Figure 3: The pop-up traffic circles were completed (left, center, right) through the hard work of the installation crew (center).

The interior of the circles were painted white with a 6-inch-wide yellow line outlining the perimeter – forming a 12–foot radius circle. Each circle also included 36-inch-high reflective yellow delineators. The delineators formed a 10-foot radius circle at 3rd & Baker and 2nd & Grove. The traffic circle at 4th & Desta incorporated rubber curb stops set at an 11-foot radius with delineators set at a nine-foot radius. As Desta Street is the designated truck route for RML, this altered design allows larger vehicles to navigate the circles without running over the delineators. All materials are compliant with the Manual on Uniform of Traffic Control Devices (MUTCD).

The intersection characteristics, traffic circle dimensions, and resulting travel lane widths are shown in Table 1:

Table 1: Intersection and traffic circle characteristics for the Hamilton pop-up features.

Intersection	Diagonal Distance	Stop Signs	Sidewalk Description	Traffic Circle Radius	Lane widths with circle installed
2nd & Grove	68 feet	Yes – 2-Way	Sidewalks with curb cuts run north/south on east side of 2nd and southwest side. Missing sidewalks on west side of 2nd north of intersection. No sidewalks on Grove.	Paint: 12 feet Delineators: 10 feet	22 feet (68'-24'= 44'/2)
3rd & Baker	64 feet	no	Sidewalks with curb cuts run north/south on both sides of 3rd. A short section of sidewalk on SW corner of Baker does not connect to street	Paint: 12 feet Delineators: 10 feet	20 feet (64'-24'= 40'/2)
4th & Desta	72 feet	Yes – 4-Way	Sidewalks with curb cuts run north/south on both sides of 4th. No sidewalks on Desta.	Paint: 12 feet Curb stops: 11 feet Delineators: 9 feet	24 feet (72'-24' = 48'/2)

Data Collection

Data collection included vehicle speed and traffic volume, as described below.

Vehicle Speed and Traffic Volume

Vehicle speed and traffic volume data were collected midblock at multiple locations surrounding each of the intersections. Figure 4 shows the locations of the individual data collection sites in blue and the traffic circle locations in red.

Pre-installation data collection occurred during May and June of 2023. Post installation (or during the installation) data collection occurred during September and October of 2023. Speed and volume data were collected utilizing a Houston Radar unit and analyzed with the Houston Radar Software. The main data points analyzed were average speed, 85th percentile speeds, max speed, average daily traffic volume, and percentage of drivers speeding. The speed limit was 25 miles per hour (mph) in all locations in the study area. Key changes in the data collected pre and post installation were very minor changes or no change in the average and 85th percentile speed data collected near the 2nd & Grove traffic installation, and an increase in max speed midblock from the installation as shown in Table 2.

Figure 4: The data collection sights (blue pins) and traffic circle locations (red) in Hamilton.

Table 2: 2nd & Grove traffic circle vehicle speed and traffic volume data - Grove at alley.

Incoming – (Eastbound)	Before Installation	During Installation	Change		Outgoing – (Westbound)	Before Installation	During Installation	Change
Average Speed	21.5 mph	21.3 mph	**- 0.2 mph**		Average Speed	21.3 mph	21.1 mph	**- 0.2 mph**
85th Percentile Speed	25 mph	25 mph	**0 mph**		85th Percentile Speed	25 mph	25 mph	**0 mph**
Max Speed	38 mph	42 mph	**+ 4 mph**		Max Speed	38 mph	40 mph	**+ 2 mph**
% Over Speed Limit	14.6 %	14.0 %	**- 0.6 %**		% Over Speed Limit	11.2 %	11.8 %	**+ 0.6 %**
Average Daily Vehicle Volume	222	195	**- 29**		Average Daily Vehicle Volume	231	205	**- 26**

Data collected near the 3rd & Baker installation showed a reduction in average and 85th percentile speeds in all directions with a minor increase (+1 MPH) in max speed for traffic travelling east on Baker as demonstrated in Table 3and Table 4.

Table 3: 3rd & Baker Traffic Circle Vehicle Speed & Traffic Volume Data – Baker at 3rd.

