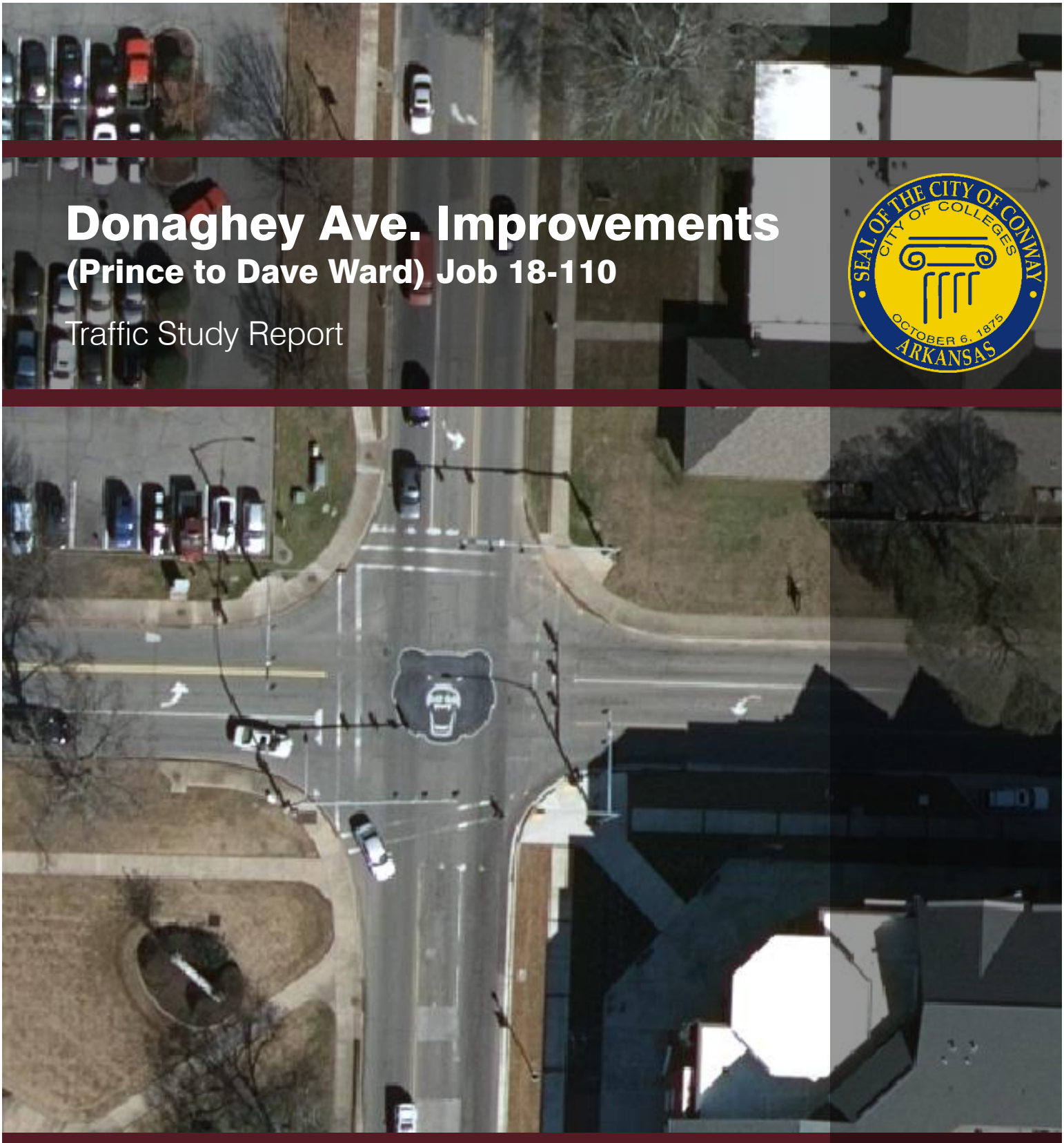

Donaghey Ave. Improvements
(Prince to Dave Ward) Job 18-110

Traffic Study Report

Prepared For:

City of Conway

February 19, 2019

GARVER

GarverUSA.com

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1.0 Introduction

Garver was retained by the City of Conway to analyze the existing and proposed traffic conditions along the Donaghey Avenue corridor between Prince Avenue and Robins Street.

1.1 Project Purpose

The purpose of the study is to improve mobility for vehicles, pedestrians, and bicyclists along Donaghey Avenue. The current conditions and future no build conditions were analyzed with signal timing being optimized for the latter. These conditions were then compared to a build scenario, wherein traffic signals were replaced with roundabouts at four of the six study intersections along the Donaghey Avenue corridor (Prince Street, Caldwell Street, College Avenue, and Bruce Street).

2.0 Existing Conditions

This section describes the study area, characteristics of study intersections, existing traffic volumes, and existing conditions traffic analysis.

2.1 Existing Intersection Configurations

The study area, pictured in **Figure 1**, encompasses Donaghey Avenue from Prince Street to Dave Ward Drive. It includes the intersections of Donaghey Avenue at Prince Street, Caldwell Street, Robinson Avenue, College Avenue, Bruce Street and Robins Street; all of which are currently signalized. In the following subsections, **Figures 2 – 7** show the existing layout of the six study intersections and details of each intersection are also included. Throughout the study area, Donaghey Avenue is a two lane roadway with a Two Way Left Turn Lane (TWLTL) and a speed limit of 30 MPH.

The study corridor provides access to Conway High School, Conway Junior High School, Conway Regional Medical Center, and the University of Central Arkansas (UCA). Residential land uses and a local park are also in close proximity to the corridor. Characteristics of study intersections are described in the following sub-sections.

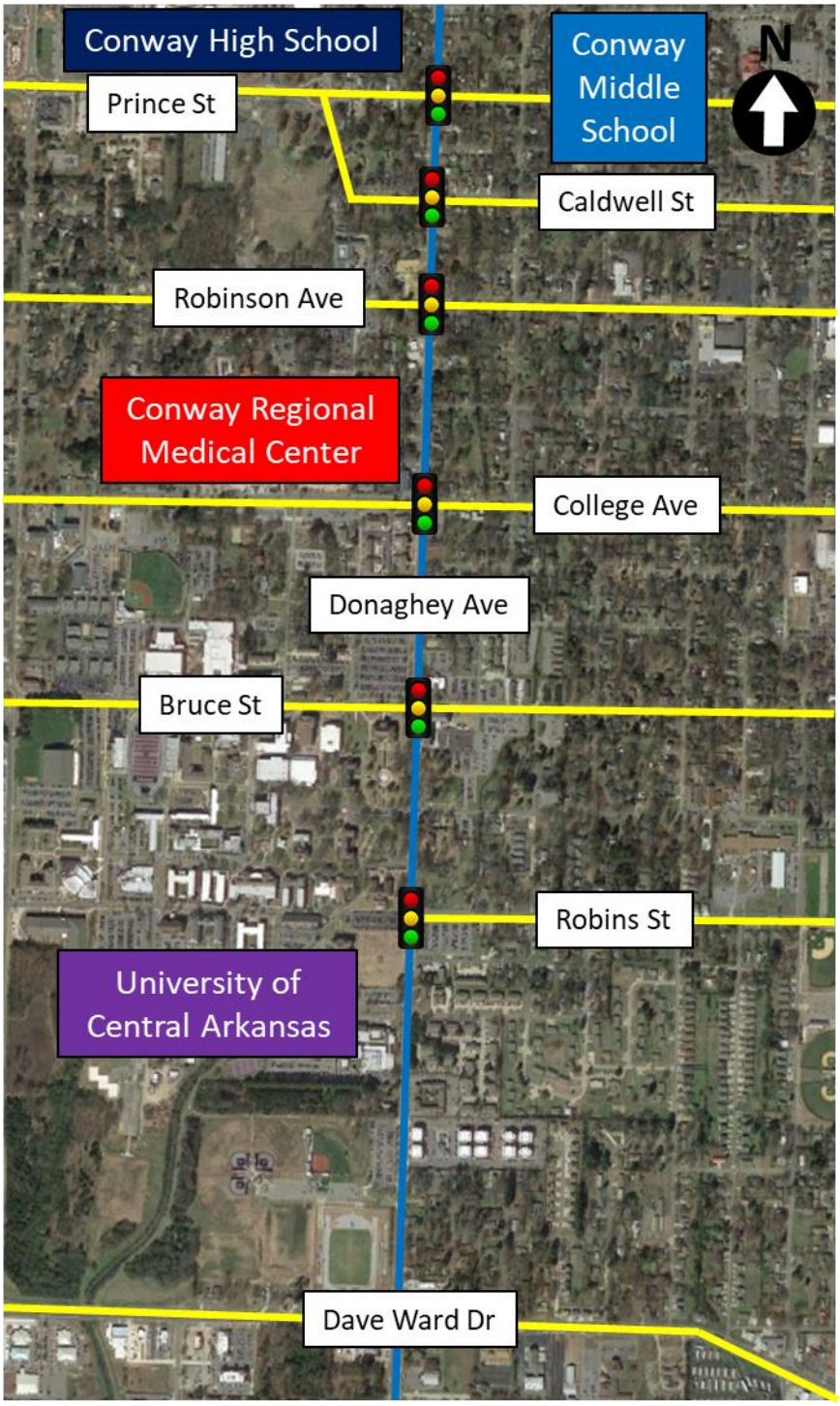


Figure 1: Existing Layout

2.1.1 Donaghey Avenue at Prince Street

- Separate left turn lanes are provided on northbound and southbound Donaghey Avenue and eastbound Prince Street
    - Each of these left turn movements has protected-permissive phasing
- Crosswalks on all four legs of the intersection

Figure 2: Donaghey Avenue at Prince Street

2.1.2 Donaghey Avenue at Caldwell Street

- Separate left turn lanes are provided on northbound and southbound Donaghey Avenue and westbound Caldwell Street
    - Each of these left turn movements has protected-permissive phasing
- Crosswalks on the south, east, and west legs

Figure 3: Donaghey Avenue at Caldwell Street

2.1.3 Donaghey Avenue at Robinson Avenue

- Recently upgraded signal
- Separate left turn lanes are provided on all four legs
    - All left turn movements are controlled by protected-permissive Flashing Yellow Arrow (FYA) signal operation
- Crosswalks are provided on the west and north legs

Figure 4: Donaghey Avenue at Robinson Avenue

2.1.4 Donaghey Avenue at College Avenue

- Separate left turn lanes are provided on all four legs of the intersection
    - Each of these left turn movements has protected-permissive phasing
- Crosswalks on the south and west legs
- The UCA campus is in the southwest quadrant of the intersection

Figure 5: Donaghey Avenue at College Avenue

2.1.5 Donaghey Avenue at Bruce Street

- Separate left turn lanes are provided on all four legs of the intersection
    - Each of these left turn movements has protected-permissive phasing
- Crosswalks on all four legs of the intersection
- The west leg leads directly into the UCA campus

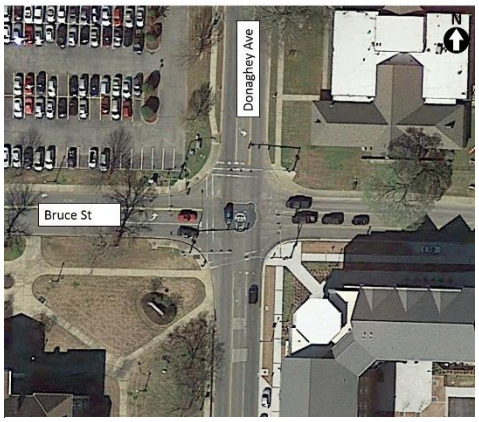


Figure 6: Donaghey Avenue at Bruce Street

2.1.6 Donaghey Avenue at Robins Street

- Separate left turn lanes are provided on southbound Donaghey Avenue and westbound Robins Street
    - Southbound left turn movement has protected-permissive phasing
- Crosswalk on the south leg of the intersection features protected-only pedestrian phase (no pedestrian phases provided on other intersection legs).
    - Approximately 140 pedestrians per peak hour

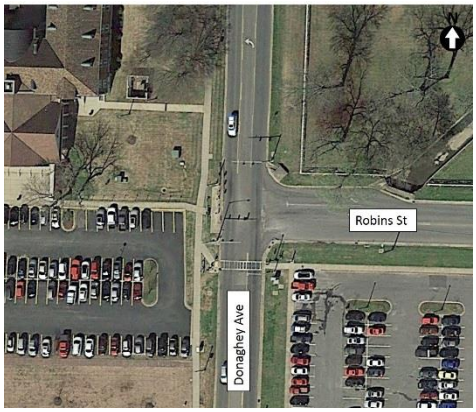


Figure 7: Donaghey Avenue at Robins Street

2.2 Traffic Volumes

Traffic volumes were developed based on data collected in the field in October 2018, which was collected at all six study intersections over a 24 hour period. The 2018 Design volumes for existing conditions can be found in **Figure A-1 in Appendix A**. The 2018 Existing vehicular and pedestrian traffic flows can be found in **Figure 8**.

As shown, Donaghey Avenue carries approximately 10,000 vehicles per day on the north end of the project and about 17,000 vehicles per day on the south end and has a daily truck percentage of 2%. The data indicated an average Peak Hour Factor (PHF) of 0.80 in the AM peak and an average PHF of 0.95 in the PM peak. From Prince Street to Robinson Avenue, the southbound direction is heaviest in the AM peak hour and the northbound direction is the heaviest in the PM peak hour. Traffic volumes are well balanced for all four approaches at the College Avenue intersection during both peak hours. At the intersection of Donaghey Avenue at Bruce Street, the northbound direction is the heaviest direction during both peak hours. The northbound direction is the heaviest during the AM peak and the southbound direction is the heaviest direction during the PM peak hour at the Robins Street intersection. The reason for the flows changing between College Avenue and Robins Street is due to UCA being located in this area.

Donaghey Avenue also experiences significant pedestrian traffic. In particular, the Donaghey Avenue intersections at Bruce Street and Robins Street have large pedestrian volumes during the AM and PM peak hours.

2.3 Existing Conditions Capacity Analysis

Existing conditions on Donaghey Avenue were evaluated. The assessment included identifying the existing layout and lane configurations, evaluating existing traffic volume information, and gathering existing signal timings from the City of Conway. The traffic volume and signal timing for both vehicles and pedestrians were modeled to determine existing operational conditions.

2.3.1 Methodology

The quality of operations within the study area were evaluated in terms of level of service (LOS). LOS is a concept defined by the *Highway Capacity Manual (HCM)* to qualitatively describe operating conditions within a traffic stream. LOS is typically stratified into six categories. These range from LOS A indicating free-flow, low density, or nearly negligible delay conditions to LOS F where demand exceeds capacity and large queues are experienced. For evaluation of traffic operations at the intersections within the study area, *Synchro 10.1* was used. This software was used to determine the expected LOS at intersections using a procedure consistent with the equation-based *HCM* methodology. The LOS thresholds defined by *HCM 6th Edition (pg. 19-16* for signalized intersections, pgs. 20-6 and 21-9 for stop-controlled intersections, and pg. 22-9 for roundabout intersections) are shown in **Table 1**.

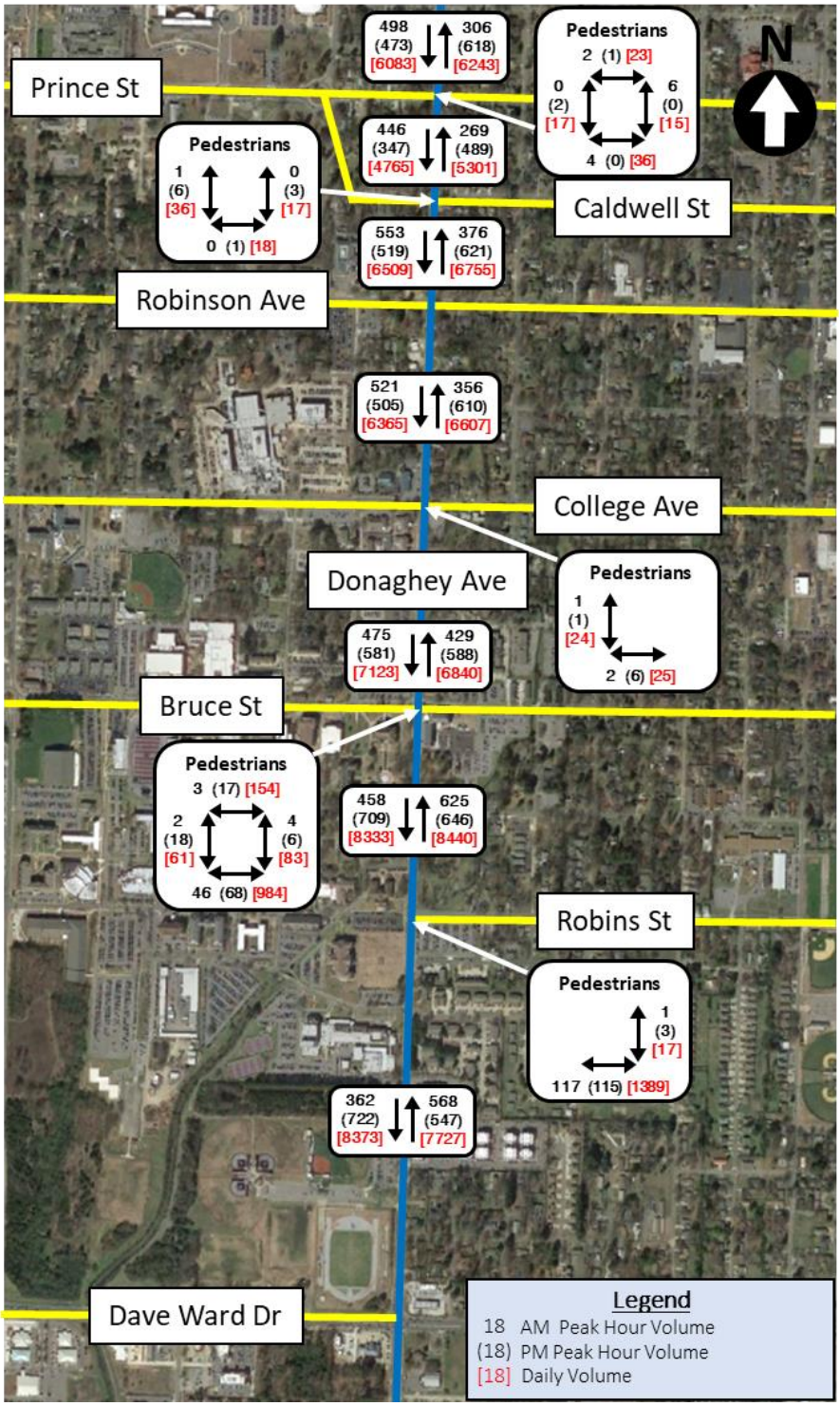


Figure 8: Vehicular and Pedestrian Traffic Flows (2018)

Table 1: LOS Thresholds for Intersections (Control Delay)

Level of Service	Description	Signalized Intersection-Control Delay Range (sec/veh)	Stop Control or Roundabout Intersection-Control Delay Range (sec/veh)
A	Most vehicles do not stop	0 to 10	0 to 10
B	Some vehicles stop	> 10 to 20	> 10 to 15
C	Significant number of stops	> 20 to 35	> 15 to 25
D	Many stop, individual cycle failure	> 35 to 55	> 25 to 35
E	Frequent individual cycle failure, at capacity	> 55 to 80	> 35 to 50
F	Arrival rate exceeds capacity	> 80	> 50

In addition, micro-simulation was used to analyze arterial operations via *SimTraffic*, the companion software to *Synchro*, to supplement some of the shortcomings of the *HCM* procedure. With this time-based, stochastic simulation model, the user can consider intricate signal timing parameters or the impacts of closely spaced intersections. In addition to the Measures of Effectiveness (MOEs), the program gives the user a powerful visualization tool to trace the source of vehicle delay and queuing as well as the opportunity to perform multiple runs with varying traffic loading within the peak hour to account for the expected variability within a system. This variation also accounts for driver characteristics (aggressiveness, gap acceptance tolerance) and vehicles (performance on grades, general acceleration/deceleration). Finally, micro-simulation provides the best means to demonstrate the impacts of queues on nearby intersections.

2.4 2018 Capacity Analysis

For both peak periods, existing signal timings were used with a cycle length of 90 seconds in the AM and 110 seconds in the PM with the Donaghey Avenue mainline being the coordinated phase. Each intersection was analyzed using *HCM 6th Edition* and *SimTraffic* methodologies, and the results can be found in **Tables B-1 and B-2** in **Appendix B – Intersection Analysis Results**. The results indicate that most movements operate at LOS D or better during both peak periods based on both *HCM* and *SimTraffic* analysis methods. The only exceptions for the *HCM* method are at the following locations:

- Donaghey Avenue at College Avenue
  - Eastbound and westbound thru/right turn movements
    - LOS F in AM peak
    - LOS E in PM peak
- Donaghey Avenue at Bruce Street
  - Eastbound thru/right turn movement (LOS E in PM peak)
- Donaghey Avenue at Robins Street
  - Westbound left turn movement (LOS E in PM peak)

At College Avenue, the westbound thru and right turn movements are combined and the thru movement is heavy in both peak periods (359 vehicles in the AM and 397 vehicles in the PM). The eastbound thru and right turn movements are also combined and the thru movement is also heavy in both peak periods (284 vehicles in the AM and 355 vehicles in the PM). At Bruce Street, the LOS E conditions on the

eastbound approach are related to the shared thru/right turn movement and the relatively heavy right turn movement (121 cars in the PM peak) having a limited amount of green time and few opportunities for right turn on red. At Robins Street, the LOS E condition is brought by the need to provide a separate pedestrian phase to safely accommodate a large number of crossings to the UCA campus within the coordinated system, which leaves a limited amount of green time for the side street.

In the *SimTraffic* analysis, all locations were shown to operate with a LOS D or better, with the following exception:

- Donaghey Avenue at Caldwell Street
    - Eastbound left turn movement (LOS E in the AM peak)

The movements that were shown to operate at LOS E and F via the *HCM* method operated within the high LOS C to high LOS D range via the *SimTraffic* method. The average of these results is consistent with the moderate delay generally experienced on this corridor.

3.0 No Build Conditions

In addition to analyzing the existing conditions, projected conditions without roadway improvements (No Build) were determined for the 2040 design year. The process of developing 2040 No Build volumes and conducting capacity analyses for the No Build conditions is detailed in the following subsections.

3.1 Traffic Volume Development

Volumes for the 2040 design year were developed by applying a growth rate of 1.0% to the existing volumes over a 22-year span. This growth rate was chosen by examining historical volumes from Arkansas Department of Transportation count stations containing segment traffic volumes on Donaghey Avenue dating back to 1997. These stations indicated growth ranging between 0 to 2% per year throughout the corridor, thus a 1% growth average was determined.

Figure A-2 in Appendix A shows the resulting 2040 Design Volumes for No Build conditions. The 2040 No Build vehicular and pedestrian traffic flows can be found in **Figure 9**. While the truck percentages and PHFs remain the same as existing conditions, the volume on Donaghey Avenue has increased to 12,000 vehicles per day on the north end and 20,000 vehicles per day on the south end.

