Swift & Spear Intersection Feasibility Study

Alternatives Public Input + Conclusions

July 27, 2021

Design Principles

Think big!

- Potential right-of-way acquisition.
- Incorporate planned bike & pedestrian facilities.
- Forecast traffic volumes to 2033 design year.

Improve safety & function for people on foot & bicycle.

- Maintain or shorten street crossing widths.
- Maximize street crossing options.
- Do not increase vehicle speeds where people have to cross the road.

Improve safety & function for people driving.

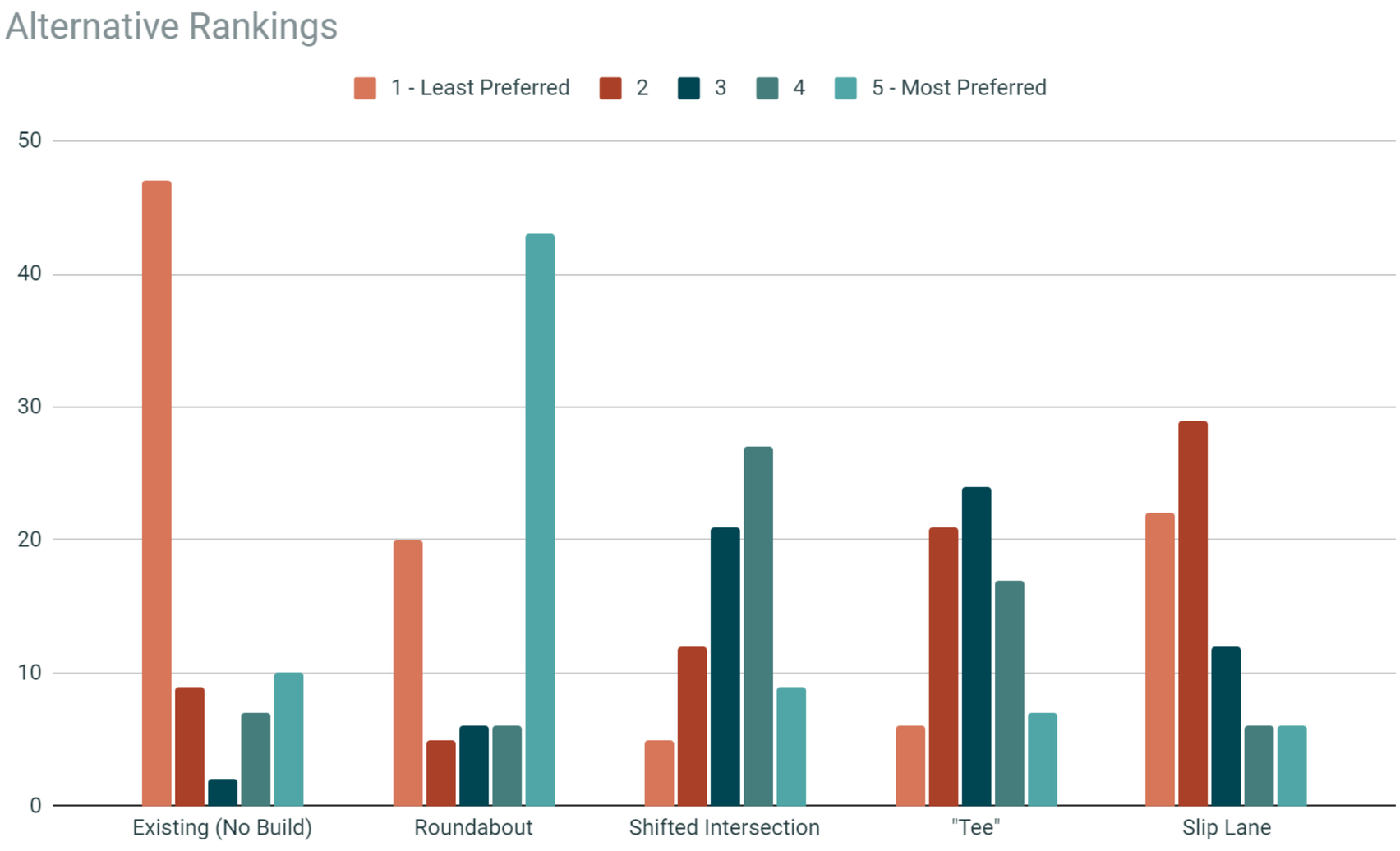
- Improve sight distance.
- Improve or maintain traffic operations.
- Design vehicle: City Bus & WB40. *Larger vehicles can use the intersection, but would cross the centerline or use a truck apron.*

Constructability.

- Minimize natural resource impacts.
- Gain community support.
- Cost/budget feasibility.

Alternatives Public Input

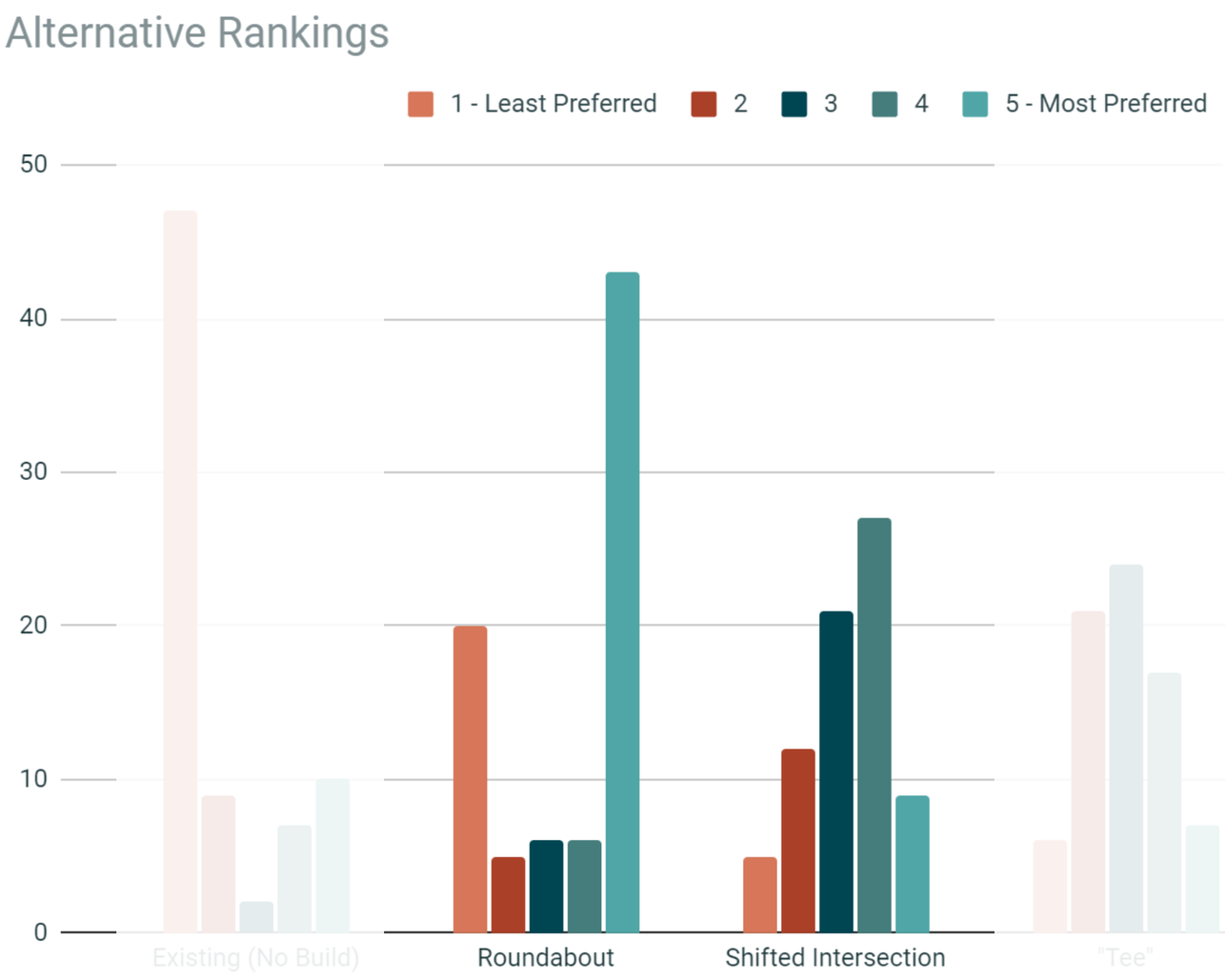
- 85 Responses
- Online survey open from June 7 - July 9, 2021
- Online video was viewed 33 times