Incoming – (Southbound)	Before Installation	During Installation	Change		Outgoing – (Northbound)	Before Installation	During Installation	Change
Average Speed	19.1 mph	17.3 mph	**- 1.8 mph**		Average Speed	18.7 mph	17 mph	**- 1.7 mph**
85th Percentile Speed	23 mph	20 mph	**- 3 mph**		85th Percentile Speed	22 mph	20 mph	**- 2 mph**
Max Speed	36 mph	26 mph	**- 10 mph**		Max Speed	46 mph	33 mph	**- 13 mph**
% Over Speed Limit	3.7 %	0.3 %	**- 3.4 %**		% Over Speed Limit	3.8 %	1.0 %	**- 2.8 %**
Average Daily Vehicle Volume	80	65	**- 15**		Average Daily Vehicle Volume	80	84	**+ 4**

Table 4: 3rd & Baker Traffic Circle Vehicle Speed & Traffic Volume Data – Baker at alley.

Incoming – (Eastbound)	Before Installation	During Installation	Change		Outgoing – (Westbound)	Before Installation	During Installation	Change
Average Speed	19.8 mph	18.4 mph	**- 1.4 mph**		Average Speed	19.6 mph	18.3 mph	**- 1.3 mph**
85th Percentile Speed	23 mph	22 mph	**- 1 mph**		85th Percentile Speed	24 mph	21 mph	**- 3 mph**
Max Speed	34 mph	35 mph	**+ 1 mph**		Max Speed	42 mph	39 mph	**- 3 mph**
% Over Speed Limit	5.9 %	1.9 %	**- 4.0 %**		% Over Speed Limit	7.7 %	3.9 %	**- 3.6 %**
Average Daily Vehicle Volume	89	86	**- 3**		Average Daily Vehicle Volume	141	137	**- 4**

Data collected near the 4th & Desta traffic circle installation showed an increase and no change for traffic travelling north and south on 4th and a decrease in all data variables for traffic travelling east and west on Desta as demonstrated in Table 5 and Table 6. The radar placed closer to the circle at Desta and the alley just to the east, showed significant decreases in speeds and the percentage of people driving over the limit.

Table 5: 4th & Desta Traffic Circles Vehicle Speed & Traffic Volume Data – Desmet at 4th.

Incoming – (Southbound)	**Before Installation**	**During Installation**	**Change**		**Outgoing – (Northbound)**	**Before Installation**	**During Installation**	**Change**
Average Speed	22.2 mph	22.0 mph	**- 0.2 mph**		Average Speed	21.8 mph	22.0 mph	**+ 0.2 mph**
85th Percentile Speed	25 mph	25 mph	**0 mph**		85th Percentile Speed	25 mph	26 mph	**+ 1 mph**
Max Speed	36 mph	39 mph	**+ 3 mph**		Max Speed	40 mph	46 mph	**+ 6 mph**
% Over Speed Limit	13.5 %	15.0 %	**+ 1.5 %**		% Over Speed Limit	12.5 %	15.5 %	**+ 3.0 %**
Average Daily Vehicle Volume	363	288	**- 75**		Average Daily Vehicle Volume	288	274	**- 1**

Table 6: 4th & Desta Traffic Circles Vehicle Speed & Traffic Volume Data – Desta at alley.

Incoming – (Eastbound)	**Before Installation**	**During Installation**	**Change**		**Outgoing – (Westbound)**	**Before Installation**	**During Installation**	**Change**
Average Speed	22.5 mph	18.1 mph	**- 4.4 mph**		Average Speed	21.2 mph	19.4 mph	**- 1.8 mph**
85th Percentile Speed	26 mph	21 mph	**- 5 mph**		85th Percentile Speed	25 mph	22 Mph	**- 3 mph**
Max Speed	41 mph	31 mph	**- 10 mph**		Max Speed	48 mph	41 mph	**- 7 mph**
% Over Speed Limit	18.7 %	1.1 %	**-17.6 %**		% Over Speed Limit	13.2 %	3.0 %	**- 10.2 %**
Average Daily Vehicle Volume	141	174	**+ 33**		Average Daily Vehicle Volume	227	296	**+ 69**

There was a collision at the 4th & Desta traffic circle on Friday November 3rd, 2023. The report relayed that a vehicle entered the circle on Desta and the driver approaching on 4th failed to yield. Traffic circles force drivers to slow down, thus, if a crash does occur, it tends to be at a lower speed and less severe than a higher-speed collision at an uncontrolled or stop-controlled intersection. Traffic speed is an important safety factor, especially along neighborhood streets where there tend to be more people and children walking. The faster a vehicle travels, the greater the likelihood of serious injury or death in the event of a crash (see Figure 5 for more).

