes		
Satd. Flow (RTOR)		4				13				19		
Link Speed (mph)		40				40			30			30
Link Distance (ft)		634				648			272			544
Travel Time (s)		10.8				11.0			6.2			12.4

Intersection Summary	
Area Type:	Other

Lane Group	SBR
Lane Configurations	
Ideal Flow (vphpl)	1900
Lane Width (ft)	12
Grade (%)	
Storage Length (ft)	0
Storage Lanes	1
Taper Length (ft)	
Lane Util. Factor	1.00
Ped Bike Factor	
Frt	0.865
Flt Protected	
Satd. Flow (prot)	1611
Flt Permitted	
Satd. Flow (perm)	1611
Right Turn on Red	Yes
Satd. Flow (RTOR)	65
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	

Intersection Summary

Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Traffic Volume (vph)	150	2330	30	5	15	1465	55	0	0	45	0	0
Future Volume (vph)	150	2330	30	5	15	1465	55	0	0	45	0	0
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	4%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%				0%			0%			0%
Adj. Flow (vph)	158	2453	32	5	16	1542	58	0	0	47	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	158	2485	0	0	21	1600	0	0	0	47	0	0

Intersection Summary

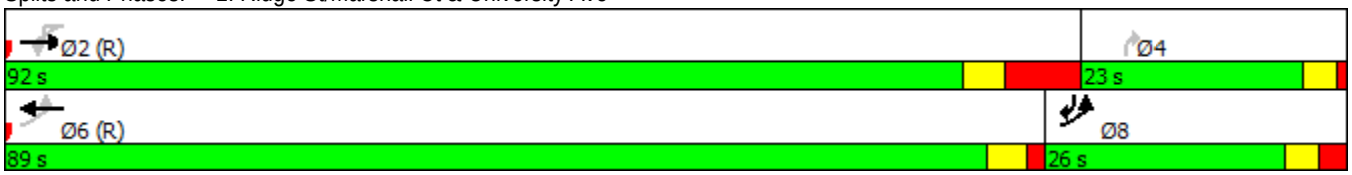
Lane Group	SBR
Traffic Volume (vph)	50
Future Volume (vph)	50
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	0.95
Growth Factor	100%
Heavy Vehicles (%)	2%
Bus Blockages (#/hr)	0
Parking (#/hr)	
Mid-Block Traffic (%)	
Adj. Flow (vph)	53
Shared Lane Traffic (%)	
Lane Group Flow (vph)	53

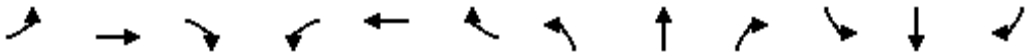
Intersection Summary

Lane Group	EBL	EBT	WBU	WBL	WBT	NBR	SBR
Lane Configurations							
Traffic Volume (vph)	150	2330	5	15	1465	45	50
Future Volume (vph)	150	2330	5	15	1465	45	50
Turn Type	D.P+P	NA	D.Pm	D.Pm	NA	Perm	Over
Protected Phases	8	2			6		8
Permitted Phases	6		2	2		4	
Detector Phase	8	2			6	4	8
Switch Phase							
Minimum Initial (s)	8.0	15.0	15.0	15.0	15.0	6.0	8.0
Minimum Split (s)	25.5	39.0	39.0	39.0	20.0	22.0	25.5
Total Split (s)	26.0	92.0	92.0	92.0	89.0	23.0	26.0
Total Split (%)	22.6%	80.0%	80.0%	80.0%	77.4%	20.0%	22.6%
Yellow Time (s)	3.0	3.5	3.5	3.5	3.5	3.0	3.0
All-Red Time (s)	2.5	6.5	6.5	6.5	1.5	1.0	2.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	10.0		10.0	5.0	4.0	5.5
Lead/Lag							
Lead-Lag Optimize?							
Recall Mode	None	C-Max	C-Max	C-Max	C-Max	None	None
Act Effct Green (s)	104.0	93.6		93.6	91.5	11.4	13.0
Actuated g/C Ratio	0.90	0.81		0.81	0.80	0.10	0.11
v/c Ratio	0.40	0.60		0.30	0.40	0.27	0.22
Control Delay	4.6	6.5		19.4	4.3	33.7	9.6
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0
Total Delay	4.6	6.5		19.4	4.3	33.7	9.6
LOS	A	A		B	A	C	A
Approach Delay		6.4			4.5		
Approach LOS		A			A		

