

Adams Avenue/49th Street/ Lorraine Drive

Pedestrian Safety Study

Prepared for:
City of San Diego

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Prepared By:

STC Traffic, Inc.
5865 Avenida Encinas, Suite 142-B
Carlsbad, CA 92008





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REFERENCES

1. 2014 California Manual on Uniform Traffic Control Devices (CA MUTCD)
2. 2013 National Association of City Transportation Officials (NACTO) Urban Street Design Guide
3. Adams Avenue & 49th Street Splitter Islands, Signing and Striping Plan, City of San Diego, CA. 40840-09-D

APPENDICES

Appendix : Traffic Count Data

1 INTRODUCTION

The purpose of this study is to determine if the warning signs W11-2 and W16-7P are necessary at the pedestrian crossings located at the Adams Avenue/ 49th Street/ Lorraine Drive roundabout.

The roundabout configuration is unique and consists of five-legs with a single circulating lane and minipark located at the center. The entry and exit lanes are separated by channelized yellow striping. The existing condition before improvements were made is shown in **Figure 1-1**.

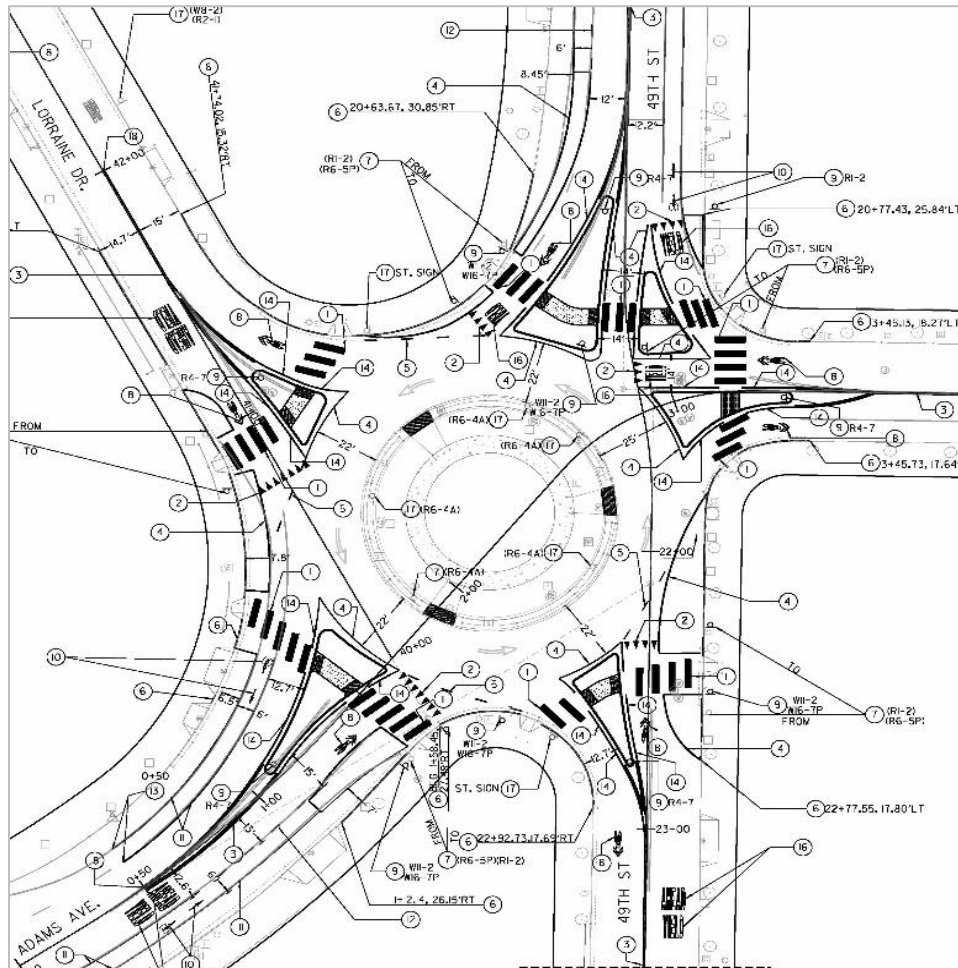
The City of San Diego has recently installed improvements to the roundabout that includes splitter islands to better direct traffic entering and exiting the roundabout. The project also installs continental crosswalks at all the legs that connect the existing ADA compliant pedestrian ramps. The splitter island improvements design is shown in **Figure 1-2**.

This study examines the behavior and interaction of pedestrians and motorists to determine if the pedestrian crossing warning signs are needed.

Figure 1-1: Existing Condition (Before Splitter Islands)



Figure 1-2: Improvement Design



1.1 Talmadge Roundabout Description

The Talmadge roundabout was constructed in the early 1980s and is tucked away in the surrounding residential neighborhood. The roundabout is large, and the Talmadge Mini Park was constructed in 1996 to replace a paved area at the center. Residents enjoy this unique feature, and it has become an icon of the neighborhood.

The roadway around the circle is wide and multiple legs make it more unique than a typical four-leg roundabout. The project incorporates splitter islands that serve to reduce speed and provide refuge space for pedestrians crossing the street.



2 CALIFORNIA MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD)

Traffic control devices are critical for the safe and efficient transportation of people and goods. The MUTCD is the law governing standard used to install and maintain all traffic control devices and is backed by years of practical experience and research. By setting minimum standards and providing guidance, the MUTCD ensures uniformity of traffic control devices across the nation which helps reduce crashes and congestion and improves the efficiency of transportation systems. Non-compliance with the MUTCD ultimately can result in the loss of federal-aid funds as well as in a significant increase in liability. The State of California maintains a state specific version of the National MUTCD referred to as the CAMUTCD which is maintained by the California Department of Transportation (Caltrans) and provides uniform standards and specifications for all official traffic control devices in California. Traffic engineering practitioners in the state of California must comply with the requirements set forth in the CA MUTCD.

The following excerpts from the California MUTCD Chapter 2C (Warning Signs and Object Markers) summarize the relevant signage guidance and requirements.

Section 2C.01 Function of Warning Signs

Support: Warning signs call attention to an unexpected condition on or adjacent to a highway, street, or private road open to public travel and to situations that might not be readily apparent to road users. Warning signs alert road users to conditions that might call for a reduction of speed or an action in the interest of safety and efficient traffic operations.

Section 2C.02 Application of Warning Signs

Standard: The use of warning signs shall be based on an engineering study or on engineering judgement.

Guidance: The use of warning signs should be kept to a minimum as the unnecessary use of warning signs tends to breed disrespect for all signs. In situations where the condition or activity is seasonal or temporary, the warning sign should be removed or covered when the condition or activity does not exist.

Section 2C.50 Non-Vehicular Warning Signs (including W11-2)

Option: Non-vehicular warning signs, such as W11-2, may be used to alert road users in advance of locations where unexpected entries into the roadway might occur or where shared use of the roadway by pedestrians, animals, or equestrians might occur.

Standard: If a post-mounted sign (including W11-2) is placed at the location of the crossing point where pedestrians, snowmobilers, or equestrians might be crossing the roadway, a diagonal downward pointing arrow (W16-7P) plaque shall be mounted below the sign.

The warning sign W11-2 and the diagonal downward pointing arrow plaque W16-7P are shown below:



W11-2



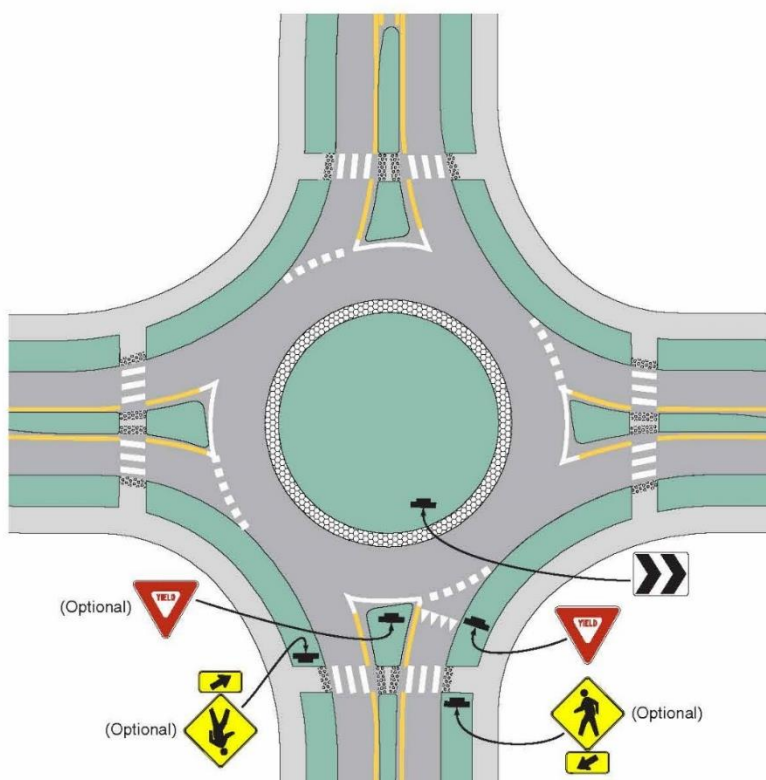
W16-7P

Signs are generally more visible than markings. The sign with arrow draws attention to a crosswalk and is meant to warn the motorist that pedestrians have the right of way and the motorist is to yield to pedestrians.

According to the California MUTCD Figure 2B-21 through Figure 2B-23 examples of regulatory and warning signs for a mini, one-lane, and two-lane roundabouts, use of the warning sign W11-2 and the diagonal downward pointing arrow plaque W16-7P are optional. Figure 2B-22 of the California MUTCD for a one-lane roundabout is shown in **Figure 2-1** below:

Figure 2-1: California MUTCD Example

Figure 2B-22. Example of Regulatory and Warning Signs for a One-Lane Roundabout





Based on the California MUTCD, the use of the warning sign W11-2 and the diagonal downward pointing arrow plaque W16-7P are optional. The CA MUTCD further states that the use of warning signs shall be based on an engineering study or engineering judgement.




3 LOCAL AND REGIONAL APPLICATIONS

There are several local and regional roundabouts in the City of San Diego and greater San Diego County that provide examples of traffic control device applications. **Table 3-1** identifies several roundabouts with pictures, dates, and installation of W11-2/ W16-7 signs. As shown in the table, the City of San Diego has recently installed the W11-2/ W16-7 signage at pedestrian crossings located at the Moraga Avenue / Idyllwild Way roundabout. This is a newly constructed roundabout located in a residential area. Other examples of similar configurations and signage include the City of Coronado and City of La Jolla, along Pomona Avenue and La Jolla Boulevard, respectively.

In the Cities of Carlsbad and Encinitas the roundabouts located at Carlsbad Boulevard/ State Street (on the border of Carlsbad and Oceanside) and Leucadia Boulevard/ Hymettus Ave do not have the W11-2/ W16-7 signs installed.

