

“Roundabouts 101”

A primer on reasons to build roundabouts and how to drive and negotiate this circular intersection



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State Traffic Design Engineer

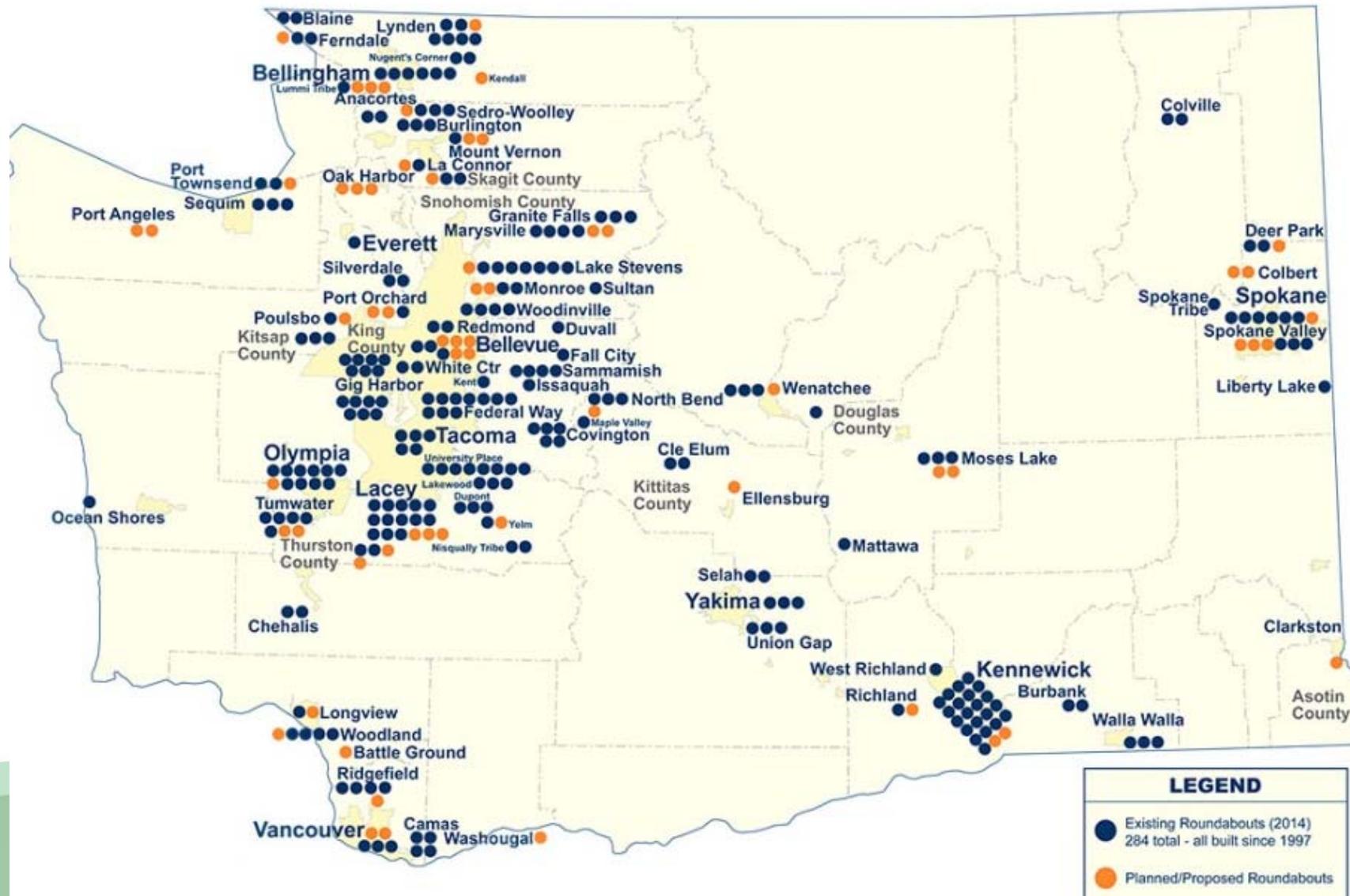
Roger Millar
Secretary of Transportation

Spokane Regional Transportation
Council
June 07, 2018



Approaching 400 Roundabouts (2018)