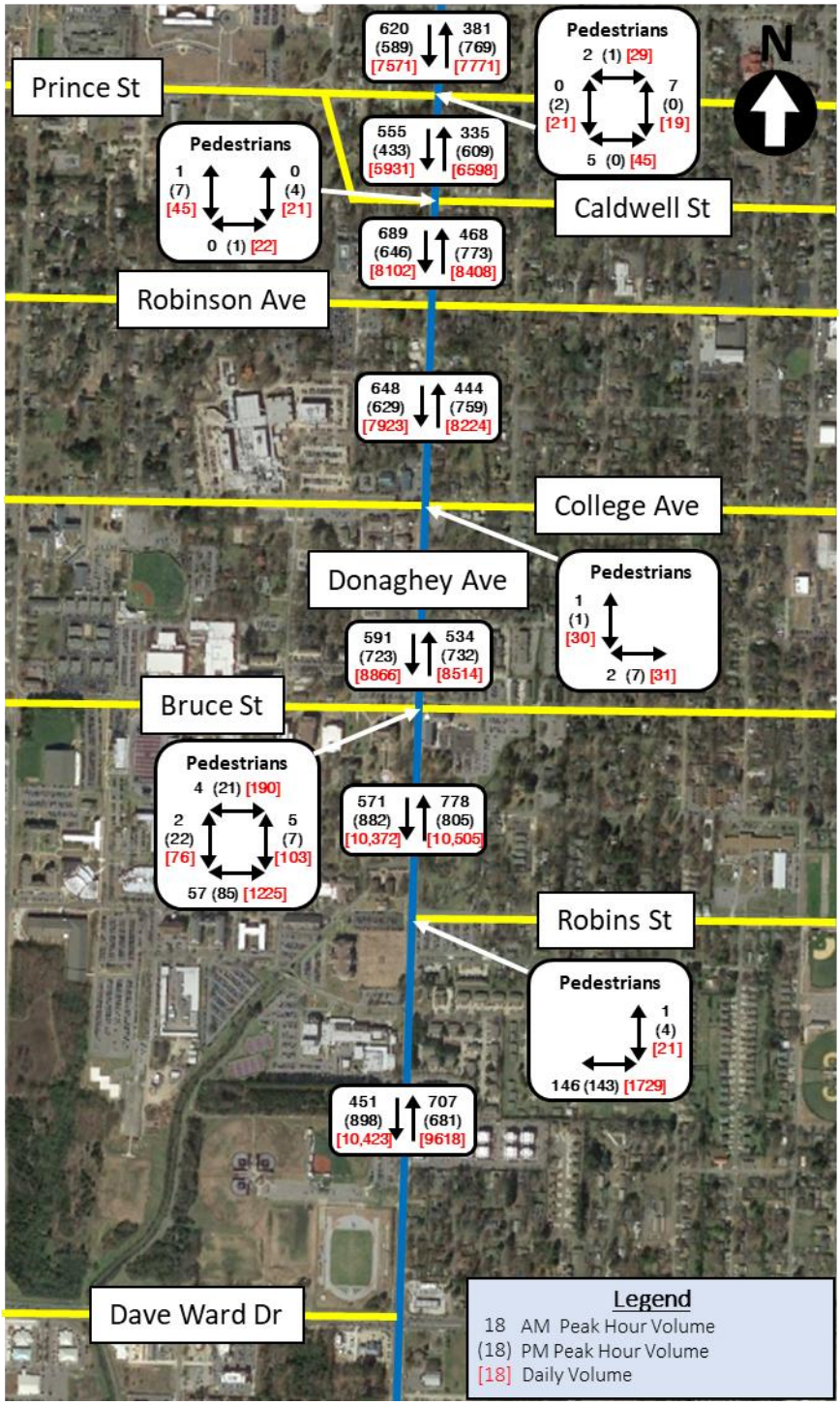


Figure 9: Vehicular and Pedestrian Traffic Flows (2040)

3.2 Capacity Analysis Results

Capacity analysis for the 2040 No Build configuration was performed using the same methodology as for 2018 Existing conditions. For 2040, the signal timing along the corridor was optimized to match the increased volumes and create better bandwidth on Donaghey Avenue. The results are described in the following subsections.

3.2.1 Intersection Analysis

Via the *HCM* results shown in **Table B-3** of **Appendix B – Intersection Analysis Results**, a number of movements operate at LOS E and F conditions during the 2040 AM and PM peak periods. They are as follows:

- Donaghey Avenue at Prince Street
  - Eastbound left turn movement operates at LOS E in the AM peak
  - Westbound left turn movement operates at LOS E in both peak periods
- Donaghey Avenue at Caldwell Street
  - Eastbound left turn movement operates at LOS E in both peak periods
- Donaghey Avenue at Robinson Avenue
  - Eastbound left turn and all westbound movements operate at LOS E in both peak periods
  - Eastbound thru/right turn movement operates at LOS F in the AM peak and LOS E in the PM peak
- Donaghey Avenue at College Avenue
  - Many failing movements during both peak periods
- Donaghey Avenue at Bruce Street
  - Eastbound thru/right turn movement operates at LOS F in both peak periods
  - Westbound thru/right turn movement operates at LOS E in the AM peak
- Donaghey Avenue at Robins Street
  - Westbound left turn movement operates at LOS F in both peak periods
    - This is due to the protected-only pedestrian phase provided on the south leg of the intersection

Similar to *HCM*, the *SimTraffic* analysis results shown in **Table B-4** of **Appendix B – Intersection Analysis Results** showed many intersection movements operate at LOS E and F conditions during the 2040 AM and PM peak periods. Below is a description of each intersection with more specific details.

- Donaghey Avenue at Prince Street
  - Eastbound left turn movement operates at LOS E in the AM peak
  - Westbound left turn and thru movements operate at LOS E in both peak periods
- Donaghey Avenue at Caldwell Street
  - Eastbound left turn movement operates at LOS F in the PM peak
  - Eastbound thru, eastbound right turn, and westbound left turn movements operate at LOS E in both peak periods
    - These results are due to the single lane eastbound approach being over capacity
  - Southbound left turn movement operates at LOS E in the PM peak

- Donaghey Avenue at Robinson Avenue
    - Eastbound and westbound left turn and thru movements operate at LOS E in both peak periods
    - Northbound thru/right turn movement experiences spillback from congestion at the Caldwell Street intersection in the PM peak, as shown in **Figure 10**

Figure 10: Donaghey Avenue from Caldwell Street to Robinson Avenue (2040 No Build PM Peak)

- Donaghey Avenue at College Avenue
    - Many failing movements during both peak periods
        - The demand volume is over capacity in all directions
- Donaghey Avenue at Bruce Street
    - Eastbound thru movement operates at LOS E in both peak periods
- Donaghey Avenue at Robins Street
    - Westbound left turn movement operates at LOS E in both peak periods

4.0 Proposed Conditions – Roundabouts

As directed by the City of Conway, the proposed conditions involve replacing the traffic signals at the Donaghey Avenue intersections at Prince Street, Caldwell Street, College Avenue, and Bruce Street with roundabouts. The signals at Robinson Avenue and Robins Street will remain the same. The following subsections detail the analysis of the proposed conditions.

4.1 Arcady Analysis

MSA Professional Services, Inc. (MSA) dba Ourston was retained by Garver to determine the feasibility of implementing roundabouts at the four locations. Arcady (Assessment of Roundabout Capacity and Delay) software was used for all roundabout analyses. Arcady is a program based on U.K. empirical research into geometry-capacity relationships and was calibrated by MSA/Ourston to match capacity performances for roundabouts in the United States using capacity reduction factors in the 2018 and 2040 years. A memorandum summarizing the study from MSA/Ourston can be found in **Appendix C – MSA/Ourston Roundabout Study Memorandum**.

The anticipated performance of the proposed roundabout intersections were analyzed for the years 2018 and 2040. Each of the four intersections were analyzed under multiple lane configurations, including as a mini roundabout, single-lane roundabout, and complex roundabouts with multiple lane approaches and/or circulating lanes. These options were examined to balance a practical design versus a configuration that would produce excessive delay in the design year peak hour.

In order to measure the effectiveness of each configuration, residual capacity comparisons were made from the Arcady analysis. Residual capacity is an analysis term in Arcady that gives the corresponding percentage that traffic can be increased on all approaches before the most critical approach experiences LOS E conditions. A positive residual capacity indicates that all approaches are anticipated to operate at LOS D or better and a negative residual capacity indicates that one or more of the approaches is operating at either LOS E or F. In the MSA/Ourston analysis, a threshold for residual capacity was set at 10%, which meant that intersections with less than that are likely to experience congestion and ones with more than that are likely to operate within acceptable conditions.

Since UCA is located on the southern end of the study area, pedestrian traffic was included in the roundabout analysis. The results at each roundabout location from MSA/Ourston's Arcady analysis is presented below.

4.1.1 Donaghey Avenue at Prince Street

The analysis showed that a mini roundabout would function slightly over capacity in 2018 and would function over capacity in 2040. Analysis of a single-lane roundabout showed LOS D or better conditions in the 2040 AM and PM peak periods, but the eastbound approach will near the residual capacity threshold. An additional option was ran with an eastbound right turn lane to show an expanded option that overcame the concern in residual capacity.

4.1.2 Donaghey Avenue at Caldwell Street

A mini roundabout is expected to perform poorly in both 2018 and 2040. The single-lane roundabout option showed acceptable conditions through 2040, with the northbound and southbound approaches nearing the 10% residual capacity threshold. To avoid this possibility, an additional option was explored to include two entering and exiting lanes on northbound and southbound Donaghey Avenue (keeping eastbound and westbound as single lane approaches). However, ROW constraints may make single-lane approaches in all directions be the only viable option.

4.1.3 Donaghey Avenue at College Avenue

Analysis showed that a mini roundabout and a single-lane roundabout will both operate at LOS E and F and will therefore not be sufficient for this intersection. Further analysis of two different hybrid multi-lane roundabouts with two entering lanes and one circulating lane was conducted (one option with LT + TH/RT lane, the other with LT/TH + RT lane). One of these hybrid roundabouts would work in the 2040 AM peak but would fail in the 2040 PM peak and the other roundabout failed in both peak periods.

A multi-lane roundabout with two entering, two exiting lanes and two circulating lanes on all approaches, also known as a 2x2 roundabout, was analyzed and found to satisfy conditions in both 2040 peak periods.

4.1.4 Donaghey Avenue at Bruce Street

A single-lane roundabout was analyzed and operated at LOS D or better conditions in both 2040 peak periods, although it had borderline residual capacity. A second option with two entering and exiting lanes on northbound and southbound Donaghey Avenue was analyzed and was found to alleviate the residual capacity issues presented by a single-lane roundabout. As is the case with the Caldwell Street intersection, ROW constraints may restrict the final configuration to a single entry and exit lane in each direction.

4.2 Supplemental HCM Analysis

The recommendations from the Arcady analysis were verified in *Synchro 10.1* using *HCM 6th Edition* methodology to determine the minimum roundabout configuration that would provide LOS D or better for all intersection approaches. Intersections were iteratively modeled to produce the minimal configuration and are presented on the following page. The results can be seen in **Table B-5 in Appendix B – Intersection Analysis Results**.

- Prince Street
  - Single-lane roundabout with an additional right turn lane located on the eastbound approach (see **Figure 11**)

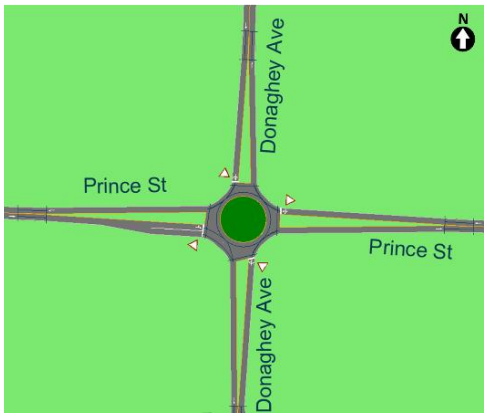


Figure 11: Donaghey Avenue at Prince Street Roundabout

- Caldwell Street
  - Single-lane roundabout would not achieve LOS D thresholds
  - Addition of right turn lanes to a single lane roundabout would not achieve LOS D thresholds
  - The following Hybrid Two-Lane roundabout options **would provide acceptable LOS:**
    - Construct 2x1 Roundabout (see **Figure 12**)
    - Provide two entry/exit lanes southbound, northbound right turn bypass lane (Alt 1)
    - Provide northbound and southbound left turn lanes into the roundabout, two circulating lanes on east and west legs, single exit lanes on all approaches (Alt 2)

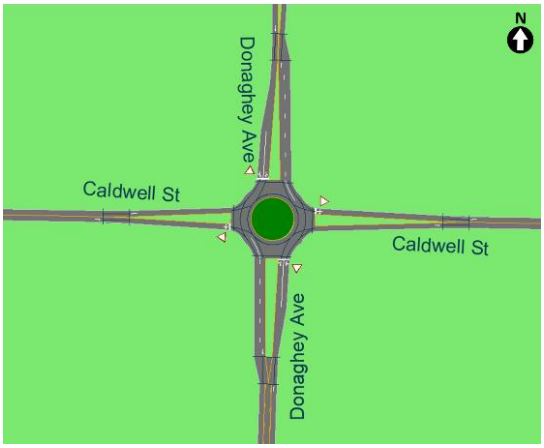


Figure 12: Donaghey Avenue at Caldwell Street Roundabout

- Bruce Street
  - Single lane roundabouts were found to operate acceptably

- College Avenue
  - 2x2 roundabout was only option modeled to provide acceptable LOS on all approaches in the design year (see **Figure 13**).

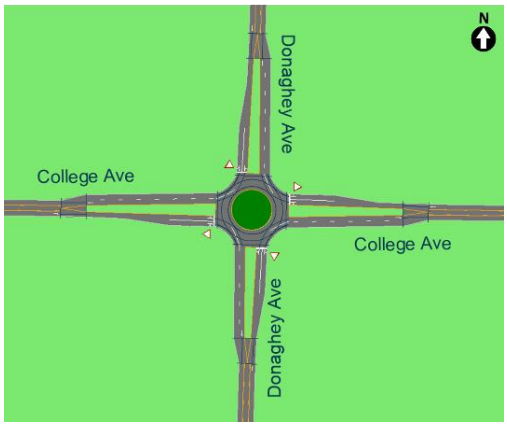


Figure 13: Donaghey Avenue at College Avenue Roundabout

5.0 Conclusion

Existing and future traffic operations were analyzed for Donaghey Avenue in Conway, Arkansas. The intersections of Donaghey Avenue at Prince Street, Caldwell Street, Robinson Avenue, College Avenue, Bruce Street, and Robins Street were included in the study and are currently signalized.

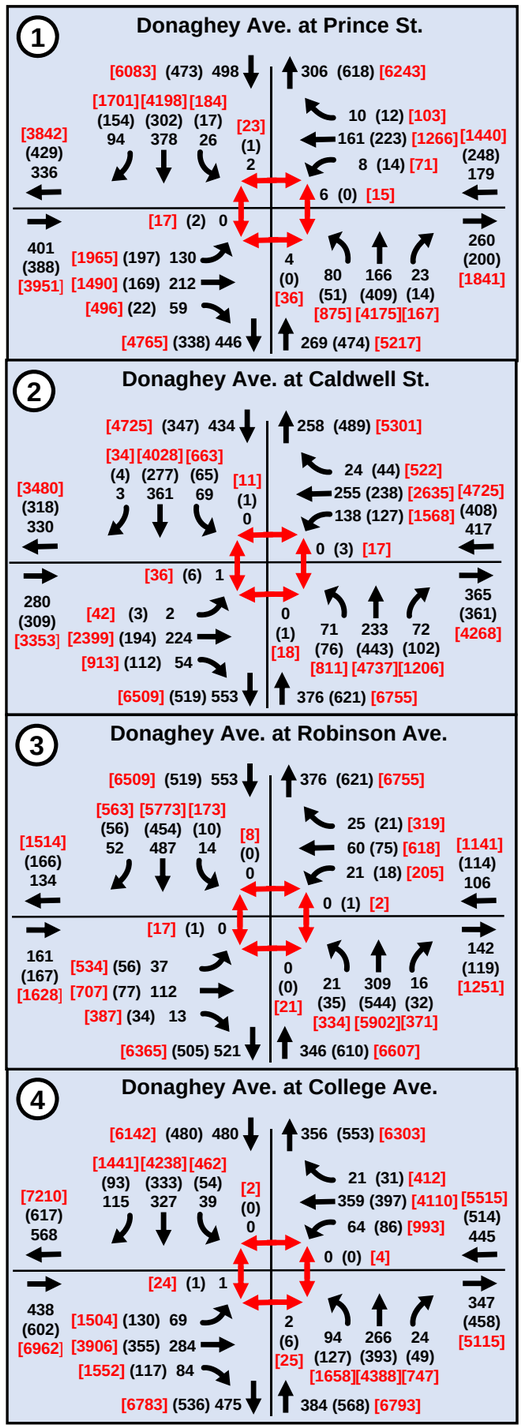
Analysis of the 2018 Existing and 2040 No Build scenarios showed that the moderate delay experienced in 2018 would grow into substantial delay throughout the study area in 2040 if the current configuration remains unchanged even assuming optimal signal timings.

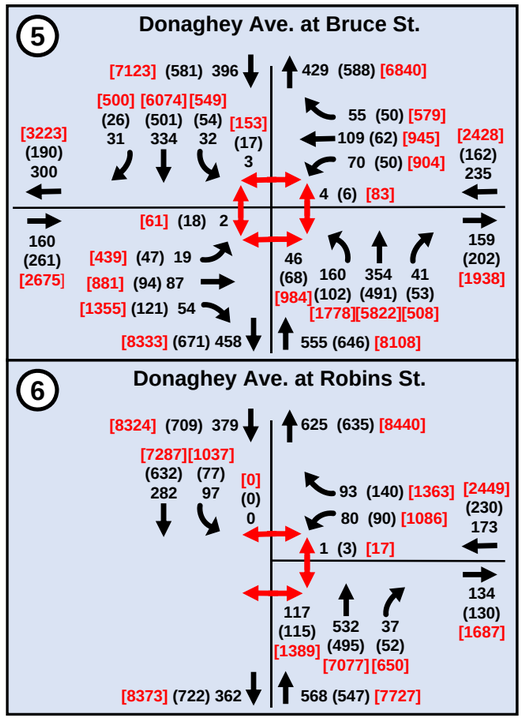
In the 2040 Build scenario, the intersections of Prince Street, Caldwell Street, College Avenue, and Bruce Street were analyzed as roundabouts while Robinson Avenue and Robins Street remained signalized.

Roundabout analysis was performed by MSA/Ourston using Arcady software and "residual capacities" were reported at each intersection under a variety of options. In addition, the configurations were also checked using *HCM* methodology. The following conclusions can be made:

- **Prince Street**
  - Single lane roundabout will handle 2018 traffic and produce borderline conditions in 2040.
    - Providing an eastbound right turn lane into the single lane roundabout would alleviate 2040 concerns about LOS D/E conditions.
- **Caldwell Street**
  - Single lane roundabout will handle 2018 traffic but will produce borderline conditions in 2040 via Arcady residual capacity method with *HCM* results indicating LOS E/F critical approaches
    - Arcady analysis indicated provision of 2x1 configuration would alleviate the borderline conditions.
    - *HCM* analysis showed 2x1 configuration as well as two hybrid options were needed to prevent failing approaches
- **Bruce Street**
  - Single lane roundabout will be sufficient through 2040 according to Arcady and *HCM* methods.
    - Arcady analysis included an option for a 2x1 to alleviate potential concern from residual capacity thresholds
- **College Street**
  - Single lane option would not provide acceptable conditions
  - Hybrid two lane options would provide acceptable 2018 conditions but would not produce acceptable 2040 residual capacities
  - 2x2 roundabout is the only option that meets 2040 demand
    - If 2x2 roundabout is provided, the design should consider providing sufficient departure leg distance for the second receiving lane. Balanced lane utilization must be achieved in order for roundabout to perform acceptably. Guidance from the Wisconsin DOT suggests full width departure distance of up to 300 feet with a merging taper of 20:1 to 30:1

Appendix A – Traffic Volumes





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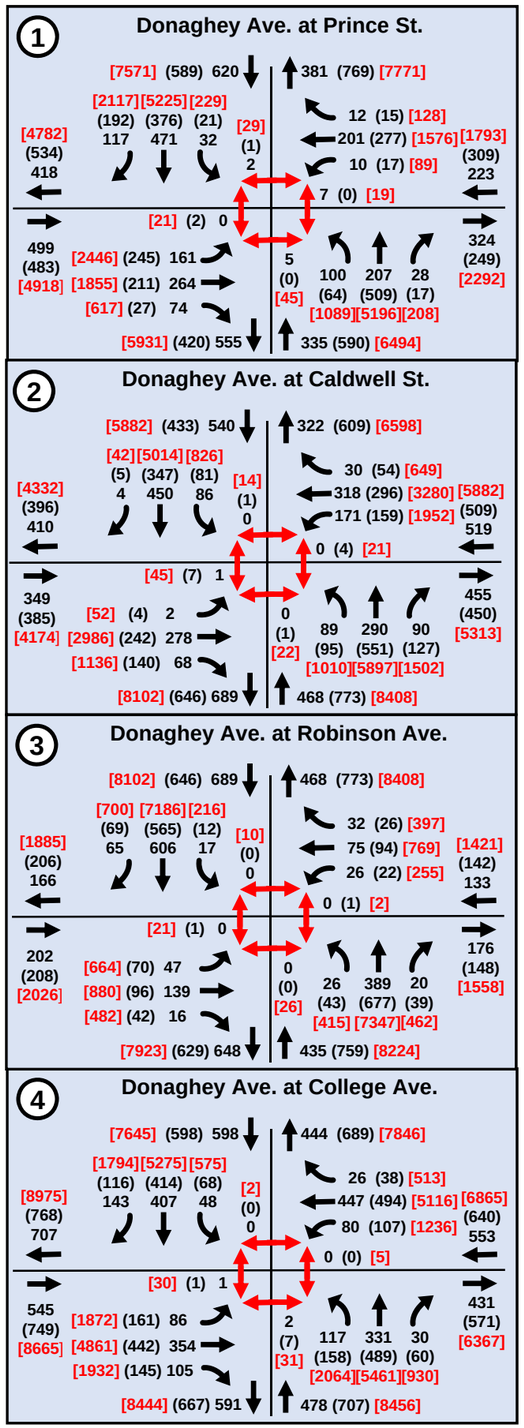
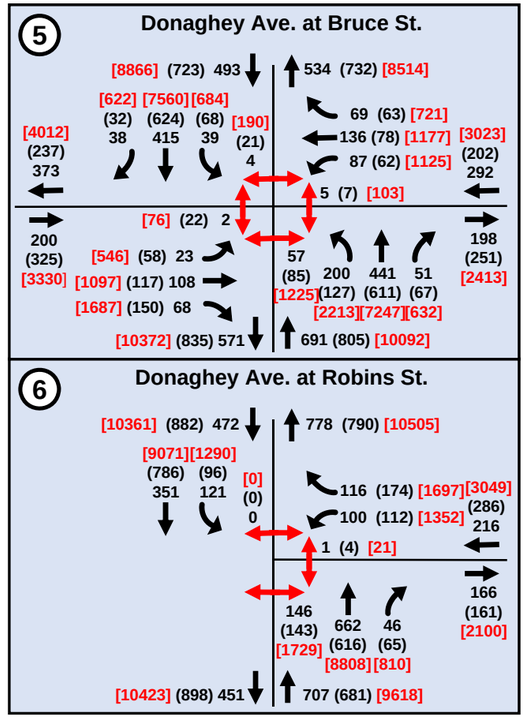
18	AM Design Hourly Volume
(18)	PM Design Hourly Volume
[18]	Average Annual Daily Traffic Volume

Donaghey Avenue 2018 Design Traffic Volumes	Figure A-1	GARVER
	Nov 2018	





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18 AM Design Hourly Volume
(18) PM Design Hourly Volume
[18] Average Annual Daily Traffic Volume

Donaghey Avenue 2040 Design Traffic Volumes	Figure A-2	GARVER
	Nov 2018	

Appendix B – Intersection Analysis Results

Table B-1: 2018 HCM Capacity Analysis Results - Existing Configuration

Intersection	Time Period	Control	MOE	EB Movement			WB Movement			NB Movement			SB Movement			Overall
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Donaghey Ave. at Prince St.	AM	Signal	LOS	C	C		D	A		B	C		B	C		C
			Delay	28.1	30.3		44.1	0.0		14.4	22.9		11.0	22.4		26.8
	PM		LOS	D	C		D	A		B	A		B	B		C
			Delay	38.0	29.9		48.9	0.0		13.1	9.6		12.1	19.5		24.8
Donaghey Ave. at Caldwell St.	AM	Signal	LOS	D	A		C	C		B	C		B	C		C
			Delay	45.8	0.0		22.9	22.9		17.6	33.1		16.3	34.6		31.4
	PM		LOS	D	A		C	C		B	A		B	A		B
			Delay	52.1	0.0		30.2	30.5		11.9	3.8		12.1	0.9		19.0
Donaghey Ave. at Robinson Ave.	AM	Signal	LOS	D	D		C	D		B	A		A	D		C
			Delay	35.2	42.3		34.9	39.5		15.9	0.8		5.4	42.8		29.3
	PM		LOS	D	D		D	D		A	A		A	A		B
			Delay	46.4	49.8		44.3	53.7		4.4	3.0		3.3	1.2		11.1
Donaghey Ave. at College Ave.	AM	Signal	LOS	C	F		C	F		B	A		B	D		D
			Delay	26.3	76.3		26.2	85.7		19.9	9.0		16.1	48.3		51.8
	PM		LOS	C	E		C	E		C	D		C	D		D
			Delay	32.6	65.9		31.5	58.0		23.6	38.0		22.6	47.5		48.0
Donaghey Ave. at Bruce St.	AM	Signal	LOS	C	D		C	C		B	A		B	C		C
			Delay	28.9	36.5		28.7	33.6		13.1	1.3		11.8	31.0		20.0
	PM		LOS	D	E		D	D		B	A		A	C		C
			Delay	36.3	57.2		37.9	41.6		12.4	2.1		8.9	25.2		21.0
Donaghey Ave. at Robins St.	AM	Signal	LOS				D		B		D		C	B		C
			Delay				54.5		14.0		39.9		25.1	13.4		30.8
	PM		LOS				E		B		C		A	A		B
			Delay				64.5		15.4		22.1		7.8	9.2		17.8