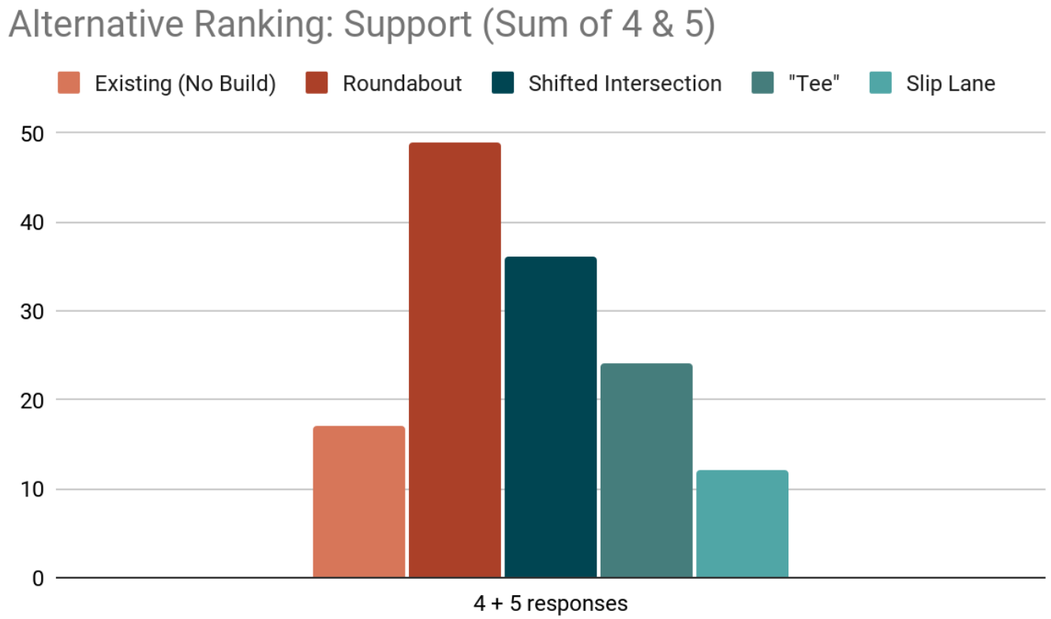


Alternatives Public Input

» There was the most support for the roundabout alternative and the shifted intersection alternative.

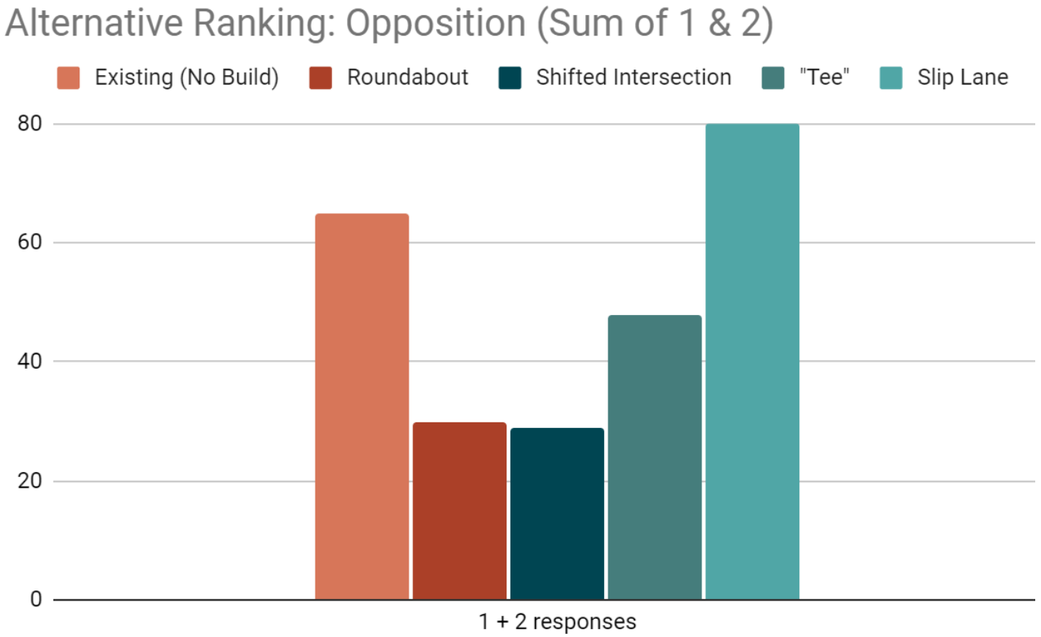
» Though there was more support than opposition, the roundabout was polarizing.