Roundabouts in Washington State



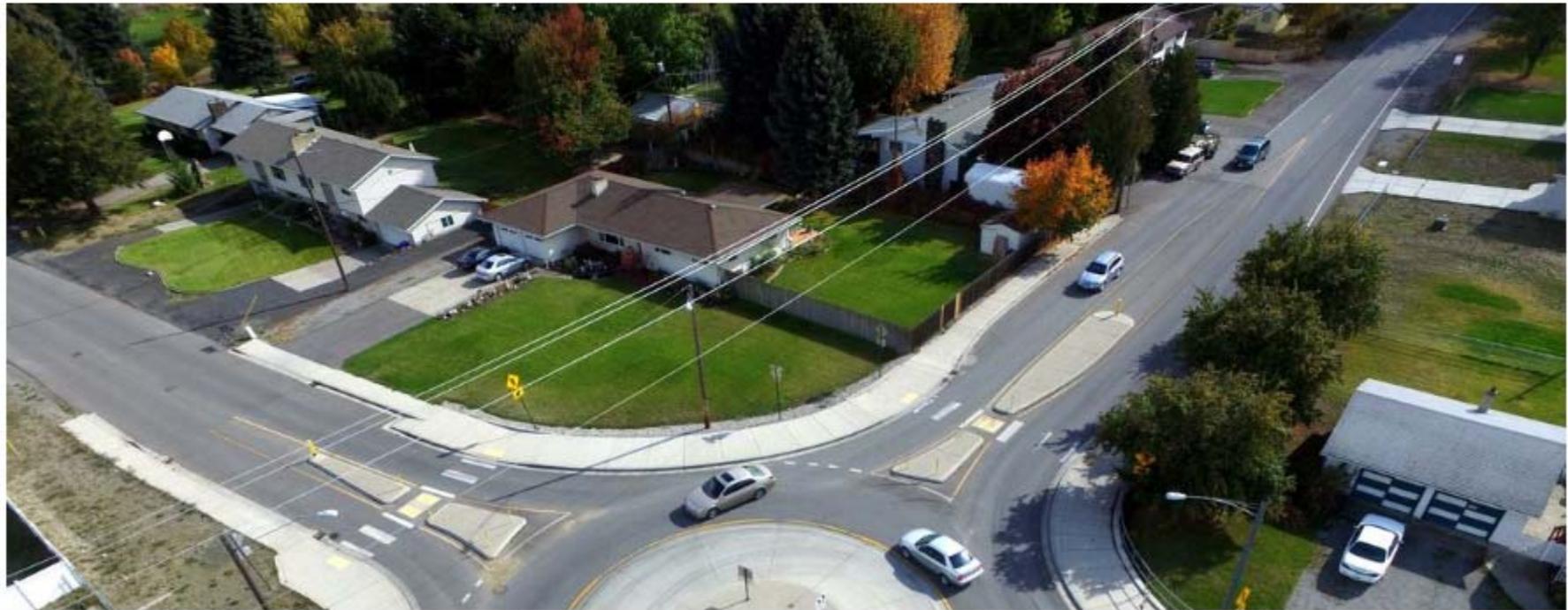




SPOKANE

Washington State DOT touts roundabouts

Wed., May 3, 2017, 12:12 p.m.



A “North American” Perspective



4/15/2003

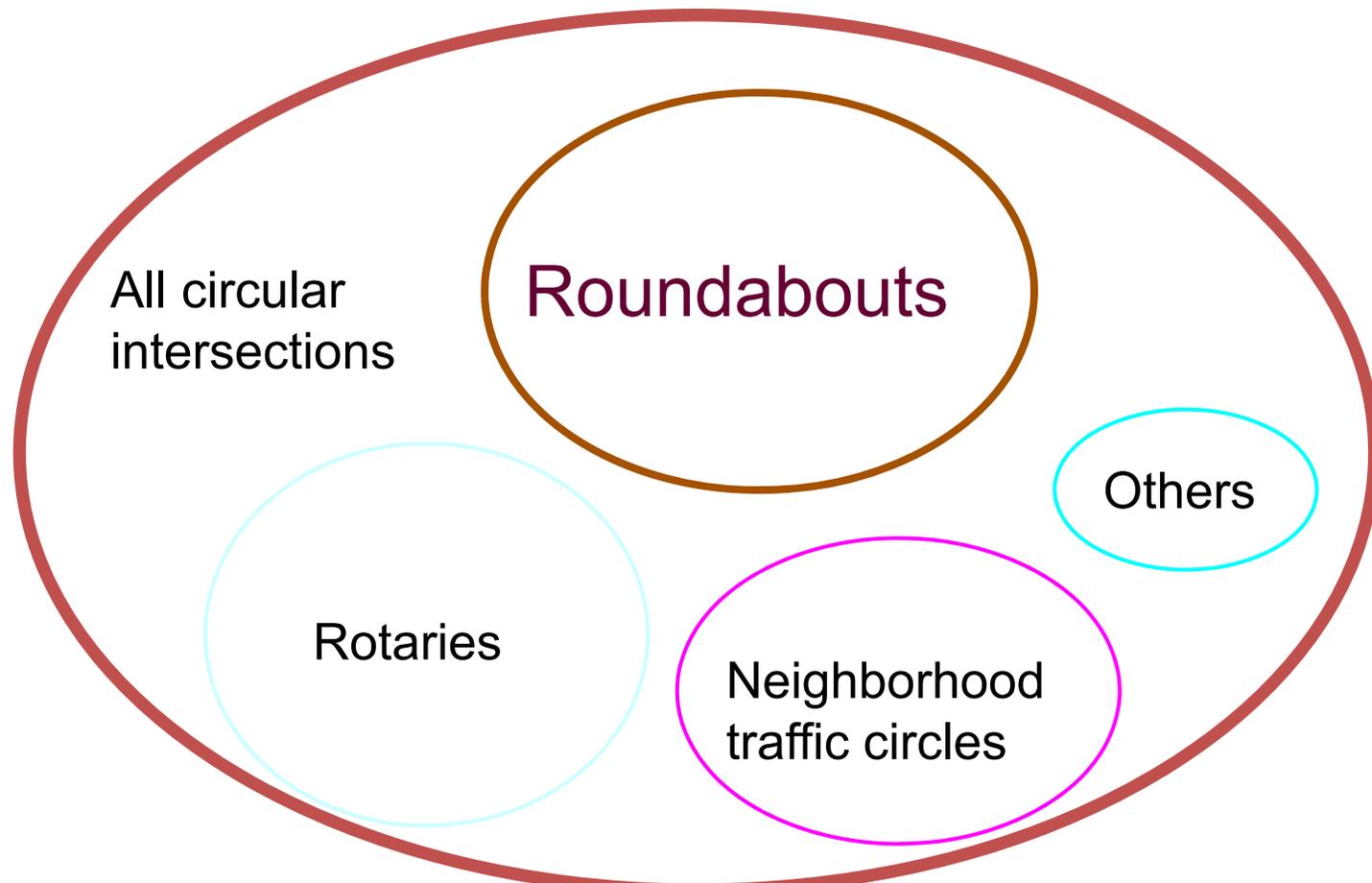
A European Perspective



Reasons for Roundabouts

- Safety
 - Lower speeds through intersection
 - Pedestrian and bicycles integrated
- Efficiency
 - Less delay for all vehicles/pedestrians
 - No unnecessary stopping
 - Low or no maintenance costs to taxpayer
- Aethstically fitting community goals/culture
 - Less pavement area needed and a chance to build in community elements that enhance look and feel of the area
- Access Management
 - Series of roundabouts can help right turns/U turn and eliminate left turns

Not all circular intersections are roundabouts!!!