Table 3-1: Regional Roundabouts W11-2/ W16-7P

City	Intersection	Build Date	W11-2 / W16-7P	Approach
 San Diego	Moraga Ave/ Idyllwild Way	2019	W11-2 / W16-7P	All
 Coronado	Pomona Avenue / 7 th Street	2014	W11-2 / W16-7P	All

City	Intersection	Build Date	W11-2/ 16-7P	Approach
 <p>La Jolla (San Diego)</p>	La Jolla Boulevard / Colima Street	2008	W11-2 / W16-7P	All
 <p>Carlsbad/Oceanside Border</p>	Carlsbad Boulevard / State Street	2014	None	N/A
 <p>Encinitas/ Leucadia</p>	Leucadia Blvd / Hymettus	2007	None	N/A

3.1 Navigating Roundabouts

A roundabout is a form of intersection control that requires vehicles to travel in a counterclockwise direction around a central island. Vehicles entering or exiting the roundabout must yield to other vehicles, bicyclists, and pedestrians.

Roundabouts have many advantages when constructed in the right location. Roundabouts:

- Are a traffic calming mechanism that help reduce vehicle speeds.
- Require less maintenance, have lower yearly operational costs, and have a longer service life than traffic signals.
- Reduce the number of conflict points in comparison to other intersection controls.
- Reduce vehicle idling time resulting in less fuel consumption and greenhouse gas emission reduction.
- Provide refuge for pedestrians with median islands, allowing them to cross one direction of traffic at a time.
- Provide aesthetic opportunities for the community.
- Improve safety through the elimination of left turns.

Motorists approaching and navigating a roundabout should:

- Slow down on the intersection approach and navigate the roundabout with caution.
- Yield to pedestrians and bicyclists crossing the roadway.
- Watch for signs and pavement markings that guide or prohibit certain movements.
- Enter the roundabout when there is a big enough gap in traffic and is safe to do so.
- Drive in a counterclockwise direction and do not stop or pass other vehicles.
- Use turn signals when changing lanes or exiting the roundabout.
- Continue around again if the exit is missed until return to the exit.

Figure 3-1: Roundabout Navigation





4 STUDY METHODOLOGY

The California MUTCD does not provide guidance on conducting an engineering study to determine if the W11-2 warning sign is necessary at a roundabout. The methodology for this study was developed based on engineering judgement. The CA MUTCD 2014 Revision 5 Section 1A.13.03 definition 64 defines engineering judgement.

Engineering Judgment—the evaluation of available pertinent information, and the application of appropriate principles, experience, education, discretion, provisions, and practices as contained in this Manual and other sources, for the purpose of deciding upon the applicability, design, operation, or installation of a traffic control device. Engineering judgment shall be exercised by an engineer, or by an individual working under the supervision of an engineer, through the application of procedures and criteria established by the engineer. Documentation of engineering judgment is not required.

The CA MUTCD provides further guidance regarding signs in Standard of Application Section 2A.03.02 and 03.

02 Signs should be used only where justified by engineering judgment or studies, as provided in Section 1A.09.

03 Results from traffic engineering studies of physical and traffic factors should indicate the locations where signs are deemed necessary or desirable.

The CA MUTCD recognizes that the use of engineering judgment and studies is a fundamental aspect of the application of traffic control devices. It is for this reason that, in most cases, the selection of a device is not required by a standard but is determined by engineering study or judgment.

Judgement is generally based on site specific conditions at a given location. The City has undertaken this effort to collect data and site-specific conditions at the Talmadge roundabout. The information collected informs this engineering study to determine if the W11-2/ 16-7P signage is necessary. Based on the information provided in the CA MUTCD, it was determined this study would consist of the following process: (1) collect data, (2) analyze data, and (3) present the results.



4.1 Conditions to Consider

Traffic conditions observed at the roundabout revolve around the user's compliance with "rules" of the roundabout. Observations include how drivers and pedestrians use the roundabout and whether compliance with the rules are adhered to.

Some questions that were considered in this study include:

- Do motorists and pedestrians understand how the roundabout works? Is there driver confusion?
- Are people familiar with how to traverse the roundabout? Are they too comfortable with it? Are the splitter islands effective?
- How are motorists reacting?
- Are motorists complying to the rules by yielding to vehicles and pedestrians in the roundabout?
- Are motorists coming to a stop when they see a pedestrian?
- Are pedestrians entering the roundabout cautiously? Do pedestrians use the crosswalk and look both ways?
- Do the pedestrians observe vehicles on the approach and wait until the vehicle yields or stops before entering the crosswalk? Do pedestrians wait for a gap in vehicles? Do pedestrians use the splitter islands?
- Would the signs improve driver awareness?
- Are there unique characteristics of the roundabout that should be considered for installing the signs?

The data and observations help inform whether there are issues that can be corrected by implementing the optional signs.

The CA MUTCD is very purposeful about not establishing thresholds. There are not predetermined thresholds of significance that establish whether signs should or should not be installed to improve possible issues that have yet to be observed. The approach of the analysis is to look at the data and let the observations and analysis in total drive the decision-making process of whether to put the signs in. It is important to use engineering judgement based on qualitative and quantitative understanding of the data without preconceived thresholds.

The recommendation to install or not install the signs is based on the trends observed and analyzed at the roundabout. For example, if there is wide compliance and drivers and pedestrians are using caution before entering the roundabout, then the signs may not be necessary. If the opposite is determined, and drivers and pedestrians are not using due care when traversing the roundabout, then the signs may be necessary.



Based on the conditions, the following data was collected and summarized for representative time periods.

- Total number of vehicles at each approach.
- Total number of bicycles at each approach.
- Total number of pedestrians at each leg.
- Total mode share comparison.
- Number of vehicle interactions with pedestrians.
- Driver behavior with pedestrian at the crossing ramp:
 - Number of vehicles that ignore the pedestrian.
 - Number of vehicles that yield to the pedestrian.
 - Number of vehicles that stop.
- Driver behavior without pedestrian at crossing ramp:
 - Number of vehicles that yield on approach to the crosswalk/ roundabout.
 - Number of vehicles that do not yield on approach to the crosswalk/ roundabout.
- Pedestrian crossing behavior with a vehicle on the approach:
 - Waiting on ramp.
 - Looking both ways before stepping onto the crosswalk.
 - No stopping on the ramp.
- Pedestrian crossing behavior without a vehicle on the approach:
 - Waiting on the ramp.
 - Looking both ways before stepping onto the crosswalk.
 - No stopping on the ramp.

24-hour vehicle and pedestrian volume data was collected over a period of one month (November 2020 to December 2020) to determine the conditions. A description of the data collection system is discussed in the following section and data analysis is presented in a tabular and graphical format in Section 6.

5 DATA COLLECTION SYSTEM

The video data was collected and recorded utilizing CCTV cameras and recording devices mounted on 30-foot temporary wooden poles. Two locations, on the south and east sides of the intersection, were identified for pole/ camera installation. **Figure 5-1** shows the locations of the temporary wooden poles and **Figure 5-2** shows the device installation. Frequent visits to the site were made to ensure proper recording took place and to obtain video data footage.

Figure 5-1: Temporary Wooden Pole Locations

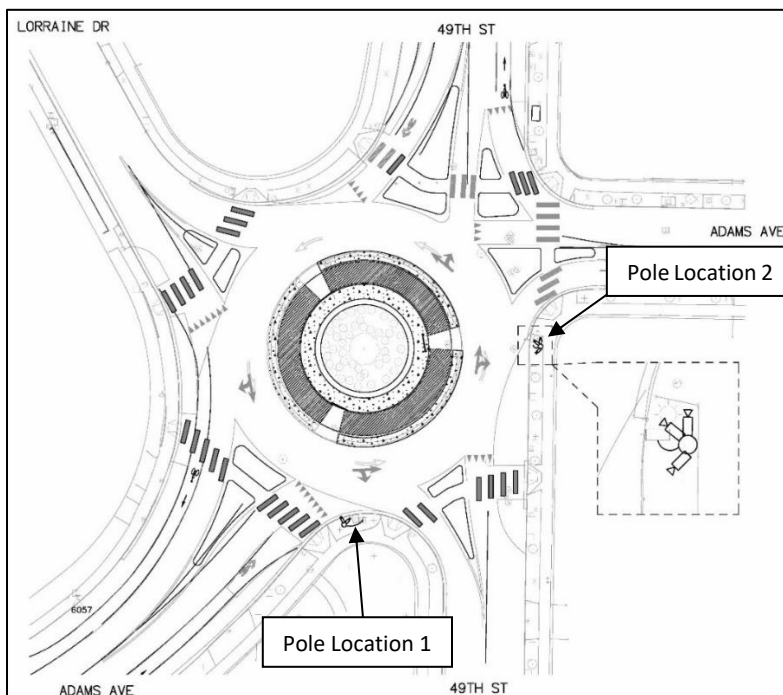
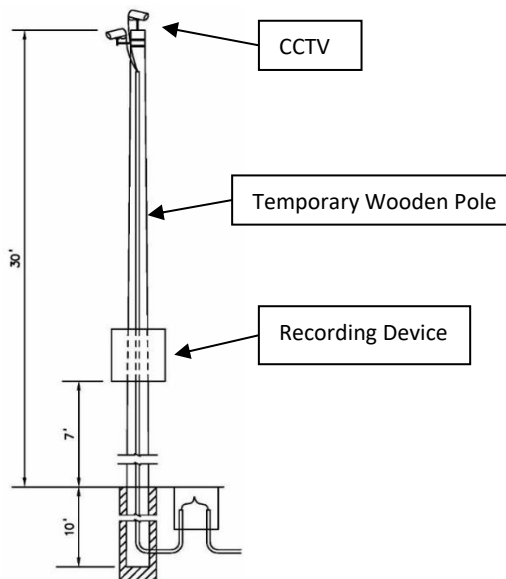


Figure 5-2: Exhibit of Device Installation





6 DATA REVIEW AND ANALYSIS

The National Association of City Transportation Officials' (NACTO) *Urban Street Design Guide* recommends collecting 4-hour volumes across the morning, midday, evening, and Saturday peaks to analyze typical traffic levels. For this analysis, 24 hours of video data was reviewed; 12 hours on Friday November 20th, 2020 (8:30 AM - 8:30 PM) and 12 hours on Saturday November 21st, 2020 (6:30 AM - 6:30 PM). The weekday and weekend count times were chosen to capture traffic periods that coincide with the expected peak periods of traffic entering and exiting the study area on a typical day. Given these counts were collected on typical operating days, the driver behaviors observed over the course of the two-12-hour counts reflect what the study area experiences on a day-to-day basis. Driver behavior does not change based on more observations without a change to the surrounding environment such as new traffic control devices. Additional data was reviewed and analyzed from video footage recorded on Wednesday, November 25th, 2020 to assess the results below, and is discussed in Section 6.1.

Table 6-1 through **Table 6-7** summarize the data based on the categories listed in the study methodology section. The pedestrian and driver behavior and interaction conditions are shown graphically in **Figure 6-3** through **Figure 6-6**.