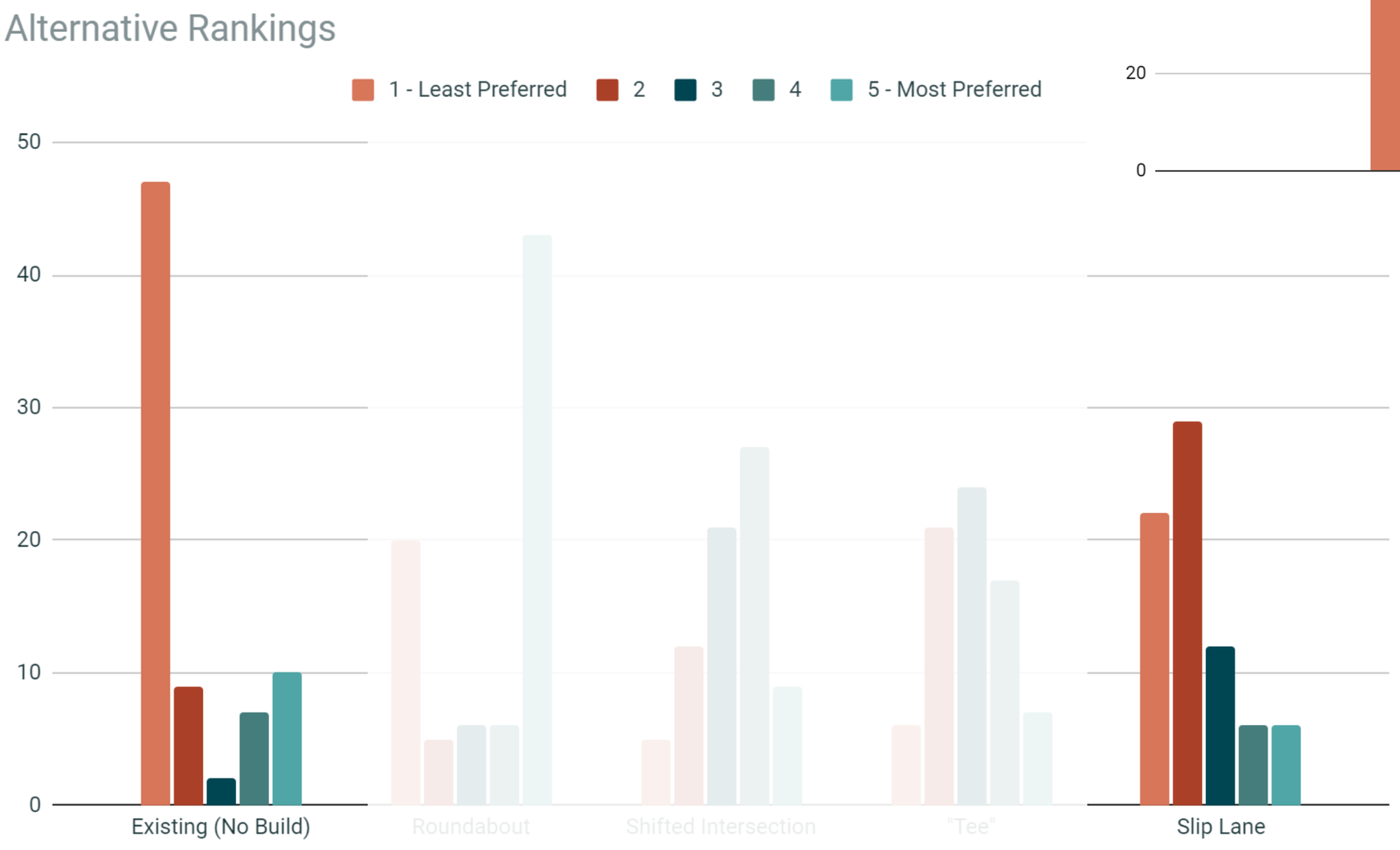




Alternatives Public Input

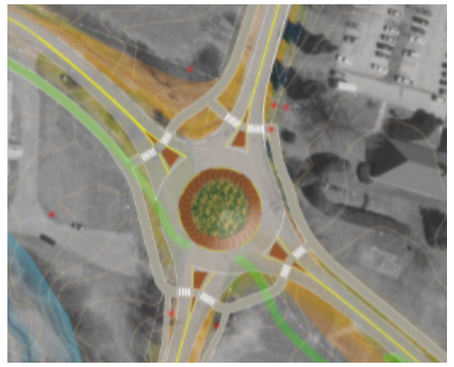
» There was the most opposition to the slip lane alternative and Existing (No Build).



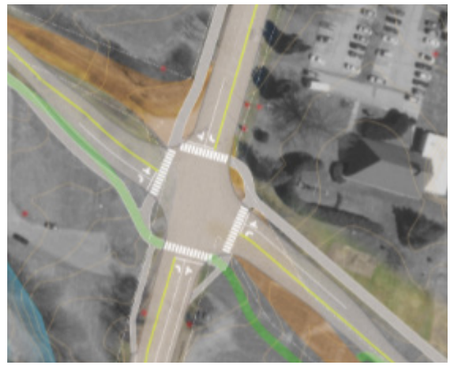


Alternatives Public Input

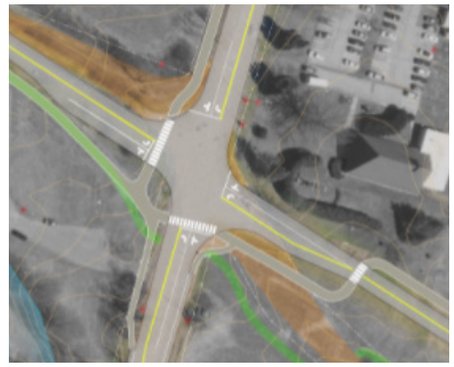
No Build



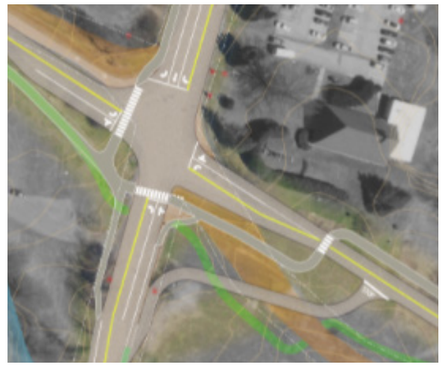
Roundabout



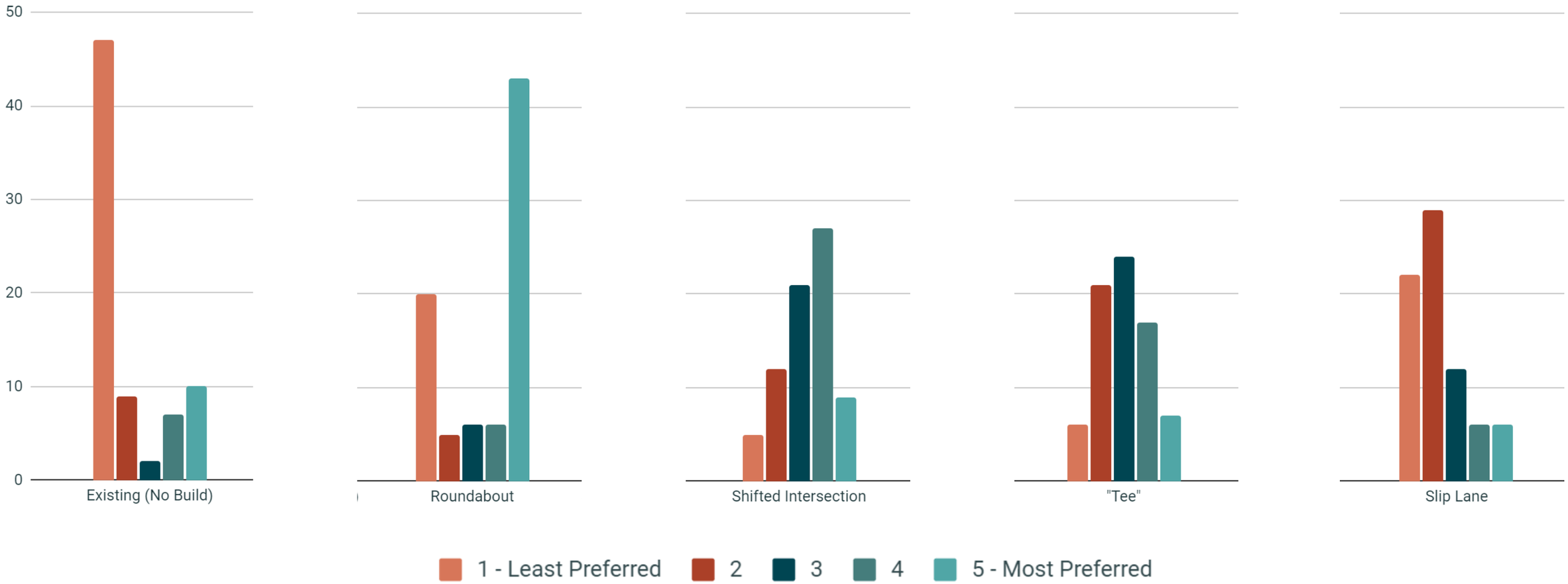
Shifted Intersection



“Tee”