Roundabouts are a type or subset of circular intersections (Slide provided by FHWA)

Roundabouts are not to be confused with “Neighborhood Traffic Calming”



Safety - trend toward less severe

Total Collisions in WSDOT Study of Nine Roundabouts by Type of Collision

Before and After Installation of Roundabouts

Type of collision	Collisions Before Installation	Collisions After Installation	Percent Change
Fatal and disabling	5	1 ²	-80%
Evident injury ¹	15	4	-73%

Source: WSDOT Traffic Office

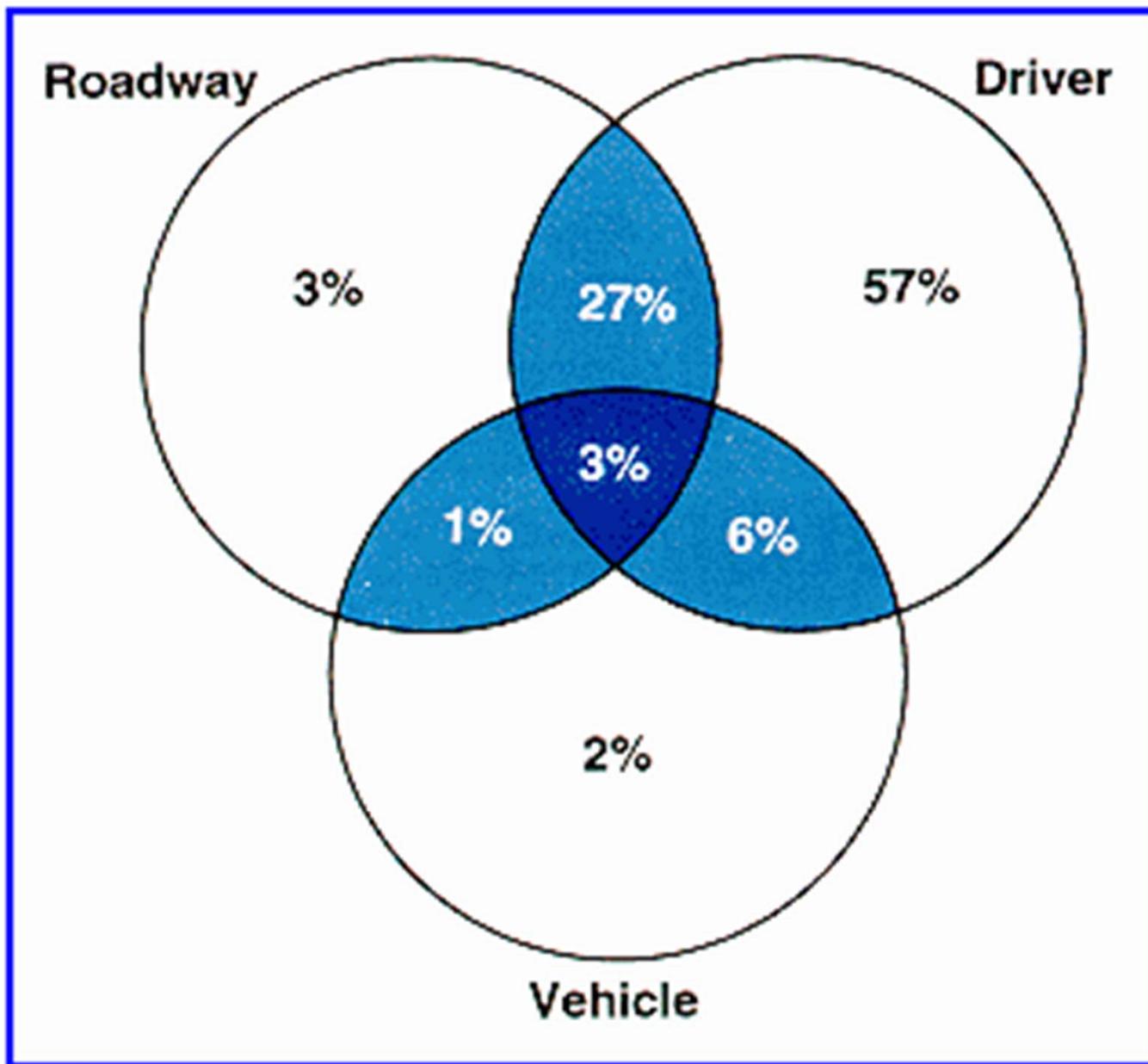


Figure 3 - Venn diagram showing the causes by percentage, of road accidents in the United States. (8)

Mythbusters



NCDOT - Division 12 Gaston Day Roundabout Construction



Schematic (Visual)



Verbal (brochure)

- **Movements in a single-lane roundabout**

Slowdown as you approach a single-lane roundabout. Upon entering, yield to vehicles in the circle and drive counterclockwise to your exit.

- **Movements in a double-lane roundabout**

- **How do I go straight?**

In most cases, use either the left or right lane to go straight in a two-lane roundabout. Yield to vehicles traveling in the circle coming from your left and drive counterclockwise while staying in your lane. Exit cautiously as cars may have tried to pass you on the right. Pay attention to pavement markings and signs as they will help guide you through the roundabout.

How do I make a right turn?

Make sure you are in the right lane as you approach the roundabout. Yield to traffic already in the circle. While driving counterclockwise, turn one-quarter of the way around the roundabout and exit.

- **How do I make a left turn?**

Make sure you are in the left lane as you approach the roundabout. Yield to traffic already in the circle. Drive counterclockwise three-quarters of the way around the circle while staying in your lane. Exit cautiously as cars may have tried to pass you on the right.

- **How do I make a U turn?**

Make sure you are in the left lane as you approach the roundabout. Yield to traffic already in the circle.

Applicable Driving Laws

Key RCW's that are applicable to rules on driving Roundabouts

- **RCW 46.61.190**
Vehicle entering stop or yield intersection.
- **RCW 46.61.135**
One-way roadways and rotary traffic islands
- **RCW 46.61.140**
Driving on roadways laned for traffic.



Volumes matter!