Intersection Summary	
Cycle Length: 115	
Actuated Cycle Length: 115	
Offset: 45 (39%), Referenced to phase 2:EBWB and 6:EBWB, Start of 1st Green	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.60	
Intersection Signal Delay: 6.0	Intersection LOS: A
Intersection Capacity Utilization 83.2%	ICU Level of Service E
Analysis Period (min) 15	

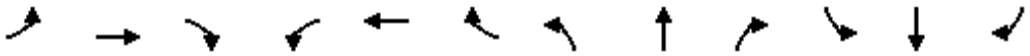
Splits and Phases: 1: Ridge St/Marshall Ct & University Ave





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.938			0.983			0.985			0.924	
Flt Protected		0.977			0.994			0.974			0.999	
Satd. Flow (prot)	0	1707	0	0	1820	0	0	1787	0	0	1719	0
Flt Permitted		0.977			0.994			0.974			0.999	
Satd. Flow (perm)	0	1707	0	0	1820	0	0	1787	0	0	1719	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		534			324			252			272	
Travel Time (s)		12.1			7.4			5.7			6.2	

Intersection Summary	
Area Type:	Other



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume (vph)	5	1	5	1	5	1	45	30	10	1	15	20
Future Volume (vph)	5	1	5	1	5	1	45	30	10	1	15	20
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	6	1	6	1	6	1	52	34	11	1	17	23
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	13	0	0	8	0	0	97	0	0	41	0

Intersection Summary

Intersection	
Int Delay, s/veh	3.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	5	1	5	1	5	1	45	30	10	1	15	20
Future Vol, veh/h	5	1	5	1	5	1	45	30	10	1	15	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	87	87	87	87	87	87	87	87	87	87	87	87
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	6	1	6	1	6	1	52	34	11	1	17	23

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	178	180	29	178	187	40	40	0	0	46	0	0
Stage 1	31	31	-	144	144	-	-	-	-	-	-	-
Stage 2	147	149	-	34	43	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	784	714	1046	784	708	1031	1570	-	-	1562	-	-
Stage 1	986	869	-	859	778	-	-	-	-	-	-	-
Stage 2	856	774	-	982	859	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	757	689	1046	758	683	1031	1570	-	-	1562	-	-
Mov Cap-2 Maneuver	757	689	-	758	683	-	-	-	-	-	-	-
Stage 1	952	868	-	830	752	-	-	-	-	-	-	-
Stage 2	820	748	-	974	858	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.3	10	3.9	0.2
HCM LOS	A	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1570	-	-	857	728	1562	-	-
HCM Lane V/C Ratio	0.033	-	-	0.015	0.011	0.001	-	-
HCM Control Delay (s)	7.4	0	-	9.3	10	7.3	0	-
HCM Lane LOS	A	A	-	A	B	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0	0	0	-	-

Intersection: 1: Ridge St/Marshall Ct & University Ave

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	SB
Directions Served	L	T	T	TR	UL	T	T	TR	R	R
Maximum Queue (ft)	171	271	235	205	59	200	190	99	63	123
Average Queue (ft)	52	43	32	21	13	104	61	18	26	40
95th Queue (ft)	113	172	139	103	38	197	148	60	57	93
Link Distance (ft)		604	604	604		601	601	601	174	486
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	125				100					
Storage Blk Time (%)	1	2			0	5				
Queuing Penalty (veh)	4	3			0	1				

Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%				0%			0%			0%
Storage Length (ft)	125		0		100		0	0		0	0	
Storage Lanes	1		0		1		0	0		1	0	
Taper Length (ft)	100				100			100			100	
Lane Util. Factor	1.00	0.91	0.91	0.91	1.00	0.91	0.91	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.996				0.997				0.865		
Flt Protected	0.950				0.950							
Satd. Flow (prot)	1770	5065	0	0	1736	4973	0	0	0	1611	0	0
Flt Permitted	0.057				0.065							
Satd. Flow (perm)	106	5065	0	0	119	4973	0	0	0	1611	0	0
Right Turn on Red			Yes				Yes			Yes		
Satd. Flow (RTOR)		8				6				22		
Link Speed (mph)		40				40			30			30
Link Distance (ft)		634				648			272			544
Travel Time (s)		10.8				11.0			6.2			12.4

Intersection Summary	
Area Type:	Other

Lane Group	SBR
Lane Configurations	
Ideal Flow (vphpl)	1900
Lane Width (ft)	12
Grade (%)	
Storage Length (ft)	0
Storage Lanes	1
Taper Length (ft)	
Lane Util. Factor	1.00
Ped Bike Factor	
Frt	0.865
Flt Protected	
Satd. Flow (prot)	1611
Flt Permitted	
Satd. Flow (perm)	1611
Right Turn on Red	Yes
Satd. Flow (RTOR)	22
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	

Intersection Summary

Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Traffic Volume (vph)	75	2010	50	5	60	2215	40	0	0	65	0	0
Future Volume (vph)	75	2010	50	5	60	2215	40	0	0	65	0	0
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	4%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%				0%			0%			0%
Adj. Flow (vph)	79	2116	53	5	63	2332	42	0	0	68	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	79	2169	0	0	68	2374	0	0	0	68	0	0

Intersection Summary

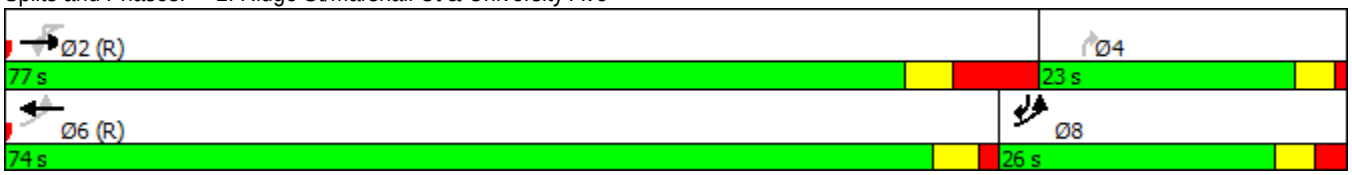
Lane Group	SBR
Traffic Volume (vph)	240
Future Volume (vph)	240
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	0.95
Growth Factor	100%
Heavy Vehicles (%)	2%
Bus Blockages (#/hr)	0
Parking (#/hr)	
Mid-Block Traffic (%)	
Adj. Flow (vph)	253
Shared Lane Traffic (%)	
Lane Group Flow (vph)	253

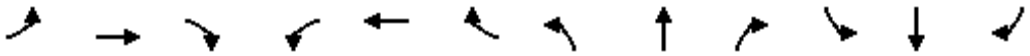
Intersection Summary

Lane Group	EBL	EBT	WBU	WBL	WBT	NBR	SBR
Lane Configurations							
Traffic Volume (vph)	75	2010	5	60	2215	65	240
Future Volume (vph)	75	2010	5	60	2215	65	240
Turn Type	D.P+P	NA	D.Pm	D.Pm	NA	Perm	Over
Protected Phases	8	2			6		8
Permitted Phases	6		2	2		4	
Detector Phase	8	2			6	4	8
Switch Phase							
Minimum Initial (s)	8.0	15.0	15.0	15.0	15.0	6.0	8.0
Minimum Split (s)	25.5	25.0	25.0	25.0	36.0	22.0	25.5
Total Split (s)	26.0	77.0	77.0	77.0	74.0	23.0	26.0
Total Split (%)	26.0%	77.0%	77.0%	77.0%	74.0%	23.0%	26.0%
Yellow Time (s)	3.0	3.5	3.5	3.5	3.5	3.0	3.0
All-Red Time (s)	2.5	6.5	6.5	6.5	1.5	1.0	2.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	10.0		10.0	5.0	4.0	5.5
Lead/Lag							
Lead-Lag Optimize?							
Recall Mode	None	C-Max	C-Max	C-Max	C-Max	None	None
Act Effct Green (s)	89.0	74.4		74.4	71.4	15.6	18.1
Actuated g/C Ratio	0.89	0.74		0.74	0.71	0.16	0.18
v/c Ratio	0.20	0.58		0.77	0.67	0.25	0.82
Control Delay	7.2	8.5		70.1	9.4	27.6	56.8
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0
Total Delay	7.2	8.5		70.1	9.4	27.6	56.8
LOS	A	A		E	A	C	E
Approach Delay		8.4			11.0		
Approach LOS		A			B		