Table B-2: 2018 SimTraffic Capacity Analysis Results - Existing Configuration

Intersection	Time Period	Control	MOE	EB Movement			WB Movement			NB Movement			SB Movement			Overall
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Donaghey Ave. at Prince St.	AM	Signal	LOS	C	C	B	D	D	C	B	B	B	B	B	B	C
			Delay	31.1	27.6	19.0	35.6	38.9	22.7	14.8	17.0	11.6	14.6	19.2	14.1	23.2
	PM		LOS	D	C	B	D	D	C	B	A	A	B	B	B	C
			Delay	36.3	30.3	18.8	48.6	44.2	31.4	12.8	6.1	3.4	16.0	17.5	12.3	21.4
Donaghey Ave. at Caldwell St.	AM	Signal	LOS	E	D	D	C	C	B	B	B	B	B	B	A	C
			Delay	64.0	43.3	35.0	28.7	24.1	15.4	14.5	15.0	11.3	12.6	14.7	8.3	22.4
	PM		LOS	D	D	C	C	C	C	B	B	B	C	B	B	C
			Delay	44.2	46.0	32.8	33.3	28.5	20.5	14.5	19.5	14.4	27.0	17.1	13.3	25.1
Donaghey Ave. at Robinson Ave.	AM	Signal	LOS	D	D	B	D	D	B	B	A	A	A	A	A	B
			Delay	37.3	35.0	19.7	36.8	38.7	17.2	15.2	6.8	4.3	9.3	9.5	7.0	14.4
	PM		LOS	D	D	C	D	D	C	B	A	A	B	A	A	B
			Delay	41.5	43.3	20.9	40.2	49.0	31.6	11.2	8.1	6.3	19.8	7.8	6.2	14.2
Donaghey Ave. at College Ave.	AM	Signal	LOS	C	C	C	C	D	D	C	B	A	D	D	D	C
			Delay	26.3	33.1	27.2	30.3	42.0	37.2	22.6	11.3	9.1	35.3	40.5	36.4	31.4
	PM		LOS	C	D	D	C	D	C	C	C	B	C	C	C	C
			Delay	32.1	46.5	39.3	30.7	38.3	33.8	29.0	22.1	16.0	26.8	33.1	29.5	33.4
Donaghey Ave. at Bruce St.	AM	Signal	LOS	C	C	C	C	C	B	B	B	B	B	B	B	B
			Delay	21.5	32.9	20.7	26.4	27.3	17.2	19.8	16.6	15.6	17.5	16.8	12.1	19.2
	PM		LOS	C	D	C	C	C	C	C	C	C	C	C	B	C
			Delay	29.2	37.0	25.2	31.8	32.6	20.2	30.2	30.7	26.1	24.5	24.4	19.1	27.9
Donaghey Ave. at Robins St.	AM	Signal	LOS				D		B		C	B	B	A		B
			Delay				40.6		13.6		21.3	15.1	18.9	8.8		17.8
	PM		LOS				D		B		B	A	B	B		B
			Delay				48.2		15.3		14.3	9.9	15.9	10.3		14.6

Table B-3: 2040 HCM Capacity Analysis Results - Existing Configuration

Intersection	Time Period	Control	MOE	EB Movement			WB Movement			NB Movement			SB Movement			Overall
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Donaghey Ave. at Prince St.	AM	Signal	LOS	E	D		E	A		C	A		B	D		D
			Delay	57.6	53.4		70.2	0.0		24.4	0.6		14.5	35.1		39.7
	PM		LOS	D	C		E	A		C	A		B	C		C
			Delay	47.0	34.9		71.8	0.0		23.0	0.9		17.9	34.9		32.5
Donaghey Ave. at Caldwell St.	AM	Signal	LOS	E	A		D	D		C	A		B	A		C
			Delay	72.1	0.0		47.7	37.5		20.1	8.0		19.5	7.3		29.9
	PM		LOS	E	A		D	D		B	A		B	A		C
			Delay	71.4	0.0		43.0	39.3		16.6	9.0		16.9	1.6		27.2
Donaghey Ave. at Robinson Ave.	AM	Signal	LOS	E	F		E	E		A	A		A	A		B
			Delay	58.1	84.4		58.0	66.2		5.6	1.4		4.6	2.0		17.8
	PM		LOS	E	E		E	E		A	A		A	A		B
			Delay	61.5	69.3		57.9	75.1		5.1	1.4		4.3	1.6		14.5
Donaghey Ave. at College Ave.	AM	Signal	LOS	D	F		D	F		E	B		C	F		E
			Delay	54.7	84.5		48.7	91.2		71.4	10.1		26.1	104.6		74.1
	PM		LOS	E	E		D	E		D	C		C	F		E
			Delay	59.7	78.7		52.1	62.7		54.3	22.9		32.8	82.0		59.9
Donaghey Ave. at Bruce St.	AM	Signal	LOS	D	F		D	E		B	B		B	A		C
			Delay	52.1	80.6		53.2	68.4		10.5	18.7		14.3	0.2		26.7
	PM		LOS	D	F		D	D		B	D		C	A		D
			Delay	45.7	83.9		50.0	53.0		11.9	51.7		23.1	1.2		35.3
Donaghey Ave. at Robins St.	AM	Signal	LOS				F		C		D		C	B		D
			Delay				82.3		22.3		47.3		21.8	12.2		36.7
	PM		LOS				F		C		C		A	B		C
			Delay				82.5		21.1		28.0		7.9	19.6		26.0

Table B-4: 2040 SimTraffic Capacity Analysis Results - Existing Configuration

Intersection	Time Period	Control	MOE	EB Movement			WB Movement			NB Movement			SB Movement			Overall
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Donaghey Ave. at Prince St.	AM	Signal	LOS	E	D	D	E	E	D	C	B	A	C	D	C	D
			Delay	58.5	47.8	39.9	77.7	66.8	49.4	32.6	11.4	6.6	32.6	36.0	29.5	39.9
	PM		LOS	D	D	C	E	E	D	D	B	B	D	D	C	D
			Delay	52.1	36.7	26.7	72.6	67.7	52.7	39.7	18.3	14.4	38.6	38.1	31.9	38.2
Donaghey Ave. at Caldwell St.	AM	Signal	LOS	E	E	E	E	D	C	B	B	A	C	B	A	C
			Delay	69.4	66.2	59.1	61.0	38.8	33.4	19.6	12.6	9.5	22.8	18.0	7.7	33.3
	PM		LOS	F	E	E	E	D	C	C	D	C	E	C	B	D
			Delay	99.3	75.2	66.2	73.2	38.5	32.8	32.3	37.0	30.3	56.5	20.4	10.8	43.7
Donaghey Ave. at Robinson Ave.	AM	Signal	LOS	E	E	D	E	E	D	B	A	A	B	B	A	C
			Delay	57.5	61.6	42.2	57.9	62.8	36.5	17.9	8.8	6.3	14.7	10.2	9.0	20.7
	PM		LOS	E	E	D	E	E	D	B	B	A	C	B	B	C
			Delay	61.9	61.6	44.5	57.1	69.0	49.7	18.4	11.4	9.9	22.3	14.3	12.1	22.6
Donaghey Ave. at College Ave.	AM	Signal	LOS	D	E	D	E	E	E	D	C	C	F	E	F	E
			Delay	50.6	59.2	49.0	59.5	61.2	59.6	53.0	25.1	22.9	81.5	79.4	86.7	58.6
	PM		LOS	F	F	F	F	D	D	F	F	F	F	F	F	F
			Delay	144.5	158.4	121.5	99.4	53.5	45.0	156.0	81.7	81.5	139.5	130.2	131.2	105.3
Donaghey Ave. at Bruce St.	AM	Signal	LOS	D	E	D	D	D	D	B	B	B	B	B	C	C
			Delay	39.9	60.3	45.0	51.2	48.1	35.8	19.6	11.0	10.8	19.5	19.9	20.4	24.8
	PM		LOS	D	E	D	D	D	C	D	D	C	D	C	C	D
			Delay	41.8	57.4	42.3	45.4	48.7	34.6	41.9	36.2	30.2	38.8	33.1	30.4	37.9
Donaghey Ave. at Robins St.	AM	Signal	LOS				E		C		C	C	C	B		C
			Delay				65.7		27.6		31.3	24.9	33.5	11.3		27.5
	PM		LOS				E		C		C	B	C	C		C
			Delay				68.8		26.7		20.7	17.0	30.0	20.1		24.3

Table B-5: 2040 HCM Capacity Analysis Results - Build Configuration

Intersection	Time Period	Control	MOE	EB Movement			WB Movement			NB Movement			SB Movement			Overall
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Donaghey Ave. at Prince St.	AM	Roundabout	LOS	C		A	A			B			D			C
			Delay	23.9		6.4	9.7			13.7			27.0			20.3
	PM		LOS	B		A	C			C			C			C
			Delay	12.1		4.4	18.3			21.8			15.2			16.8
Donaghey Ave. at Caldwell St.	AM	Roundabout	LOS	C			C			A	A		B	B		B
			Delay	19.7			16.2			7.2	7.7		11.3	12.6		13.5
	PM		LOS	B			C			A	A		A	A		B
			Delay	11.2			18.2			7.6	8.3		7.3	7.8		11.0
Donaghey Ave. at Caldwell St. Alt 1	AM	Roundabout	LOS	C			C			B	A		B	B		C
			Delay	19.7			22.5			12.5	5.6		11.3	12.6		16.1
	PM		LOS	B			D			C	A		A	A		C
			Delay	11.2			28.1			16.5	5.1		7.3	7.8		15.8
Donaghey Ave. at Caldwell St. Alt 2	AM	Roundabout	LOS	C			C			A	B		A	D		C
			Delay	19.7			16.2			5.1	10.8		6.7	25.8		17.1
	PM		LOS	B			C			A	C		A	B		B
			Delay	11.2			18.2			4.4	15.2		5.5	10.3		13.5
Donaghey Ave. at Robinson Ave.	AM	Signal	LOS	C	D		C	C		B	B		A	B		B
			Delay	28.8	39.4		28.5	34.9		14.2	10.7		7.8	17.7		19.5
	PM		LOS	C	C		C	C		B	B		B	B		B
			Delay	27.0	31.1		26.2	31.3		10.3	14.7		10.9	14.9		17.5
Donaghey Ave. at College Ave.	AM	Roundabout	LOS	B	B		B	B		A	A		C	B		B
			Delay	11.5	10.9		11.7	11.0		9.6	9.1		15.9	14.8		11.9
	PM		LOS	B	B		C	B		B	B		B	B		B
			Delay	12.1	11.6		15.2	14.1		13.2	12.5		13.2	12.2		12.9
Donaghey Ave. at Bruce St.	AM	Roundabout	LOS	B			C			C			C			C
			Delay	10.4			20.1			19.5			23.5			19.7
	PM		LOS	C			B			C			C			C
			Delay	16.9			12.0			21.8			17.6			18.6
Donaghey Ave. at Robins St.	AM	Signal	LOS				E		C		D		C	B		D
			Delay				79.3		24.2		47.9		31.2	12.1		37.8
	PM		LOS				D		B		D		B	C		C
			Delay				54.1		12.5		35.3		13.6	23.2		28.0

Appendix C – MSA/Ourston Roundabout Study Memorandum

January 24, 2019

To	Dustin Tackett, P.E.		
From	Jay VonAhsen, P.E. – MSA|Ourston Sina Kahrobaei – MSA|Ourston		
Subject	Donaghey Avenue Roundabouts Conway, AR Roundabout Operational Analysis Memorandum	Tel	(972) 649-0665

INTRODUCTION AND INTERSECTION BACKGROUND

MSA Professional Services, Inc. dba Ourston has completed an operational analysis for four intersections along Donaghey Avenue at Prince Street, Caldwell Street, College Avenue, and Bruce Street. The balanced 2018 and forecasted balanced 2040 AM and PM peak traffic volumes, provided by Garver, are analyzed using Arcady (Assessment of Roundabout Capacity and Delay) software. The goal of this analysis is to analyze the feasibility of mini, single-, and multi-lane roundabout alternatives in terms of operation and develop proposed lane configurations that will operate at a level of service (LOS) “D” or better on each approach leg for the horizon year of 2040.

OPERATIONAL ANALYSIS METHODOLOGY

The anticipated capacity of the proposed roundabout intersections are analyzed using Arcady roundabout design and capacity analysis software using forecasted balanced peak hour turning movement counts for the year 2040. Arcady is a program based on U.K. empirical research into geometry-capacity relationships. The findings on capacity performance for U.S. roundabouts to-date and our experience suggests a reduction in the capacity assumed for modeling these intersections as roundabouts is appropriate. The Arcady analysis includes a capacity equation reduction of 10% and 5% for single-lane/multi-lane roundabouts and 20% and 15% for mini roundabouts in year 2018 and year 2040, respectively. Truck percentages are calculated for each leg of the intersection in 2018. For the horizon year of 2040 a typical 2% truck percentage is used, as directed by Garver. The peak hour factor (PHF) values are also calculated for each intersection and each peak hour for 2018. For the horizon year of 2040 a PHF of 0.80 in the AM peak and 0.95 in the PM peak are incorporated, as directed by Garver.

Each of the four subject intersections are analyzed as a mini roundabout, single-lane roundabout and multi-lane roundabout layouts, and for each, different lane configurations are examined on the extent they achieve the goal of the analysis, which is LOS “D” or better on each approach leg at the horizon year. The goal achievement is measured using “*residual capacity*”, which is an analysis term in Arcady that gives the corresponding percentage that traffic can be increased on all approach legs before the most critical approach leg experiences a LOS “E”, or a congested condition. A positive residual capacity means that all approach

legs, including the most critical leg, are anticipated to operate at LOS “D” or better. A negative residual capacity means that at least one of the approach legs is experiencing LOS “E” or “F”.

Typically, once residual capacity reaches less than 10% in the peak hour analysis, the intersection will be prone to congestion due to slight upticks in traffic caused by nearby incidents that may divert traffic to the subject intersection, or potentially a larger percentage of trucks, varying PHF, inclement weather conditions, or larger number of pedestrians. Because of the sensitivity of low residual capacities, the roundabout configuration analyses in this memo provide a “*practical”* and an “*expanded*” alternative with the latter achieving at least 10% residual capacity.

The proximity of the subject intersections to the University of Central Arkansas (UCA) suggests a high volume of crossing pedestrians and the necessity of including pedestrian traffic into the analysis. For comparison purposes, the roundabout capacity models are analyzed with and without crossing pedestrians at each intersection.

OPERATIONAL ANALYSIS RESULTS

Table 1 (Page 3) shows the results of each roundabout control alternative with the inclusion of crossing pedestrians and Table 2 (Page 3) shows the alternatives without crossing pedestrians. Exhibit 1 (Page 4) provides a description of how to read the information in Table 1 and Table 2.

With the exception of the College St intersection, each intersection appears to adequately convey 2040 AM and PM peak hour projected traffic volume via the use of a single-lane roundabout. At Prince, Caldwell, and Bruce St there are residual capacities less than 10% that indicates the likely potential for an intersection that may or will experience congestion within the peak hour. While the intersections will be at or near capacity during the peak periods, generally roundabouts will function near free-flow conditions during the remaining 22 hours of the day. The off-peak free-flow operations provide an operational benefit, as well as a reduction in vehicle emissions as compared to a stop-controlled intersection or a traffic signal.

One interesting part of the analysis was the increase in residual capacity at the Bruce Street intersection when comparing the single-lane roundabout operational performance in 2018 (6% residual capacity) to that in 2040 (11% residual capacity) during the AM peak period. Even though traffic volumes increased by approximately 20% from 2018 to 2040, the change in the PHF, the percentage trucks, and the Arcady capacity reduction factor led to a resulting 5% increase in capacity for the NB approach when comparing existing versus future conditions.

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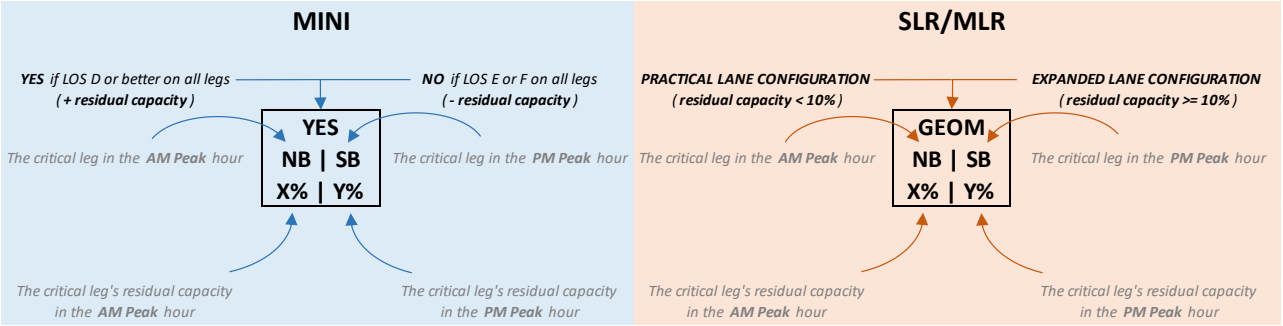
Table 1. Existing (2018) and Forecasted (2040) Roundabout Alternatives – *WITH* Crossing Peds

WITH PEDS	Mini		SLR/MLR					
	2018	2040	2018		2040			
			Practical	Expanded	Practical		Expanded	
Donaghey @ Prince	NO EB | NB -4% | 19%	NO EB | NB -11% | 2%	SLR EB | NB 12% | 41%		SLR EB | NB 2% | 20%		2-Ln Entry EB (LT-R) SB | NB 11% | 20%	
Donaghey @ Caldwell	NO SB | NB -10% | 5%	NO SB | NB -13% | -12%	SLR SB | NB 7% | 25%	2-Ln Entry SB & NB (LT-TR) WB | WB 13% | 37%	SLR SB | NB 2% | 3%		2-Ln Entry SB & NB (LT-TR) EB | WB	
Donaghey @ College	NO SB | EB -11% | -9%	NO SB | EB -22% | -23%	SLR SB | EB 6% | 5%	2-Ln Entry SB & EB (LT-TR) WB | WB 12% | 13%	SLR SB | EB -8% | -12%	2-Ln Entry SB & EB (LT-TR) WB | WB 4% | -5%	MLR 2-Ln Entry All Over (LT-TR) SB | EB	
Donaghey @ Bruce	NO NB | NB -9% | 6%	NO NB | NB -5% | -9%	SLR NB | NB 6% | 26%	2-Ln Entry SB & NB (LT-TR) WB | EB 49% | 35%	SLR NB | NB 11% | 7%		2-Ln Entry SB & NB (LT-TR) WB | EB	

Table 2. Existing (2018) and Forecasted (2040) Roundabout Alternatives – *WITHOUT* Crossing Peds

WITHOUT PEDS	Mini		SLR/MLR					
	2018	2040	2018		2040			
			Practical	Expanded	Practical		Expanded	
Donaghey @ Prince	NO SB | NB -2% | 19%	NO SB | NB -5% | 2%	SLR SB | NB 16% | 41%		SLR SB | NB 11% | 20%			
Donaghey @ Caldwell	NO SB | NB -10% | 5%	NO SB | NB -13% | -9%	SLR SB | NB 7% | 25%	2-Ln Entry SB & NB (LT-TR) WB | WB 13% | 37%	SLR SB | NB 2% | 8%		2-Ln Entry SB & NB (LT-TR) EB | WB	
Donaghey @ College	NO SB | WB -11% | -6%	NO SB | WB -22% | -20%	SLR SB | WB 6% | 11%	2-Ln Entry SB & EB (LT-TR) WB | WB 12% | 13%	SLR SB | WB -8% | -6%	2-Ln Entry SB & EB (LT-TR) WB | WB 4% | -5%	MLR 2-Ln Entry All Over (LT-TR) SB | WB	
Donaghey @ Bruce	NO NB | NB -7% | 7%	NO NB | NB -4% | -7%	SLR NB | NB 11% | 28%		SLR NB | NB 13% | 10%			

Exhibit 1. Visual Guidance on How to Read Tables 1-2



Tables 1 and 2 are split into two main sections: a mini roundabout column and a SLR/MLR column. SLR/MLR columns are divided into “practical” and “expanded” columns based on their residual capacities. Roundabout configurations with less than 10% residual capacity are categorized under “practical” and those with 10% or higher residual capacity are categorized under “expanded”. Finally, each of the columns are cross-tabbed with the four subject intersections.

Due to the prevailing need, based on the capacity analysis, to expand the College St roundabout to two-lane entry each approach is studied using a lane-by-lane analysis. Table 3 shows the results of two scenarios: 1) Entry lanes that are assigned with an inner left-turn lane (left-turn only) and 2) Entry lanes that are assigned with an outer right-turn lane (right-turn only).

Table 3. Forecasted (2040) Intermediate Alternatives at Donaghey at College– *WITH* Crossing Peds

WITH PEDS	***SCENARIOS***	NB Approach	SB Approach	EB Approach	WB Approach	Total Intersection
Donaghey @ College	Scen. 1 (Left and Thru-Right) 	40% | 11%	-4% | 9%	16% | -1%	13% | 6%	SB | EB -4% | -1%
	Scen. 2 (Left-Thru and Right) 	20% | -2%	8% | 15%	18% | 0%	4% | -3%	WB | WB 4% | -3%

CONCLUSION

This memo intends to show how variations in the size and lane configurations of a proposed circular intersection will change the anticipated operational performance. The noted trade-offs that typically exist when analyzing roundabout feasibility at a given intersection include: slight congestion during an AM or PM peak period using a smaller ICD/footprint versus an expanded footprint/laneage and no congestion, changes to construction cost, and adjacent property impacts of a smaller ICD or less laneage versus an expanded lane configuration. For example, in comparing a mini roundabout to a SLR, there may be a slight difference in the anticipated operational performance in the peak periods, however, the circle size can decrease from a 110’-120’ ICD of a SLR down to a 70’-80’ ICD of a mini. Another consideration for selecting the proposed

lane configuration and circle size is the remaining 22hrs of the day where the "*Practical*" design will function at or near a LOS A.

Donaghey Ave @ Prince St

A mini roundabout is anticipated to function slightly over capacity in the 2018 AM peak period. By year 2040 the residual capacity is at -11% in the AM peak. The PM peak period analysis results in a positive residual capacity for the 2018 and 2040 PM peak period at 19% and 2%, respectively.

A SLR meets the practical design definition already set forth in the memo in both 2018 and 2040, however, foot traffic crossing the EB approach in the AM peak may require a second entry lane to be added prior to year 2040. In this configuration, the circulatory would be one lane with all approaches being single-lane entries except the EB approach with one shared left-thru and one dedicated right-turn lane. The deliberate choice of the dedicated right-turn lane over a yielding right-turn lane bypass is due to comparative lesser costs at the expense of a slightly degraded capacity.

Donaghey Ave @ Caldwell St

A mini roundabout is not expected to operate free of congestion in either the 2018 or 2040 peak periods. Both alternatives predict a SLR to be a practical design with a 7% residual capacity in the year 2040 AM peak period.

An expanded design would provide single-lane entries EB and WB and two-lane entries (shared left-thru and shared thru-right) for the NB and SB approach legs resulting in 13% and 37% residual capacity in the AM and PM peak period, respectively. However, due to ROW constraints this expanded option may not be as feasible as implementing the standard single-lane roundabout configuration.

Donaghey Ave @ College Ave

Large negative residual capacities associated with a mini suggest that a mini roundabout will not be a reasonable solution at this intersection. A SLR appears to be practical for the 2018 volumes, but is approximately 10% beyond capacity in the 2040 AM and PM peak periods. Expanding on the SLR lane configuration until congestion is removed from the AM peak period results in a two-lane entry SB and EB. However, the PM peak WB approach is slightly overcapacity in 2040 (-5% residual capacity) and leads to a MLR with two-lane entries from all approaches to satisfy the 2040 AM and PM peak period traffic volume. High residual capacities associated with a MLR (two lanes entering with dual thru movement lanes) at this intersection (at least 34% of unused capacity) suggests that a standard MLR would provide excess capacity in 2040, and therefore, may not be a cost-effective solution to implement.