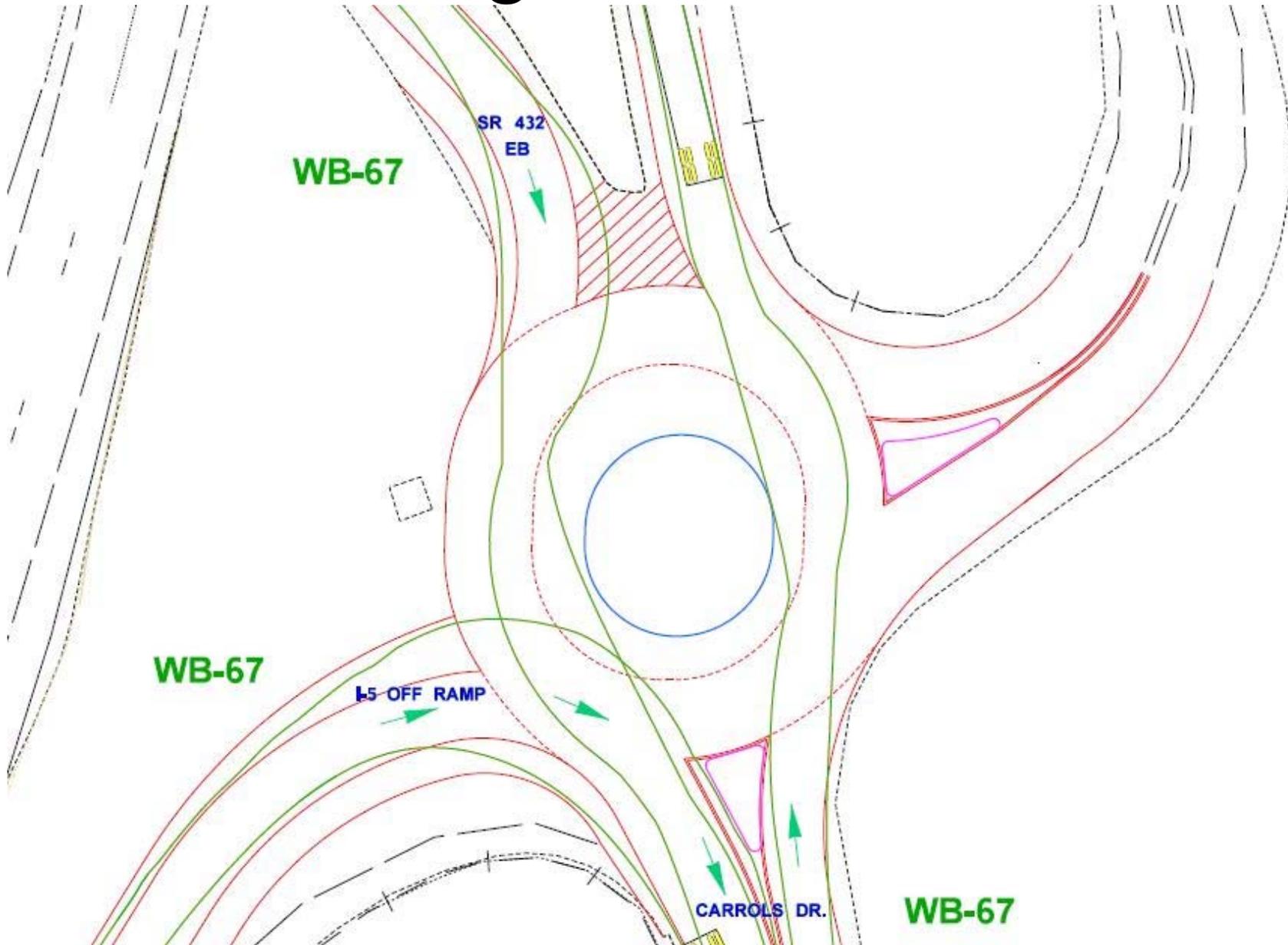
Washington DOT North Central Region
 PO Box 98 Wenatchee
 Wenatchee, Washington, United States 98801
 509 667 3081 stuartg@wsdot.wa.gov

Count Name: US2/97 MP120.62 Cascade 1500-
 1900 4/28/11
 Site Code:
 Start Date: 04/28/2011
 Page No: 1