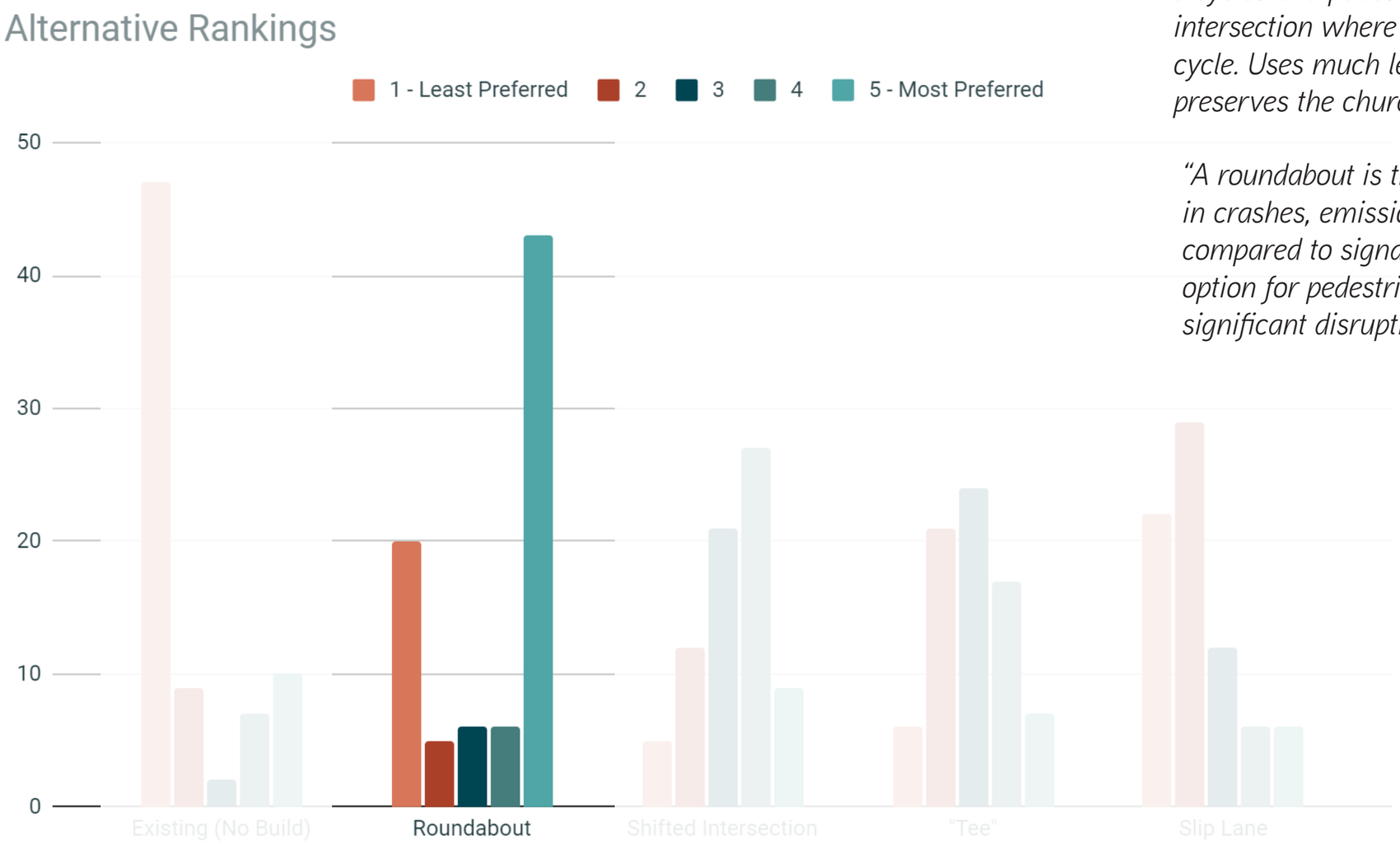
Slip Lane



Alternatives Public Input - “Pro” Comments

» Open ended responses highlight the differing schools of thought on roundabouts.

» Note that there were more “pro” roundabout open-ended responses (11) than “anti” roundabout comments (6).



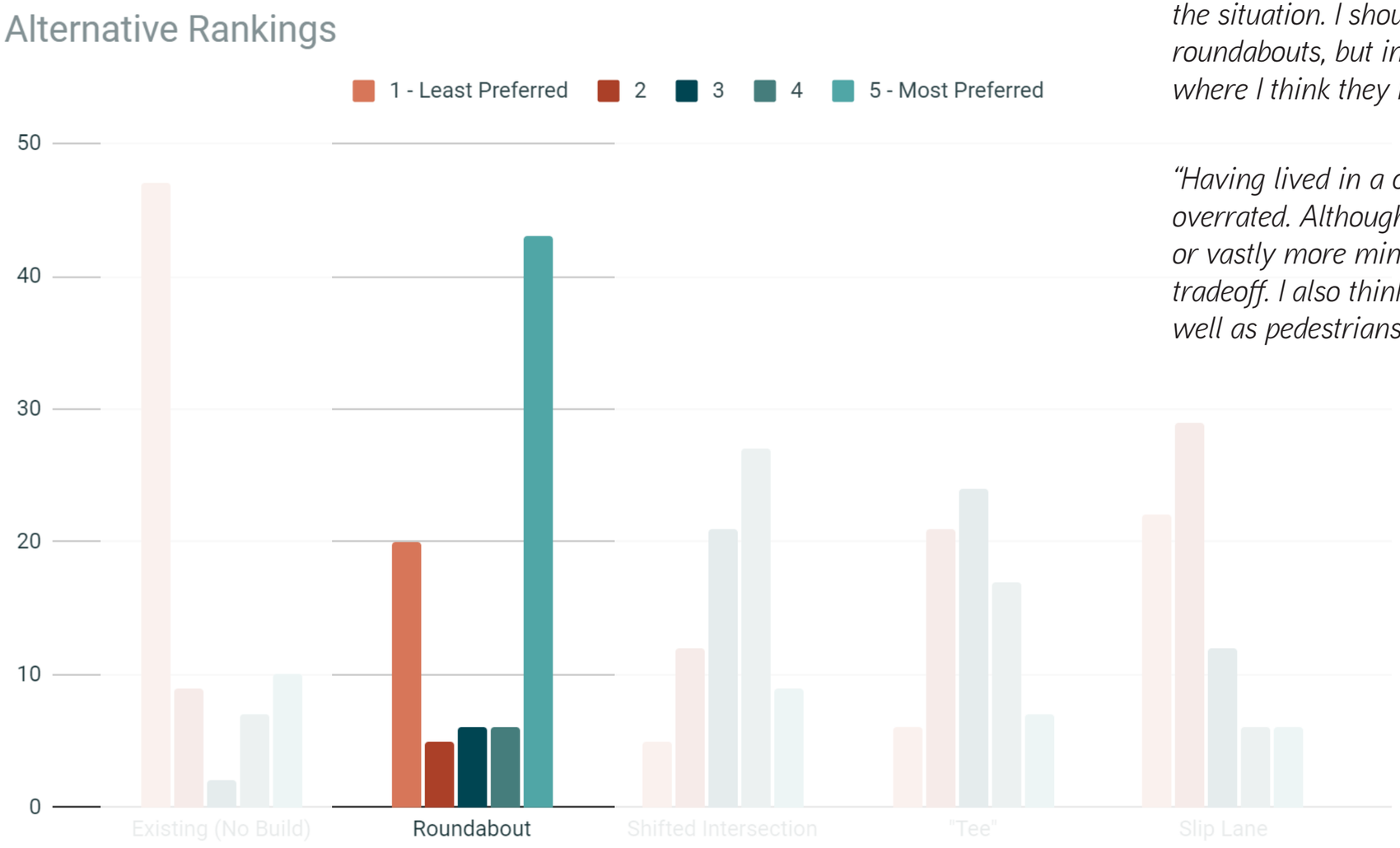
“Where I come from (Ireland) roundabouts are everywhere and they work brilliantly, allowing much better traffic flow while reducing accidents and keeping pedestrians safe. Let’s innovate to make South Burlington a better, safer place for everyone. “

“The Roundabout is the best solution: Safest for vehicles, bicycles and pedestrians. Better for traffic flow than signalized intersection where traffic must stop and start at every signal cycle. Uses much less of the All Saints Church property and preserves the church’s community garden.”

“A roundabout is the superior choice given proven reductions in crashes, emissions, energy usage, and speed when compared to signalized intersections. It will be a much safer option for pedestrians. Land is available to build this without significant disruption to traffic operations.”

Alternatives Public Input - “Con” Comments

» Open ended responses highlight the differing schools of thought on roundabouts.