Table 3 shows further analysis of multi-lane entries at this intersection based on two scenarios of differing lane assignments. Scenario 1 is a 2x2 (two lanes entering, two lanes circulating/conflicting on each approach) roundabout with a dedicated left-turn and a shared thru-right from all approaches. The results for this scenario are not promising due to the predicted failing condition of both the AM peak (-4% residual capacity) and PM peak (-1% residual capacity) in year 2040.

Scenario 2 analyzes the MLR built as a 2x1 (two lanes entering, one lane circulating/conflicting) roundabout with shared left-thru and dedicated right-turn entries at all approaches. Although the traffic operations are still in acceptable ranges in the AM peak (4% residual capacity), it is anticipated to congest in the PM peak on the northbound and westbound approach at -2% and -3% residual capacity, respectively. In addition to Arcady, HCS7 is also used to validate these findings utilizing HCM 6th Edition capacity formulas. Appendix C presents the HCS7 results. The additional capacity analysis from HCS7 aligns with the Arcady results in that

scenario 2 at Donaghey and College will result in a slightly congested intersection operation in the PM peak due to predicted over-capacity conditions on both the NB approach and the WB approach.

Donaghey Ave @ Bruce St

The intersection at Bruce St has the highest pedestrian volume amongst all the subject intersections with a few dozen pedestrians crossing the Donaghey Ave NB approach in the peak periods. A mini roundabout does not appear to provide enough capacity in 2018 or 2040. A SLR is anticipated to be sufficient in both the AM and PM peak period of the horizon year. A two-lane entry NB and SB would be the expanded alternative at this intersection that would provide greater than 10% residual capacity in year 2040, based on the traffic volumes and assumptions used. Again, based on existing ROW constraints and the high level of performance during the off-peak period, the SLR would be the recommended solution at this intersection.

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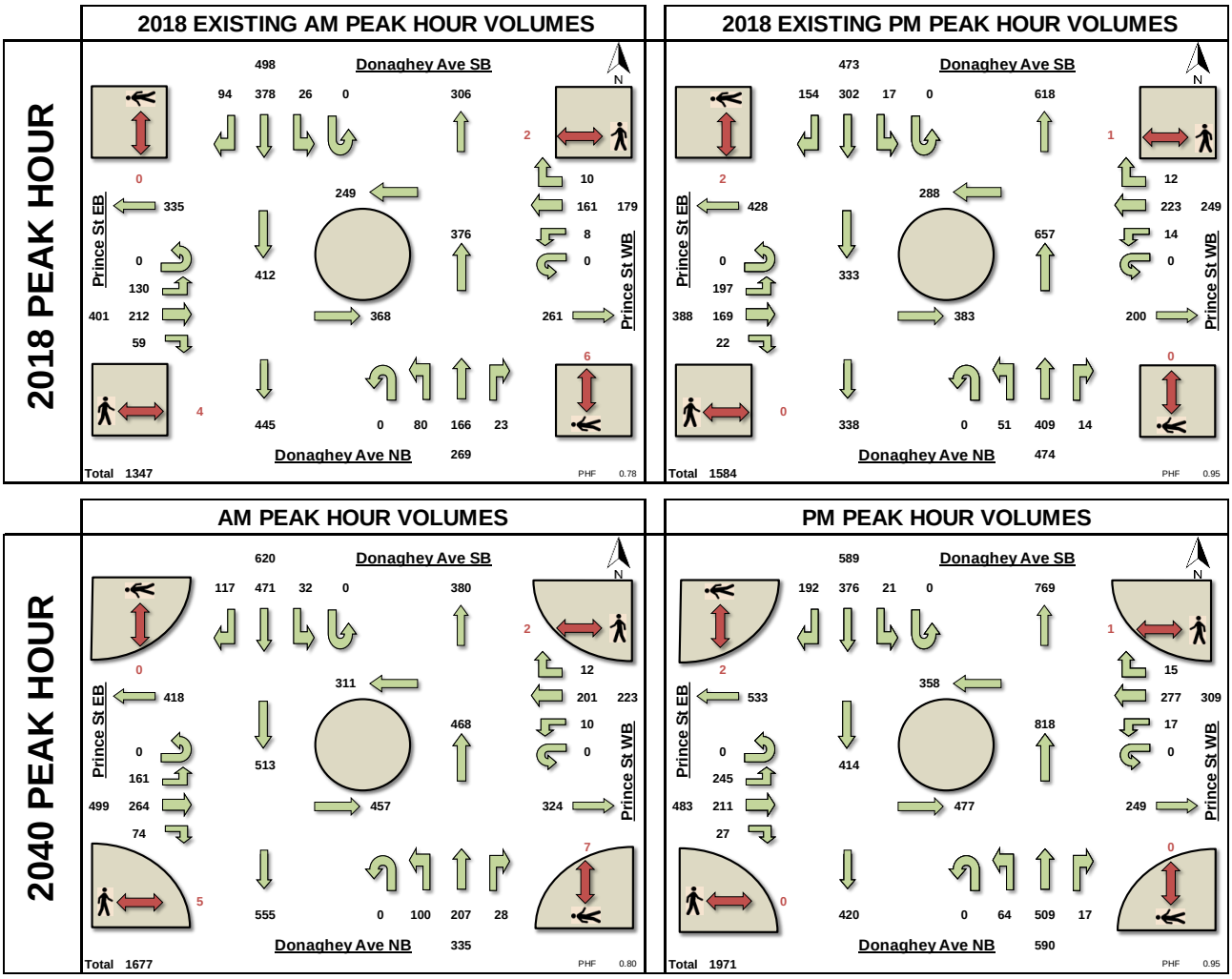
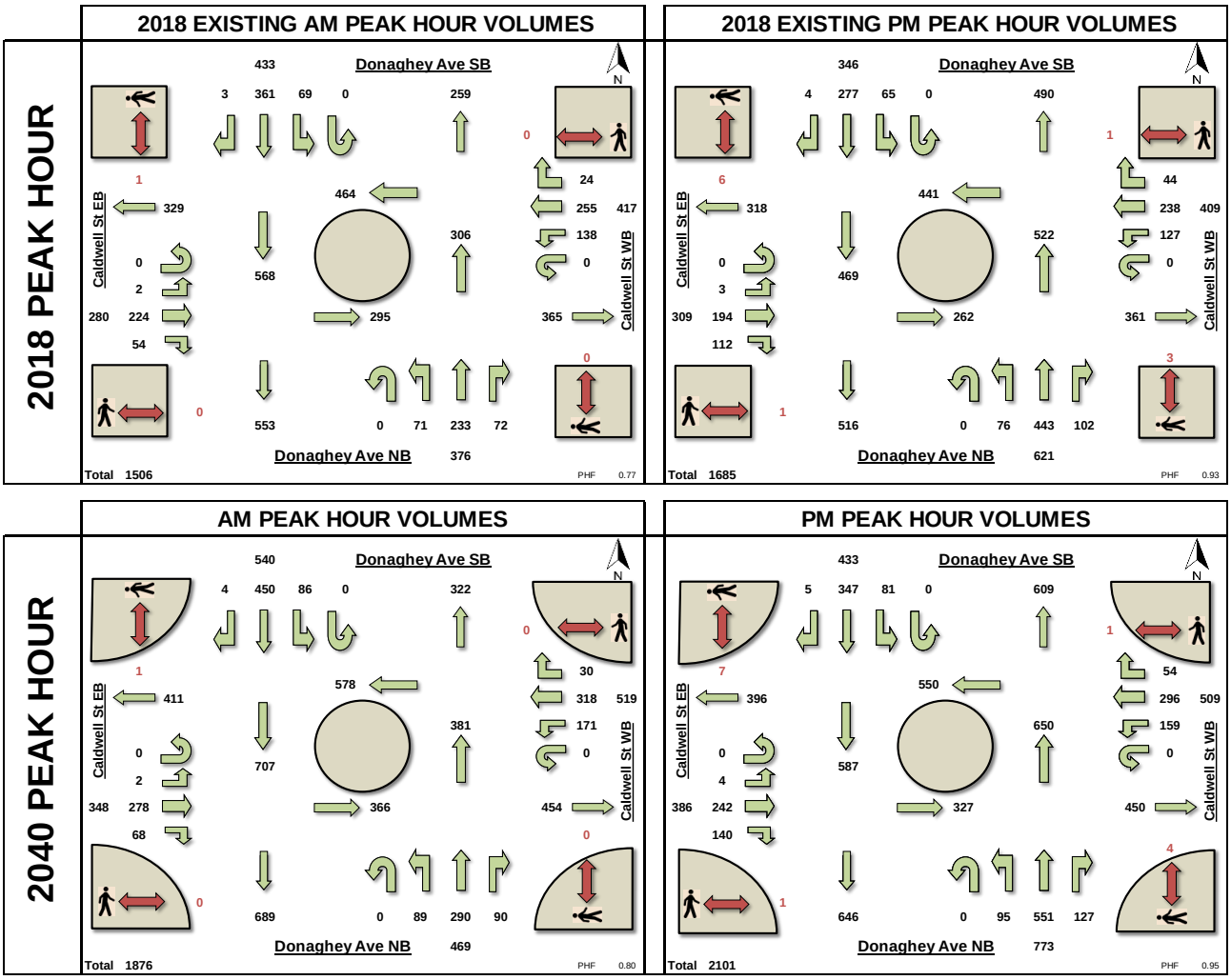
APPENDIX A

2018 and 2040 Turning Movement Counts

A.1. Donaghey Ave at Prince St - Existing (2018) and Forecasted (2040) Turning Movement Counts



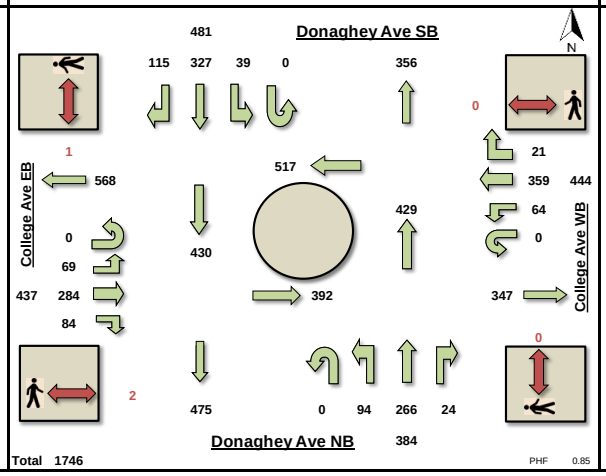
A.2. Donaghey Ave at Caldwell St - Existing (2018) and Forecasted (2040) Turning Movement Counts



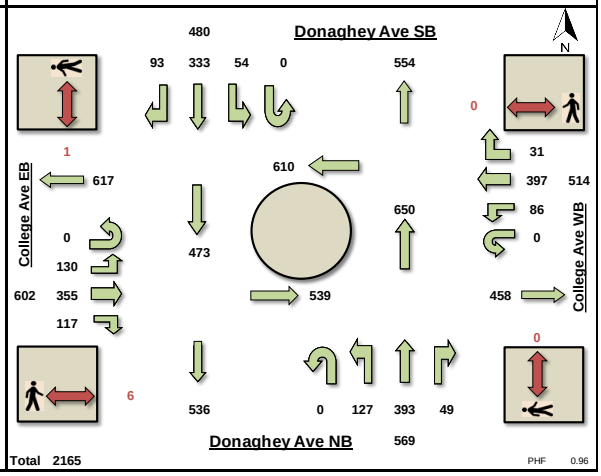
A.3. Donaghey Ave at College Ave - Existing (2018) and Forecasted (2040) Turning Movement Counts

2018 PEAK HOUR

2018 EXISTING AM PEAK HOUR VOLUMES

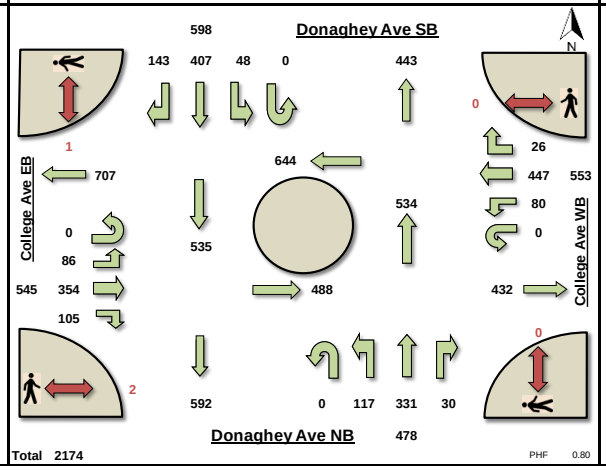


2018 EXISTING PM PEAK HOUR VOLUMES

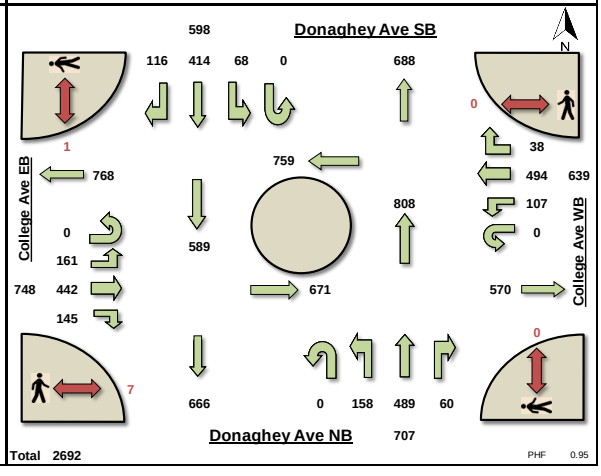


2040 PEAK HOUR

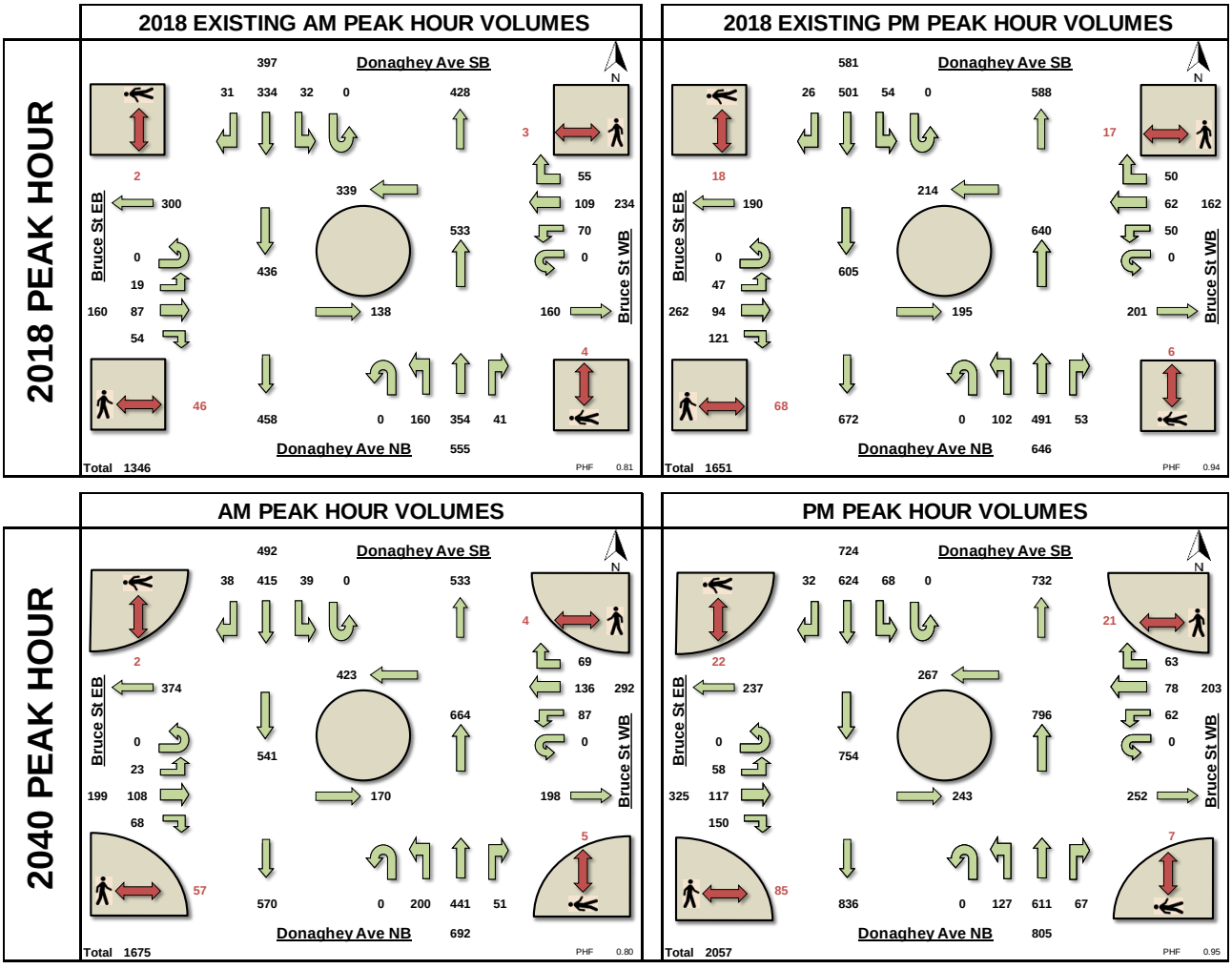
AM PEAK HOUR VOLUMES



PM PEAK HOUR VOLUMES



A.4. Donaghey Ave at Bruce St - Existing (2018) and Forecasted (2040) Turning Movement Counts



APPENDIX B

Donaghey Avenue Roundabouts

ARCADY OPERATIONAL ANALYSIS DOCUMENTATION

ROUNDABOUT CAPACITY MODELS WITH CROSSING PEDESTRIANS

Year 2018
Donaghey Ave at Prince St
AM Peak Hour – Scenario 1 – Mini Roundabout

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
Prince St WB	10	161	8	0	179
Donaghey Ave SB	94	378	26	0	498
Prince St EB	59	212	130	0	401
Donaghey Ave NB	23	166	80	0	269
Total	186	917	244	0	-

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Prince St WB	0	3	0	0	1
Donaghey Ave SB	1	1	0	0	1
Prince St EB	0	3	3	0	2
Donaghey Ave NB	0	3	0	0	1
Average	0	3	1	0	-

Geometry and Analysis Results

Leg	Prince St WB	Donaghey Ave SB	Prince St EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	13.00	13.00	13.00	13.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	60.0	60.0	60.0	60.0
D - Inscribed circle diameter (ft)	80.0	80.0	80.0	80.0
PHI - Conflict (entry) angle (deg)	35.0	35.0	35.0	35.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	80.00	80.00	80.00	80.00
Average Demand (PCE/hr)	179	498	401	269
Max Delay (s)	10.12	39.42	43.91	19.46
Max LOS	B	E	E	C
Max 95th percentile Queue (PCE)	2.1	31.0	27.4	8.1
Max V/C Ratio	0.39	0.93	0.92	0.66

Year 2018

Donaghey Ave at Prince St

PM Peak Hour – Scenario 1 – Mini Roundabout

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
Prince St WB	12	223	14	0	249
Donaghey Ave SB	154	302	17	0	473
Prince St EB	22	169	197	0	388
Donaghey Ave NB	14	409	51	0	474
Total	202	1103	279	0	-

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Prince St WB	0	0	0	0	0
Donaghey Ave SB	0	1	0	0	0
Prince St EB	0	0	1	0	0
Donaghey Ave NB	0	0	0	0	0
Average	0	0	0	0	-

Geometry and Analysis Results

Leg	Prince St WB	Donaghey Ave SB	Prince St EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	13.00	13.00	13.00	13.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	60.0	60.0	60.0	60.0
D - Inscribed circle diameter (ft)	80.0	80.0	80.0	80.0
PHI - Conflict (entry) angle (deg)	35.0	35.0	35.0	35.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	80.00	80.00	80.00	80.00
Average Demand (PCE/hr)	249	473	388	474
Max Delay (s)	11.97	13.02	10.63	16.07
Max LOS	B	B	B	C
Max 95th percentile Queue (PCE)	1.7	5.1	1.9	9.3
Max V/C Ratio	0.47	0.64	0.55	0.70

Year 2040
Donaghey Ave at Prince St
AM Peak Hour – Scenario 1 – Mini Roundabout

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
Prince St WB	12	201	10	0	223
Donaghey Ave SB	117	471	32	0	620
Prince St EB	74	264	161	0	499
Donaghey Ave NB	28	207	100	0	335
Total	231	1143	303	0	-

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Prince St WB	2	2	2	0	2
Donaghey Ave SB	2	2	2	0	2
Prince St EB	2	2	2	0	2
Donaghey Ave NB	2	2	2	0	2
Average	2	2	2	0	-

Geometry and Analysis Results

Leg	Prince St WB	Donaghey Ave SB	Prince St EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	13.00	13.00	13.00	13.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	60.0	60.0	60.0	60.0
D - Inscribed circle diameter (ft)	80.0	80.0	80.0	80.0
PHI - Conflict (entry) angle (deg)	35.0	35.0	35.0	35.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	85.00	85.00	85.00	85.00
Average Demand (PCE/hr)	223	620	499	335
Max Delay (s)	8.90	48.84	76.60	13.15
Max LOS	A	E	F	B
Max 95th percentile Queue (PCE)	2.4	40.0	45.1	3.6
Max V/C Ratio	0.40	0.99	1.04	0.61

Year 2040
Donaghey Ave at Prince St
PM Peak Hour – Scenario 1 – Mini Roundabout

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
Prince St WB	15	277	17	0	309
Donaghey Ave SB	192	376	21	0	589
Prince St EB	27	211	245	0	483
Donaghey Ave NB	17	509	64	0	590
Total	251	1373	347	0	-

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Prince St WB	2	2	2	0	2
Donaghey Ave SB	2	2	2	0	2
Prince St EB	2	2	2	0	2
Donaghey Ave NB	2	2	2	0	2
Average	2	2	2	0	-

Geometry and Analysis Results

Leg	Prince St WB	Donaghey Ave SB	Prince St EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	13.00	13.00	13.00	13.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	60.0	60.0	60.0	60.0
D - Inscribed circle diameter (ft)	80.0	80.0	80.0	80.0
PHI - Conflict (entry) angle (deg)	35.0	35.0	35.0	35.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	85.00	85.00	85.00	85.00
Average Demand (PCE/hr)	309	589	483	590
Max Delay (s)	17.59	20.27	14.36	30.77
Max LOS	C	C	B	D
Max 95th percentile Queue (PCE)	5.5	18.0	7.2	26.6
Max V/C Ratio	0.61	0.78	0.67	0.86

Year 2040 Residual Capacity
Donaghey Ave at Prince St
Scenario 1 – Mini Roundabout

AM Peak Hour

	AM							
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS	Network Residual Capacity
	2040 MINI - 2040							
Prince St WB	0.7	2.4	8.9	0.4	A	44.66	E	-11% [Prince St EB]
Donaghey Ave SB	12.5	40	48.84	0.99	E			
Prince St EB	15.7	45.1	76.6	104	F			
Donaghey Ave NB	1.5	3.6	13.15	0.61	B			

Traffic is 11% above what would cause Prince Street eastbound to begin experiencing congested results (LOS E, >35 sec of delay) based on the 2040 turning movement volumes analyzed.

PM Peak Hour

	PM							
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS	Network Residual Capacity
	2040 MINI - 2040							
Prince St WB	1.5	5.5	17.59	0.61	C	21.54	C	2% [Donaghey Ave NB]
Donaghey Ave SB	3.4	18	20.27	0.78	C			
Prince St EB	2	7.2	14.36	0.67	B			
Donaghey Ave NB	5.1	26.6	30.77	0.86	D			

With an increase of 2% traffic on all approaches, Donaghey Avenue northbound will begin to experience congested results (LOS E, >35 sec of delay) based on the 2040 turning movement volumes analyzed.