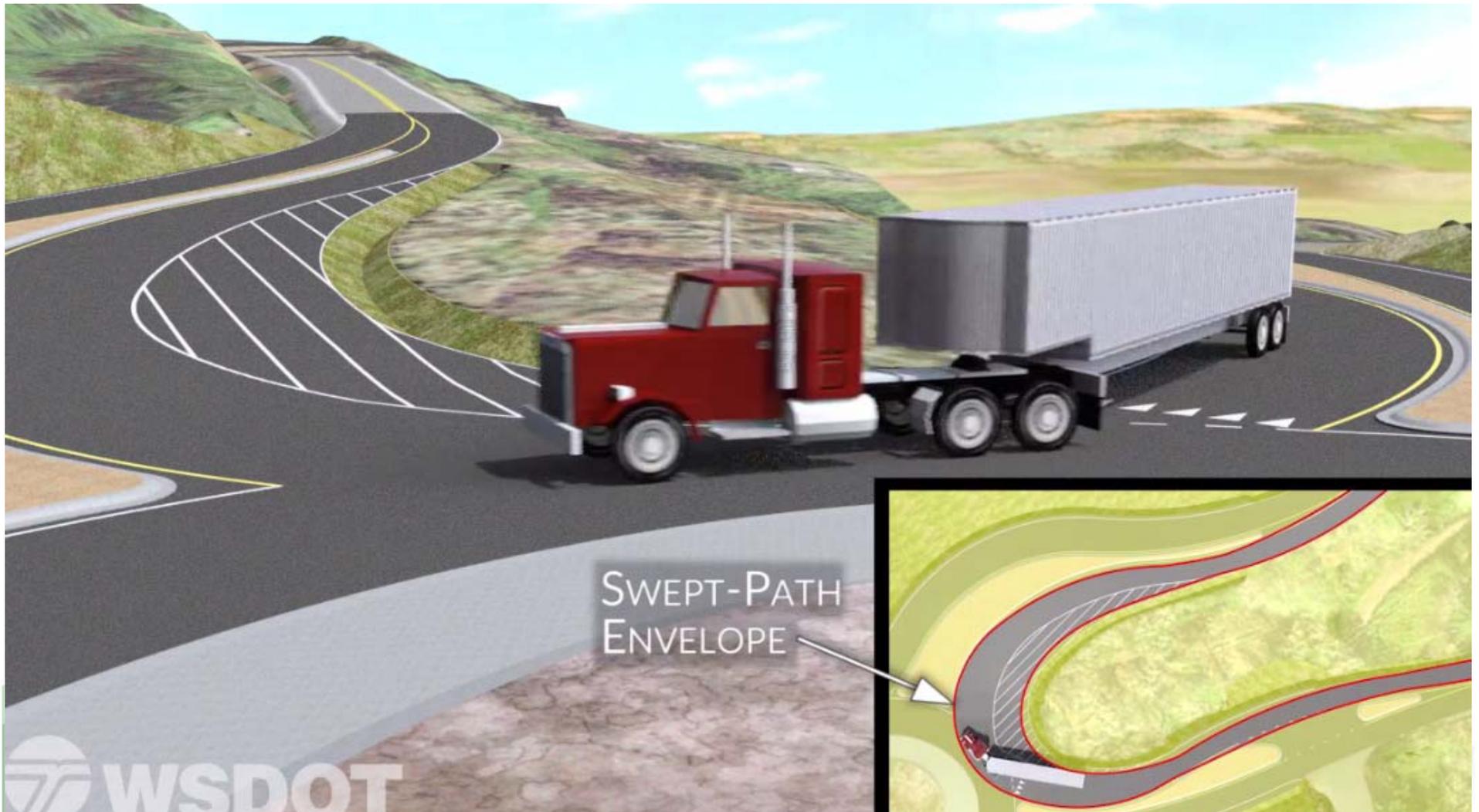
Turning Movement Data

Start Time	Southbound Street Southbound					Westbound Street Westbound					Northbound Street Northbound					Eastbound Street Eastbound					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
3:00 PM	63	37	0	0	100	0	1	0	0	1	0	36	116	0	152	160	1	54	1	216	469
3:15 PM	54	35	0	0	89	1	0	0	0	1	0	29	119	0	148	167	1	56	2	226	464
3:30 PM	66	63	0	0	129	0	0	0	0	0	0	45	118	0	163	228	1	47	0	276	568
3:45 PM	120	95	0	0	215	2	1	0	0	3	0	33	129	0	162	160	1	61	4	226	606
Hourly Total	303	230	0	0	533	3	2	0	0	5	0	143	482	0	625	715	4	218	7	944	2107
4:00 PM	79	58	0	0	137	0	0	0	0	0	0	71	122	0	193	215	0	74	0	289	619
4:15 PM	73	57	0	0	130	0	2	2	0	4	0	63	143	0	206	189	0	68	0	257	597
4:30 PM	84	69	0	0	153	0	0	0	0	0	0	59	100	0	159	190	0	67	0	257	569
4:45 PM	64	59	0	0	123	0	2	0	0	2	0	72	120	0	192	189	0	69	0	258	575
Hourly Total	300	243	0	0	543	0	4	2	0	6	0	265	485	0	750	783	0	278	0	1061	2360
5:00 PM	80	37	0	0	117	0	0	0	0	0	0	39	106	0	145	238	1	76	2	317	579
5:15 PM	68	57	1	0	126	0	0	0	0	0	0	43	150	0	193	204	0	52	0	256	575
5:30 PM	54	39	0	0	93	1	0	0	0	1	0	36	99	0	135	186	0	52	0	238	467
5:45 PM	46	46	0	0	92	0	0	0	0	0	0	37	134	0	171	137	0	54	1	192	455
Hourly Total	248	179	1	0	428	1	0	0	0	1	0	155	489	0	644	765	1	234	3	1003	2076
6:00 PM	35	28	0	0	63	0	2	0	0	2	0	38	87	0	125	166	0	41	0	207	397
6:15 PM	44	25	0	0	69	0	3	0	0	3	0	29	108	0	137	114	0	40	0	154	363
6:30 PM	31	25	0	0	56	0	0	0	0	0	0	29	89	0	118	123	0	51	1	175	349
6:45 PM	28	30	0	0	58	0	0	0	0	0	0	30	82	0	112	95	0	37	0	132	302
Hourly Total	138	108	0	0	246	0	5	0	0	5	0	126	366	0	492	498	0	169	1	668	1411
7:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	4	0	1	0	5	6
Grand Total	989	760	1	0	1750	4	11	2	0	17	0	689	1823	0	2512	2765	5	900	11	3681	7960
Approach %	56.5	43.4	0.1	0.0	-	23.5	64.7	11.8	0.0	-	0.0	27.4	72.6	0.0	-	75.1	0.1	24.4	0.3	-	-
Total %	12.4	9.5	0.0	0.0	22.0	0.1	0.1	0.0	0.0	0.2	0.0	8.7	22.9	0.0	31.6	34.7	0.1	11.3	0.1	46.2	-
Car	929	724	1	0	1654	1	11	0	0	12	0	652	1751	0	2403	2667	5	835	10	3517	7586
% Car	93.9	95.3	100.0	-	94.5	25.0	100.0	0.0	-	70.6	-	94.6	96.1	-	95.7	96.5	100.0	92.8	90.9	95.5	95.3
Truck	60	36	0	0	96	3	0	2	0	5	0	37	72	0	109	98	0	65	1	164	374
% Truck	6.1	4.7	0.0	-	5.5	75.0	0.0	100.0	-	29.4	-	5.4	3.9	-	4.3	3.5	0.0	7.2	9.1	4.5	4.7

Design Vehicle Check



Proof of Concept – Combatting Myths



Truck modeling

AutoTURN

Select Current Vehicle

Group Vehicles By:

- Library
- Type
- Class
- Region
- # of Parts
- No Group
- Recent

5

AASHTO 2001 (US)

AASHTO 2004 (US)

AASHTO 2011 (US)

AASHTOM 2001 (US)

AASHTOM 2004 (US)

AASHTOM 2011 (US)

ALBERTA DB68 (CA)

ALBERTA INFTRA-HGDG (CA)

ARCHITECTURAL

AUSTROADS (AU)