Table 6-1: Weekday 12 Hour Vehicle Movements

Approach	Weekday Vehicles	
	Entry	Exit
Adams Avenue East	352	356
Adams Avenue West	919	860
49th Street North	297	528
49th Street South	123	114
Lorraine Drive	311	144

Date: November 20, 2020 – 8:30 AM – 8:30 PM

Total Number of Vehicles: 2,002

Table 6-2: Weekday 12 Hour Bicycle Movements

Leg	Entry	Exit
Adams Avenue East	10	16
Adams Avenue West	30	30
49th Street North	7	17
49th Street South	3	3
Lorraine Drive	23	7

Date: November 20, 2020 – 8:30 AM – 8:30 PM

Total Number of Bicyclists: 73



Table 6-3: Weekday 12 Hour Pedestrian Movements

Leg Crossing	Instances
Adams Avenue East	157
Adams Avenue West	108
49th Street North	99
49th Street South	102
Lorraine Drive	72

Date: November 20, 2020 – 8:30 AM – 8:30 PM

Total Number of Pedestrian Crossings: 538

Figure 6-1: Weekday Mode Share

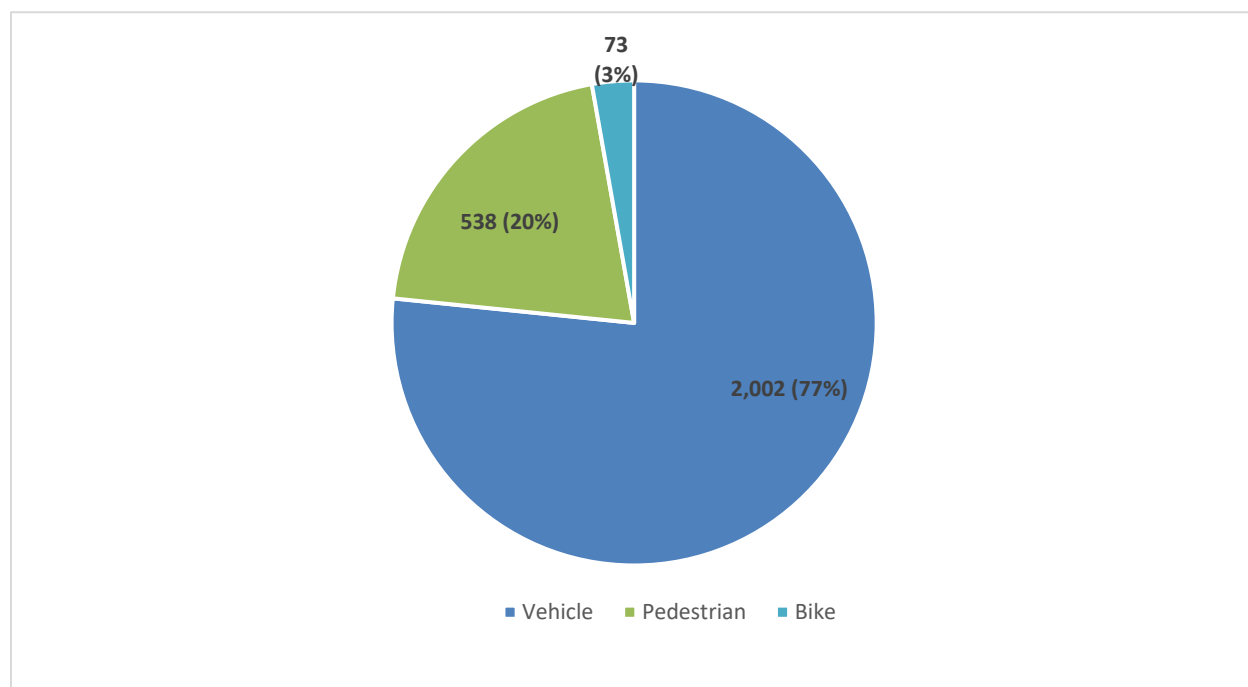




Table 6-4: Weekend 12 Hour Vehicle Movements

Leg	Entry	Exit
Adams Avenue East	337	256
Adams Avenue West	757	873
49th Street North	298	481
49th Street South	119	92
Lorraine Drive	294	103

Date: November 21, 2020 – 6:15 AM – 6:15 PM

Total Number of Vehicles: 1,805

Table 6-5: Weekend 12 Hour Bicycle Movements

Leg	Entry	Exit
Adams Avenue East	15	22
Adams Avenue West	37	40
49th Street North	19	24
49th Street South	7	6
Lorraine Drive	23	9

November 21, 2020 – 6:15 AM – 6:15 PM

Total Number of Bicyclists: 101

Table 6-6: Weekend 12 Hour Pedestrian Movements

Leg Crossing	Entry
Adams Avenue East	124
Adams Avenue West	79
49th Street North	119
49th Street South	109
Lorraine Drive	76

Date: November 21, 2020 – 6:15 AM – 6:15 PM

Total Number of Pedestrian Crossings: 507

Figure 6-2: Weekend Mode Share

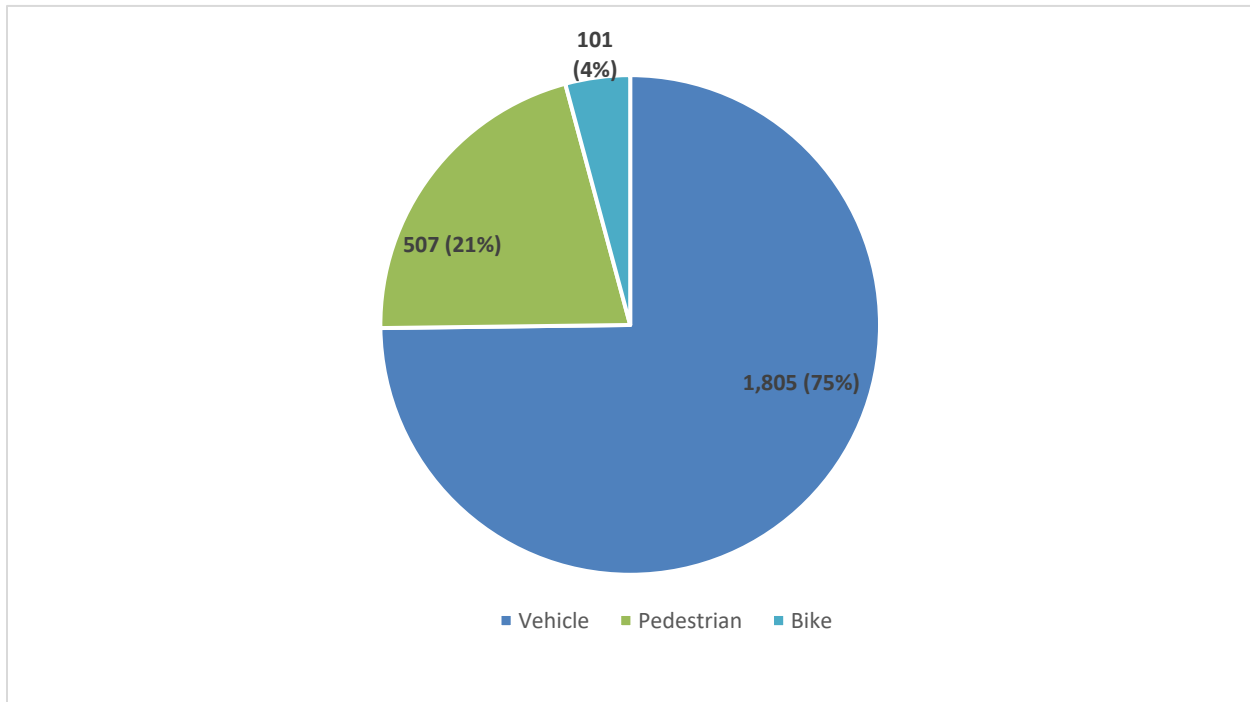


Table 6-7: Vehicle and Pedestrian Interaction Comparison

Approach	Weekday	Weekend
	Interactions	Interactions
Adams Avenue East	22	13
Adams Avenue West	19	7
49th Street North	15	9
49th Street South	6	3
Lorraine Drive	8	1

The weekday period vehicle and pedestrian volumes and interactions are higher than weekend conditions. The Friday, November 20, 2020 video data was further reviewed to evaluate driver and pedestrian behavior and the following tables and graphs present the results.

Figure 6-3: Driver Behavior with Pedestrian at Crossing Ramp

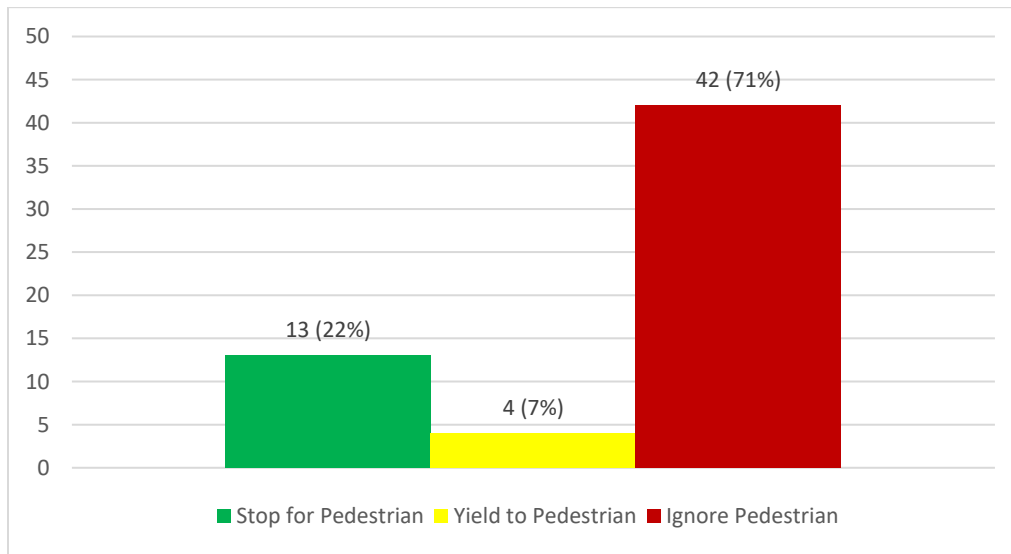
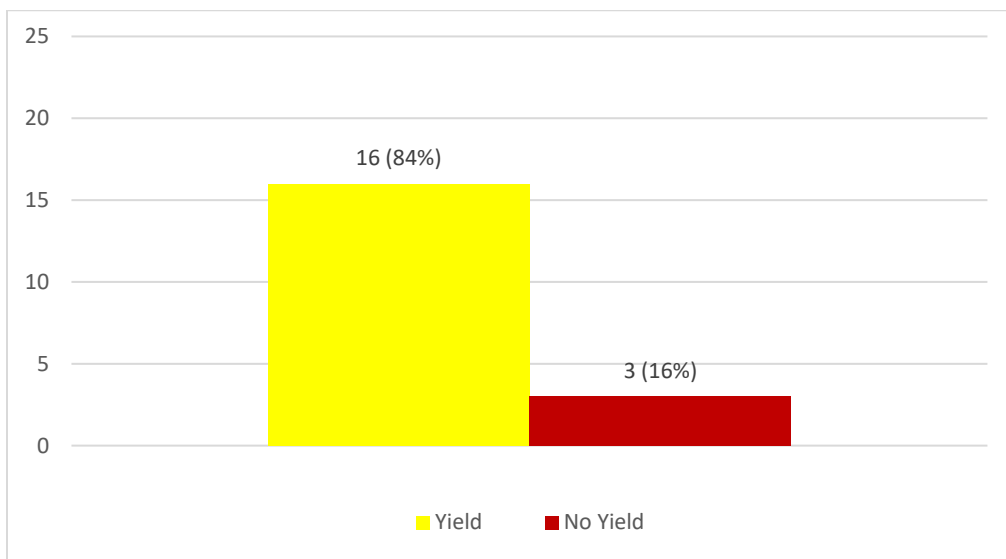


Figure 6-4: Driver Behavior without Pedestrian at Crossing Ramp



Note: This interaction occurs when a pedestrian is walking nearby the ramp but is not crossing at the ramp.