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 8 (8%), Referenced to phase 2:EBWB and 6:EBWB, Start of 1st Green	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.82	
Intersection Signal Delay: 12.4	Intersection LOS: B
Intersection Capacity Utilization 77.4%	ICU Level of Service D
Analysis Period (min) 15	

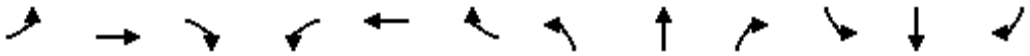
Splits and Phases: 1: Ridge St/Marshall Ct & University Ave





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.915			0.992			0.998			0.933	
Flt Protected		0.988			0.984			0.969			0.999	
Satd. Flow (prot)	0	1684	0	0	1818	0	0	1801	0	0	1736	0
Flt Permitted		0.988			0.984			0.969			0.999	
Satd. Flow (perm)	0	1684	0	0	1818	0	0	1801	0	0	1736	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		534			324			252			272	
Travel Time (s)		12.1			7.4			5.7			6.2	

Intersection Summary	
Area Type:	Other



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume (vph)	10	5	25	5	10	1	45	25	1	1	35	35
Future Volume (vph)	10	5	25	5	10	1	45	25	1	1	35	35
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	11	6	29	6	11	1	52	29	1	1	40	40
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	46	0	0	18	0	0	82	0	0	81	0

Intersection Summary

Intersection	
Int Delay, s/veh	4.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	10	5	25	5	10	1	45	25	1	1	35	35
Future Vol, veh/h	10	5	25	5	10	1	45	25	1	1	35	35
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	87	87	87	87	87	87	87	87	87	87	87	87
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	11	6	29	6	11	1	52	29	1	1	40	40

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	202	196	60	213	216	29	80	0	0	30	0	0
Stage 1	63	63	-	133	133	-	-	-	-	-	-	-
Stage 2	139	133	-	80	83	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	756	699	1005	744	682	1046	1518	-	-	1583	-	-
Stage 1	948	842	-	870	786	-	-	-	-	-	-	-
Stage 2	864	786	-	929	826	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	725	674	1005	698	657	1046	1518	-	-	1583	-	-
Mov Cap-2 Maneuver	725	674	-	698	657	-	-	-	-	-	-	-
Stage 1	915	841	-	840	758	-	-	-	-	-	-	-
Stage 2	820	758	-	895	825	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.4	10.4	4.7	0.1
HCM LOS	A	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1518	-	-	868	686	1583	-	-
HCM Lane V/C Ratio	0.034	-	-	0.053	0.027	0.001	-	-
HCM Control Delay (s)	7.5	0	-	9.4	10.4	7.3	0	-
HCM Lane LOS	A	A	-	A	B	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.2	0.1	0	-	-

Intersection: 1: Ridge St/Marshall Ct & University Ave

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	SB
Directions Served	L	T	T	TR	UL	T	T	TR	R	R
Maximum Queue (ft)	87	244	215	140	171	312	299	190	68	278
Average Queue (ft)	34	60	43	20	49	180	150	76	32	154
95th Queue (ft)	72	199	156	86	123	280	249	161	59	252
Link Distance (ft)		604	604	604		601	601	601	174	486
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	125				100					
Storage Blk Time (%)	0	3			5	14				
Queuing Penalty (veh)	0	2			37	9				