Year 2018
Donaghey Ave at Prince St
AM Peak Hour – Scenario 2 – Single-Lane Roundabout

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
Prince St WB	10	161	8	0	179
Donaghey Ave SB	94	378	26	0	498
Prince St EB	59	212	130	0	401
Donaghey Ave NB	23	166	80	0	269
Total	186	917	244	0	-

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Prince St WB	0	3	0	0	1
Donaghey Ave SB	1	1	0	0	1
Prince St EB	0	3	3	0	2
Donaghey Ave NB	0	3	0	0	1
Average	0	3	1	0	-

Geometry and Analysis Results

Leg	Prince St WB	Donaghey Ave SB	Prince St EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	13.00	13.00	13.00	13.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	65.0	65.0	65.0	65.0
D - Inscribed circle diameter (ft)	115.0	115.0	115.0	115.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	90.00	90.00	90.00	90.00
Average Demand (PCE/hr)	179	498	401	269
Max Delay (s)	7.24	16.79	18.59	11.58
Max LOS	A	C	C	B
Max 95th percentile Queue (PCE)	1.1	15.8	13.9	2.7
Max V/C Ratio	0.32	0.76	0.74	0.53

Year 2018

Donaghey Ave at Prince St

PM Peak Hour – Scenario 2 – Single-Lane Roundabout

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
Prince St WB	12	223	14	0	249
Donaghey Ave SB	154	302	17	0	473
Prince St EB	22	169	197	0	388
Donaghey Ave NB	14	409	51	0	474
Total	202	1103	279	0	-

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Prince St WB	0	0	0	0	0
Donaghey Ave SB	0	1	0	0	0
Prince St EB	0	0	1	0	0
Donaghey Ave NB	0	0	0	0	0
Average	0	0	0	0	-

Geometry and Analysis Results

Leg	Prince St WB	Donaghey Ave SB	Prince St EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	13.00	13.00	13.00	13.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	65.0	65.0	65.0	65.0
D - Inscribed circle diameter (ft)	115.0	115.0	115.0	115.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	90.00	90.00	90.00	90.00
Average Demand (PCE/hr)	249	473	388	474
Max Delay (s)	8.01	8.40	7.32	9.60
Max LOS	A	A	A	A
Max 95th percentile Queue (PCE)	2.0	1.7	1.5	2.1
Max V/C Ratio	0.37	0.54	0.45	0.57

Year 2040
Donaghey Ave at Prince St
AM Peak Hour – Scenario 2 – Single-Lane Roundabout

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
Prince St WB	12	201	10	0	223
Donaghey Ave SB	117	471	32	0	620
Prince St EB	74	264	161	0	499
Donaghey Ave NB	28	207	100	0	335
Total	231	1143	303	0	-

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Prince St WB	2	2	2	0	2
Donaghey Ave SB	2	2	2	0	2
Prince St EB	2	2	2	0	2
Donaghey Ave NB	2	2	2	0	2
Average	2	2	2	0	-

Geometry and Analysis Results

Leg	Prince St WB	Donaghey Ave SB	Prince St EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	13.00	13.00	13.00	13.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	65.0	65.0	65.0	65.0
D - Inscribed circle diameter (ft)	115.0	115.0	115.0	115.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	95.00	95.00	95.00	95.00
Average Demand (PCE/hr)	223	620	499	335
Max Delay (s)	6.58	19.30	29.63	9.08
Max LOS	A	C	D	A
Max 95th percentile Queue (PCE)	1.7	22.8	26.4	2.0
Max V/C Ratio	0.33	0.82	0.87	0.51

Year 2040
Donaghey Ave at Prince St
PM Peak Hour – Scenario 2 – Single-Lane Roundabout

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
Prince St WB	15	277	17	0	309
Donaghey Ave SB	192	376	21	0	589
Prince St EB	27	211	245	0	483
Donaghey Ave NB	17	509	64	0	590
Total	251	1373	347	0	-

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Prince St WB	2	2	2	0	2
Donaghey Ave SB	2	2	2	0	2
Prince St EB	2	2	2	0	2
Donaghey Ave NB	2	2	2	0	2
Average	2	2	2	0	-

Geometry and Analysis Results

Leg	Prince St WB	Donaghey Ave SB	Prince St EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	13.00	13.00	13.00	13.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	65.0	65.0	65.0	65.0
D - Inscribed circle diameter (ft)	115.0	115.0	115.0	115.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	95.00	95.00	95.00	95.00
Average Demand (PCE/hr)	309	589	483	590
Max Delay (s)	10.36	11.08	8.99	14.00
Max LOS	B	B	A	B
Max 95th percentile Queue (PCE)	1.5	4.6	1.9	9.4
Max V/C Ratio	0.48	0.65	0.56	0.71

Year 2040 Residual Capacity
Donaghey Ave at Prince St
Scenario 2 – Single-Lane Roundabout

AM Peak Hour

	AM							
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS	Network Residual Capacity
	2040 SLR - 2040							
Prince St WB	0.5	1.7	6.58	0.33	A	18.64	C	2% [Prince St EB]
Donaghey Ave SB	4.2	22.8	19.3	0.82	C			
Prince St EB	5.4	26.4	29.63	0.87	D			
Donaghey Ave NB	1	2	9.08	0.51	A			

With an increase of 2% traffic on all approaches, Prince Street eastbound will begin to experience congested results (LOS E, >35 sec of delay) based on the 2040 turning movement volumes analyzed.

PM Peak Hour

	PM							
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS	Network Residual Capacity
	2040 SLR - 2040							
Prince St WB	0.9	1.5	10.36	0.48	B	11.33	B	20% [Donaghey Ave NB]
Donaghey Ave SB	1.9	4.6	11.08	0.65	B			
Prince St EB	1.2	1.9	8.99	0.56	A			
Donaghey Ave NB	2.4	9.4	14	0.71	B			

With an increase of 20% traffic on all approaches, Donaghey Avenue northbound will begin to experience congested results (LOS E, >35 sec of delay) based on the 2040 turning movement volumes analyzed.

Year 2040

Donaghey Ave at Prince St

AM Peak Hour – Scenario 2 – Single-Lane Entry NB, SB, WB & 2-Lane Entry EB (LT-R)

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
Prince St WB	12	201	10	0	223
Donaghey Ave SB	117	471	32	0	620
Prince St EB	74	264	161	0	499
Donaghey Ave NB	28	207	100	0	335
Total	231	1143	303	0	-

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Prince St WB	2	2	2	0	2
Donaghey Ave SB	2	2	2	0	2
Prince St EB	2	2	2	0	2
Donaghey Ave NB	2	2	2	0	2
Average	2	2	2	0	-

Geometry and Analysis Results

Leg	Prince St WB	Donaghey Ave SB	Prince St EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	13.00	13.00	26.00	13.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	65.0	65.0	70.0	65.0
D - Inscribed circle diameter (ft)	115.0	115.0	115.0	115.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	95.00	95.00	95.00	95.00
Average Demand (PCE/hr)	223	620	499	335
Max Delay (s)	6.61	19.30	4.87	9.28
Max LOS	A	C	A	A
Max 95th percentile Queue (PCE)	1.7	22.8	2.2	1.8
Max V/C Ratio	0.33	0.82	0.45	0.52

Year 2040

Donaghey Ave at Prince St

PM Peak Hour – Scenario 2 – Single-Lane Entry NB, SB, WB & 2-Lane Entry EB (LT-R)

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
Prince St WB	15	277	17	0	309
Donaghey Ave SB	192	376	21	0	589
Prince St EB	27	211	245	0	483
Donaghey Ave NB	17	509	64	0	590
Total	251	1373	347	0	-

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Prince St WB	2	2	2	0	2
Donaghey Ave SB	2	2	2	0	2
Prince St EB	2	2	2	0	2
Donaghey Ave NB	2	2	2	0	2
Average	2	2	2	0	-

Geometry and Analysis Results

Leg	Prince St WB	Donaghey Ave SB	Prince St EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	13.00	13.00	26.00	13.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	65.0	65.0	70.0	65.0
D - Inscribed circle diameter (ft)	115.0	115.0	115.0	115.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	95.00	95.00	95.00	95.00
Average Demand (PCE/hr)	309	589	483	590
Max Delay (s)	10.36	11.08	3.10	14.03
Max LOS	B	B	A	B
Max 95th percentile Queue (PCE)	1.5	4.6	1.8	9.5
Max V/C Ratio	0.48	0.65	0.30	0.71

Year 2040

Donaghey Ave at Prince St

AM Peak Hour – Scenario 2 – Single-Lane NB, SB, WB & 2-Lane Entry EB (LT-R)

By-lane Results for Eastbound Left-Thru Lane

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
Prince St WB	12	201	10	0	223
Donaghey Ave SB	117	471	32	0	620
Prince St EB	0	264	161	0	425
Donaghey Ave NB	28	207	100	0	335
Total	157	1143	303	0	-

Prince St EB right-turns removed to analyze the inner EB lane. A 1/2 capacity reduction was used for the EB approach to analyze the inner lane performance.

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Prince St WB	2	2	2	0	2
Donaghey Ave SB	2	2	2	0	2
Prince St EB	2	2	2	0	2
Donaghey Ave NB	2	2	2	0	2
Average	2	2	2	0	-

Geometry and Analysis Results, 50% Capacity Reduction Applied for By-lane Analysis

Leg	Prince St WB	Donaghey Ave SB	Prince St EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	13.00	13.00	26.00	13.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	65.0	65.0	70.0	65.0
D - Inscribed circle diameter (ft)	115.0	115.0	115.0	115.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	95.00	95.00	95.00	95.00
Average Demand (PCE/hr)			425	
Max Delay (s)			18.89	
Max LOS			C	
Max 95th percentile Queue (PCE)			14.7	
Max V/C Ratio			0.75	

Year 2040

Donaghey Ave at Prince St

PM Peak Hour – Scenario 2 – Single-Lane NB, SB, WB & 2-Lane Entry EB (LT-R)

By-lane Results for Eastbound Left-Thru Lane

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
Prince St WB	15	277	17	0	309
Donaghey Ave SB	192	376	21	0	589
Prince St EB	0	211	245	0	456
Donaghey Ave NB	17	509	64	0	590
Total	224	1373	347	0	-

Prince St EB right-turns removed to analyze the inner EB lane. A 1/2 capacity reduction was used for the EB approach to analyze the inner lane performance.

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Prince St WB	2	2	2	0	2
Donaghey Ave SB	2	2	2	0	2
Prince St EB	2	2	2	0	2
Donaghey Ave NB	2	2	2	0	2
Average	2	2	2	0	-

Geometry and Analysis Results, 50% Capacity Reduction Applied for By-lane Analysis

Leg	Prince St WB	Donaghey Ave SB	Prince St EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	13.00	13.00	26.00	13.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	65.0	65.0	70.0	65.0
D - Inscribed circle diameter (ft)	115.0	115.0	115.0	115.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	95.00	95.00	95.00	95.00
Average Demand (PCE/hr)			456	
Max Delay (s)			9.97	
Max LOS			A	
Max 95th percentile Queue (PCE)			2.1	
Max V/C Ratio			0.57	

Year 2040 Residual Capacity
Donaghey Ave at Prince St
Scenario 2 – Single-Lane NB, SB, WB & 2-Lane Entry EB (LT-R)

AM Peak Hour

	AM							
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS	Network Residual Capacity
	2040 2Ln EB - 2040							
Donaghey Ave SB	4.2	22.8	19.3	0.82	C			11% [Donaghey Ave SB]

With an increase of 11% traffic on all approaches, Donaghey Avenue southbound will begin to experience congested results (LOS E, >35 sec of delay) based on the 2040 turning movement volumes analyzed.

PM Peak Hour

	PM							
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS	Network Residual Capacity
	2040 2Ln EB - 2040							
Donaghey Ave NB	2.4	9.5	14.03	0.71	B			20% [Donaghey Ave NB]

With an increase of 20% traffic on all approaches, Donaghey Avenue northbound will begin to experience congested results (LOS E, >35 sec of delay) based on the 2040 turning movement volumes analyzed.

Year 2018
Donaghey Ave at Caldwell St
AM Peak Hour – Scenario 1 – Mini Roundabout

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
Caldwell St WB	24	255	138	0	417
Donaghey Ave SB	3	361	69	0	433
Caldwell St EB	54	224	2	0	280
Donaghey Ave NB	72	233	71	0	376
Total	153	1073	280	0	-

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Caldwell St WB	0	3	2	0	1
Donaghey Ave SB	0	1	0	0	0
Caldwell St EB	0	3	0	0	1
Donaghey Ave NB	1	3	3	0	2
Average	0	3	1	0	-

Geometry and Analysis Results

Leg	Caldwell St WB	Donaghey Ave SB	Caldwell St EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	13.00	13.00	13.00	13.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	60.0	60.0	60.0	60.0
D - Inscribed circle diameter (ft)	80.0	80.0	80.0	80.0
PHI - Conflict (entry) angle (deg)	35.0	35.0	35.0	35.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	80.00	80.00	80.00	80.00
Average Demand (PCE/hr)	417	433	280	376
Max Delay (s)	45.28	66.71	21.02	30.09
Max LOS	E	F	C	D
Max 95th percentile Queue (PCE)	29.0	35.0	10.6	21.5
Max V/C Ratio	0.94	1.02	0.70	0.84

Year 2018
Donaghey Ave at Caldwell St
PM Peak Hour – Scenario 1 – Mini Roundabout

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
Caldwell St WB	44	238	127	0	409
Donaghey Ave SB	4	277	65	0	346
Caldwell St EB	112	194	3	0	309
Donaghey Ave NB	102	443	76	0	621
Total	262	1152	271	0	-

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Caldwell St WB	2	1	1	0	1
Donaghey Ave SB	0	2	0	0	1
Caldwell St EB	1	1	0	0	1
Donaghey Ave NB	0	1	1	0	1
Average	1	1	1	0	-

Geometry and Analysis Results

Leg	Caldwell St WB	Donaghey Ave SB	Caldwell St EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	13.00	13.00	13.00	13.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	60.0	60.0	60.0	60.0
D - Inscribed circle diameter (ft)	80.0	80.0	80.0	80.0
PHI - Conflict (entry) angle (deg)	35.0	35.0	35.0	35.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	80.00	80.00	80.00	80.00
Average Demand (PCE/hr)	409	346	309	621
Max Delay (s)	18.03	12.41	10.91	26.98
Max LOS	C	B	B	D
Max 95th percentile Queue (PCE)	9.8	1.9	1.5	26.0
Max V/C Ratio	0.69	0.56	0.50	0.85

Year 2040
Donaghey Ave at Caldwell St
AM Peak Hour – Scenario 1 – Mini Roundabout

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
Caldwell St WB	30	318	171	0	519
Donaghey Ave SB	4	450	86	0	540
Caldwell St EB	68	278	2	0	348
Donaghey Ave NB	90	290	89	0	469
Total	192	1336	348	0	-

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Caldwell St WB	2	2	2	0	2
Donaghey Ave SB	2	2	2	0	2
Caldwell St EB	2	2	2	0	2
Donaghey Ave NB	2	2	2	0	2
Average	2	2	2	0	-

Geometry and Analysis Results

Leg	Caldwell St WB	Donaghey Ave SB	Caldwell St EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	13.00	13.00	13.00	13.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	60.0	60.0	60.0	60.0
D - Inscribed circle diameter (ft)	80.0	80.0	80.0	80.0
PHI - Conflict (entry) angle (deg)	35.0	35.0	35.0	35.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	85.00	85.00	85.00	85.00
Average Demand (PCE/hr)	519	540	348	469
Max Delay (s)	29.78	111.16	25.30	19.43
Max LOS	D	F	D	C
Max 95th percentile Queue (PCE)	27.3	55.6	16.5	17.1
Max V/C Ratio	0.88	1.10	0.77	0.77

Year 2040
Donaghey Ave at Caldwell St
PM Peak Hour – Scenario 1 – Mini Roundabout

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
Caldwell St WB	54	296	159	0	509
Donaghey Ave SB	5	347	81	0	433
Caldwell St EB	140	242	4	0	386
Donaghey Ave NB	127	551	95	0	773
Total	326	1436	339	0	-

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Caldwell St WB	2	2	2	0	2
Donaghey Ave SB	2	2	2	0	2
Caldwell St EB	2	2	2	0	2
Donaghey Ave NB	2	2	2	0	2
Average	2	2	2	0	-

Geometry and Analysis Results

Leg	Caldwell St WB	Donaghey Ave SB	Caldwell St EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	13.00	13.00	13.00	13.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	60.0	60.0	60.0	60.0
D - Inscribed circle diameter (ft)	80.0	80.0	80.0	80.0
PHI - Conflict (entry) angle (deg)	35.0	35.0	35.0	35.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	85.00	85.00	85.00	85.00
Average Demand (PCE/hr)	509	433	386	773
Max Delay (s)	28.88	17.37	14.23	137.37
Max LOS	D	C	B	F
Max 95th percentile Queue (PCE)	22.1	9.5	4.4	104.6
Max V/C Ratio	0.82	0.69	0.61	1.06

Year 2040 Residual Capacity
Donaghey Ave at Caldwell St
Scenario 1 – Mini Roundabout

AM Peak Hour

	AM							
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS	Network Residual Capacity
	2040 MINI - 2040							
Caldwell St WB	5.6	27.3	29.78	0.88	D	49.79	E	-13% [Donaghey Ave SB]
Donaghey Ave SB	22.8	55.6	111.16	1.1	F			
Caldwell St EB	3.1	16.5	25.3	0.77	D			
Donaghey Ave NB	3.2	17.1	19.43	0.77	C			

Traffic is 13% above what would cause Donaghey Avenue southbound to begin experiencing congested results (LOS E, >35 sec of delay) based on the 2040 turning movement volumes analyzed.

PM Peak Hour

	PM							
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS	Network Residual Capacity
	2040 MINI - 2040							
Caldwell St WB	4.1	22.1	28.88	0.82	D	63.73	F	-12% [Donaghey Ave NB]
Donaghey Ave SB	2.1	9.5	17.37	0.69	C			
Caldwell St EB	1.6	4.4	14.23	0.61	B			
Donaghey Ave NB	29.7	104.6	137.37	1.06	F			

Traffic is 12% above what would cause Donaghey Avenue northbound to begin experiencing congested results (LOS E, >35 sec of delay) based on the 2040 turning movement volumes analyzed.

Year 2018
Donaghey Ave at Caldwell St
AM Peak Hour – Scenario 2 – Single-Lane Roundabout

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
Caldwell St WB	24	255	138	0	417
Donaghey Ave SB	3	361	69	0	433
Caldwell St EB	54	224	2	0	280
Donaghey Ave NB	72	233	71	0	376
Total	153	1073	280	0	-

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Caldwell St WB	0	3	2	0	1
Donaghey Ave SB	0	1	0	0	0
Caldwell St EB	0	3	0	0	1
Donaghey Ave NB	1	3	3	0	2
Average	0	3	1	0	-

Geometry and Analysis Results

Leg	Caldwell St WB	Donaghey Ave SB	Caldwell St EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	13.00	13.00	13.00	13.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	65.0	65.0	65.0	65.0
D - Inscribed circle diameter (ft)	115.0	115.0	115.0	115.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	90.00	90.00	90.00	90.00
Average Demand (PCE/hr)	417	433	280	376
Max Delay (s)	18.58	23.99	12.27	14.86
Max LOS	C	C	B	B
Max 95th percentile Queue (PCE)	14.9	20.6	2.3	8.1
Max V/C Ratio	0.75	0.82	0.56	0.68

Year 2018
Donaghey Ave at Caldwell St
PM Peak Hour – Scenario 2 – Single-Lane Roundabout

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
Caldwell St WB	44	238	127	0	409
Donaghey Ave SB	4	277	65	0	346
Caldwell St EB	112	194	3	0	309
Donaghey Ave NB	102	443	76	0	621
Total	262	1152	271	0	-

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Caldwell St WB	2	1	1	0	1
Donaghey Ave SB	0	2	0	0	1
Caldwell St EB	1	1	0	0	1
Donaghey Ave NB	0	1	1	0	1
Average	1	1	1	0	-

Geometry and Analysis Results

Leg	Caldwell St WB	Donaghey Ave SB	Caldwell St EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	13.00	13.00	13.00	13.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	65.0	65.0	65.0	65.0
D - Inscribed circle diameter (ft)	115.0	115.0	115.0	115.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	90.00	90.00	90.00	90.00
Average Demand (PCE/hr)	409	346	309	621
Max Delay (s)	10.47	8.29	7.50	13.03
Max LOS	B	A	A	B
Max 95th percentile Queue (PCE)	1.8	1.5	1.8	9.2
Max V/C Ratio	0.56	0.46	0.41	0.71

Year 2018

Donaghey Ave at Caldwell St

AM Peak Hour – Scenario 2 – Single-Lane EB, WB & 2-Lane Entry NB, SB (LT-TR)

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
Caldwell St WB	24	255	138	0	417
Donaghey Ave SB	3	361	69	0	433
Caldwell St EB	54	224	2	0	280
Donaghey Ave NB	72	233	71	0	376
Total	153	1073	280	0	-

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Caldwell St WB	0	3	2	0	1
Donaghey Ave SB	0	1	0	0	0
Caldwell St EB	0	3	0	0	1
Donaghey Ave NB	1	3	3	0	2
Average	0	3	1	0	-

Geometry and Analysis Results

Leg	Caldwell St WB	Donaghey Ave SB	Caldwell St EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	13.00	26.00	13.00	26.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	65.0	70.0	65.0	70.0
D - Inscribed circle diameter (ft)	140.0	115.0	140.0	115.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	90.00	90.00	90.00	90.00
Average Demand (PCE/hr)	417	433	280	376
Max Delay (s)	18.09	4.47	12.03	3.93
Max LOS	C	A	B	A
Max 95th percentile Queue (PCE)	14.3	2.3	2.1	1.5
Max V/C Ratio	0.75	0.41	0.55	0.35

Year 2018

Donaghey Ave at Caldwell St

PM Peak Hour – Scenario 2 – Single-Lane EB, WB & 2-Lane Entry NB, SB (LT-TR)

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
Caldwell St WB	44	238	127	0	409
Donaghey Ave SB	4	277	65	0	346
Caldwell St EB	112	194	3	0	309
Donaghey Ave NB	102	443	76	0	621
Total	262	1152	271	0	-

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Caldwell St WB	2	1	1	0	1
Donaghey Ave SB	0	2	0	0	1
Caldwell St EB	1	1	0	0	1
Donaghey Ave NB	0	1	1	0	1
Average	1	1	1	0	-

Geometry and Analysis Results

Leg	Caldwell St WB	Donaghey Ave SB	Caldwell St EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	13.00	26.00	13.00	26.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	65.0	70.0	65.0	70.0
D - Inscribed circle diameter (ft)	140.0	115.0	140.0	115.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	90.00	90.00	90.00	90.00
Average Demand (PCE/hr)	409	346	309	621
Max Delay (s)	10.27	3.19	7.40	3.51
Max LOS	B	A	A	A
Max 95th percentile Queue (PCE)	1.7	1.4	1.9	1.7
Max V/C Ratio	0.56	0.25	0.40	0.39

Year 2040
Donaghey Ave at Caldwell St
AM Peak Hour – Scenario 2 – Single-Lane Roundabout

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
Caldwell St WB	30	318	171	0	519
Donaghey Ave SB	4	450	86	0	540
Caldwell St EB	68	278	2	0	348
Donaghey Ave NB	90	290	89	0	469
Total	192	1336	348	0	-

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Caldwell St WB	2	2	2	0	2
Donaghey Ave SB	2	2	2	0	2
Caldwell St EB	2	2	2	0	2
Donaghey Ave NB	2	2	2	0	2
Average	2	2	2	0	-

Geometry and Analysis Results

Leg	Caldwell St WB	Donaghey Ave SB	Caldwell St EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	13.00	13.00	13.00	13.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	65.0	65.0	65.0	65.0
D - Inscribed circle diameter (ft)	115.0	115.0	115.0	115.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	95.00	95.00	95.00	95.00
Average Demand (PCE/hr)	519	540	348	469
Max Delay (s)	14.20	30.92	14.63	11.17
Max LOS	B	D	B	B
Max 95th percentile Queue (PCE)	11.8	28.9	5.9	4.7
Max V/C Ratio	0.73	0.89	0.64	0.65

Year 2040
Donaghey Ave at Caldwell St
PM Peak Hour – Scenario 2 – Single-Lane Roundabout

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
Caldwell St WB	54	296	159	0	509
Donaghey Ave SB	5	347	81	0	433
Caldwell St EB	140	242	4	0	386
Donaghey Ave NB	127	551	95	0	773
Total	326	1436	339	0	-

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Caldwell St WB	2	2	2	0	2
Donaghey Ave SB	2	2	2	0	2
Caldwell St EB	2	2	2	0	2
Donaghey Ave NB	2	2	2	0	2
Average	2	2	2	0	-

Geometry and Analysis Results

Leg	Caldwell St WB	Donaghey Ave SB	Caldwell St EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	13.00	13.00	13.00	13.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	65.0	65.0	65.0	65.0
D - Inscribed circle diameter (ft)	115.0	115.0	115.0	115.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	95.00	95.00	95.00	95.00
Average Demand (PCE/hr)	509	433	386	773
Max Delay (s)	14.69	10.46	8.98	29.04
Max LOS	B	B	A	D
Max 95th percentile Queue (PCE)	8.4	2.0	1.5	32.9
Max V/C Ratio	0.69	0.57	0.50	0.89

Year 2040 Residual Capacity
Donaghey Ave at Caldwell St
Scenario 2 – Single-Lane Roundabout

AM Peak Hour

	AM							
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS	Network Residual Capacity
	2040 SLR - 2040							
Caldwell St WB	2.6	11.8	14.2	0.73	B	18.34	C	2% [Donaghey Ave SB]
Donaghey Ave SB	6.2	28.9	30.92	0.89	D			
Caldwell St EB	1.8	5.9	14.63	0.64	B			
Donaghey Ave NB	1.8	4.7	11.17	0.65	B			

With an increase of 2% traffic on all approaches, Donaghey Avenue southbound will begin to experience congested results (LOS E, >35 sec of delay) based on the 2040 turning movement volumes analyzed.