Figure 6-5: Pedestrian Behavior with Vehicle on Approach

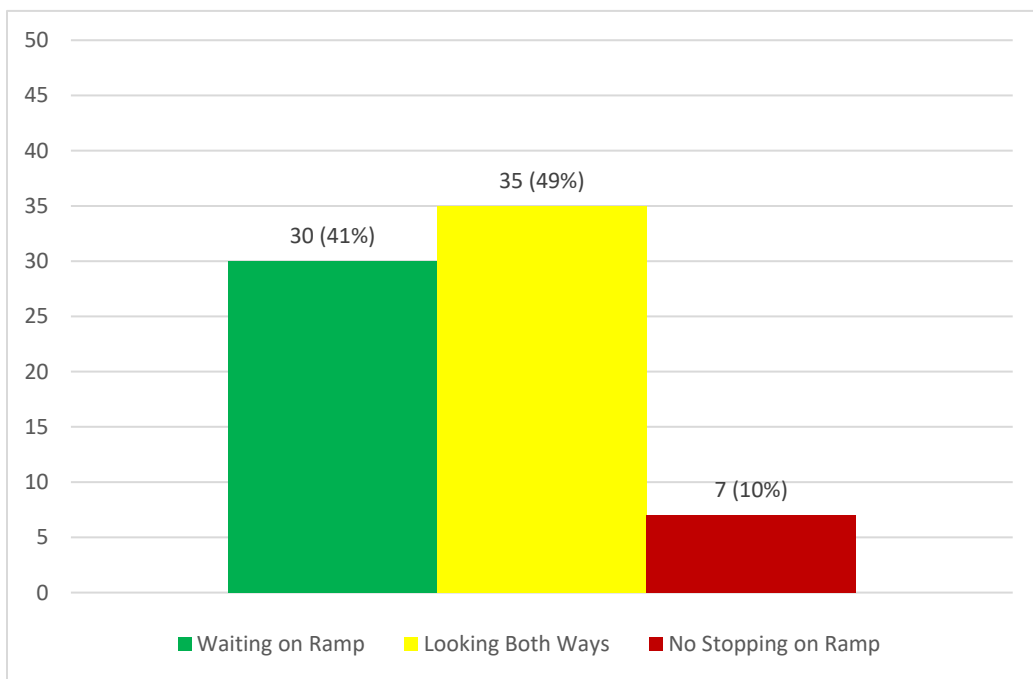
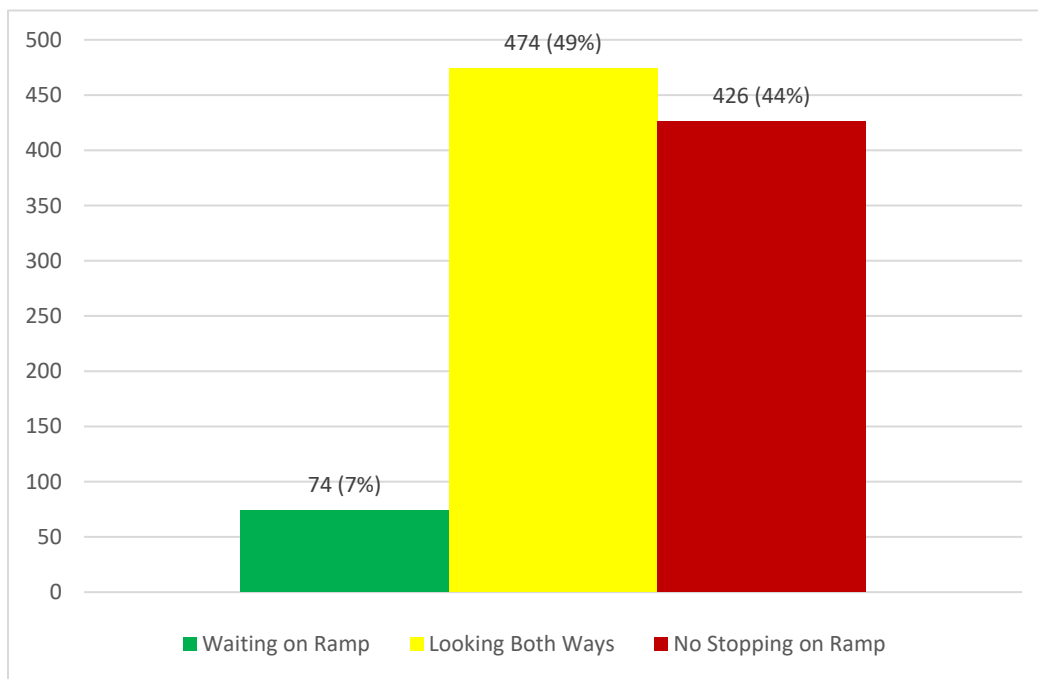


Figure 6-6: Pedestrian Behavior without Vehicle on Approach





Additional Observations and Considerations:

- 189 vehicles (9%) were observed to approach the intersection or navigate the roundabout at high speed.
- 14 pedestrians (3%) were observed to cross diagonally to access the Talmadge Mini Park located at the center of the roundabout, including elderly persons and families with children.
- Pedestrians choose to yield to vehicles to cross safely rather than waiting for the vehicle to yield or stop.
- Vehicles at higher speeds tend to drift into the bike lane and shoulder upon exiting the roundabout.

Figure 6-3 shows 71-percent of drivers ignore pedestrians attempting to cross the street at a crossing ramp, indicating that most drivers are not proceeding with caution when entering or exiting the roundabout while pedestrians are present. **Figure 6-5** shows that while a vehicle is on approach, 90-percent of pedestrians either look both ways before crossing or at least wait on the ramp before proceeding to cross the street when safe. This indicates that most pedestrians exhibit caution before entering the roundabout when a vehicle is present. Although pedestrians generally show caution when navigating through the roundabout, the same cannot be said about drivers, which creates potential safety hazards during vehicle-pedestrian interactions. Providing additional warning signage of pedestrian crossings at all approaches would benefit drivers by letting them know what to expect upon approach, increasing the chances they will react and behave appropriately.



6.1 Data Review and Analysis Confirmation

An additional two hours of data was reviewed and analyzed from video footage recorded on Wednesday, November 25th, 2020 between 11:00 AM – 2:30 PM. This analysis was conducted to assess the results of the previous 24 hours of data reviewed in the section above. The following section summarizes the review of the Wednesday footage and **Table 6-8** through **Table 6-11** summarize the data based on the categories listed in the study methodology section. The pedestrian and driver behavior and interaction conditions are shown graphically in **Figure 6-7** through **Figure 6-11**.

Table 6-8: Weekday 2 Hour Vehicle Movement

Approach	Weekday Vehicles	
	Entry	Exit
Adams Avenue East	67	60
Adams Avenue West	151	187
49th Street North	64	93
49th Street South	27	26
Lorraine Drive	85	28

Date: November 25, 2020 – 11:00 AM – 12:00 AM, 1:00 PM – 1:30 PM, 2:00 PM – 2:30 PM

Total Number of Vehicles: 394

Table 6-9: Weekday 2 Hour Bicycle Movements

Leg	Entry	Exit
Adams Avenue East	1	1
Adams Avenue West	8	6
49th Street North	1	7
49th Street South	1	1
Lorraine Drive	5	1

Date: November 25, 2020 – 11:00 AM – 12:00 AM, 1:00 PM – 1:30 PM, 2:00 PM – 2:30 PM

Total Number of Bicyclists: 16

Table 6-10: Weekday 2 Hour Pedestrian Movements

Leg Crossing	Instances
Adams Avenue East	26
Adams Avenue West	17
49th Street North	21
49th Street South	11
Lorraine Drive	13

Date: November 25, 2020 – 11:00 AM – 12:00 AM, 1:00 PM – 1:30 PM, 2:00 PM – 2:30 PM

Total Number of Bicyclists: 88

Figure 6-7: Weekday Mode Share

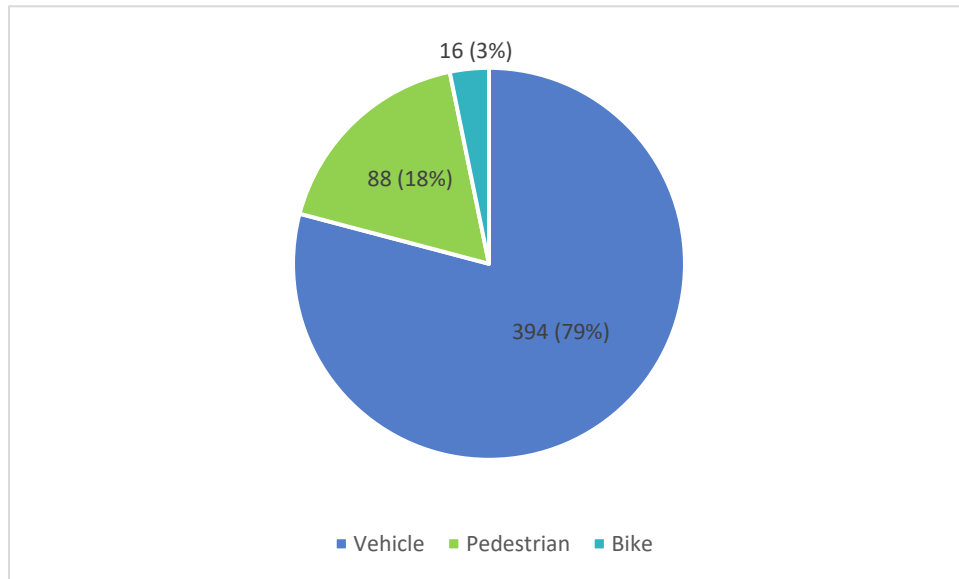


Table 6-11: Vehicle Pedestrian Interaction

Approach	Weekday
	Interactions
Adams Avenue East	4
Adams Avenue West	10
49th Street North	2
49th Street South	0
Lorraine Drive	6