Units: feet

Library	Vehicle Name	Type	Region	Lock	# Parts	Length	Wheelbase	Trailer Len.
AASHTO 2001...	WB-100T	Triple Trailer CB-A	North A...	15.6	4	104.83	11.00	28.50
AASHTO 2001...	WB-109D	Double Trailer CB-A	North A...	12.6	3	114.03	12.20	48.00
AASHTO 2001...	WB-40	Semitrailer CB	North A...	20.3	2	45.50	12.50	33.00
AASHTO 2001...	WB-50	Semitrailer CB	North A...	17.7	2	55.00	12.50	42.50
AASHTO 2001...	WB-62	Semitrailer CB	North A...	28.4	2	68.50	19.50	48.00
AASHTO 2001...	WB-65	Semitrailer CB	North A...	28.4	2	73.50	19.50	53.00
AASHTO 2001...	WB-67	Semitrailer CB	North A...	28.4	2	73.50	19.50	53.00

OK Cancel Help

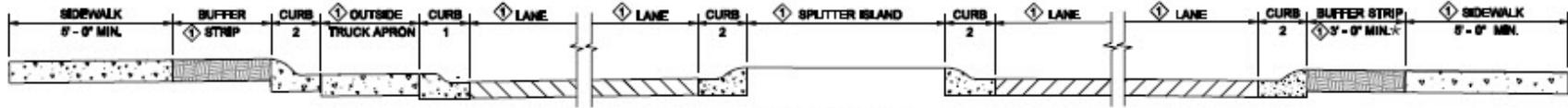
CAUTION



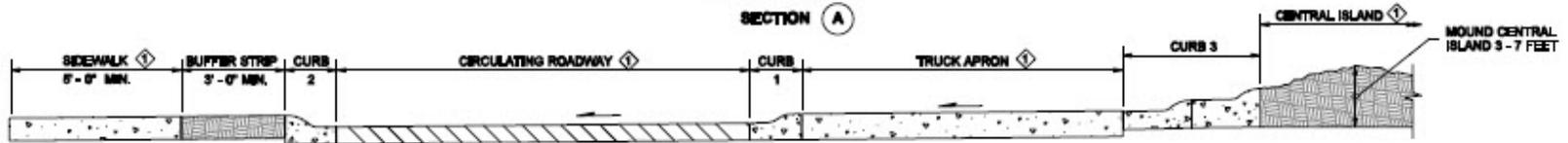
WIDE TURNS



WSDOT specific Roundabout Curb Detail



CURB PLACEMENT
SECTION A



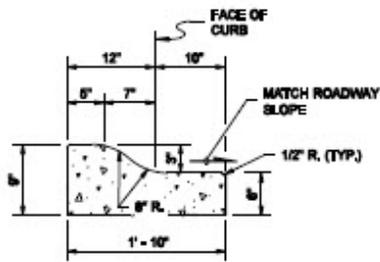
CURB PLACEMENT
SECTION B
(THIS ROUNDABOUT CONFIGURATION WILL VARY
DEPENDING ON CONTRACT PLANS)

NOTES

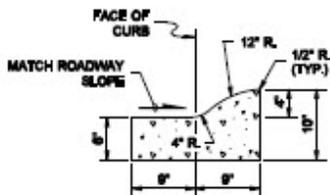
1. See Standard Plan F-30.10 for Curb Expansion and Contraction Joint spacing.
2. Island nose shall be painted with yellow reflectorized paint shaping and painting will be subsidiary.

LEGEND

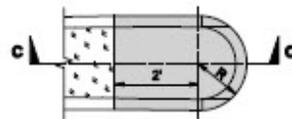
- ① WIDTH VARIES - SEE CONTRACT PLANS
- * 8'-0" MIN. SIDEWALK WITHOUT BUFFER STRIP