PM Peak Hour

	PM							
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS	Network Residual Capacity
	2040 SLR - 2040							
Caldwell St WB	2.1	8.4	14.69	0.69	B	18.05	C	3% [Donaghey Ave NB]
Donaghey Ave SB	1.3	2	10.46	0.57	B			
Caldwell St EB	1	1.5	8.98	0.5	A			
Donaghey Ave NB	6.4	32.9	29.04	0.89	D			

With an increase of 3% traffic on all approaches, Donaghey Avenue northbound will begin to experience congested results (LOS E, >35 sec of delay) based on the 2040 turning movement volumes analyzed.

Year 2040

Donaghey Ave at Caldwell St

AM Peak Hour – Scenario 2 – Single-Lane EB, WB & 2-Lane Entry NB, SB (LT-TR)

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
Caldwell St WB	30	318	171	0	519
Donaghey Ave SB	4	450	86	0	540
Caldwell St EB	68	278	2	0	348
Donaghey Ave NB	90	290	89	0	469
Total	192	1336	348	0	-

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Caldwell St WB	2	2	2	0	2
Donaghey Ave SB	2	2	2	0	2
Caldwell St EB	2	2	2	0	2
Donaghey Ave NB	2	2	2	0	2
Average	2	2	2	0	-

Geometry and Analysis Results

Leg	Caldwell St WB	Donaghey Ave SB	Caldwell St EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	13.00	26.00	13.00	26.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	65.0	70.0	65.0	70.0
D - Inscribed circle diameter (ft)	140.0	115.0	140.0	115.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	95.00	95.00	95.00	95.00
Average Demand (PCE/hr)	519	540	348	469
Max Delay (s)	13.94	4.52	14.52	3.36
Max LOS	B	A	B	A
Max 95th percentile Queue (PCE)	11.4	2.1	5.8	1.8
Max V/C Ratio	0.72	0.46	0.64	0.35

Year 2040

Donaghey Ave at Caldwell St

PM Peak Hour – Scenario 2 – Single-Lane EB, WB & 2-Lane Entry NB, SB (LT-TR)

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
Caldwell St WB	54	296	159	0	509
Donaghey Ave SB	5	347	81	0	433
Caldwell St EB	140	242	4	0	386
Donaghey Ave NB	127	551	95	0	773
Total	326	1436	339	0	-

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Caldwell St WB	2	2	2	0	2
Donaghey Ave SB	2	2	2	0	2
Caldwell St EB	2	2	2	0	2
Donaghey Ave NB	2	2	2	0	2
Average	2	2	2	0	-

Geometry and Analysis Results

Leg	Caldwell St WB	Donaghey Ave SB	Caldwell St EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	13.00	26.00	13.00	26.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	65.0	70.0	65.0	70.0
D - Inscribed circle diameter (ft)	140.0	115.0	140.0	115.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	95.00	95.00	95.00	95.00
Average Demand (PCE/hr)	509	433	386	773
Max Delay (s)	14.43	3.43	8.81	4.28
Max LOS	B	A	A	A
Max 95th percentile Queue (PCE)	8.0	1.8	1.5	1.5
Max V/C Ratio	0.68	0.30	0.49	0.49

Year 2040 Residual Capacity
Donaghey Ave at Caldwell St
Scenario 2 – Single-Lane EB, WB & 2-Lane Entry NB, SB (LT-TR)

AM Peak Hour

	AM							
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS	Network Residual Capacity
	2040 2Ln entry SB & NB - 2040							
Caldwell St WB	2.5	11.4	13.94	0.72	B	8.69	A	19% [Caldwell St EB]
Donaghey Ave SB	0.8	2.1	4.52	0.46	A			
Caldwell St EB	1.7	5.8	14.52	0.64	B			
Donaghey Ave NB	0.5	1.8	3.36	0.35	A			

With an increase of 19% traffic on all approaches, Caldwell Street eastbound will begin to experience congested results (LOS E, >35 sec of delay) based on the 2040 turning movement volumes analyzed.

PM Peak Hour

	PM							
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS	Network Residual Capacity
	2040 2Ln entry SB & NB - 2040							
Caldwell St WB	2.1	8	14.43	0.68	B	7.39	A	18% [Caldwell St WB]
Donaghey Ave SB	0.4	1.8	3.43	0.3	A			
Caldwell St EB	1	1.5	8.81	0.49	A			
Donaghey Ave NB	1	1.5	4.28	0.49	A			

With an increase of 18% traffic on all approaches, Caldwell Street westbound will begin to experience congested results (LOS E, >35 sec of delay) based on the 2040 turning movement volumes analyzed.

Year 2018
Donaghey Ave at College Ave
AM Peak Hour – Scenario 1 – Mini Roundabout

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
College Ave WB	21	359	64	0	444
Donaghey Ave SB	115	327	39	0	481
College Ave EB	84	284	69	0	437
Donaghey Ave NB	24	266	94	0	384
Total	244	1236	266	0	-

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
College Ave WB	0	1	0	0	0
Donaghey Ave SB	2	1	0	0	1
College Ave EB	1	2	0	0	1
Donaghey Ave NB	0	4	3	0	2
Average	1	2	1	0	-

Geometry and Analysis Results

Leg	College Ave WB	Donaghey Ave SB	College Ave EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	13.00	13.00	13.00	13.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	60.0	60.0	60.0	60.0
D - Inscribed circle diameter (ft)	80.0	80.0	80.0	80.0
PHI - Conflict (entry) angle (deg)	35.0	35.0	35.0	35.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	80.00	80.00	80.00	80.00
Average Demand (PCE/hr)	444	481	437	384
Max Delay (s)	47.19	83.90	56.77	33.82
Max LOS	E	F	F	D
Max 95th percentile Queue (PCE)	29.7	50.0	37.9	21.7
Max V/C Ratio	0.94	1.03	0.97	0.85

Year 2018
Donaghey Ave at College Ave
PM Peak Hour – Scenario 1 – Mini Roundabout

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
College Ave WB	31	397	86	0	514
Donaghey Ave SB	93	333	54	0	480
College Ave EB	117	355	130	0	602
Donaghey Ave NB	49	393	127	0	569
Total	290	1478	397	0	-

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
College Ave WB	0	0	0	0	0
Donaghey Ave SB	1	0	0	0	0
College Ave EB	0	0	1	0	0
Donaghey Ave NB	0	0	0	0	0
Average	0	0	0	0	-

Geometry and Analysis Results

Leg	College Ave WB	Donaghey Ave SB	College Ave EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	13.00	13.00	13.00	13.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	60.0	60.0	60.0	60.0
D - Inscribed circle diameter (ft)	80.0	80.0	80.0	80.0
PHI - Conflict (entry) angle (deg)	35.0	35.0	35.0	35.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	80.00	80.00	80.00	80.00
Average Demand (PCE/hr)	514	480	602	569
Max Delay (s)	57.39	32.12	98.08	51.06
Max LOS	F	D	F	F
Max 95th percentile Queue (PCE)	41.8	22.4	67.7	42.0
Max V/C Ratio	0.93	0.83	1.00	0.92

Year 2040
Donaghey Ave at College Ave
AM Peak Hour – Scenario 1 – Mini Roundabout

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
College Ave WB	26	447	80	0	553
Donaghey Ave SB	143	407	48	0	598
College Ave EB	105	354	86	0	545
Donaghey Ave NB	30	331	117	0	478
Total	304	1539	331	0	-

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Caldwell St WB	2	2	2	0	2
Donaghey Ave SB	2	2	2	0	2
Caldwell St EB	2	2	2	0	2
Donaghey Ave NB	2	2	2	0	2
Average	2	2	2	0	-

Geometry and Analysis Results

Leg	College Ave WB	Donaghey Ave SB	College Ave EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	13.00	13.00	13.00	13.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	60.0	60.0	60.0	60.0
D - Inscribed circle diameter (ft)	80.0	80.0	80.0	80.0
PHI - Conflict (entry) angle (deg)	35.0	35.0	35.0	35.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	85.00	85.00	85.00	85.00
Average Demand (PCE/hr)	553	598	545	478
Max Delay (s)	89.96	302.74	47.92	30.93
Max LOS	F	F	E	D
Max 95th percentile Queue (PCE)	51.4	99.7	35.7	26.0
Max V/C Ratio	1.07	1.25	0.97	0.87

Year 2040
Donaghey Ave at College Ave
PM Peak Hour – Scenario 1 – Mini Roundabout

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
College Ave WB	38	494	107	0	639
Donaghey Ave SB	116	414	68	0	598
College Ave EB	145	442	161	0	748
Donaghey Ave NB	60	489	158	0	707
Total	359	1839	494	0	-

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Caldwell St WB	2	2	2	0	2
Donaghey Ave SB	2	2	2	0	2
Caldwell St EB	2	2	2	0	2
Donaghey Ave NB	2	2	2	0	2
Average	2	2	2	0	-

Geometry and Analysis Results

Leg	College Ave WB	Donaghey Ave SB	College Ave EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	13.00	13.00	13.00	13.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	60.0	60.0	60.0	60.0
D - Inscribed circle diameter (ft)	80.0	80.0	80.0	80.0
PHI - Conflict (entry) angle (deg)	35.0	35.0	35.0	35.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	85.00	85.00	85.00	85.00
Average Demand (PCE/hr)	639	598	748	707
Max Delay (s)	370.40	119.74	677.85	215.70
Max LOS	F	F	F	F
Max 95th percentile Queue (PCE)	200.0	84.2	200.0	196.6
Max V/C Ratio	1.15	1.02	1.27	1.08

Year 2040 Residual Capacity
Donaghey Ave at College Ave
Scenario 1 – Mini Roundabout

AM Peak Hour

	AM							
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS	Network Residual Capacity
	2040 MINI - 2040							
College Ave WB	20.1	51.4	89.96	1.07	F	124.97	F	-22% [Donaghey Ave SB]
Donaghey Ave SB	56	99.7	302.74	1.25	F			
College Ave EB	10.4	35.7	47.92	0.97	E			
Donaghey Ave NB	5.4	26	30.93	0.87	D			

Traffic is 22% above what would cause Donaghey Avenue southbound to begin experiencing congested results (LOS E, >35 sec of delay) based on the 2040 turning movement volumes analyzed.

PM Peak Hour

	PM							
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS	Network Residual Capacity
	2040 MINI - 2040							
College Ave WB	62.4	200	370.4	1.15	F	359.52	F	-23% [College Ave EB]
Donaghey Ave SB	19.5	84.2	119.74	1.02	F			
College Ave EB	128.2	200	677.85	1.27	F			
Donaghey Ave NB	39.9	196.6	215.7	1.08	F			

Traffic is 23% above what would cause College Avenue eastbound to begin experiencing congested results (LOS E, >35 sec of delay) based on the 2040 turning movement volumes analyzed.

Year 2018

Donaghey Ave at College Ave

AM Peak Hour – Scenario 2 – Single-Lane Roundabout

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
College Ave WB	21	359	64	0	444
Donaghey Ave SB	115	327	39	0	481
College Ave EB	84	284	69	0	437
Donaghey Ave NB	24	266	94	0	384
Total	244	1236	266	0	-

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
College Ave WB	0	1	0	0	0
Donaghey Ave SB	2	1	0	0	1
College Ave EB	1	2	0	0	1
Donaghey Ave NB	0	4	3	0	2
Average	1	2	1	0	-

Geometry and Analysis Results

Leg	College Ave WB	Donaghey Ave SB	College Ave EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	13.00	13.00	13.00	13.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	65.0	65.0	65.0	65.0
D - Inscribed circle diameter (ft)	115.0	115.0	115.0	115.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	90.00	90.00	90.00	90.00
Average Demand (PCE/hr)	444	481	437	384
Max Delay (s)	19.41	25.18	22.02	16.41
Max LOS	C	D	C	C
Max 95th percentile Queue (PCE)	14.9	21.5	17.1	8.8
Max V/C Ratio	0.75	0.82	0.78	0.68

Year 2018

Donaghey Ave at College Ave

PM Peak Hour – Scenario 2 – Single-Lane Roundabout

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
College Ave WB	31	397	86	0	514
Donaghey Ave SB	93	333	54	0	480
College Ave EB	117	355	130	0	602
Donaghey Ave NB	49	393	127	0	569
Total	290	1478	397	0	-

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
College Ave WB	0	0	0	0	0
Donaghey Ave SB	1	0	0	0	0
College Ave EB	0	0	1	0	0
Donaghey Ave NB	0	0	0	0	0
Average	0	0	0	0	-

Geometry and Analysis Results

Leg	College Ave WB	Donaghey Ave SB	College Ave EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	13.00	13.00	13.00	13.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	65.0	65.0	65.0	65.0
D - Inscribed circle diameter (ft)	115.0	115.0	115.0	115.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	90.00	90.00	90.00	90.00
Average Demand (PCE/hr)	514	480	602	569
Max Delay (s)	18.76	14.56	24.39	18.02
Max LOS	C	B	C	C
Max 95th percentile Queue (PCE)	13.5	7.3	22.1	14.3
Max V/C Ratio	0.74	0.67	0.82	0.75

Year 2018

Donaghey Ave at College Ave

AM Peak Hour – Scenario 2 – Single-Lane NB, WB & 2-Lane Entry SB, EB (LT-TR)

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
College Ave WB	21	359	64	0	444
Donaghey Ave SB	115	327	39	0	481
College Ave EB	84	284	69	0	437
Donaghey Ave NB	24	266	94	0	384
Total	244	1236	266	0	-

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
College Ave WB	0	1	0	0	0
Donaghey Ave SB	2	1	0	0	1
College Ave EB	1	2	0	0	1
Donaghey Ave NB	0	4	3	0	2
Average	1	2	1	0	-

Geometry and Analysis Results

Leg	College Ave WB	Donaghey Ave SB	College Ave EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	13.00	26.00	26.00	13.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	65.0	70.0	70.0	65.0
D - Inscribed circle diameter (ft)	140.0	115.0	140.0	140.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	90.00	90.00	90.00	90.00
Average Demand (PCE/hr)	444	481	437	384
Max Delay (s)	18.87	4.51	4.36	16.13
Max LOS	C	A	A	C
Max 95th percentile Queue (PCE)	14.3	2.3	2.3	8.5
Max V/C Ratio	0.75	0.42	0.38	0.68

Year 2018

Donaghey Ave at College Ave

PM Peak Hour – Scenario 2 – Single-Lane NB, WB & 2-Lane Entry SB, EB (LT-TR)

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
College Ave WB	31	397	86	0	514
Donaghey Ave SB	93	333	54	0	480
College Ave EB	117	355	130	0	602
Donaghey Ave NB	49	393	127	0	569
Total	290	1478	397	0	-

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
College Ave WB	0	0	0	0	0
Donaghey Ave SB	1	0	0	0	0
College Ave EB	0	0	1	0	0
Donaghey Ave NB	0	0	0	0	0
Average	0	0	0	0	-

Geometry and Analysis Results

Leg	College Ave WB	Donaghey Ave SB	College Ave EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	13.00	26.00	26.00	13.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	65.0	70.0	70.0	65.0
D - Inscribed circle diameter (ft)	140.0	115.0	140.0	140.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	90.00	90.00	90.00	90.00
Average Demand (PCE/hr)	514	480	602	569
Max Delay (s)	17.98	3.84	4.43	17.57
Max LOS	C	A	A	C
Max 95th percentile Queue (PCE)	12.5	2.0	1.5	13.7
Max V/C Ratio	0.73	0.35	0.44	0.75

Year 2040
Donaghey Ave at College Ave
AM Peak Hour – Scenario 2 – Single-Lane Roundabout

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
College Ave WB	26	447	80	0	553
Donaghey Ave SB	143	407	48	0	598
College Ave EB	105	354	86	0	545
Donaghey Ave NB	30	331	117	0	478
Total	304	1539	331	0	-

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Caldwell St WB	2	2	2	0	2
Donaghey Ave SB	2	2	2	0	2
Caldwell St EB	2	2	2	0	2
Donaghey Ave NB	2	2	2	0	2
Average	2	2	2	0	-

Geometry and Analysis Results

Leg	College Ave WB	Donaghey Ave SB	College Ave EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	13.00	13.00	13.00	13.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	65.0	65.0	65.0	65.0
D - Inscribed circle diameter (ft)	115.0	115.0	115.0	115.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	95.00	95.00	95.00	95.00
Average Demand (PCE/hr)	553	598	545	478
Max Delay (s)	28.02	65.07	23.32	15.16
Max LOS	D	F	C	C
Max 95th percentile Queue (PCE)	27.7	44.3	24.0	11.8
Max V/C Ratio	0.88	1.04	0.84	0.72

Year 2040
Donaghey Ave at College Ave
PM Peak Hour – Scenario 2 – Single-Lane Roundabout

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
College Ave WB	38	494	107	0	639
Donaghey Ave SB	116	414	68	0	598
College Ave EB	145	442	161	0	748
Donaghey Ave NB	60	489	158	0	707
Total	359	1839	494	0	-

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Caldwell St WB	2	2	2	0	2
Donaghey Ave SB	2	2	2	0	2
Caldwell St EB	2	2	2	0	2
Donaghey Ave NB	2	2	2	0	2
Average	2	2	2	0	-

Geometry and Analysis Results

Leg	College Ave WB	Donaghey Ave SB	College Ave EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	13.00	13.00	13.00	13.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	65.0	65.0	65.0	65.0
D - Inscribed circle diameter (ft)	115.0	115.0	115.0	115.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	95.00	95.00	95.00	95.00
Average Demand (PCE/hr)	639	598	748	707
Max Delay (s)	62.48	31.77	169.41	47.80
Max LOS	F	D	F	E
Max 95th percentile Queue (PCE)	53.4	27.9	127.4	49.2
Max V/C Ratio	0.96	0.87	1.08	0.93

Year 2040 Residual Capacity
Donaghey Ave at College Ave
Scenario 2 – Single-Lane Roundabout

AM Peak Hour

	AM							
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS	Network Residual Capacity
	2040 SLR - 2040							
College Ave WB	5.7	27.7	28.02	0.88	D	34.21	D	-8% [Donaghey Ave SB]
Donaghey Ave SB	17.4	44.3	65.07	1.04	F			
College Ave EB	4.5	24	23.32	0.84	C			
Donaghey Ave NB	2.5	11.8	15.16	0.72	C			

Traffic is 8% above what would cause Donaghey Avenue southbound to begin experiencing congested results (LOS E, >35 sec of delay) based on the 2040 turning movement volumes analyzed.

PM Peak Hour

	PM							
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS	Network Residual Capacity
	2040 SLR - 2040							
College Ave WB	10.7	53.4	62.48	0.96	F	81.51	F	-12% [College Ave EB]
Donaghey Ave SB	5.4	27.9	31.77	0.87	D			
College Ave EB	35.5	127.4	169.41	1.08	F			
Donaghey Ave NB	9.1	49.2	47.8	0.93	E			

Traffic is 12% above what would cause College Avenue eastbound to begin experiencing congested results (LOS E, >35 sec of delay) based on the 2040 turning movement volumes analyzed.

Year 2040

Donaghey Ave at College Ave

AM Peak Hour – Scenario 2 – Single-Lane NB, WB & 2-Lane Entry SB, EB (LT-TR)

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
College Ave WB	26	447	80	0	553
Donaghey Ave SB	143	407	48	0	598
College Ave EB	105	354	86	0	545
Donaghey Ave NB	30	331	117	0	478
Total	304	1539	331	0	-

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Caldwell St WB	2	2	2	0	2
Donaghey Ave SB	2	2	2	0	2
Caldwell St EB	2	2	2	0	2
Donaghey Ave NB	2	2	2	0	2
Average	2	2	2	0	-

Geometry and Analysis Results

Leg	College Ave WB	Donaghey Ave SB	College Ave EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	13.00	26.00	26.00	13.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	65.0	70.0	70.0	65.0
D - Inscribed circle diameter (ft)	140.0	115.0	140.0	140.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	95.00	95.00	95.00	95.00
Average Demand (PCE/hr)	553	598	545	478
Max Delay (s)	26.71	5.33	4.29	15.15
Max LOS	D	A	A	C
Max 95th percentile Queue (PCE)	26.9	1.4	2.2	11.8
Max V/C Ratio	0.87	0.52	0.44	0.72

Year 2040

Donaghey Ave at College Ave

PM Peak Hour – Scenario 2 – Single-Lane NB, WB & 2-Lane Entry SB, EB (LT-TR)

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
College Ave WB	38	494	107	0	639
Donaghey Ave SB	116	414	68	0	598
College Ave EB	145	442	161	0	748
Donaghey Ave NB	60	489	158	0	707
Total	359	1839	494	0	-

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Caldwell St WB	2	2	2	0	2
Donaghey Ave SB	2	2	2	0	2
Caldwell St EB	2	2	2	0	2
Donaghey Ave NB	2	2	2	0	2
Average	2	2	2	0	-

Geometry and Analysis Results

Leg	College Ave WB	Donaghey Ave SB	College Ave EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	13.00	26.00	26.00	13.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	65.0	70.0	70.0	65.0
D - Inscribed circle diameter (ft)	140.0	115.0	140.0	140.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	95.00	95.00	95.00	95.00
Average Demand (PCE/hr)	639	598	748	707
Max Delay (s)	57.29	4.52	6.10	54.98
Max LOS	F	A	A	F
Max 95th percentile Queue (PCE)	51.1	1.5	1.9	55.3
Max V/C Ratio	0.95	0.44	0.57	0.96

Year 2040

Donaghey Ave at College Ave

AM Peak Hour – Scenario 2 – Multi-Lane NB, SB, EB, WB 2-Lane Entry (LT-R)

By-lane Results for Northbound Left-Thru Lane

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
College Ave WB	26	447	80	0	553
Donaghey Ave SB	143	407	48	0	598
College Ave EB	105	354	86	0	545
Donaghey Ave NB	0	331	117	0	448
Total	274	1539	331	0	-

Donaghey Ave NB right-turns removed to analyze the outer NB lane. A 1/2 capacity reduction was used for the NB approach to analyze the outer lane performance.

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Prince St WB	2	2	2	0	2
Donaghey Ave SB	2	2	2	0	2
Prince St EB	2	2	2	0	2
Donaghey Ave NB	2	2	2	0	2
Average	2	2	2	0	-

Geometry and Analysis Results, 50% Capacity Reduction Applied for By-lane Analysis

Leg	College Ave WB	Donaghey Ave SB	College Ave EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	26.00	26.00	26.00	26.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	70.0	70.0	70.0	70.0
D - Inscribed circle diameter (ft)	115.0	115.0	115.0	115.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	95.00	95.00	95.00	95.00
Average Demand (PCE/hr)				448
Max Delay (s)				15.66
Max LOS				C
Max 95th percentile Queue (PCE)				11.5
Max V/C Ratio				0.72

Year 2040

Donaghey Ave at College Ave

PM Peak Hour – Scenario 2 – Multi-Lane NB, SB, EB, WB 2-Lane Entry (LT-R)

By-lane Results for Northbound Left-Thru Lane

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
College Ave WB	38	494	107	0	639
Donaghey Ave SB	116	414	68	0	598
College Ave EB	145	442	161	0	748
Donaghey Ave NB	0	489	158	0	647
Total	299	1839	494	0	-

Donaghey Ave NB right-turns removed to analyze the outer NB lane. A 1/2 capacity reduction was used for the NB approach to analyze the outer lane performance.

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Prince St WB	2	2	2	0	2
Donaghey Ave SB	2	2	2	0	2
Prince St EB	2	2	2	0	2
Donaghey Ave NB	2	2	2	0	2
Average	2	2	2	0	-

Geometry and Analysis Results, 50% Capacity Reduction Applied for By-lane Analysis

Leg	College Ave WB	Donaghey Ave SB	College Ave EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	26.00	26.00	26.00	26.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	70.0	70.0	70.0	70.0
D - Inscribed circle diameter (ft)	115.0	115.0	115.0	115.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	95.00	95.00	95.00	95.00
Average Demand (PCE/hr)				647
Max Delay (s)				40.07
Max LOS				E
Max 95th percentile Queue (PCE)				40.4
Max V/C Ratio				0.91

Year 2040

Donaghey Ave at College Ave

AM Peak Hour – Scenario 2 – Multi-Lane NB, SB, EB, WB 2-Lane Entry (LT-R)

By-lane Results for Southbound Left-Thru Lane

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
College Ave WB	26	447	80	0	553
Donaghey Ave SB	0	407	48	0	455
College Ave EB	105	354	86	0	545
Donaghey Ave NB	30	331	117	0	478
Total	161	1539	331	0	-

Donaghey Ave SB right-turns removed to analyze the outer SB lane. A 1/2 capacity reduction was used for the SB approach to analyze the outer lane performance.