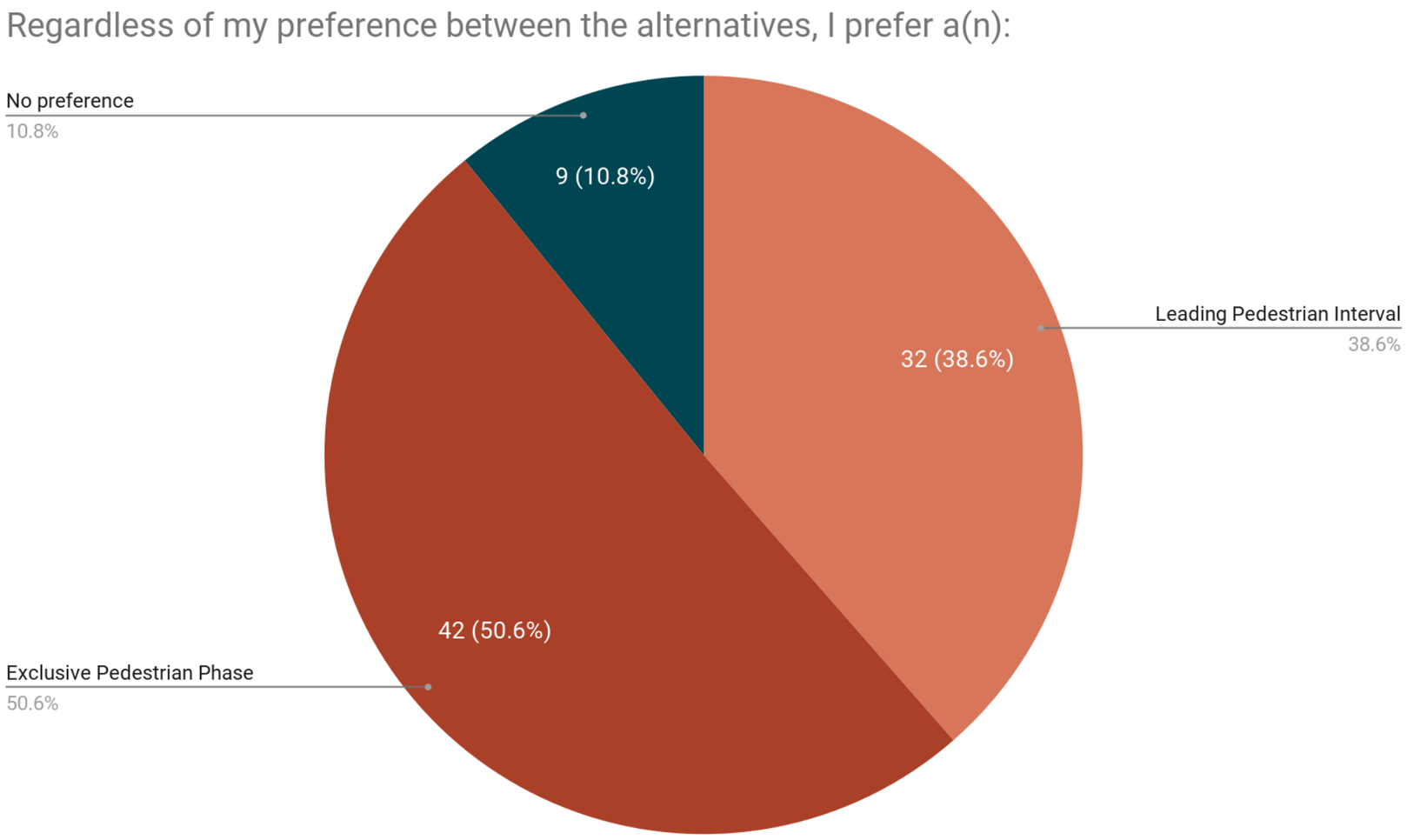
“The roundabout option looks interesting, and seems to be the engineer’s choice, but there would be even less inclination for drivers to stop for pedestrians/bicyclists with no stop lights. I’m afraid the roundabout would be too confusing for drivers unfamiliar with the intersection.“

“ I really can’t imagine how the roundabout would improve the situation. I should say that in general, I’m a big fan of roundabouts, but in areas without a lot of pedestrian traffic where I think they keep traffic moving smoothly and safely. “

“Having lived in a city with multiple ‘circles’, I find them highly overrated. Although there are fewer ‘severe’ accidents, there or vastly more minor accidents. I don’t think it is worth the tradeoff. I also think it will make it worse for both bicyclists, as well as pedestrians.”

Alternatives Public Input

» For signalized intersections, exclusive pedestrian phases were preferred over leading pedestrian intervals.



Design Principles - Goals Met

	No Build	Roundabout	Shifted Intersection	Tee	Slip Lane
Think big!	✓✓✓	✓✓✓	✓✓	✓✓✓	✓✓✓
Improve safety & function for people on foot & bicycle.	✓✓✓	✓✓✓	✓✓	✓✓	✓✓
Improve safety & function for people driving.	✓✓✓	✓✓✓	✓	✓✓	✓✓
Constructability (includes cost).	✓✓✓	✓	✓✓	✓	✓

Comparison

	Improve safety & function for people on foot & bicycle.				Improve safety & function for people driving						Constructability		
Alternative	**Average Crosswalk Width (ft)**	**Crossing Options**	**Crossing Type**	**Path Connectivity Improvement**	**Improves Sight Distance**	**Proven to Reduce Crashes**	**Traffic Operations (Worst Case)** Scenario	LOS	Delay	Queue	**Add'l ROW (acre)**	**Existing Path Reconst-ruction (ft)**	**Planning Level Cost**
No Build													
	36	2 / 4	Exclusive Ped Phase (sig)	No change	No	No	2033 AM	E	67.9	844 (NB)	0	0	-
Roundabout													
	35	4 / 4	Median Refuges (unsig)	4 approaches	Yes	Yes	2033 AM	C	32.4	924 (WB)	0.60	545	$2.8 million
Shifted Intersection													
	54	4 / 4	Exclusive Ped Phase (sig)	4 approaches	Yes, but not all	No	2033 AM	E	67.9	844 (NB)	0.66	575	$1.7 million
Tee													
	43	3 / 4	Leading Ped Interval (sig)	2 approaches	Yes	No	2033 PM	D	44.2	535 (NB)	0.96	785	$1.8 million
Slip Lane													
	37	3 / 4	Exclusive Ped Phase (sig)	2 approaches	Yes	No	2033 AM	D	44.4	942 (AM)	1.19	795	$2 million

Traffic Analysis

Alternative	Morning Peak Hour								Afternoon Peak Hour							
	2023 AM				2033 AM				2023 PM				2033 PM			
	LOS	Delay (s)	v/c ratio	Queue (ft) (approach)	LOS	Delay (s)	v/c ratio	Queue (ft) (approach)	LOS	Delay (s)	v/c ratio	Queue (ft) (approach)	LOS	Delay (s)	v/c ratio	Queue (ft) (approach)
No Build																
	E	65.3	0.87	874 (NB)	E	67.9	0.90	844 (NB)	E	61.1	0.77	722 (EB)	E	62.3	0.81	716 (EB)
Roundabout																
	C	21.4	0.71	535 (WB)	C	32.4	0.78	924 (WB)	A	9.1	0.50	134 (NB)	B	11.7	0.60	206 (NB)
Shifted Intersection																
	E	65.3	0.87	874 (NB)	E	67.9	0.90	844 (NB)	E	61.1	0.77	722 (EB)	E	62.3	0.81	716 (EB)
Tee																
	D	38.2	0.84	797 (NB)	D	40.5	0.89	906 (NB)	D	40.3	0.89	417 (NB)	D	44.2	0.94	535 (NB)
Slip Lane																
	D	40.3	0.71	776 (NB)	D	44.4	0.75	942 (NB)	D	37.9	0.70	582 (WB)	D	39.6	0.68	805 (NB)

Conclusions & Recommendation

- The feasibility study analysis showed clear operational benefits to the roundabout alternative.
- Roundabouts are shown to reduce crashes at intersections nationally, especially severe crashes (resulting in an injury or fatality). However, though Swift St is a high crash segment through the intersection, there have been no injuries or fatalities at Swift & Spear.
- Based on the public survey (n=85), the roundabout received the most support.
- Opposition to the roundabout primarily centered around concerns over bicycle and pedestrian accommodations.
- The survey results also showed that the majority of respondents think the existing alignment (No Build) is the least preferred alternative.

The project team recommends that the Planning Commission select a preferred alternative from the top two ranked alternatives: roundabout or shifted intersection. The preferred alternative will then be advanced to the next stage which is a scoping study.

Depending on the alternative selected, the project team recommends that the scoping study include education outreach and the following evaluation components:

- Additional designs for bicycle and pedestrian accommodations at the roundabout (a VT precedent is coming on Shelburne Road).
- Additional roundabout configurations and sizes to further reduce right-of-way impacts.
- Additional lane configuration and traffic signal timing and phasing including pedestrian phases for the shifted intersection.
- Safety and predictive crash analysis for the shifted intersection.

End / Discussion

Roundabout Information Requested at the Last Commission Meeting

Roundabout Data

In Vermont:

- There are 13 modern roundabouts and 7 more planned. The first roundabout in the state was constructed in Montpelier in 1995.
- There are no published studies on safety or crash impacts at roundabouts in Vermont.