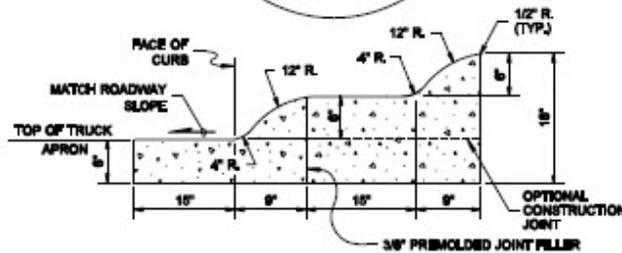
CURB 1 - ROUNDABOUT TRUCK APRON



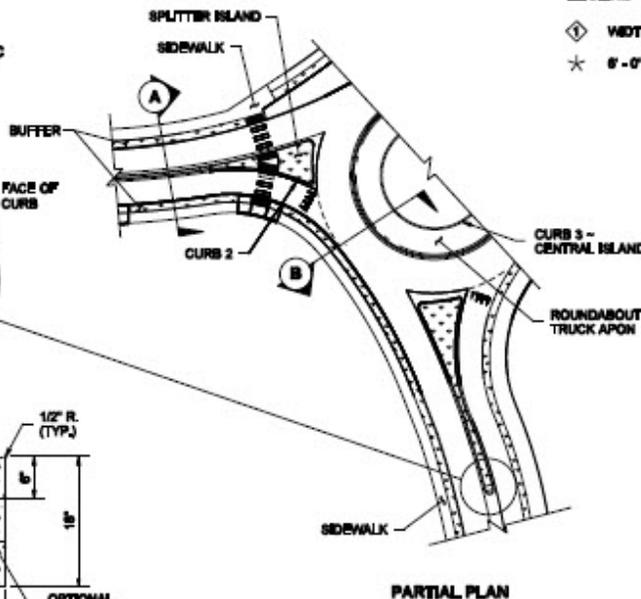
CURB 2 - OUTSIDE OR RIGHT SIDE CURB &
SPLITTER ISLAND CURB



ISLAND NOSE DETAIL
SECTION C-C



CURB 3 - CENTRAL ISLAND CURB



PARTIAL PLAN

PRELIMINARY

**ROUNDABOUT CEMENT
CONCRETE CURBS
STANDARD PLAN F-10.18-00**

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

DATE: _____ DATE: _____
 WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

Roundabout Efficiency

Roundabouts versus Signals:
MUTCD Signal Warrant Threshold

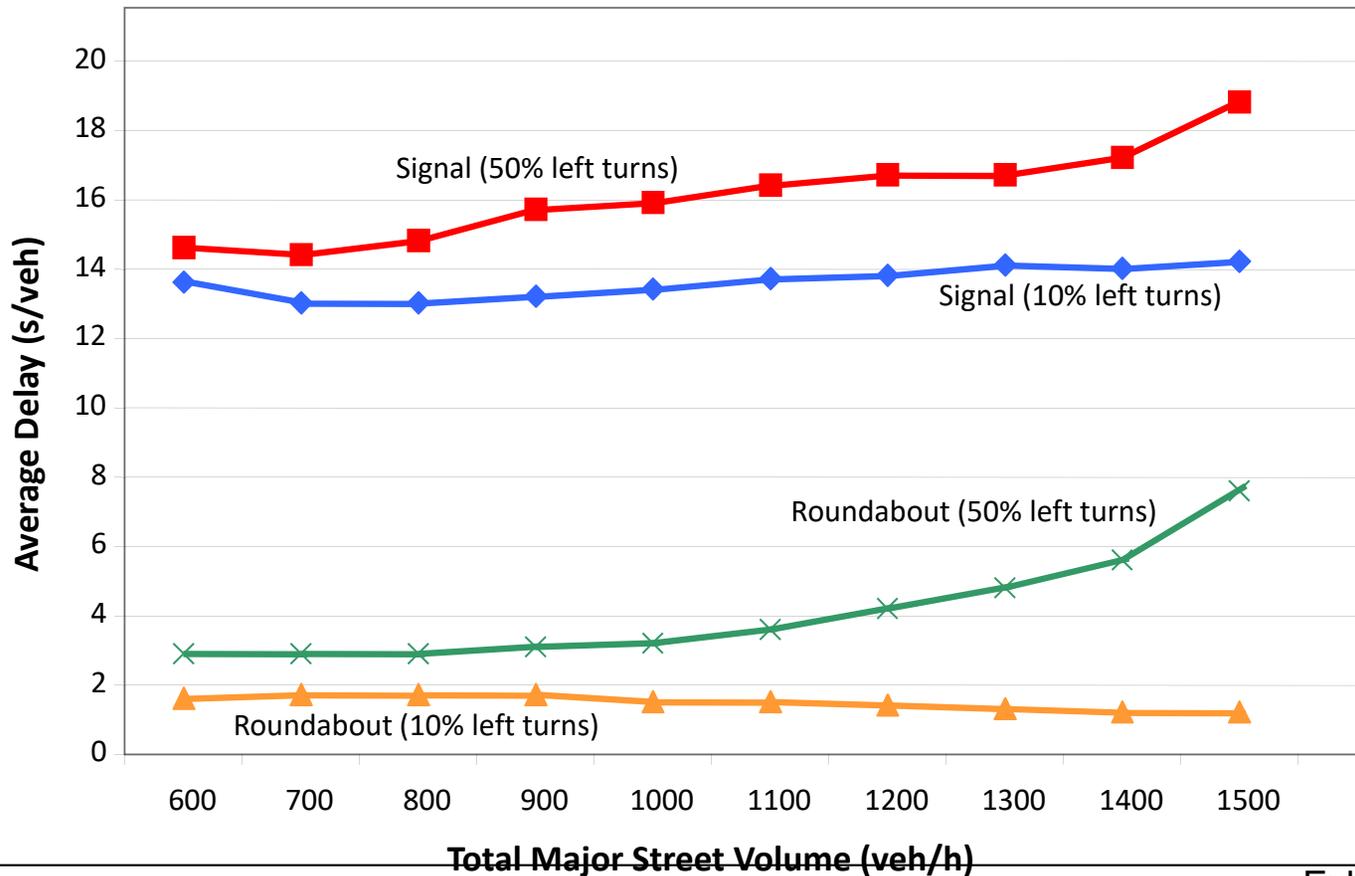


Exhibit 3-7, p. 63

Based on MUTCD Warrant 3 (2000 ed.)/Warrant 11 (1988 ed.)

New York State Corridor - Efficiency

Travel time statistics for the Route 67 corridor following opening of the 5th roundabout

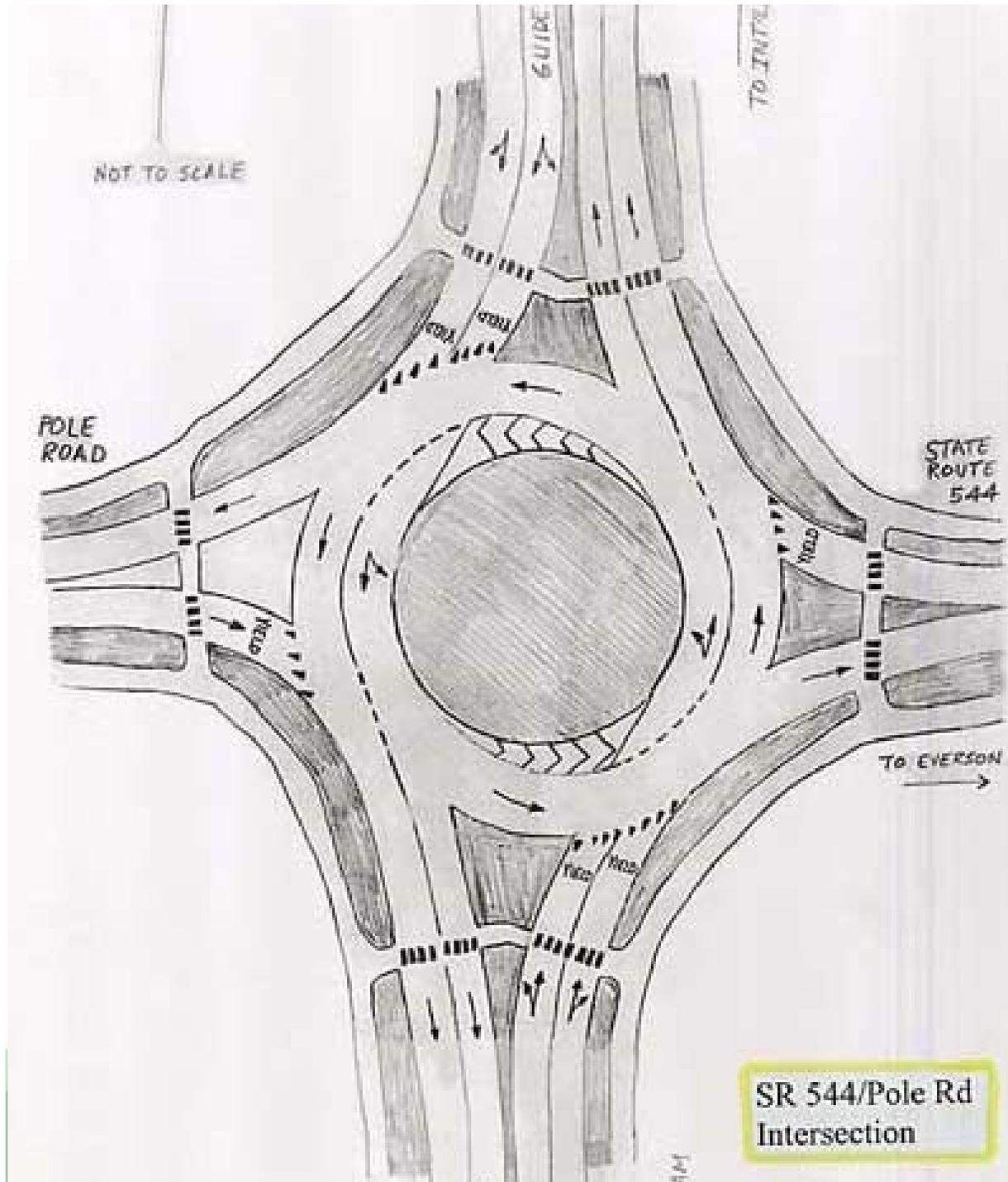
Note: All measurements taken in the eastbound direction at approximately 5:00 PM