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Prince St WB	2	2	2	0	2
Donaghey Ave SB	2	2	2	0	2
Prince St EB	2	2	2	0	2
Donaghey Ave NB	2	2	2	0	2
Average	2	2	2	0	-

Geometry and Analysis Results, 50% Capacity Reduction Applied for By-lane Analysis

Leg	College Ave WB	Donaghey Ave SB	College Ave EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	26.00	26.00	26.00	26.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	70.0	70.0	70.0	70.0
D - Inscribed circle diameter (ft)	115.0	115.0	115.0	115.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	95.00	95.00	95.00	95.00
Average Demand (PCE/hr)		455		
Max Delay (s)		22.77		
Max LOS		C		
Max 95th percentile Queue (PCE)		19.6		
Max V/C Ratio		0.80		

Year 2040

Donaghey Ave at College Ave

PM Peak Hour – Scenario 2 – Multi-Lane NB, SB, EB, WB 2-Lane Entry (LT-R)

By-lane Results for Southbound Left-Thru Lane

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
College Ave WB	38	494	107	0	639
Donaghey Ave SB	0	414	68	0	482
College Ave EB	145	442	161	0	748
Donaghey Ave NB	60	489	158	0	707
Total	243	1839	494	0	-

Donaghey Ave SB right-turns removed to analyze the outer SB lane. A 1/2 capacity reduction was used for the SB approach to analyze the outer lane performance.

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Prince St WB	2	2	2	0	2
Donaghey Ave SB	2	2	2	0	2
Prince St EB	2	2	2	0	2
Donaghey Ave NB	2	2	2	0	2
Average	2	2	2	0	-

Geometry and Analysis Results, 50% Capacity Reduction Applied for By-lane Analysis

Leg	College Ave WB	Donaghey Ave SB	College Ave EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	26.00	26.00	26.00	26.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	70.0	70.0	70.0	70.0
D - Inscribed circle diameter (ft)	115.0	115.0	115.0	115.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	95.00	95.00	95.00	95.00
Average Demand (PCE/hr)		482		
Max Delay (s)		17.50		
Max LOS		C		
Max 95th percentile Queue (PCE)		11.1		
Max V/C Ratio		0.71		

Year 2040

Donaghey Ave at College Ave

AM Peak Hour – Scenario 2 – Multi-Lane NB, SB, EB, WB 2-Lane Entry (LT-R)

By-lane Results for Eastbound Left-Thru Lane

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
College Ave WB	26	447	80	0	553
Donaghey Ave SB	143	407	48	0	598
College Ave EB	0	354	86	0	440
Donaghey Ave NB	30	331	117	0	478
Total	199	1539	331	0	-

College Ave EB right-turns removed to analyze the outer EB lane. A 1/2 capacity reduction was used for the EB approach to analyze the outer lane performance.

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Prince St WB	2	2	2	0	2
Donaghey Ave SB	2	2	2	0	2
Prince St EB	2	2	2	0	2
Donaghey Ave NB	2	2	2	0	2
Average	2	2	2	0	-

Geometry and Analysis Results, 50% Capacity Reduction Applied for By-lane Analysis

Leg	College Ave WB	Donaghey Ave SB	College Ave EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	26.00	26.00	26.00	26.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	70.0	70.0	70.0	70.0
D - Inscribed circle diameter (ft)	115.0	115.0	115.0	115.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	95.00	95.00	95.00	95.00
Average Demand (PCE/hr)			440	
Max Delay (s)			16.43	
Max LOS			C	
Max 95th percentile Queue (PCE)			12.2	
Max V/C Ratio			0.72	

Year 2040

Donaghey Ave at College Ave

PM Peak Hour – Scenario 2 – Multi-Lane NB, SB, EB, WB 2-Lane Entry (LT-R)

By-lane Results for Eastbound Left-Thru Lane

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
College Ave WB	38	494	107	0	639
Donaghey Ave SB	116	414	68	0	598
College Ave EB	0	442	161	0	603
Donaghey Ave NB	60	489	158	0	707
Total	214	1839	494	0	-

College Ave EB right-turns removed to analyze the outer EB lane. A 1/2 capacity reduction was used for the EB approach to analyze the outer lane performance.

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Prince St WB	2	2	2	0	2
Donaghey Ave SB	2	2	2	0	2
Prince St EB	2	2	2	0	2
Donaghey Ave NB	2	2	2	0	2
Average	2	2	2	0	-

Geometry and Analysis Results, 50% Capacity Reduction Applied for By-lane Analysis

Leg	College Ave WB	Donaghey Ave SB	College Ave EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	26.00	26.00	26.00	26.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	70.0	70.0	70.0	70.0
D - Inscribed circle diameter (ft)	115.0	115.0	115.0	115.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	95.00	95.00	95.00	95.00
Average Demand (PCE/hr)			603	
Max Delay (s)			33.63	
Max LOS			D	
Max 95th percentile Queue (PCE)			29.3	
Max V/C Ratio			0.88	

Year 2040

Donaghey Ave at College Ave

AM Peak Hour – Scenario 2 – Multi-Lane NB, SB, EB, WB 2-Lane Entry (LT-R)

By-lane Results for Eastbound Left-Thru Lane

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
College Ave WB	0	447	80	0	527
Donaghey Ave SB	143	407	48	0	598
College Ave EB	105	354	86	0	545
Donaghey Ave NB	30	331	117	0	478
Total	278	1539	331	0	-

College Ave WB right-turns removed to analyze the outer WB lane. A 1/2 capacity reduction was used for the WB approach to analyze the outer lane performance.

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Prince St WB	2	2	2	0	2
Donaghey Ave SB	2	2	2	0	2
Prince St EB	2	2	2	0	2
Donaghey Ave NB	2	2	2	0	2
Average	2	2	2	0	-

Geometry and Analysis Results, 50% Capacity Reduction Applied for By-lane Analysis

Leg	College Ave WB	Donaghey Ave SB	College Ave EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	26.00	26.00	26.00	26.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	70.0	70.0	70.0	70.0
D - Inscribed circle diameter (ft)	115.0	115.0	115.0	115.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	95.00	95.00	95.00	95.00
Average Demand (PCE/hr)	527			
Max Delay (s)	27.88			
Max LOS	D			
Max 95th percentile Queue (PCE)	26.4			
Max V/C Ratio	0.87			

Year 2040

Donaghey Ave at College Ave

PM Peak Hour – Scenario 2 – Multi-Lane NB, SB, EB, WB 2-Lane Entry (LT-R)

By-lane Results for Eastbound Left-Thru Lane

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
College Ave WB	0	494	107	0	601
Donaghey Ave SB	116	414	68	0	598
College Ave EB	145	442	161	0	748
Donaghey Ave NB	60	489	158	0	707
Total	321	1839	494	0	-

College Ave WB right-turns removed to analyze the outer WB lane. A 1/2 capacity reduction was used for the WB approach to analyze the outer lane performance.

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Prince St WB	2	2	2	0	2
Donaghey Ave SB	2	2	2	0	2
Prince St EB	2	2	2	0	2
Donaghey Ave NB	2	2	2	0	2
Average	2	2	2	0	-

Geometry and Analysis Results, 50% Capacity Reduction Applied for By-lane Analysis

Leg	College Ave WB	Donaghey Ave SB	College Ave EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	26.00	26.00	26.00	26.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	70.0	70.0	70.0	70.0
D - Inscribed circle diameter (ft)	115.0	115.0	115.0	115.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	95.00	95.00	95.00	95.00
Average Demand (PCE/hr)	601			
Max Delay (s)	42.40			
Max LOS	E			
Max 95th percentile Queue (PCE)	39.6			
Max V/C Ratio	0.91			

Year 2040

Donaghey Ave at College Ave

AM Peak Hour – Scenario 2 – Multi-Lane NB, SB, EB, WB 2-Lane Entry (L-TR)

By-lane Results for Northbound Thru-Right Lane

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
College Ave WB	26	447	80	0	553
Donaghey Ave SB	143	407	48	0	598
College Ave EB	105	354	86	0	545
Donaghey Ave NB	30	331	0	0	361
Total	304	1539	214	0	-

Donaghey Ave NB left-turns removed to analyze the outer NB lane. A 1/2 capacity reduction was used for the NB approach to analyze the outer lane performance.

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Prince St WB	2	2	2	0	2
Donaghey Ave SB	2	2	2	0	2
Prince St EB	2	2	2	0	2
Donaghey Ave NB	2	2	2	0	2
Average	2	2	2	0	-

Geometry and Analysis Results, 50% Capacity Reduction Applied for By-lane Analysis

Leg	College Ave WB	Donaghey Ave SB	College Ave EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	26.00	26.00	26.00	26.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	70.0	70.0	70.0	70.0
D - Inscribed circle diameter (ft)	140.0	140.0	140.0	140.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	95.00	95.00	95.00	95.00
Average Demand (PCE/hr)				361
Max Delay (s)				10.73
Max LOS				B
Max 95th percentile Queue (PCE)				1.4
Max V/C Ratio				0.57

Year 2040

Donaghey Ave at College Ave

PM Peak Hour – Scenario 2 – Multi-Lane NB, SB, EB, WB 2-Lane Entry (L-TR)

By-lane Results for Northbound Thru-Right Lane

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
College Ave WB	38	494	107	0	639
Donaghey Ave SB	116	414	68	0	598
College Ave EB	145	442	161	0	748
Donaghey Ave NB	60	489	0	0	549
Total	359	1839	336	0	-

Donaghey Ave NB left-turns removed to analyze the outer NB lane. A 1/2 capacity reduction was used for the NB approach to analyze the outer lane performance.

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Prince St WB	2	2	2	0	2
Donaghey Ave SB	2	2	2	0	2
Prince St EB	2	2	2	0	2
Donaghey Ave NB	2	2	2	0	2
Average	2	2	2	0	-

Geometry and Analysis Results, 50% Capacity Reduction Applied for By-lane Analysis

Leg	College Ave WB	Donaghey Ave SB	College Ave EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	26.00	26.00	26.00	26.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	70.0	70.0	70.0	70.0
D - Inscribed circle diameter (ft)	140.0	140.0	140.0	140.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	95.00	95.00	95.00	95.00
Average Demand (PCE/hr)				549
Max Delay (s)				20.08
Max LOS				C
Max 95th percentile Queue (PCE)				16.4
Max V/C Ratio				0.77

Year 2040

Donaghey Ave at College Ave

AM Peak Hour – Scenario 2 – Multi-Lane NB, SB, EB, WB 2-Lane Entry (L-TR)

By-lane Results for Southbound Thru-Right Lane

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
College Ave WB	26	447	80	0	553
Donaghey Ave SB	143	407	0	0	550
College Ave EB	105	354	86	0	545
Donaghey Ave NB	30	331	117	0	478
Total	304	1539	283	0	-

Donaghey Ave SB left-turns removed to analyze the outer SB lane. A 1/2 capacity reduction was used for the SB approach to analyze the outer lane performance.

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Prince St WB	2	2	2	0	2
Donaghey Ave SB	2	2	2	0	2
Prince St EB	2	2	2	0	2
Donaghey Ave NB	2	2	2	0	2
Average	2	2	2	0	-

Geometry and Analysis Results, 50% Capacity Reduction Applied for By-lane Analysis

Leg	College Ave WB	Donaghey Ave SB	College Ave EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	26.00	26.00	26.00	26.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	70.0	70.0	70.0	70.0
D - Inscribed circle diameter (ft)	140.0	140.0	140.0	140.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	95.00	95.00	95.00	95.00
Average Demand (PCE/hr)		550		
Max Delay (s)		44.69		
Max LOS		E		
Max 95th percentile Queue (PCE)		35.1		
Max V/C Ratio		0.96		

Year 2040

Donaghey Ave at College Ave

PM Peak Hour – Scenario 2 – Multi-Lane NB, SB, EB, WB 2-Lane Entry (L-TR)

By-lane Results for Southbound Thru-Right Lane

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
College Ave WB	38	494	107	0	639
Donaghey Ave SB	116	414	0	0	530
College Ave EB	145	442	161	0	748
Donaghey Ave NB	60	489	158	0	707
Total	359	1839	426	0	-

Donaghey Ave SB left-turns removed to analyze the outer SB lane. A 1/2 capacity reduction was used for the SB approach to analyze the outer lane performance.

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Prince St WB	2	2	2	0	2
Donaghey Ave SB	2	2	2	0	2
Prince St EB	2	2	2	0	2
Donaghey Ave NB	2	2	2	0	2
Average	2	2	2	0	-

Geometry and Analysis Results, 50% Capacity Reduction Applied for By-lane Analysis

Leg	College Ave WB	Donaghey Ave SB	College Ave EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	26.00	26.00	26.00	26.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	70.0	70.0	70.0	70.0
D - Inscribed circle diameter (ft)	140.0	140.0	140.0	140.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	95.00	95.00	95.00	95.00
Average Demand (PCE/hr)		530		
Max Delay (s)		21.59		
Max LOS		C		
Max 95th percentile Queue (PCE)		17.3		
Max V/C Ratio		0.78		

Year 2040

Donaghey Ave at College Ave

AM Peak Hour – Scenario 2 – Multi-Lane NB, SB, EB, WB 2-Lane Entry (L-TR)

By-lane Results for Eastbound Thru-Right Lane

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
College Ave WB	26	447	80	0	553
Donaghey Ave SB	143	407	48	0	598
College Ave EB	105	354	0	0	459
Donaghey Ave NB	30	331	117	0	478
Total	304	1539	245	0	-

College Ave EB left-turns removed to analyze the outer EB lane. A 1/2 capacity reduction was used for the EB approach to analyze the outer lane performance.

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Prince St WB	2	2	2	0	2
Donaghey Ave SB	2	2	2	0	2
Prince St EB	2	2	2	0	2
Donaghey Ave NB	2	2	2	0	2
Average	2	2	2	0	-

Geometry and Analysis Results, 50% Capacity Reduction Applied for By-lane Analysis

Leg	College Ave WB	Donaghey Ave SB	College Ave EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	26.00	26.00	26.00	26.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	70.0	70.0	70.0	70.0
D - Inscribed circle diameter (ft)	140.0	140.0	140.0	140.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	95.00	95.00	95.00	95.00
Average Demand (PCE/hr)			459	
Max Delay (s)			17.66	
Max LOS			C	
Max 95th percentile Queue (PCE)			14.7	
Max V/C Ratio			0.75	

Year 2040

Donaghey Ave at College Ave

PM Peak Hour – Scenario 2 – Multi-Lane NB, SB, EB, WB 2-Lane Entry (L-TR)

By-lane Results for Eastbound Thru-Right Lane

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
College Ave WB	38	494	107	0	639
Donaghey Ave SB	116	414	68	0	598
College Ave EB	145	442	0	0	587
Donaghey Ave NB	60	489	158	0	707
Total	359	1839	333	0	-

College Ave EB left-turns removed to analyze the outer EB lane. A 1/2 capacity reduction was used for the EB approach to analyze the outer lane performance.

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Prince St WB	2	2	2	0	2
Donaghey Ave SB	2	2	2	0	2
Prince St EB	2	2	2	0	2
Donaghey Ave NB	2	2	2	0	2
Average	2	2	2	0	-

Geometry and Analysis Results, 50% Capacity Reduction Applied for By-lane Analysis

Leg	College Ave WB	Donaghey Ave SB	College Ave EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	26.00	26.00	26.00	26.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	70.0	70.0	70.0	70.0
D - Inscribed circle diameter (ft)	140.0	140.0	140.0	140.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	95.00	95.00	95.00	95.00
Average Demand (PCE/hr)			587	
Max Delay (s)			37.66	
Max LOS			E	
Max 95th percentile Queue (PCE)			33.6	
Max V/C Ratio			0.89	

Year 2040

Donaghey Ave at College Ave

AM Peak Hour – Scenario 2 – Multi-Lane NB, SB, EB, WB 2-Lane Entry (L-TR)

By-lane Results for Westbound Thru-Right Lane

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
College Ave WB	26	447	0	0	473
Donaghey Ave SB	143	407	48	0	598
College Ave EB	105	354	86	0	545
Donaghey Ave NB	30	331	117	0	478
Total	304	1539	251	0	-

College Ave WB left-turns removed to analyze the outer WB lane. A 1/2 capacity reduction was used for the WB approach to analyze the outer lane performance.

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Prince St WB	2	2	2	0	2
Donaghey Ave SB	2	2	2	0	2
Prince St EB	2	2	2	0	2
Donaghey Ave NB	2	2	2	0	2
Average	2	2	2	0	-

Geometry and Analysis Results, 50% Capacity Reduction Applied for By-lane Analysis

Leg	College Ave WB	Donaghey Ave SB	College Ave EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	26.00	26.00	26.00	26.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	70.0	70.0	70.0	70.0
D - Inscribed circle diameter (ft)	140.0	140.0	140.0	140.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	95.00	95.00	95.00	95.00
Average Demand (PCE/hr)	473			
Max Delay (s)	19.07			
Max LOS	C			
Max 95th percentile Queue (PCE)	16.9			
Max V/C Ratio	0.77			

Year 2040

Donaghey Ave at College Ave

PM Peak Hour – Scenario 2 – Multi-Lane NB, SB, EB, WB 2-Lane Entry (L-TR)

By-lane Results for Westbound Thru-Right Lane

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
College Ave WB	38	494	0	0	532
Donaghey Ave SB	116	414	68	0	598
College Ave EB	145	442	161	0	748
Donaghey Ave NB	60	489	158	0	707
Total	359	1839	387	0	-

College Ave WB left-turns removed to analyze the outer WB lane. A 1/2 capacity reduction was used for the WB approach to analyze the outer lane performance.

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Prince St WB	2	2	2	0	2
Donaghey Ave SB	2	2	2	0	2
Prince St EB	2	2	2	0	2
Donaghey Ave NB	2	2	2	0	2
Average	2	2	2	0	-

Geometry and Analysis Results, 50% Capacity Reduction Applied for By-lane Analysis

Leg	College Ave WB	Donaghey Ave SB	College Ave EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	26.00	26.00	26.00	26.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	70.0	70.0	70.0	70.0
D - Inscribed circle diameter (ft)	140.0	140.0	140.0	140.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	95.00	95.00	95.00	95.00
Average Demand (PCE/hr)	532			
Max Delay (s)	24.29			
Max LOS	C			
Max 95th percentile Queue (PCE)	19.7			
Max V/C Ratio	0.80			

Year 2040

Donaghey Ave at College Ave

AM Peak Hour – Scenario 2 – Multi-Lane NB, SB, EB, WB 2-Lane Entry (LT-TR)

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
College Ave WB	26	447	80	0	553
Donaghey Ave SB	143	407	48	0	598
College Ave EB	105	354	86	0	545
Donaghey Ave NB	30	331	117	0	478
Total	304	1539	331	0	-

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Caldwell St WB	2	2	2	0	2
Donaghey Ave SB	2	2	2	0	2
Caldwell St EB	2	2	2	0	2
Donaghey Ave NB	2	2	2	0	2
Average	2	2	2	0	-

Geometry and Analysis Results

Leg	College Ave WB	Donaghey Ave SB	College Ave EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	26.00	26.00	26.00	26.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	70.0	70.0	70.0	70.0
D - Inscribed circle diameter (ft)	140.0	140.0	140.0	140.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	95.00	95.00	95.00	95.00
Average Demand (PCE/hr)	553	598	545	478
Max Delay (s)	4.34	5.31	4.30	3.75
Max LOS	A	A	A	A
Max 95th percentile Queue (PCE)	2.1	1.4	2.1	2.1
Max V/C Ratio	0.45	0.52	0.44	0.38

Year 2040

Donaghey Ave at College Ave

PM Peak Hour – Scenario 2 – Multi-Lane NB, SB, EB, WB 2-Lane Entry (LT-TR)

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
College Ave WB	38	494	107	0	639
Donaghey Ave SB	116	414	68	0	598
College Ave EB	145	442	161	0	748
Donaghey Ave NB	60	489	158	0	707
Total	359	1839	494	0	-

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Caldwell St WB	2	2	2	0	2
Donaghey Ave SB	2	2	2	0	2
Caldwell St EB	2	2	2	0	2
Donaghey Ave NB	2	2	2	0	2
Average	2	2	2	0	-

Geometry and Analysis Results

Leg	College Ave WB	Donaghey Ave SB	College Ave EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	26.00	26.00	26.00	26.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	70.0	70.0	70.0	70.0
D - Inscribed circle diameter (ft)	140.0	140.0	140.0	140.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	95.00	95.00	95.00	95.00
Average Demand (PCE/hr)	639	598	748	707
Max Delay (s)	5.04	4.54	6.15	4.82
Max LOS	A	A	A	A
Max 95th percentile Queue (PCE)	1.5	1.5	1.9	1.5
Max V/C Ratio	0.48	0.44	0.57	0.49

Year 2040 Residual Capacity
Donaghey Ave at College Ave
Scenario 2 – Single-Lane NB, WB & 2-Lane Entry SB, EB (LT-TR)

AM Peak Hour

	AM							
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS	Network Residual Capacity
	2040 2-Ln Entry SB & EB - 2040							
College Ave WB	5.4	26.9	26.71	0.87	D	12.67	B	4% [College Ave WB]
Donaghey Ave SB	1.1	1.4	5.33	0.52	A			
College Ave EB	0.8	2.2	4.29	0.44	A			
Donaghey Ave NB	2.5	11.8	15.15	0.72	C			

With an increase of 4% traffic on all approaches, College Avenue westbound will begin to experience congested results (LOS E, >35 sec of delay) based on the 2040 turning movement volumes analyzed.

PM Peak Hour

	PM							
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS	Network Residual Capacity
	2040 2-Ln Entry SB & EB - 2040							
College Ave WB	9.9	51.1	57.29	0.95	F	30.74	D	-5% [College Ave WB]
Donaghey Ave SB	0.8	1.5	4.52	0.44	A			
College Ave EB	1.3	1.9	6.1	0.57	A			
Donaghey Ave NB	10.9	55.3	54.98	0.96	F			

Traffic is 5% above what would cause College Avenue westbound to begin experiencing congested results (LOS E, >35 sec of delay) based on the 2040 turning movement volumes analyzed.

Year 2040

Donaghey Ave at College Ave

Scenario 2 – Multi-Lane NB, SB, EB, WB 2-Lane Entry (LT-R)

AM Peak Hour

	AM							
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS	Network Residual Capacity
	2040 2-Ln Entry All Over (LT-R) - 2040							
College Ave WB	5.3	26.4	27.88	0.87	D			4% [College Ave WB]

With an increase of 4% traffic on all approaches, College Avenue westbound will begin to experience congested results (LOS E, >35 sec of delay) based on the 2040 turning movement volumes analyzed.

PM Peak Hour

	PM							
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS	Network Residual Capacity
	2040 2-Ln Entry All Over (LT-R) - 2040							
College Ave WB	7.3	39.6	42.4	0.91	E			-3% [College Ave WB]

Traffic is 3% above what would cause College Avenue westbound to begin experiencing congested results (LOS E, >35 sec of delay) based on the 2040 turning movement volumes analyzed.

Year 2040

Donaghey Ave at College Ave

Scenario 2 – Multi-Lane NB, SB, EB, WB 2-Lane Entry (L-TR)

AM Peak Hour

	AM							
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS	Network Residual Capacity
	2040 2-Ln Entry All Over (L-TR) - 2040							
Donaghey Ave SB	9.8	35.1	44.69	0.96	E			-4% [Donaghey Ave SB]

Traffic is 4% above what would cause Donaghey Avenue southbound to begin experiencing congested results (LOS E, >35 sec of delay) based on the 2040 turning movement volumes analyzed.

PM Peak Hour

	PM							
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS	Network Residual Capacity
	2040 2-Ln Entry All Over (L-TR) - 2040							
College Ave EB	6.3	33.6	37.66	0.89	E			-1% [College Ave EB]

Traffic is 1% above what would cause College Avenue eastbound to begin experiencing congested results (LOS E, >35 sec of delay) based on the 2040 turning movement volumes analyzed.