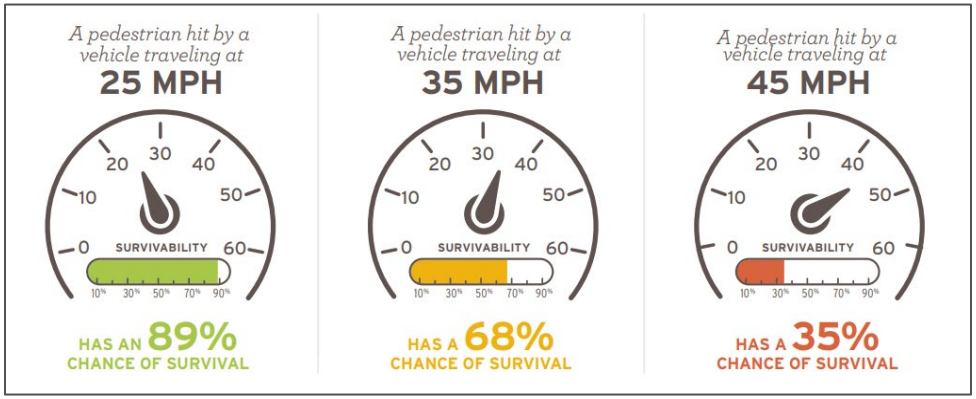

Figure 5: Comparing vehicle speeds with a pedestrians' risk of severe injury or death (Tefft 2011).

Traffic speed plays a large part in survival when a crash occurs in areas where pedestrians and children are present. The goal of this pop-up traffic circle project was to increase overall safety by lowering traffic speeds through a residential area.

Community Perceptions Survey

A key component to the pop-up traffic calming process is the creation, dissemination, and evaluation of a community survey to understand perceptions of different user groups and community members. For this project, a survey was created by staff from WTI in partnership with City of Hamilton. The survey was hosted on WTI's professional Survey Monkey account and a QR code and web link were shared with the City of Hamilton to collect survey responses. The Survey Monkey platform was used to collect and analyze data. The following is a summary of survey results.

In total, 254 people responded to the survey over the 1 ½ month period that it was open. Of those 254, 219 self-identified as living within the Hamilton City limits. When broken down and analyzed amongst individuals residing within city limits, there was an almost even split between those in favor of the traffic calming projects and those opposed to it. However, when it came to supporting permanent installation as well as looking at other areas in the city to install, more respondents (52.5% & 54.3%) were in favor than opposed (44.8% & 41.1%), respectively. Figure 6 shows the responses of residents living within city limits.