Figure 6-8: Driver Behavior with Pedestrian at Crossing Ramp

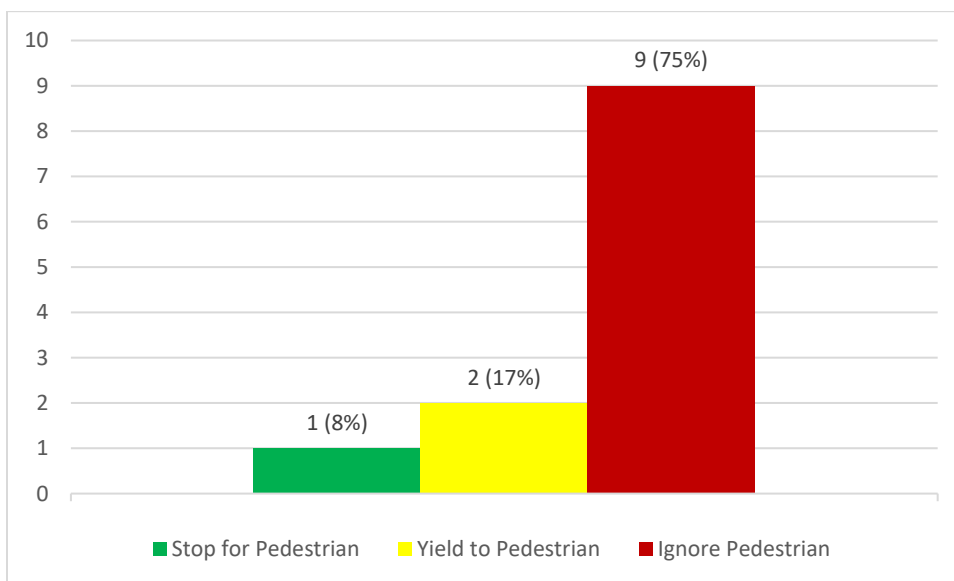


Figure 6-9: Pedestrian Behavior with Vehicle on Approach

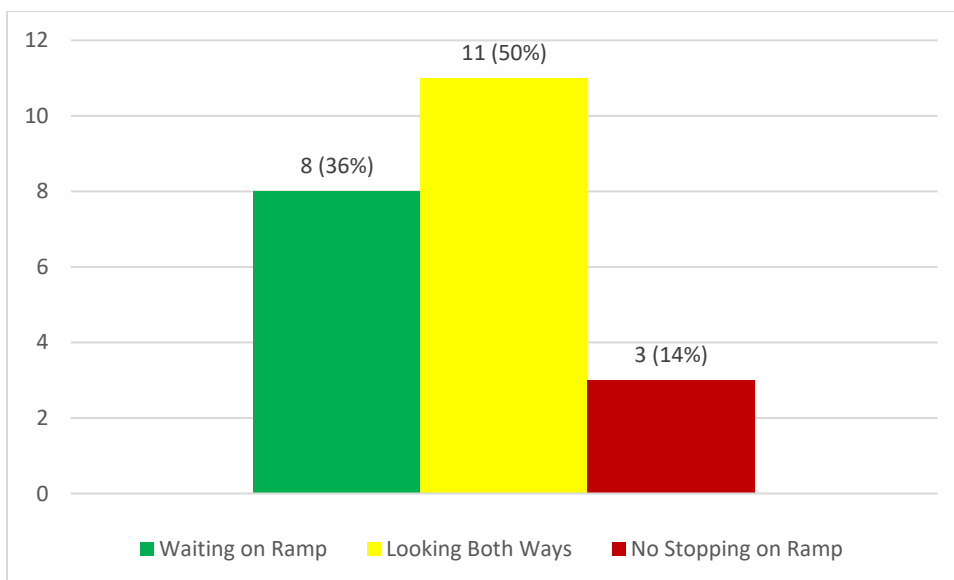
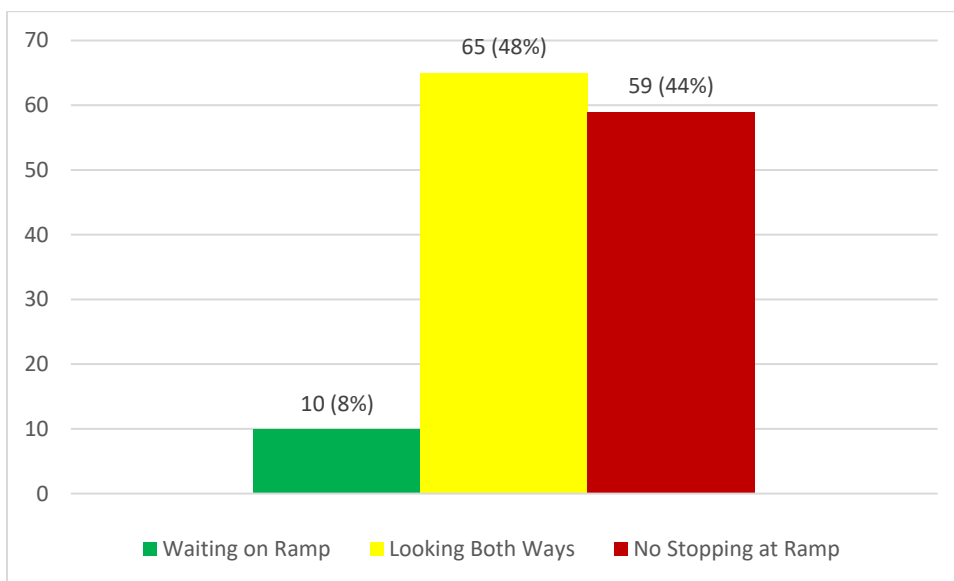


Figure 6-10: Pedestrian Behavior without Vehicle on Approach



The information gathered from the Wednesday footage closely reflects the data collected on Friday and Saturday except for volume. Vehicles were observed to ignore pedestrians at the ramps 71% of the time in the 24-hour data and 75% of the time in the supplemental data (**Figure 6-8**). **Figure 6-9** shows that while a vehicle is on approach, 86-percent of pedestrians either look both ways before crossing or at least wait on the ramp before proceeding to cross the street when safe, while 90-percent of pedestrians were observed to behave in the same manner in the 24-hour data. The supplemental analysis shows that the operational characteristics of the roundabout are consistent regardless of the date and time.

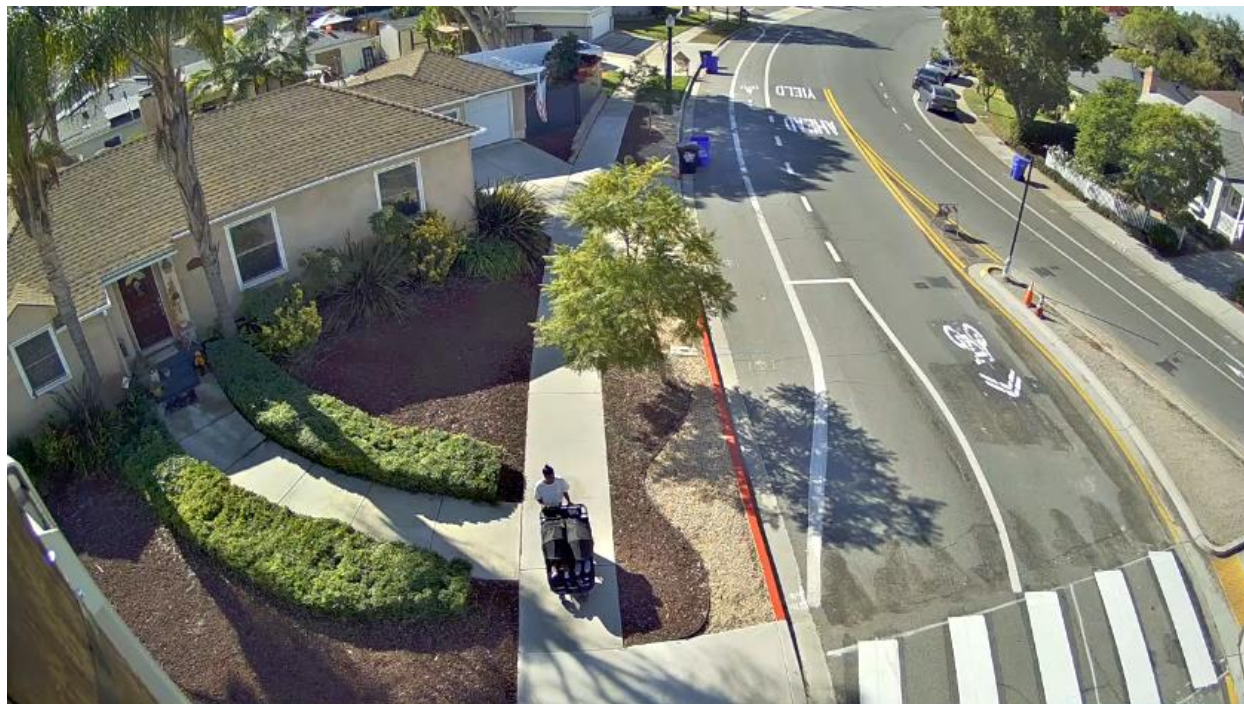
6.2 Captures of Vehicle-Pedestrian Interaction

The following section highlights pedestrian-vehicle interactions within the roundabout. The interactions included in the next series of images were captured from footage taken on Friday, November 20th, 2020. The interactions are representative of the pedestrian-vehicle interactions in which drivers fail to yield or stop for pedestrians within the roundabout. A description of each event is provided in advance of each series of images.

Interaction 1:

(Image 1-1) Pedestrian, with children in stroller, walks towards ramp. (Image 1-2) Pedestrian notices vehicle heading towards roundabout. (Image1-3) Pedestrian waits at ramp as vehicle ignores pedestrian, and is followed by another vehicle after a short gap. (Image 1-4) Pedestrian inches forward. (Image1-5) Pedestrian at edge of ramp and second vehicle also fails to yield. (Image1-6) Pedestrian crosses.

Image 1-1¹



¹ Video Reference: "20201120_041050_EEA0" Minute 0:16 Friday Nov 20, 2020 11:11:06 A.M.