Year 2040 Residual Capacity
Donaghey Ave at College Ave
Scenario 2 – Multi-Lane NB, SB, EB, WB 2-Lane Entry (LT-TR)

AM Peak Hour

	AM							
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS	Network Residual Capacity
	2040 2-Ln Entry All Over - 2040							
College Ave WB	0.8	2.1	4.34	0.45	A	4.47	A	50% [Donaghey Ave SB]
Donaghey Ave SB	1.1	1.4	5.31	0.52	A			
College Ave EB	0.8	2.1	4.3	0.44	A			
Donaghey Ave NB	0.6	2.1	3.75	0.38	A			

With an increase of 50% traffic on all approaches, Donaghey Avenue southbound will begin to experience congested results (LOS E, >35 sec of delay) based on the 2040 turning movement volumes analyzed.

PM Peak Hour

	PM							
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS	Network Residual Capacity
	2040 2-Ln Entry All Over - 2040							
College Ave WB	0.9	1.5	5.04	0.48	A	5.18	A	34% [College Ave EB]
Donaghey Ave SB	0.8	1.5	4.54	0.44	A			
College Ave EB	1.3	1.9	6.15	0.57	A			
Donaghey Ave NB	1	1.5	4.82	0.49	A			

With an increase of 18% traffic on all approaches, College Avenue eastbound will begin to experience congested results (LOS E, >35 sec of delay) based on the 2040 turning movement volumes analyzed.

Year 2018
Donaghey Ave at Bruce St
AM Peak Hour – Scenario 1 – Mini Roundabout

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
Bruce St WB	55	109	70	0	234
Donaghey Ave SB	31	334	32	0	397
Bruce St EB	54	87	19	0	160
Donaghey Ave NB	41	354	160	0	555
Total	181	884	281	0	-

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Bruce St WB	7	0	0	0	2
Donaghey Ave SB	0	1	0	0	0
Bruce St EB	2	0	0	0	1
Donaghey Ave NB	0	2	1	0	1
Average	2	1	0	0	-

Geometry and Analysis Results

Leg	Bruce St WB	Donaghey Ave SB	Bruce St EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	13.00	13.00	13.00	13.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	60.0	60.0	60.0	60.0
D - Inscribed circle diameter (ft)	80.0	80.0	80.0	80.0
PHI - Conflict (entry) angle (deg)	35.0	35.0	35.0	35.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	80.00	80.00	80.00	80.00
Average Demand (PCE/hr)	234	397	160	555
Max Delay (s)	12.97	23.75	9.99	64.38
Max LOS	B	C	A	F
Max 95th percentile Queue (PCE)	3.0	17.5	1.8	42.4
Max V/C Ratio	0.51	0.79	0.36	1.03

Year 2018

Donaghey Ave at Bruce St

PM Peak Hour – Scenario 1 – Mini Roundabout

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
Bruce St WB	50	62	50	0	162
Donaghey Ave SB	26	501	54	0	581
Bruce St EB	121	94	47	0	262
Donaghey Ave NB	53	491	102	0	646
Total	250	1148	253	0	-

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Bruce St WB	2	0	0	0	1
Donaghey Ave SB	0	1	2	0	1
Bruce St EB	0	0	0	0	0
Donaghey Ave NB	4	1	1	0	2
Average	2	1	1	0	-

Geometry and Analysis Results

Leg	Bruce St WB	Donaghey Ave SB	Bruce St EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	13.00	13.00	13.00	13.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	60.0	60.0	60.0	60.0
D - Inscribed circle diameter (ft)	80.0	80.0	80.0	80.0
PHI - Conflict (entry) angle (deg)	35.0	35.0	35.0	35.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	80.00	80.00	80.00	80.00
Average Demand (PCE/hr)	162	581	262	646
Max Delay (s)	10.48	18.39	15.45	25.47
Max LOS	B	C	C	D
Max 95th percentile Queue (PCE)	2.0	15.7	2.1	25.3
Max V/C Ratio	0.33	0.77	0.55	0.84

Year 2040
Donaghey Ave at Bruce St
AM Peak Hour – Scenario 1 – Mini Roundabout

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
Bruce St WB	69	136	87	0	292
Donaghey Ave SB	38	415	39	0	492
Bruce St EB	68	108	23	0	199
Donaghey Ave NB	51	441	200	0	692
Total	226	1100	349	0	-

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Caldwell St WB	2	2	2	0	2
Donaghey Ave SB	2	2	2	0	2
Caldwell St EB	2	2	2	0	2
Donaghey Ave NB	2	2	2	0	2
Average	2	2	2	0	-

Geometry and Analysis Results

Leg	Bruce St WB	Donaghey Ave SB	Bruce St EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	13.00	13.00	13.00	13.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	60.0	60.0	60.0	60.0
D - Inscribed circle diameter (ft)	80.0	80.0	80.0	80.0
PHI - Conflict (entry) angle (deg)	35.0	35.0	35.0	35.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	85.00	85.00	85.00	85.00
Average Demand (PCE/hr)	292	492	199	692
Max Delay (s)	22.62	27.99	11.83	48.56
Max LOS	C	D	B	E
Max 95th percentile Queue (PCE)	11.9	25.0	2.4	43.5
Max V/C Ratio	0.71	0.86	0.45	1.00

Year 2040
Donaghey Ave at Bruce St
PM Peak Hour – Scenario 1 – Mini Roundabout

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
Bruce St WB	63	78	62	0	203
Donaghey Ave SB	32	624	68	0	724
Bruce St EB	150	117	58	0	325
Donaghey Ave NB	67	611	127	0	805
Total	312	1430	315	0	-

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Caldwell St WB	2	2	2	0	2
Donaghey Ave SB	2	2	2	0	2
Caldwell St EB	2	2	2	0	2
Donaghey Ave NB	2	2	2	0	2
Average	2	2	2	0	-

Geometry and Analysis Results

Leg	Bruce St WB	Donaghey Ave SB	Bruce St EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	13.00	13.00	13.00	13.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	60.0	60.0	60.0	60.0
D - Inscribed circle diameter (ft)	80.0	80.0	80.0	80.0
PHI - Conflict (entry) angle (deg)	35.0	35.0	35.0	35.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	85.00	85.00	85.00	85.00
Average Demand (PCE/hr)	203	724	325	805
Max Delay (s)	13.58	36.67	31.23	85.48
Max LOS	B	E	D	F
Max 95th percentile Queue (PCE)	2.5	41.6	15.3	75.1
Max V/C Ratio	0.44	0.91	0.76	1.01

Year 2040 Residual Capacity
Donaghey Ave at Bruce St
Scenario 1 – Mini Roundabout

AM Peak Hour

	AM							
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS	Network Residual Capacity
	2040 MINI - 2040							
Bruce St WB	2.3	11.9	22.62	0.71	C	33.64	D	-5% [Donaghey Ave NB]
Donaghey Ave SB	5	25	27.99	0.86	D			
Bruce St EB	0.8	2.4	11.83	0.45	B			
Donaghey Ave NB	14.1	43.5	48.56	1	E			

Traffic is 5% above what would cause Donaghey Avenue northbound to begin experiencing congested results (LOS E, >35 sec of delay) based on the 2040 turning movement volumes analyzed.

PM Peak Hour

	PM							
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS	Network Residual Capacity
	2040 MINI - 2040							
Bruce St WB	0.8	2.5	13.58	0.44	B	52.64	F	-9% [Donaghey Ave NB]
Donaghey Ave SB	7.6	41.6	36.67	0.91	E			
Bruce St EB	2.9	15.3	31.23	0.76	D			
Donaghey Ave NB	18.5	75.1	85.48	1.01	F			

Traffic is 9% above what would cause Donaghey Avenue northbound to begin experiencing congested results (LOS E, >35 sec of delay) based on the 2040 turning movement volumes analyzed.

Year 2018

Donaghey Ave at Bruce St

AM Peak Hour – Scenario 2 – Single-Lane Roundabout

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
Bruce St WB	55	109	70	0	234
Donaghey Ave SB	31	334	32	0	397
Bruce St EB	54	87	19	0	160
Donaghey Ave NB	41	354	160	0	555
Total	181	884	281	0	-

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Bruce St WB	7	0	0	0	2
Donaghey Ave SB	0	1	0	0	0
Bruce St EB	2	0	0	0	1
Donaghey Ave NB	0	2	1	0	1
Average	2	1	0	0	-

Geometry and Analysis Results

Leg	Bruce St WB	Donaghey Ave SB	Bruce St EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	13.00	13.00	13.00	13.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	65.0	65.0	65.0	65.0
D - Inscribed circle diameter (ft)	115.0	115.0	115.0	115.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	90.00	90.00	90.00	90.00
Average Demand (PCE/hr)	234	397	160	555
Max Delay (s)	8.83	12.80	7.28	24.05
Max LOS	A	B	A	C
Max 95th percentile Queue (PCE)	2.4	5.0	1.4	24.8
Max V/C Ratio	0.42	0.64	0.29	0.85

Year 2018

Donaghey Ave at Bruce St

PM Peak Hour – Scenario 2 – Single-Lane Roundabout

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
Bruce St WB	50	62	50	0	162
Donaghey Ave SB	26	501	54	0	581
Bruce St EB	121	94	47	0	262
Donaghey Ave NB	53	491	102	0	646
Total	250	1148	253	0	-

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Bruce St WB	2	0	0	0	1
Donaghey Ave SB	0	1	2	0	1
Bruce St EB	0	0	0	0	0
Donaghey Ave NB	4	1	1	0	2
Average	2	1	1	0	-

Geometry and Analysis Results

Leg	Bruce St WB	Donaghey Ave SB	Bruce St EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	13.00	13.00	13.00	13.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	65.0	65.0	65.0	65.0
D - Inscribed circle diameter (ft)	115.0	115.0	115.0	115.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	90.00	90.00	90.00	90.00
Average Demand (PCE/hr)	162	581	262	646
Max Delay (s)	7.57	10.48	9.99	12.74
Max LOS	A	B	A	B
Max 95th percentile Queue (PCE)	1.3	3.9	1.8	8.9
Max V/C Ratio	0.26	0.64	0.44	0.71

Year 2018

Donaghey Ave at Bruce St

AM Peak Hour – Scenario 2 – Single-Lane EB, WB & 2-Lane Entry SB, NB (LT-TR)

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
Bruce St WB	55	109	70	0	234
Donaghey Ave SB	31	334	32	0	397
Bruce St EB	54	87	19	0	160
Donaghey Ave NB	41	354	160	0	555
Total	181	884	281	0	-

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Bruce St WB	7	0	0	0	2
Donaghey Ave SB	0	1	0	0	0
Bruce St EB	2	0	0	0	1
Donaghey Ave NB	0	2	1	0	1
Average	2	1	0	0	-

Geometry and Analysis Results

Leg	Bruce St WB	Donaghey Ave SB	Bruce St EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	13.00	26.00	13.00	26.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	65.0	70.0	65.0	70.0
D - Inscribed circle diameter (ft)	140.0	115.0	140.0	115.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	90.00	90.00	90.00	90.00
Average Demand (PCE/hr)	234	397	160	555
Max Delay (s)	8.74	3.71	7.20	4.41
Max LOS	A	A	A	A
Max 95th percentile Queue (PCE)	2.3	1.5	1.4	2.4
Max V/C Ratio	0.41	0.34	0.28	0.46

Year 2018

Donaghey Ave at Bruce St

PM Peak Hour – Scenario 2 – Single-Lane EB, WB & 2-Lane Entry SB, NB (LT-TR)

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
Bruce St WB	50	62	50	0	162
Donaghey Ave SB	26	501	54	0	581
Bruce St EB	121	94	47	0	262
Donaghey Ave NB	53	491	102	0	646
Total	250	1148	253	0	-

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Bruce St WB	2	0	0	0	1
Donaghey Ave SB	0	1	2	0	1
Bruce St EB	0	0	0	0	0
Donaghey Ave NB	4	1	1	0	2
Average	2	1	1	0	-

Geometry and Analysis Results

Leg	Bruce St WB	Donaghey Ave SB	Bruce St EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	13.00	26.00	13.00	26.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	65.0	70.0	65.0	70.0
D - Inscribed circle diameter (ft)	140.0	115.0	140.0	115.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	90.00	90.00	90.00	90.00
Average Demand (PCE/hr)	162	581	262	646
Max Delay (s)	7.45	3.29	9.80	3.55
Max LOS	A	A	A	A
Max 95th percentile Queue (PCE)	1.2	2.0	1.8	1.5
Max V/C Ratio	0.26	0.36	0.43	0.40

Year 2040
Donaghey Ave at Bruce St
AM Peak Hour – Scenario 2 – Single-Lane Roundabout

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
Bruce St WB	69	136	87	0	292
Donaghey Ave SB	38	415	39	0	492
Bruce St EB	68	108	23	0	199
Donaghey Ave NB	51	441	200	0	692
Total	226	1100	349	0	-

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Caldwell St WB	2	2	2	0	2
Donaghey Ave SB	2	2	2	0	2
Caldwell St EB	2	2	2	0	2
Donaghey Ave NB	2	2	2	0	2
Average	2	2	2	0	-

Geometry and Analysis Results

Leg	Bruce St WB	Donaghey Ave SB	Bruce St EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	13.00	13.00	13.00	13.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	65.0	65.0	65.0	65.0
D - Inscribed circle diameter (ft)	115.0	115.0	115.0	115.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	95.00	95.00	95.00	95.00
Average Demand (PCE/hr)	292	492	199	692
Max Delay (s)	13.49	13.92	8.43	19.82
Max LOS	B	B	A	C
Max 95th percentile Queue (PCE)	2.1	10.4	1.8	26.2
Max V/C Ratio	0.58	0.71	0.36	0.85

Year 2040

Donaghey Ave at Bruce St

PM Peak Hour – Scenario 2 – Single-Lane Roundabout

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
Bruce St WB	63	78	62	0	203
Donaghey Ave SB	32	624	68	0	724
Bruce St EB	150	117	58	0	325
Donaghey Ave NB	67	611	127	0	805
Total	312	1430	315	0	-

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Caldwell St WB	2	2	2	0	2
Donaghey Ave SB	2	2	2	0	2
Caldwell St EB	2	2	2	0	2
Donaghey Ave NB	2	2	2	0	2
Average	2	2	2	0	-

Geometry and Analysis Results

Leg	Bruce St WB	Donaghey Ave SB	Bruce St EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	13.00	13.00	13.00	13.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	65.0	65.0	65.0	65.0
D - Inscribed circle diameter (ft)	115.0	115.0	115.0	115.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	95.00	95.00	95.00	95.00
Average Demand (PCE/hr)	203	724	325	805
Max Delay (s)	9.66	15.68	16.44	22.68
Max LOS	A	C	C	C
Max 95th percentile Queue (PCE)	2.2	15.7	4.9	28.0
Max V/C Ratio	0.36	0.77	0.61	0.85

Year 2040 Residual Capacity
Donaghey Ave at Bruce St
Scenario 2 – Single-Lane Roundabout

AM Peak Hour

	AM							
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS	Network Residual Capacity
	2040 SLR - 2040							
Bruce St WB	1.4	2.1	13.49	0.58	B	15.63	C	11% [Donaghey Ave NB]
Donaghey Ave SB	2.4	10.4	13.92	0.71	B			
Bruce St EB	0.6	1.8	8.43	0.36	A			
Donaghey Ave NB	4.9	26.2	19.82	0.85	C			

With an increase of 11% traffic on all approaches, Donaghey Avenue northbound will begin to experience congested results (LOS E, >35 sec of delay) based on the 2040 turning movement volumes analyzed.

PM Peak Hour

	PM							
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS	Network Residual Capacity
	2040 SLR - 2040							
Bruce St WB	0.6	2.2	9.66	0.36	A	17.94	C	7% [Donaghey Ave NB]
Donaghey Ave SB	3.2	15.7	15.68	0.77	C			
Bruce St EB	1.5	4.9	16.44	0.61	C			
Donaghey Ave NB	5.2	28	22.68	0.85	C			

With an increase of 7% traffic on all approaches, Donaghey Avenue northbound will begin to experience congested results (LOS E, >35 sec of delay) based on the 2040 turning movement volumes analyzed.

Year 2040

Donaghey Ave at Bruce St

AM Peak Hour – Scenario 2 – Single-Lane EB, WB & 2-Lane Entry SB, NB (LT-TR)

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
Bruce St WB	69	136	87	0	292
Donaghey Ave SB	38	415	39	0	492
Bruce St EB	68	108	23	0	199
Donaghey Ave NB	51	441	200	0	692
Total	226	1100	349	0	-

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Caldwell St WB	2	2	2	0	2
Donaghey Ave SB	2	2	2	0	2
Caldwell St EB	2	2	2	0	2
Donaghey Ave NB	2	2	2	0	2
Average	2	2	2	0	-

Geometry and Analysis Results

Leg	Bruce St WB	Donaghey Ave SB	Bruce St EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	13.00	26.00	13.00	26.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	65.0	70.0	65.0	70.0
D - Inscribed circle diameter (ft)	140.0	115.0	140.0	115.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	95.00	95.00	95.00	95.00
Average Demand (PCE/hr)	292	492	199	692
Max Delay (s)	13.36	3.63	8.34	3.86
Max LOS	B	A	A	A
Max 95th percentile Queue (PCE)	2.0	2.1	1.8	1.4
Max V/C Ratio	0.58	0.38	0.36	0.48

Year 2040

Donaghey Ave at Bruce St

PM Peak Hour – Scenario 2 – Single-Lane EB, WB & 2-Lane Entry SB, NB (LT-TR)

Volumes

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
Bruce St WB	63	78	62	0	203
Donaghey Ave SB	32	624	68	0	724
Bruce St EB	150	117	58	0	325
Donaghey Ave NB	67	611	127	0	805
Total	312	1430	315	0	-

Truck Percentages

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Average
Caldwell St WB	2	2	2	0	2
Donaghey Ave SB	2	2	2	0	2
Caldwell St EB	2	2	2	0	2
Donaghey Ave NB	2	2	2	0	2
Average	2	2	2	0	-

Geometry and Analysis Results

Leg	Bruce St WB	Donaghey Ave SB	Bruce St EB	Donaghey Ave NB
V - Approach road half-width (ft)	12.00	12.00	12.00	12.00
E - Entry width (ft)	13.00	26.00	13.00	26.00
l' - Effective flare length (ft)	135.0	135.0	135.0	135.0
R - Entry radius (ft)	65.0	70.0	65.0	70.0
D - Inscribed circle diameter (ft)	140.0	115.0	140.0	115.0
PHI - Conflict (entry) angle (deg)	25.0	25.0	25.0	25.0
Exit only	☐	☐	☐	☐
Leg has bypass	☐	☐	☐	☐
Percentage intercept adjustment (%)	95.00	95.00	95.00	95.00
Average Demand (PCE/hr)	203	724	325	805
Max Delay (s)	9.53	3.60	16.01	4.03
Max LOS	A	A	C	A
Max 95th percentile Queue (PCE)	2.1	1.5	4.5	1.5
Max V/C Ratio	0.36	0.43	0.60	0.48

Year 2040 Residual Capacity
Donaghey Ave at Bruce St
Scenario 2 – Single-Lane EB, WB & 2-Lane Entry SB, NB (LT-TR)

AM Peak Hour

	AM							
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS	Network Residual Capacity
	2040 SLR 2-Ln Entry NB & SB - 2040							
Bruce St WB	1.3	2	13.36	0.58	B	5.98	A	21% [Bruce St WB]
Donaghey Ave SB	0.6	2.1	3.63	0.38	A			
Bruce St EB	0.6	1.8	8.34	0.36	A			
Donaghey Ave NB	0.9	1.4	3.86	0.48	A			

With an increase of 21% traffic on all approaches, Bruce Street westbound will begin to experience congested results (LOS E, >35 sec of delay) based on the 2040 turning movement volumes analyzed.

PM Peak Hour

	PM							
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS	Network Residual Capacity
	2040 SLR 2-Ln Entry NB & SB - 2040							
Bruce St WB	**0.6**	**2.1**	**9.53**	**0.36**	**A**	**6.31**	**A**	**13% [Bruce St EB]**
Donaghey Ave SB	**0.8**	**1.5**	**3.6**	**0.43**	**A**			
Bruce St EB	**1.5**	**4.5**	**16.01**	**0.6**	**C**			
Donaghey Ave NB	**0.9**	**1.5**	**4.03**	**0.48**	**A**			

With an increase of 13% traffic on all approaches, Bruce Street eastbound will begin to experience congested results (LOS E, >35 sec of delay) based on the 2040 turning movement volumes analyzed.

APPENDIX C

Donaghey Avenue at College Avenue

TWO-LANE SHARED LEFT-THRU / RIGHT (LT-R) ENTRIES

HCM 6TH EDITION ROUNDABOUT CAPACITY MODELS WITH CROSSING PEDESTRIANS

HCS7 Roundabouts Report

General Information		Site Information	
Analyst	SK	Intersection	Donaghey Ave at College Ave
Agency or Co.		E/W Street Name	College Avenue
Date Performed	01/23/2019	N/S Street Name	Donaghey Street
Analysis Year		Analysis Time Period (hrs)	0.25
Time Period	2040 AM Peak	Peak Hour Factor	0.80
Project Description		Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1
Lane Assignment	LT		R		LT		R		LT		R		LT		R	
Volume (V), veh/h	0	86	354	105	0	80	447	26	0	117	331	30	0	48	407	143
Percent Heavy Vehicles, %	0	2	2	2	0	2	2	2	0	2	2	2	0	2	2	2
Flow Rate (v_{PCE}), pc/h	0	110	451	134	0	102	570	33	0	149	422	38	0	61	519	182
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	1				0				2				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)	4.5436	4.5436		4.5436	4.5436		4.5436	4.5436		4.5436	4.5436	
Follow-Up Headway (s)	2.5352	2.5352		2.5352	2.5352		2.5352	2.5352		2.5352	2.5352	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h	561	134		672	33		571	38		580	182	
Entry Volume veh/h	550	131		659	32		560	37		569	178	
Circulating Flow (v_c), pc/h	682			681			622			821		
Exiting Flow (v_{ex}), pc/h	550			901			565			755		
Capacity (c_{pce}), pc/h	763	763		764	764		806	806		673	673	
Capacity (c), veh/h	748	748		749	749		790	790		660	660	
v/c Ratio (x)	0.74	0.18		0.88	0.04		0.71	0.05		0.86	0.27	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh	20.6	6.7		33.4	5.2		18.4	5.0		34.3	8.8	
Lane LOS	C	A		D	A		C	A		D	A	
95% Queue, veh	6.6	0.6		11.1	0.1		6.0	0.1		10.0	1.1	
Approach Delay, s/veh	17.9			32.1			17.6			28.2		
Approach LOS	C			D			C			D		
Intersection Delay, s/veh | LOS	24.3						C					

HCS7 Roundabouts Report

General Information

Analyst	SK
Agency or Co.	
Date Performed	01/23/2019
Analysis Year	
Time Period	2040 PM Peak
Project Description	

Site Information

Intersection	Donaghey Ave at College Ave
E/W Street Name	College Avenue
N/S Street Name	Donaghey Street
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.95
Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1
Lane Assignment	LT		R		LT		R		LT		R		LT		R	
Volume (V), veh/h	0	161	442	145	0	107	494	38	0	158	489	60	0	68	414	116
Percent Heavy Vehicles, %	0	2	2	2	0	2	2	2	0	2	2	2	0	2	2	2
Flow Rate (v_{PCE}), pc/h	0	173	475	156	0	115	530	41	0	170	525	64	0	73	445	125
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	1				0				7				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)	4.5436	4.5436		4.5436	4.5436		4.5436	4.5436		4.5436	4.5436	
Follow-Up Headway (s)	2.5352	2.5352		2.5352	2.5352		2.5352	2.5352		2.5352	2.5352	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h	648	156		645	41		695	64		518	125	
Entry Volume veh/h	635	153		632	40		681	63		508	123	
Circulating Flow (v_c), pc/h	633			868			721			815		
Exiting Flow (v_{ex}), pc/h	612			825			739			716		
Capacity (c_{pce}), pc/h	798	798		645	645		737	737		676	676	
Capacity (c), veh/h	782	782		632	632		721	721		663	663	
v/c Ratio (x)	0.81	0.20		1.00	0.06		0.95	0.09		0.77	0.18	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh	25.3	6.7		61.5	6.4		45.2	5.9		24.7	7.6	
Lane LOS	D	A		F	A		E	A		C	A	
95% Queue, veh	8.8	0.7		15.4	0.2		13.7	0.3		7.2	0.7	
Approach Delay, s/veh	21.7			58.2			41.9			21.4		
Approach LOS	C			F			E			C		
Intersection Delay, s/veh | LOS	35.6						E					


GARVER