NYS Route 67 Corridor, Town of Malta Travel Time Statistics - Before and After Roundabout Construction				
		Before June 7, 2005	After Oct. 5, 2006	After June 19, 2007
Begin	State Farm Rd	0	0	0
Arrive	I-87 Southbound Ramps	0:40	0:27	0:29
Leave	I-87 Southbound Ramps	2:22	0:30	0:31
Arrive	I-87 Northbound Ramps	2:40	0:52	0:48
Leave	I-87 Northbound Ramps	2:40	0:55	0:50
Arrive	Malta Commons	2:56	1:14	1:07
Leave	Malta Commons	3:08	1:16	1:09
Arrive	US 9 Intersection	3:38	1:49	1:44
Leave	US 9 Intersection	6:23	1:57	2:00
Total Time Through Corridor		6:23	1:57	2:00
70% Reduction in Travel Time thru Corridor after Roundabouts				

Signal corridor speed
<10 mph

Roundabout corridor
speed >30 mph

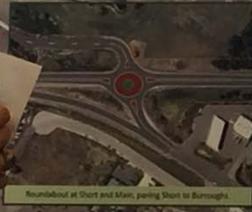
Conceptual Drawings







ALTERNATIVE Roundabouts at Monroe/Crawford & Short/Main • Closing US 395 Access at Burroughs/Dalton • Paving Short to Burroughs



Roundabout at Short and Main, paving Short to Burroughs



Roundabout at Monroe and Crawford with Cut-de-sac at Cleveland

- The Rec
- Provi
 - Allow
 - Pro
 - Bur

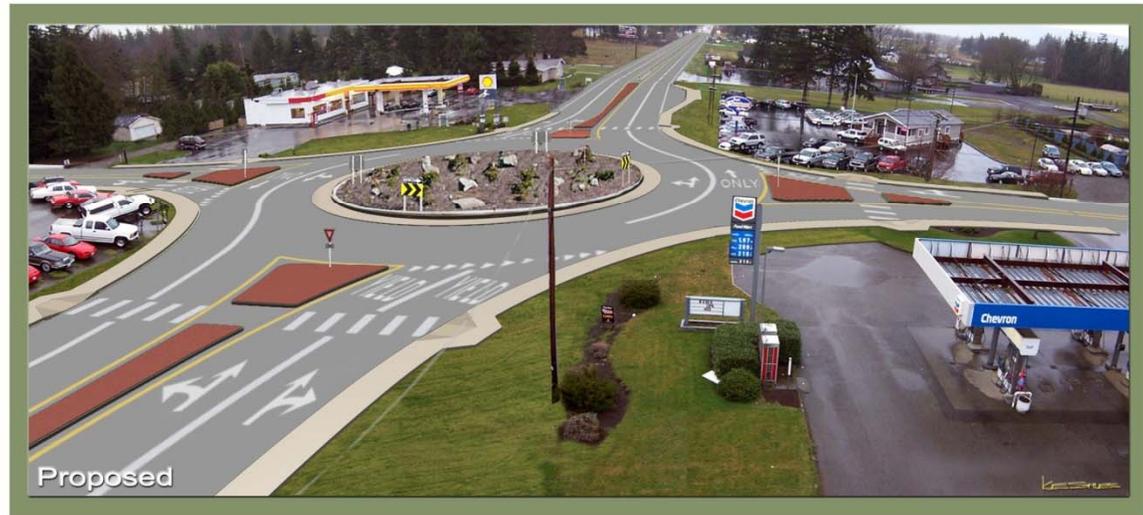
95 Deer Park Intersection Improvement Study - Burroughs Road

Can we organize the movement of people/pavement better?



Proposed Roundabout at Pole Road & SR 539

Design Visualization



Initial public perception at Mattawa

The majority of the people who gave comments in January told WSDOT engineers they remain unconvinced a roundabout would work with the 60 mph speed limit and large number of trucks utilizing the intersection. Officials say everyone did support improving the intersection to reduce accidents and **most attendees reportedly said a roundabout was “better than nothing.”**

"The first meeting gave us the opportunity to share our ideas for a roundabout, which appears to be the most efficient and cost-effective solution," stated Bob Romine, WSDOT project engineer. "We got a lot of great feedback, but we felt everyone deserved another opportunity to learn more about roundabouts and to see the other alternatives we looked at."

About 5,800 vehicles pass through the intersection of SR 243 and Road 24 Southwest each day,

Retting, Luttrell, and Russell November 2001 Study

Public Opinion	Before Construction	After Construction
• Strongly opposed	41%	15%
• Opposed	14%	13%
• Favoring	31%	63%

“Public Opinion and Traffic Flow Impacts of Newly Installed Modern Roundabouts in the United States”

Questions/Comments?



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