In the U.S.:

- There are approximately 7,100 roundabouts.
- Studies have shown roundabouts result in more than 90% reduction in fatal crashes, 76% reduction in injuries, and a 35% reduction in overall crashes.
- There is limited research on pedestrian and bicycle safety at roundabouts in the US.
- “FHWA encourages agencies to consider roundabouts during new construction and reconstruction projects as well as for existing intersections that have been identified as needing safety or operational improvements.”

Pedestrian Accommodations

High visibility crosswalk with pavers and a Rectangular Rapid Flashing Beacon (RRFB) in Edmonds, WA. Image from Carmanah Technologies.

Pedestrian Accommodations

CROSSING SOLUTIONS

NCHRP Report 834, Crossing Solutions at Roundabouts and Channelized Turn Lanes for Pedestrians with Vision Disabilities (5) provides four major types of crosswalk treatments to limit the risk experienced by pedestrians with visual impairments: (A) standard pedestrian signal, (B) pedestrian hybrid beacon (PHB), pedestrian activated warning device, such as (C) rectangular rapid flashing beacon (RRFB), and (D) a raised crosswalk (RCW).

Graphic from the MassDOT Guidelines for the Planning and Design of Roundabouts

Bicycle Accommodations

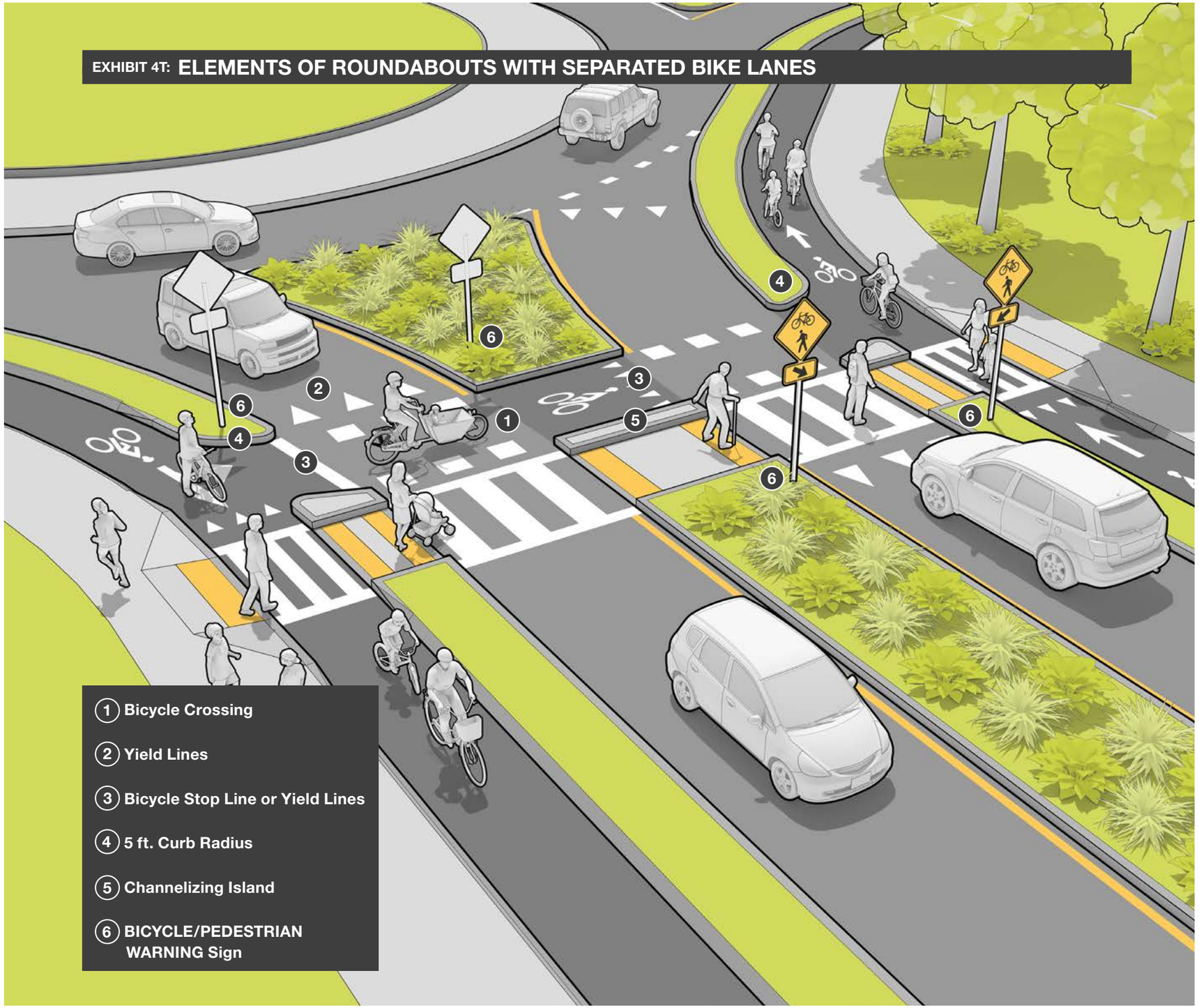


Exhibit from the MassDOT Separated Bike Lane Planning & Design Guide

Bicycle Accommodations

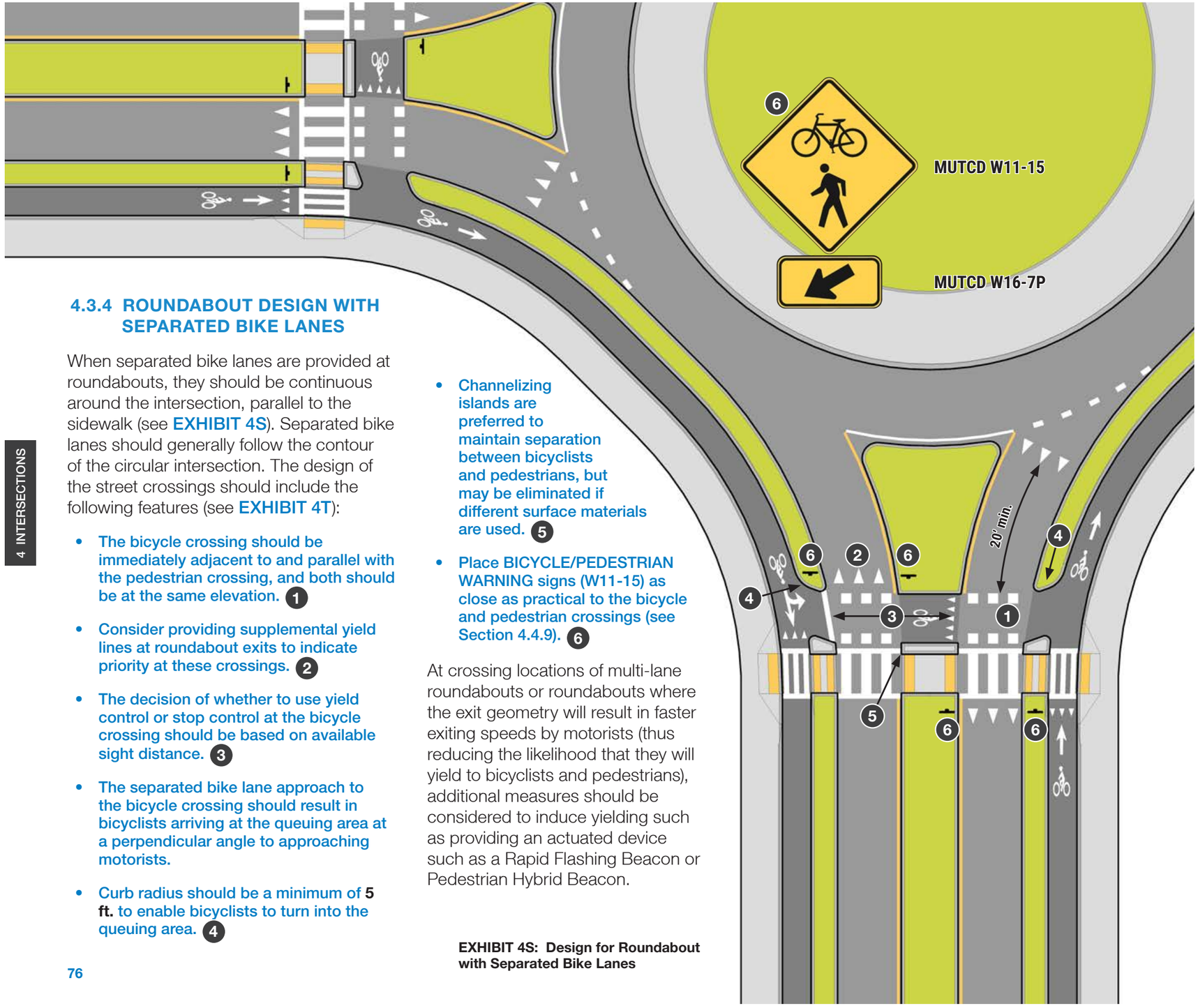


Exhibit from the MassDOT Separated Bike Lane Planning & Design Guide

4.3.4 ROUNDABOUT DESIGN WITH SEPARATED BIKE LANES

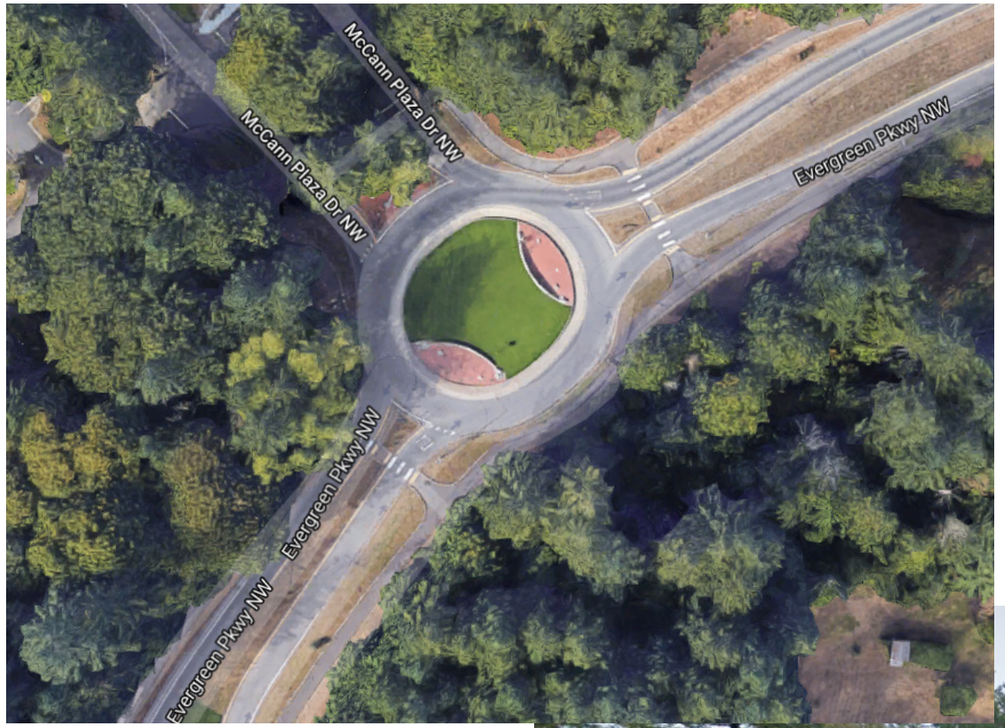