Image 1-2¹

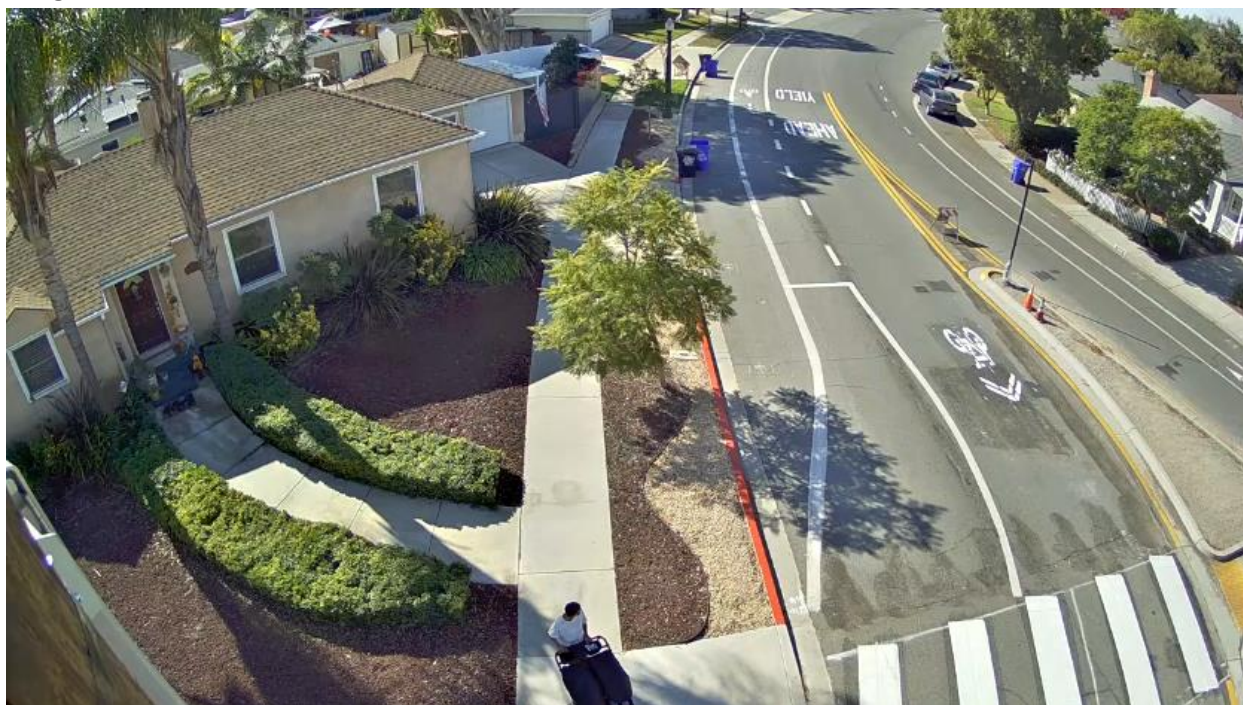
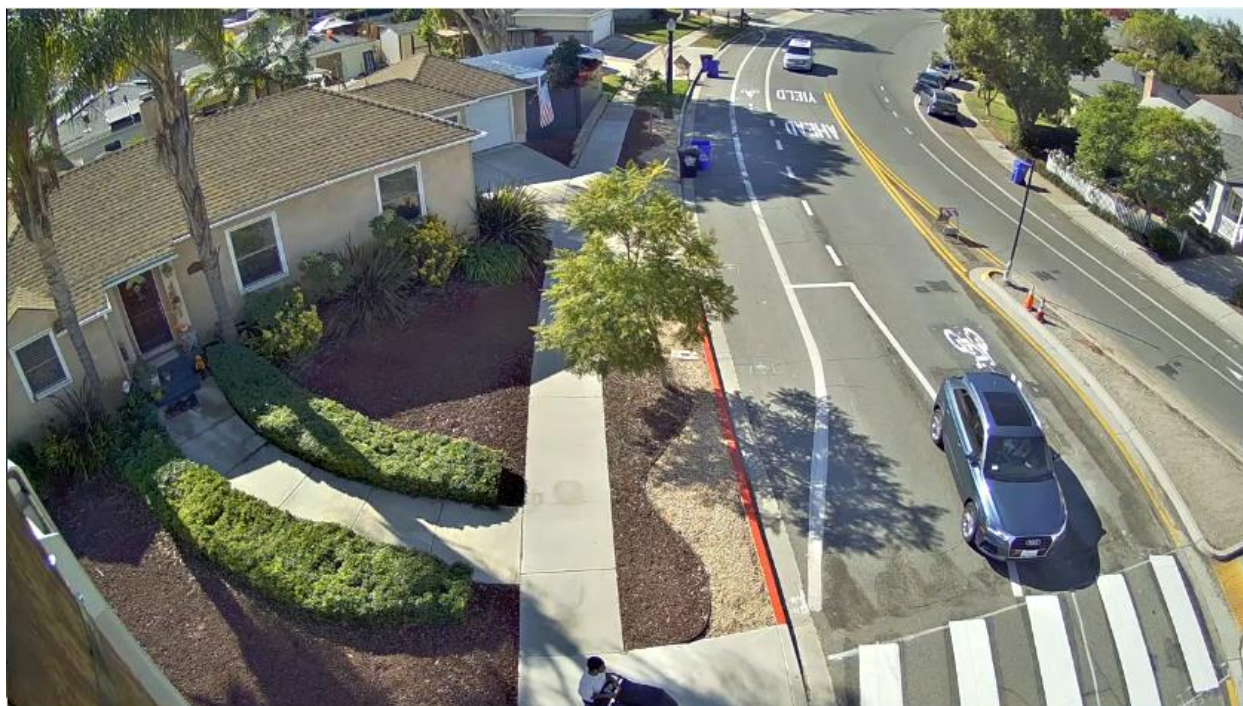


Image 1-3¹



¹ Video Reference: "20201120_041050_EEA0" Minute 0:16 Friday Nov 20, 2020 11:11:06 A.M.

Image 1-4¹

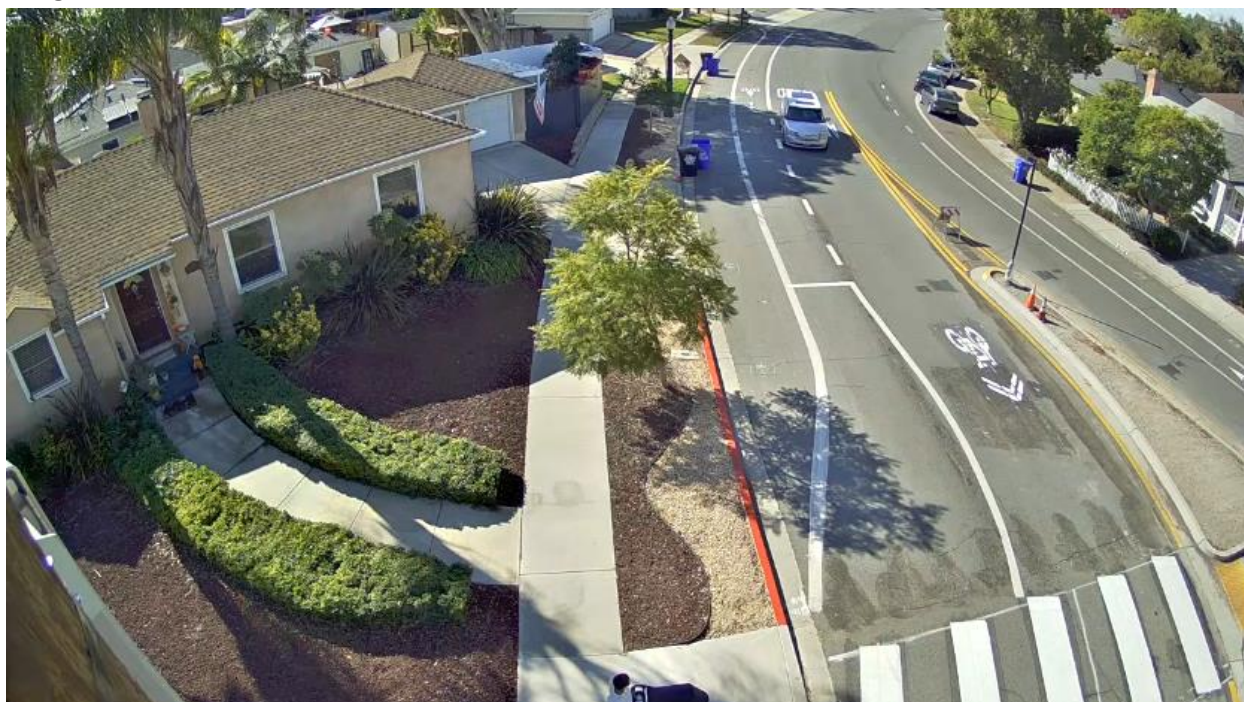
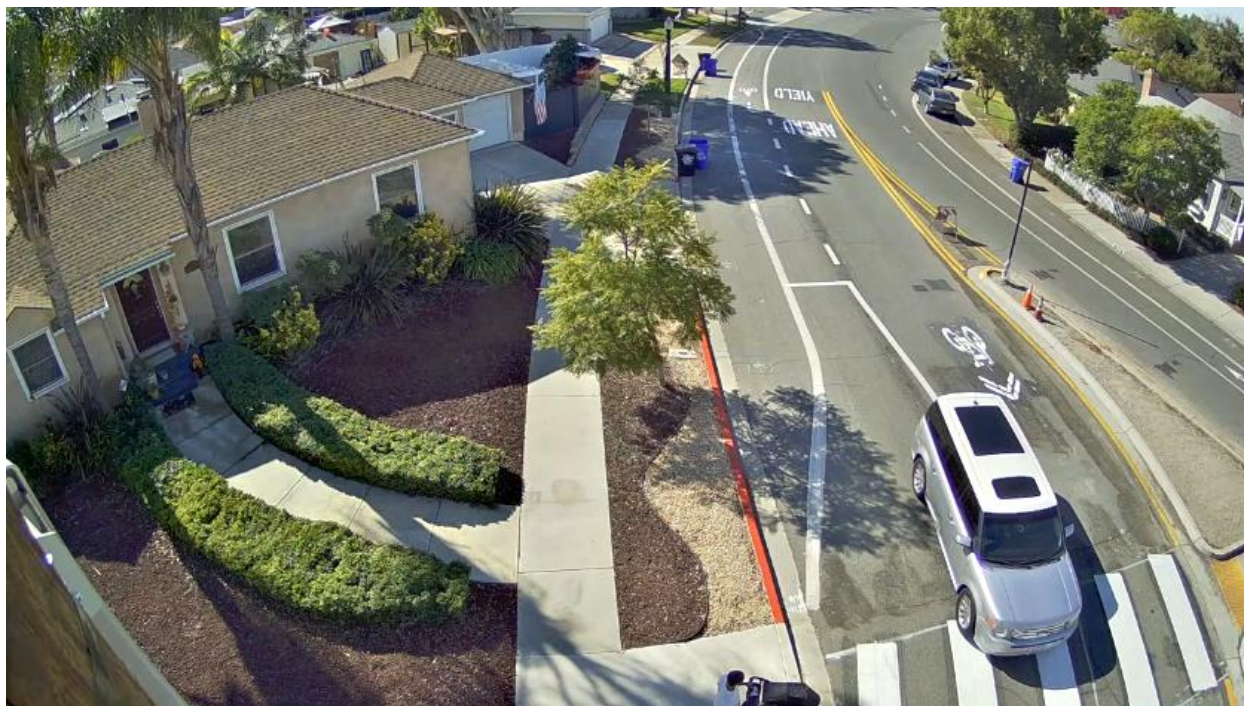
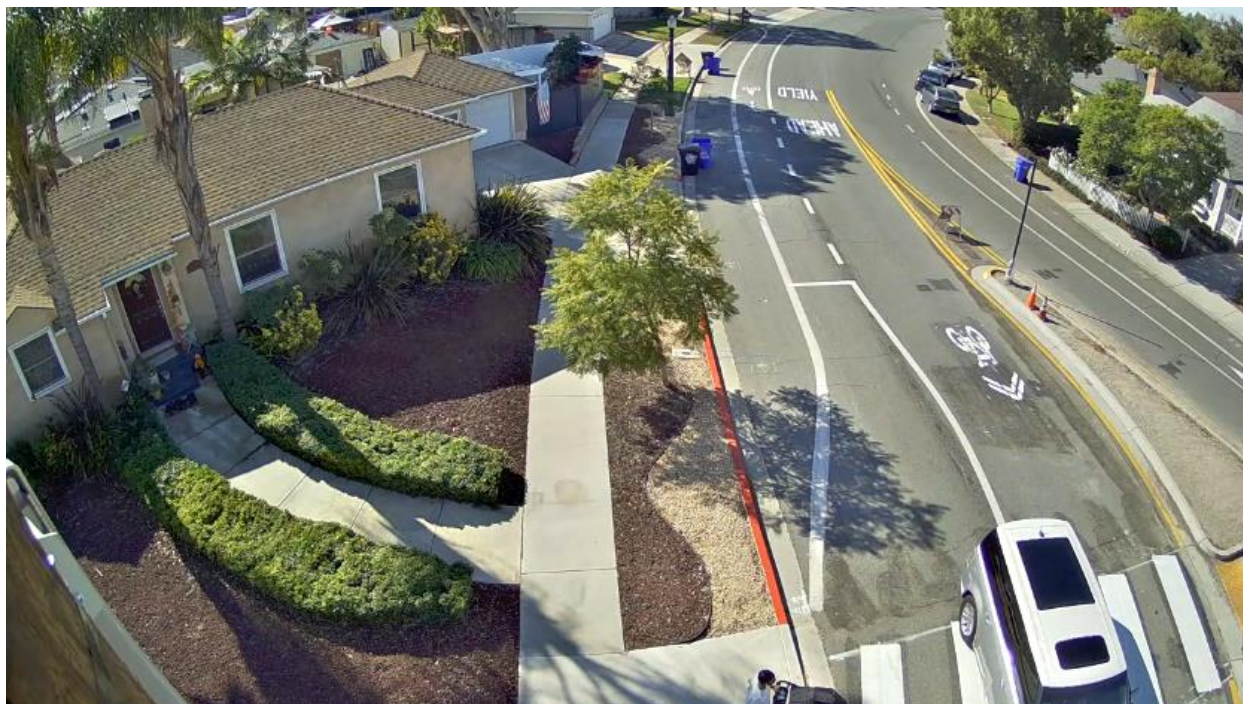