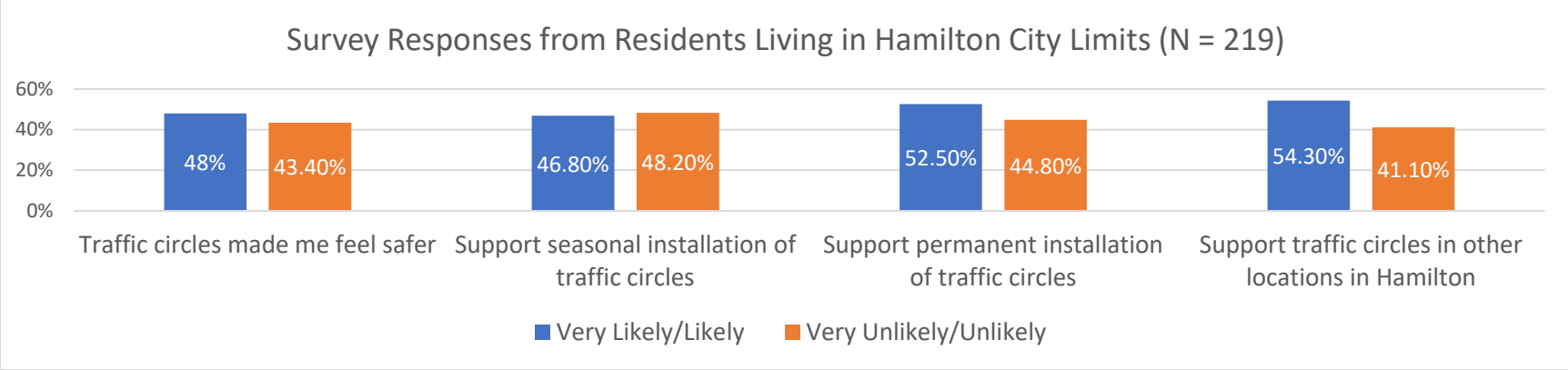

Figure 6: Traffic circle perceptions for respondents living within Hamilton city limits.

Residents were also asked to identify which neighborhood in Hamilton they lived in to gain an understanding of project support and perceptions of safety, especially amongst people who live on the Southwest side of town, where the installations occurred. Out of 219 total respondents, 128 reported living in the Southwest neighborhood (Figure 7). Residents of the Southwest neighborhood were supportive of traffic circles seasonally, permanently, and in other locations (49.2%, 54.7% and 54.7%), while residents of the same area were opposed (46.9%, 44.5%, and 39.8%).

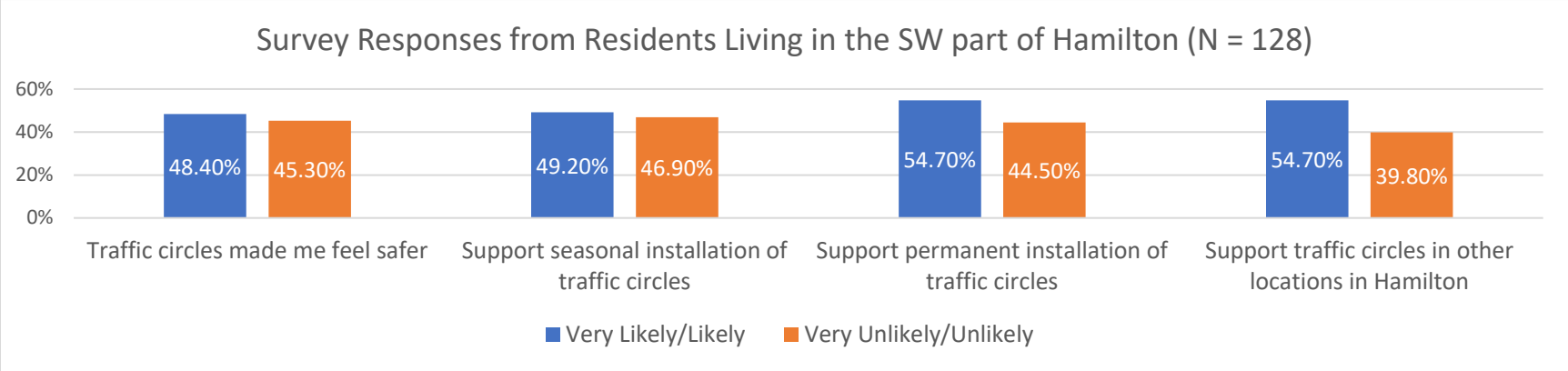

Figure 7: Traffic circle perceptions for respondents living on the southwest side of Hamilton.

Respondents were asked to report how they travelled through the installations and could choose between vehicular travel (car, truck, personal vehicle, or commercial vehicle) or forms of personal mobility (bicycle, foot, scooter, or skateboard). The data from the survey shows that people who traveled by personal mobility felt safer with the traffic installations than those in vehicular modes of travel as shown in Figure 8.