When separated bike lanes are provided at roundabouts, they should be continuous around the intersection, parallel to the sidewalk (see **EXHIBIT 4S**). Separated bike lanes should generally follow the contour of the circular intersection. The design of the street crossings should include the following features (see **EXHIBIT 4T**):

- The bicycle crossing should be immediately adjacent to and parallel with the pedestrian crossing, and both should be at the same elevation. 1
- Consider providing supplemental yield lines at roundabout exits to indicate priority at these crossings. 2
- The decision of whether to use yield control or stop control at the bicycle crossing should be based on available sight distance. 3
- The separated bike lane approach to the bicycle crossing should result in bicyclists arriving at the queuing area at a perpendicular angle to approaching motorists.
- Curb radius should be a minimum of **5 ft.** to enable bicyclists to turn into the queuing area. 4
- Channelizing islands are preferred to maintain separation between bicyclists and pedestrians, but may be eliminated if different surface materials are used. 5
- Place BICYCLE/PEDESTRIAN WARNING signs (W11-15) as close as practical to the bicycle and pedestrian crossings (see Section 4.4.9). 6

At crossing locations of multi-lane roundabouts or roundabouts where the exit geometry will result in faster exiting speeds by motorists (thus reducing the likelihood that they will yield to bicyclists and pedestrians), additional measures should be considered to induce yielding such as providing an actuated device such as a Rapid Flashing Beacon or Pedestrian Hybrid Beacon.