Image 1-5¹



¹ Video Reference: "20201120_041050_EEA0" Minute 0:16 Friday Nov 20, 2020 11:11:06 A.M.

Image 1-6¹



¹ Video Reference: “20201120_041050_EEA0” Minute 0:16 Friday Nov 20, 2020 11:11:06 A.M.

Interaction 2:

(Image 2-1) Pedestrian with stroller begins crossing from park in center of roundabout as car is moving on roundabout. (Image2-2) Driver sees pedestrian and begins to slow to give pedestrian more time to cross. (Image2-3) Pedestrian continues crossing and driver inches behind them. (Image 2-4) Pedestrian nearly finishes crossing and driver continues movement.

Image 2-1¹

¹ Video Reference: "20201120_043054_103A" Minute 4:10 Friday Nov 20,2020 11:35:04 A.M.

Image 2-2¹²



Image 2-3²



² Video Reference: "20201120_043054_103A" Minute 4:10 Friday Nov 20,2020 11:35:04 A.M.

Image 2-4²



² Video Reference: “20201120_043054_103A” Minute 4:10 Friday Nov 20,2020 11:35:04 A.M.

Interaction 3:

(Image 3-1) Pedestrian at island's ramp sees vehicle approaching and waits. (Image 3-2) Driver gets closer to crosswalk and pedestrian waits as vehicle is not slowing. (Image 3-3) Vehicle goes through crosswalk and pedestrian begins to cross afterwards. (Image 3-4) Pedestrian continues through crosswalk after being ignored by driver.

Image 3-1³

³ Video Reference: "20201120_052602_B821" Minute 3:21 Friday Nov 20, 2020 12:29:23 P.M.

Image 3-2³



Image 3-3³



³ Video Reference: "20201120_052602_B821" Minute 3:21 Friday Nov 20, 2020 12:29:23 P.M.

Image 3-4³



³ Video Reference: “20201120_052602_B821” Minute 3:21 Friday Nov 20, 2020 12:29:23 P.M.

Interaction 4:

(Image 4-1) Pedestrian walking towards Adams East as driver is moving around roundabout. (Image 4-2) Vehicle is seen heading in the direction of pedestrian while pedestrian is still crossing. (Image 4-3) Driver inches forward pressuring pedestrian, almost pushing them onto the sidewalk. (Image 4-4) Driver passing through crosswalk as pedestrian takes first step onto sidewalk.

Image 4-1⁴

⁴ Video Reference: "20201120_053604_8742" Minute 1:40 Friday Nov 20, 2020 12:37:44 P.M.

Image 4-2⁴



Image 4-3⁴



⁴ Video Reference: “20201120_053604_8742” Minute 1:40 Friday Nov 20, 2020 12:37:44 P.M.

Image 4-4⁴



⁴ Video Reference: “20201120_053604_8742” Minute 1:40 Friday Nov 20, 2020 12:37:44 P.M.

Interaction 5:

(Image 5-1) Pedestrian is crossing Adams East approaching island, and vehicle moves around roundabout. (Image 5-2) Pedestrian continues crossing and vehicle continues movement. (Image 5-3) Vehicle shows intent of exiting and pedestrian continues crossing. (Image 5-4) Pedestrian has reached Island and vehicle approaches crosswalk. (Image 5-5) Pedestrian waits on island after being ignored by driver.

Image 5-1⁵

⁵ Video Reference: "20201120_060108_FC1D" Minute 0:38 Friday Nov 20, 2020 1:01:46 P.M

Image 5-2⁵

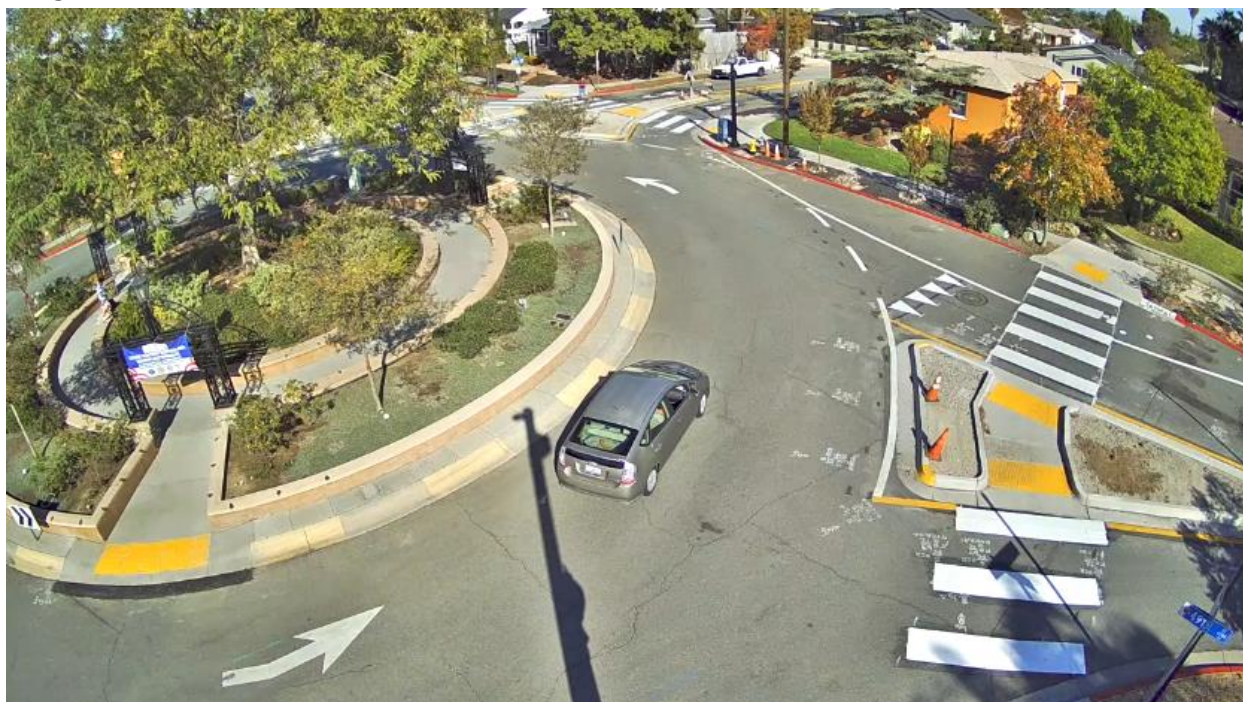


Image 5-3⁵



⁵ Video Reference: "20201120_060108_FC1D" Minute 0:38 Friday Nov 20, 2020 1:01:46 P.M

Image 5-4⁵

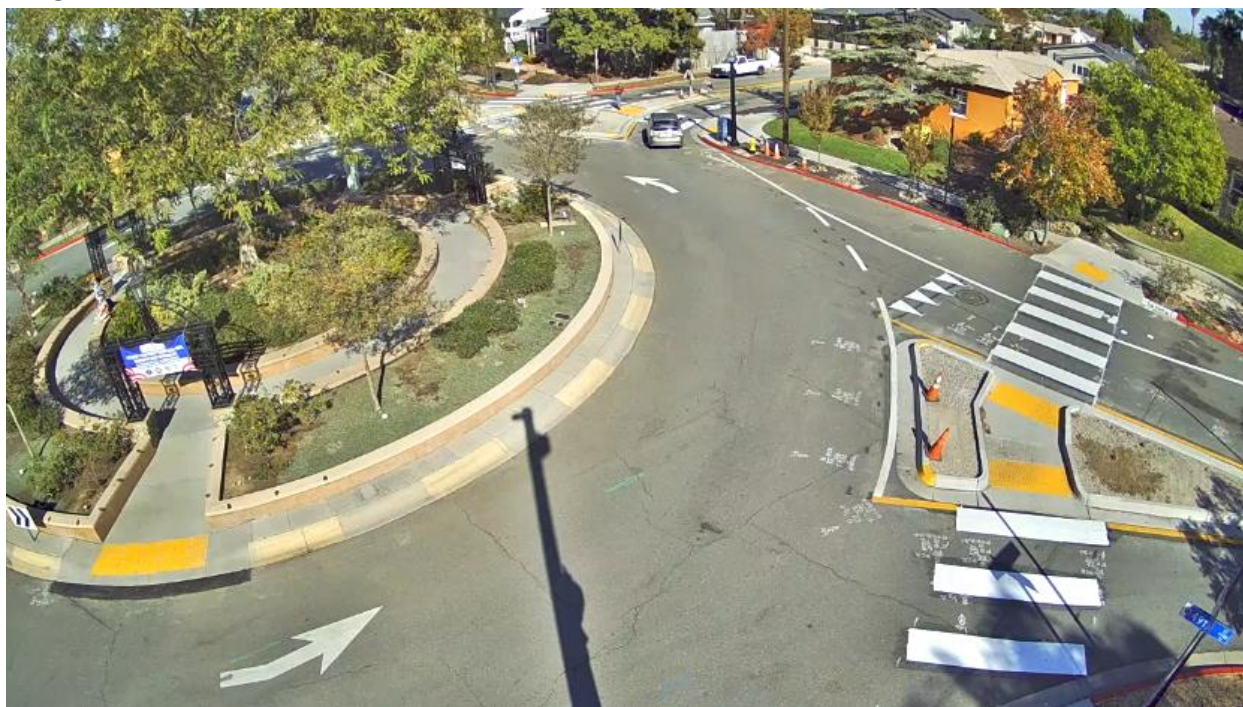


Image 5-5⁵



⁵ Video Reference: "20201120_060108_FC1D" Minute 0:38 Friday Nov 20, 2020 1:01:46 P.M

Interaction 6:

(Image 6-1) Pedestrian with dog crossing to island. (Image 6-2) Pedestrian stepping onto island and vehicle detected on approach. (Image 6-3) Pedestrian near island's ramp waits as driver does not seem to slow down. (Image 6-4) Driver ignores pedestrian and pedestrian crosses behind vehicle.