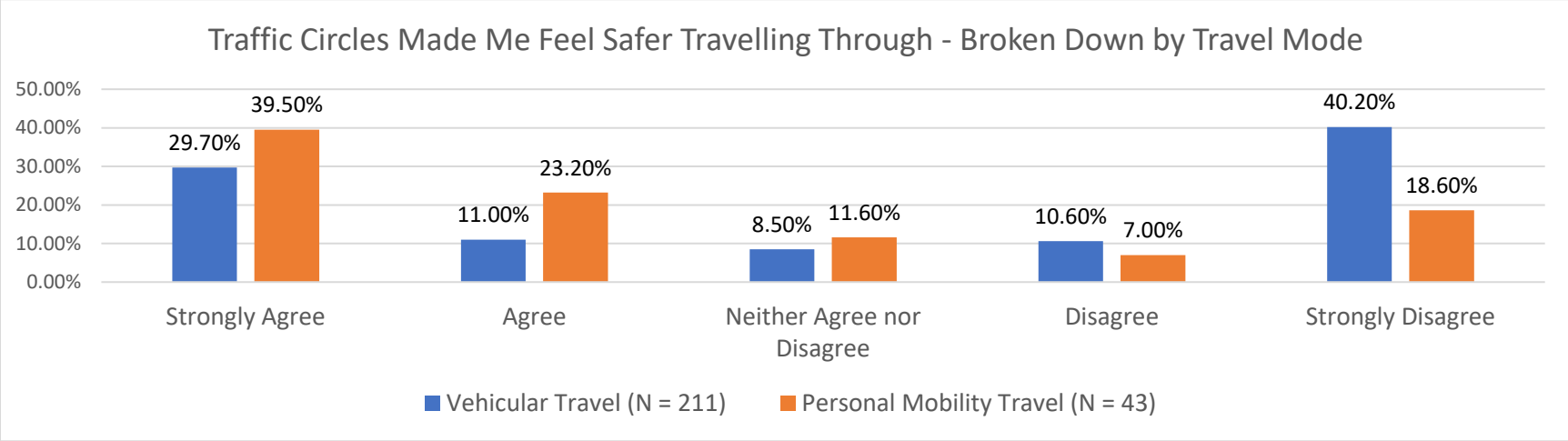

Figure 8: Safety perceptions for all of the pop-up circles broken down by travel mode.

In addition to the questions about perception, there was one open-ended question that asked for possible locations of other traffic calming installations. There were responses that recommended different locations around the city and there were responses that recommend removing and not reinstalling installations. Locations that had multiple recommendations are listed below. The full list of responses will be shared with City of Hamilton staff.

- Franklin Ave – multiple intersections along this street were recommended (2nd, 3rd, & 4th)
- State Street – at intersections further away from Highway 93 as respondents noted higher speeds
- Pine Street – at the intersection with North 3rd Street
- Marcus Street – at the intersection with Kurtz Lane
- Silverberry Street – multiple locations identified

Budgeted Costs for Traffic Circle Installation

The materials and supplies used for the installation of the City of Hamilton Traffic Circle pop-up project were purchased by Bike Walk Bitterroot with assistance from a Rapp Family Foundation grant. Technical assistance for the project was paid for with funds from an AARP Community Challenge grant. The total cost for materials and supplies (Table 7 and Table 8) for all three installations was approximately $5,800.

Table 7: 2nd & Grove and 3rd & Baker Materials & Supplies

Materials	Quantity Needed	Cost Per Unit	Material Cost
Yellow delineator w/ base	10	$40	$400
Traffic Circle & Yield Sign	8	$72	$576
White Paint	2 gallons	$40	$80
Yellow Paint	1 gallon	$40	$40
Misc supplies	--	$50	$50
Planter	1	$560	$560
Soil	9 cu. ft.	$5	$45
Plants		$90	$90
		Total Cost:	**$1,841**

Table 8: 4th & Desta Traffic Circle Materials & Supplies.

Materials	Quantity Needed	Cost Per Unit	Material Cost
Yellow delineator w/ base	10	$40	$400
Traffic Circle & Yield Sign	8	$72	$576
White Paint	2 gallons	$40	$80
Yellow Paint	1 gallon	$40	$40
Misc supplies	--	$50	$50
Planter	1	$560	$560
Soil	9 cu. ft.	$5	$45
Plants		$90	$90
Rubber Speed Bumps	10	$90	$900
		Total Cost:	**$2,741**

Outcomes and Recommendations

This traffic calming project provides neighbors, WTI, Bike Walk Bitterroot, and the City of Hamilton the opportunity to install temporary projects that test different installation types. In this Hamilton neighborhood, temporary traffic circles were tested on an uncontrolled intersection (3rd & Baker), a two-way stop intersection (2nd & Grove) and a 4-way stop intersection (4th and Desta). The data collected, neighborhood engagement, and public input during this project lays an important foundation for continued traffic calming efforts in Hamilton. Quantitative data collected with radars and qualitative data collected through surveys and public input provide valuable feedback to inform traffic calming efforts moving forward. These projects are iterative, where adjustments can be made as needed, and can inform longer-term pop-ups that provide a low-cost way to slow traffic speeds on neighborhood streets until more permanent traffic solutions are implemented during street reconstruction.