EXHIBIT 4S: Design for Roundabout with Separated Bike Lanes

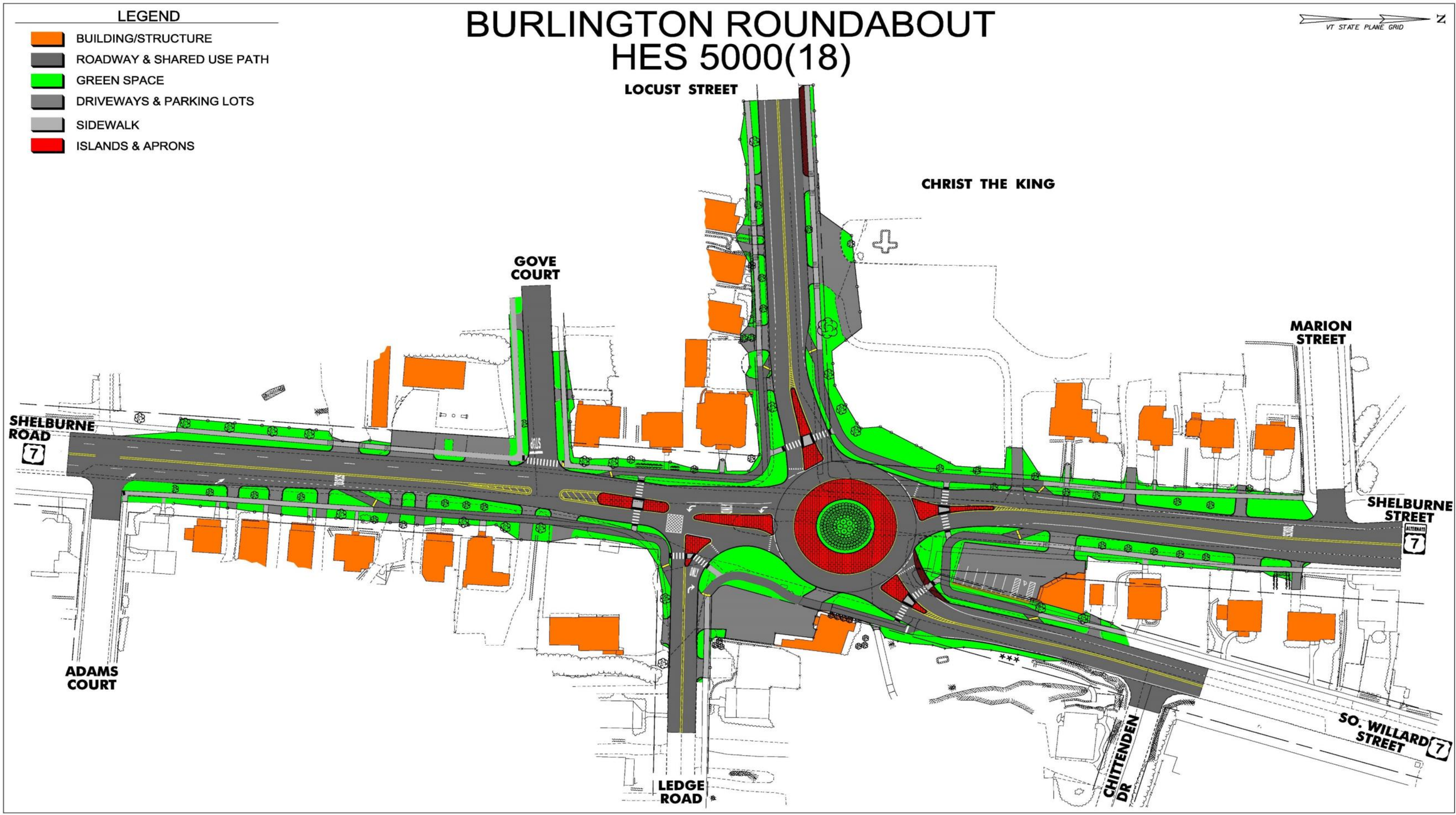
Shared Use Path Accommodations



Olympia, WA

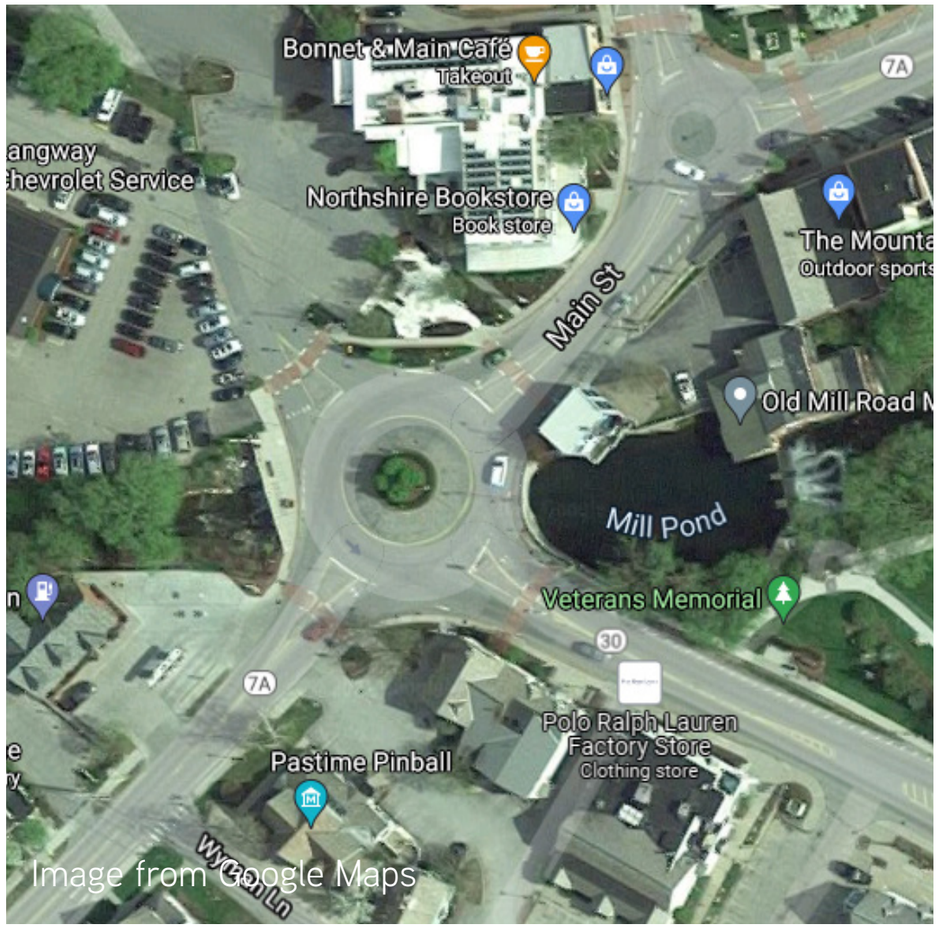
Images from Google Maps

Bicycle Accommodations - Coming Soon to Shelburne St in Burlington



Roundabout Examples

Manchester, VT (Route 7A & Route 30)



Manchester Roundabout

- » Vehicle Count: 16,000 vehicles per day
- » Pedestrian Count: 189 pedestrians per day
- » Built: 2013

Swift & Spear Intersection

- » Vehicle Count: 12,900 vehicles per day
- » Pedestrian+Bike Count: 129 per day

Roundabout Examples

Waterbury, VT

Waterbury Roundabout

- » Vehicle Count: 12,000 vehicles per day
- » Pedestrian Count: 30 pedestrians per day
- » Built: 2015

Swift & Spear Intersection

- » Vehicle Count: 12,900 vehicles per day
- » Pedestrian+Bike Count: 129 per day

Roundabout Examples

Montpelier, VT - Keck Circle (Main St & Spring St)

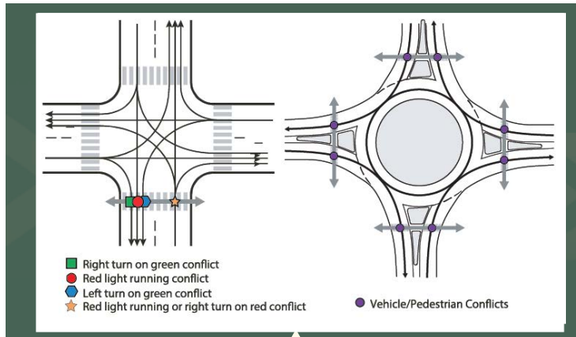
Montpelier Roundabout

- » Vehicle Count: 9,000 vehicles per day
- » Pedestrian Count: 260 pedestrians per day
- » Built: 1995

Swift & Spear Intersection

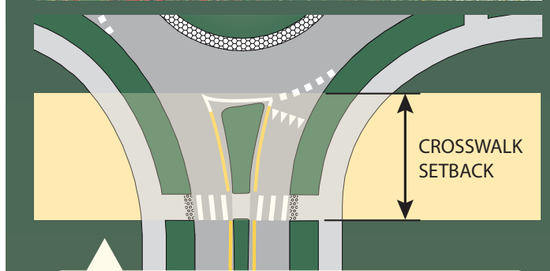
- » Vehicle Count: 12,900 vehicles per day
- » Pedestrian+Bike Count: 129 per day

See the FHWA Roundabout Brochure, [Roundabouts: A Safe Choice for Everyone]



Less conflict. Roundabouts have fewer conflict points. A single lane roundabout has 50% fewer pedestrian-vehicle conflict points than a comparable stop or signal controlled intersection. Conflicts between bicycles and vehicles are reduced as well.

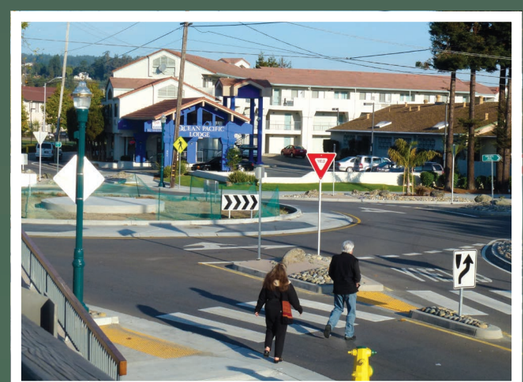
Source: Hillary Isebrands, FHWA



Shorter, setback crossings.
Pedestrians cross a shorter distance of only one direction of traffic at a time since the entering and exiting flows are separated. Drivers focus on pedestrians apart from entering, circulating and exiting maneuvers.

Lower speed.
Traffic speed at any road or intersection is vitally important to the safety of everyone, and especially non-motorized users. Lower speed is associated with better yielding rates, reduced vehicle stopping distance, and lower risk of collision injury or fatality. Also, the speed of traffic through a roundabout is more consistent with comfortable bicycle riding speed.

Source: Jeffrey Shaw, FHWA



Source: City of Santa Cruz

Source: Janet M. Barlow, Accessible Design for the Blind

Features for All Users. Adding certain treatments at roundabouts can enhance the experience for both pedestrians and bicycles.

- At more complex roundabouts, such as those with multiple lanes, certain design elements and enhanced crossing treatments can improve accessibility for visually impaired pedestrians.
- Where bicycle facilities lead to a roundabout, providing an option to bicyclists to either ride in the travel lane or use a ramp to and from a separated shared use path.

Source: www.pedbikeimages.org / Dan Burden