Image 6-1⁶



Image 6-2⁶



⁶ Video Reference: "20201120_073400_2238" Minute 4:48 Friday Nov 20, 2020 2:38:48 P.M.

Image 6-3⁶



Image 6-4⁶



⁶ Video Reference: “20201120_073400_2238” Minute 4:48 Friday Nov 20, 2020 2:38:48 P.M.

Interaction 7:

(Image 7-1) Pedestrian with dog approaches ramp and vehicle can be seen on approach. (Image 7-2) Pedestrian waiting behind ramp, and vehicle does not slow. (Image 7-3) Vehicle nearing crosswalk fails to yield to pedestrian. (Image 7-4) Ignored pedestrian crosses behind vehicle.

Image 7-1⁷



⁷ Video Reference: "20201120_085913_0447" Minute 2:30 Friday Nov 20, 2020 4:01:43 P.M.

Image 7-2⁷



Image 7-3⁷



⁷ Video Reference: "20201120_085913_0447" Minute 2:30 Friday Nov 20, 2020 4:01:43 P.M.

Image 7-4⁷



⁷ Video Reference: “20201120_085913_0447” Minute 2:30 Friday Nov 20, 2020 4:01:43 P.M.

Interaction 8:

(Image 8-1) Pedestrian waiting at ramp looking down roundabout at approaching vehicle. (Image 8-2) Vehicle does not slow, and pedestrian remains on island's ramp. (Image 8-3) Driver passing through crosswalk fails to yield to pedestrian waiting on ramp.

Image 8-1⁸

⁸ Video Reference: "20201120_093419_E849" Minute 0:15 Friday Nov 20, 2020 4:34:34 P.M.

Image 8-2⁸



Image 8-3⁸



⁸ Video Reference: “20201120_093419_E849” Minute 0:15 Friday Nov 20, 2020 4:34:34 P.M.

Interaction 9:

(Image 9-1) Vehicle on approach slows when approaching crosswalk as there is a vehicle going through the roundabout. (Image 9-2) Vehicle on approach proceeds to cover crosswalk and ignore pedestrian who waited at ramp during this interaction.

Image 9-1⁹**Image 9-2⁹**

⁹ Video Reference: "20201120_105932_05A1" Minute 2:15 Friday Nov 20, 2020 6:01:47 P.M.



7 RESULTS

The video review and analysis indicate that there is a high level of pedestrian activity at the roundabout intersection with many pedestrians walking to the center of the landscaped roundabout. Vehicle speed is also a concern and likely occurs due to the wide roadway. Pedestrians were observed to ignore pedestrian crossings and cross into the center island park area. Vehicles were also observed to ignore pedestrians waiting in the crossing areas.

The recent roundabout improvements including splitter island installation on all approaches provide shelter for pedestrians crossing each leg of the roundabout. The islands also serve to reduce speeds of vehicles entering and exiting and guide traffic into and out of the roundabout.

Installation of the warning sign W11-2 and diagonal downward pointing arrow plaque W16-7P at the pedestrian crossings is recommended to encourage driver awareness and increase safety.

The following lists the “conditions to consider” from Section 4.1 with summary details based on video review of how drivers and pedestrians use the roundabout.

- **Do motorists and pedestrians understand how the roundabout works? Is there confusion?**
Most motorists understand how to navigate the roundabout and feel comfortable going at relatively high speeds. General observations indicate that pedestrians yield to motorists.
- **Are people familiar with how to traverse the roundabout? Are they too comfortable with it? Are the splitter islands effective?**
Many vehicles observed seem comfortable navigating the roundabout and do so with little caution. The splitter islands are effective in providing refuge for pedestrians, especially given the width of the roadway and travel lanes. Vehicles exiting the roundabout tend to cross into the shoulder and bike lane.
- **How are motorists reacting?**
Motorists do not seem to mind the splitter islands. Some vehicles take more caution than others. One vehicle was observed to navigate the roundabout several times after missing an exit. For the most part, motorists seem familiar and comfortable with the splitter islands and roundabout.
- **Are motorists complying to the rules by yielding to vehicles and pedestrians in the roundabout?**
Seventy-one percent of drivers, when interacting with pedestrians, failed to yield and ignored pedestrians attempting to cross the street at a crossing ramp despite yield markings on all approaches.
- **Are motorists coming to a stop when they see a pedestrian?**
Pedestrians are yielding to vehicles rather than vehicles yielding to pedestrians. Many vehicles (43) were observed to ignore pedestrians while 21 vehicles either stopped or yielded for pedestrians.

- **Are pedestrians using care when they enter the roundabout? Do pedestrians use the crosswalk and look both ways?**
Ninety percent of pedestrians either look both ways before crossing or at least wait on the ramp before proceeding to cross the street when a vehicle is present on approach. This indicates that most pedestrians exhibit caution before entering the roundabout when a vehicle is present.
- **Do the pedestrians observe vehicles on the approach and wait until the vehicle yields or stops before entering the crosswalk? Do pedestrians use the splitter islands?**
Yes, pedestrians do not appear to trust that vehicles will stop and were observed to seek refuge at the splitter islands on multiple occasions.
- **Would the signs improve driver awareness?**
Signs would improve driver awareness. Many motorists are overly comfortable and navigate the roundabout with ease and without much caution.
- **Are there unique characteristics of the roundabout that should be considered for installing the signs?**
Yes, the mini park destination in the roundabout is unique.

7.1 Recommendations Summary

It is recommended to install the pedestrian warning signs W11-2 and W16-7P at all pedestrian crossings.



W11-2



W16-7P

The roundabout has high pedestrian activity and motorists traverse the intersection with ease. Increasing driver awareness of pedestrians is recommended to encourage yielding to pedestrians and safe speeds. Including this signage will also prepare drivers that may suddenly encounter pedestrians crossing diagonally into the Talmadge Mini Park.

Appendix: Traffic Count Data

Legend	
Symbol	Meaning
Ad E	Adams Avenue East
Ad W	Adams Avenue West
49th N	49th Street North
49th S	49th Street South
Lor	Lorraine Drive
Red Text	Entry of Interest
	1/2 Hour Increments
	Change of Viewing Location
	Start of 5-min Intervals
	Skip of Footage

Ref #	File Ref #	Time on Video (min:sec)	Date (Video)	Starting Time of Video	End Time of Video	Vehicle Movements										Bike Movements										Pedestrian Movement (Leg Crossing)					Ped/ Vehicle Interaction (Y/N)	Ped/ Vehicle Interaction (Y)	Ped/ Vehicle Interaction (N)	Driver Behavior w/o Ped @ Ramp		Driver Behavior w/ Ped @ Ramp		Ped Behavior w/o Vehicle on Approach			Ped Behavior w/ Vehicle on Approach			Descriptive Summary of Movements	High Speed																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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Ref #	File Ref #	Time on Video (min:sec)	Date (Video)	Starting Time of Video	End Time of Video	Vehicle Movements										Bike Movements										Pedestrian Movement (Leg Crossing)					Ped/ Vehicle Interaction (Y/N)	Ped/ Vehicle Interaction (Y)	Ped/ Vehicle Interaction (N)	Driver Behavior w/o Ped @ Ramp		Driver Behavior w/ Ped @ Ramp		Ped Behavior w/o Vehicle on Approach			Ped Behavior w/ Vehicle on Approach			Descriptive Summary of Movements	High Speed								
						Entry Leg					Exit Leg					Entry Leg					Exit Leg					Ad E	Ad W	49th N	49th S	Lor				Yield	No Yield	Ignore	Yield	Stop	Wait @ Ramp	Looking Both Ways	No Stop @ Ramp	Wait @ Ramp	Looking Both Ways			No Stop @ Ramp							
						Ad E	Ad W	49th N	49th S	Lor	Ad E	Ad W	49th N	49th S	Lor	Ad E	Ad W	49th N	49th S	Lor	Ad E	Ad W	49th N	49th S	Lor																												
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		1:42		12:21:01 PM	12:22:43 PM							1																					0	0															Vehicle slows on approach				
		1:45		12:21:01 PM	12:22:46 PM								1																				0	0															Vehicle slows on approach				
		1:49		12:21:01 PM	12:22:50 PM			1																									0	0															Vehicle slows on approach				
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		2:04		12:21:01 PM	12:23:05 PM			1					1																				0	0															Vehicle enters too fast	1			
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		2:17		12:21:01 PM	12:23:18 PM								1																				0	0																			
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		3:41		12:21:01 PM	12:24:42 PM			1																									0	0															Vehicle slows on approach				
		3:52		12:21:01 PM	12:24:53 PM																																																

Ref #	File Ref #	Time on Video (min:sec)	Date (Video)	Starting Time of Video	End Time of Video	Vehicle Movements										Bike Movements										Pedestrian Movement (Leg Crossing)					Ped/ Vehicle Interaction (Y/N)	Ped/ Vehicle Interaction (Y)	Ped/ Vehicle Interaction (N)	Driver Behavior w/o Ped @ Ramp		Driver Behavior w/ Ped @ Ramp		Ped Behavior w/o Vehicle on Approach			Ped Behavior w/ Vehicle on Approach			Descriptive Summary of Movements	High Speed											
						Entry Leg					Exit Leg					Entry Leg					Exit Leg					Ad E	Ad W	49th N	49th S	Lor				Ad E	Ad W	49th N	49th S	Lor	Ad E	Ad W	49th N	49th S	Lor			Yield	No Yield	Ignore	Yield	Stop	Wait @ Ramp	Looking Both Ways	No Stop @ Ramp	Wait @ Ramp	Looking Both Ways	No Stop @ Ramp
						Ad E	Ad W	49th N	49th S	Lor	Ad E	Ad W	49th N	49th S	Lor	Ad E	Ad W	49th N	49th S	Lor	Ad E	Ad W	49th N	49th S	Lor																															
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Total Vehicles	394
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