At the onset of the project, neighborhood residents, Bike Walk Bitterroot, and City of Hamilton staff identified the following goals for the project:

1. Increase safety for residents and pedestrians
2. Slow drivers' speed along neighborhood streets on the Southwest side of town

Based on data collected throughout the duration of the project, the staff at WTI made the following recommendations for traffic calming:

1. Based on updates to the MUTCD – any neighborhood traffic circles that are installed need to be signed with yield signs (R1-2) as well as a circular direction of travel sign (R6-5P) as noted in section 2B.51, figure 2B.24, p. 122 of the updated MUTCD (Figure 9).
2. Reinstall the traffic circle at 3rd & Baker with the same geometry and features as the installation during the summer of 2023, including the installation of yield signs.
3. Remove the traffic circle at 2nd & Grove and reinstall stop signs. Prioritize uncontrolled intersections, rather than those with stop signs, for future projects.
4. Reinstall the traffic circle at 4th & Desta with updated geometry that includes curb extensions on both the north and south approaches to the intersection, which will slow motorists entering the circle. If these temporary curb changes are not made, reinstallation of the circle is not recommended. Install a temporary pole that would allow for radar to be installed mid- block to measure before and after speeds closer to the circle.

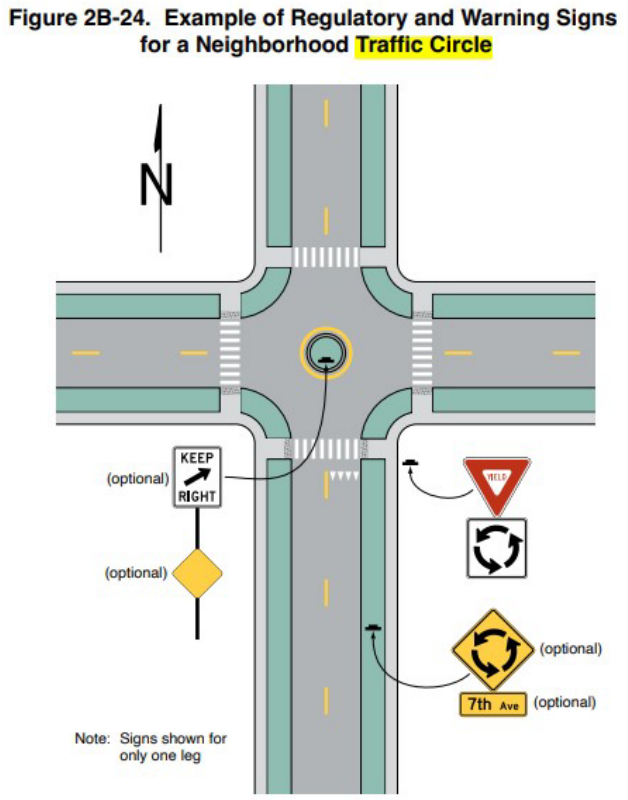

Figure 9: Figure 2B.24, from section 2B.51, p. 122 of the updated MUTCD.

5. Work with Bike Walk Bitterroot to explore other uncontrolled intersections along neighborhood streets that are key connecting routes to parks, schools, businesses, or are known cut throughs that avoid travelling on main routes. Prioritize future projects on uncontrolled intersections over stop-controlled intersections, unless there is a crash cluster, close calls and/or neighborhood complaints. Review the list of suggested locations from the community survey, as well as other conversations. Once potential intersections have been identified, collect existing conditions data to identify need.
    a. When determining whether a traffic circle is recommended, look at the following data points:
        i. Any existing crash data from the police or public works
        ii. Noted speed issues - consider 85th percentile speeds and percentage of drivers traveling over the speed limit
6. Create an annual budget for a traffic calming program that allows for reinstallation of existing traffic calming features, as well as the addition of a certain number of new features each year.

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