To: Oregon State Joint Committee on Transportation

A major issue in transportation planning is road capacity. The capacity of a traffic lane depends less on the speed limit than might be expected because drivers are supposed to leave at least a 2-second gap between cars, so even at infinite speed there's at least 2 seconds per car, limiting the capacity to 30 cars/minute, or 1,800 cars/hour. With a finite speed limit the time per car is 2 seconds plus the time for the car to pass a point, which, assuming a typical car length of 15 feet, works out to 10.2 seconds per mph speed, or about 1 second at 10 mph, .5 seconds at 20 mph, and so on, as you can see in this chart:

speed	t_{gap}	t_{car}	t_{total}	cars/min	cars/hr
10	2	1.02	3.02	19.9	1,192
20	2	0.51	2.51	23.9	1,434
30	2	0.34	2.34	25.6	1,538
35	2	0.29	2.29	26.2	1,571
45	2	0.23	2.23	26.9	1,617
55	2	0.19	2.19	27.5	1,647
65	2	0.16	2.16	27.8	1,669
75	2	0.14	2.14	28.1	1,685
9999	2	0.00	2.00	30.0	1,799

When there is a traffic signal at an intersection, while the light is red the capacity of the lane is zero, no cars move. The capacity of the traffic lane depends on how often the light is red:

						% of time the light is red		
speed	t_{gap}	t_{car}	t_{total}	cars/min	cars/hr	25	50	75
10	2	1.02	3.02	19.9	1,192	894	596	298
20	2	0.51	2.51	23.9	1,434	1,076	717	359
30	2	0.34	2.34	25.6	1,538	1,154	769	385
35	2	0.29	2.29	26.2	1,571	1,178	786	393
45	2	0.23	2.23	26.9	1,617	1,213	808	404
55	2	0.19	2.19	27.5	1,647	1,235	824	412
65	2	0.16	2.16	27.8	1,669	1,252	835	417
75	2	0.14	2.14	28.1	1,685	1,264	843	421
9999	2	0.00	2.00	30.0	1,799	1,349	900	450

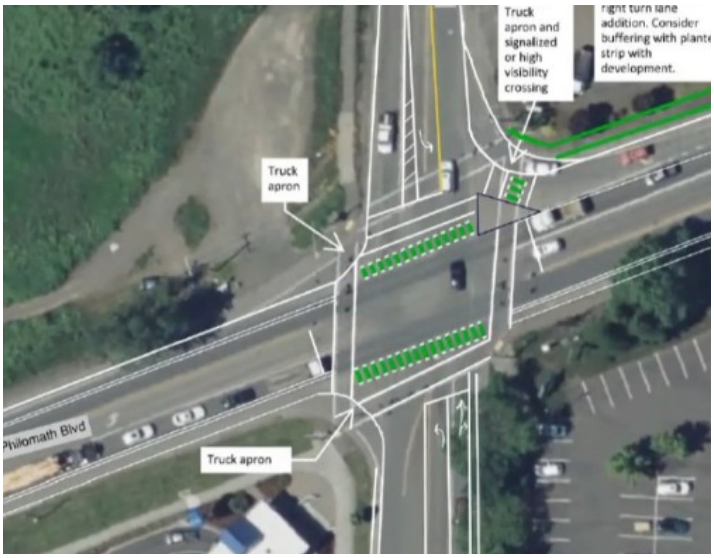
You can see that with the light red only 25% of the time, the lane capacity on a 75 mph road drops below the capacity of a road without a traffic light but with a speed limit of 20 mph. If the light is red 25% of the time in one direction it will be red more than 75% of the time for the crossing street, dropping its capacity to less than half the capacity of a road with a speed limit of 10 mph without a light, regardless of its original speed limit.

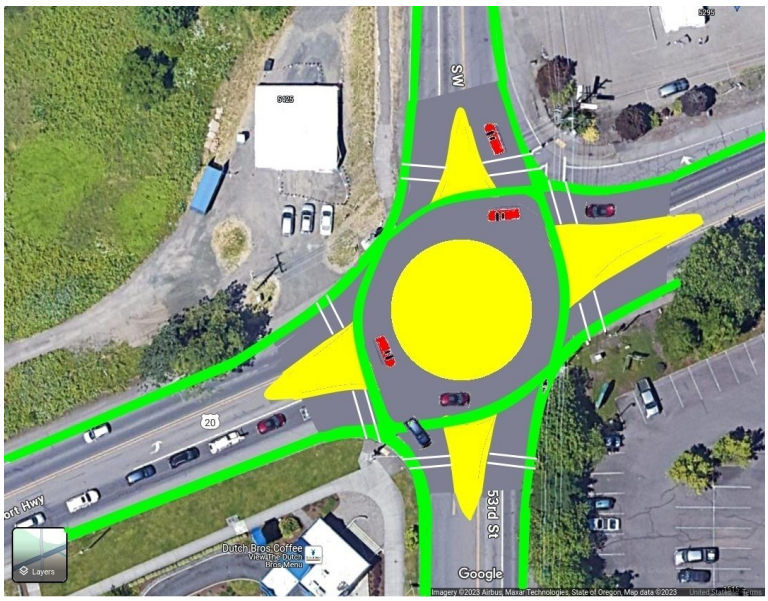
This demonstrates the power of roundabouts for improving traffic flow, while also improving safety. If a roundabout requires traffic to slow to 20 mph in the intersection, there will still be more traffic flow than if there were a traffic signal, and away from the intersection if traffic is not near capacity vehicles can drive faster. Since with a roundabout there are no left turns, and right turns flow naturally, there is no need for turning lanes so roundabouts can often be installed at existing intersections without expanding roadway width. And roundabouts automatically adjust for different traffic demands on the intersecting streets, there is no need for adaptive light timing or other 'smart city' tweaks.

The following images picture the intersection of 53rd Street and Philomath Boulevard (OR Hwy 34 and US Hwy 20) in SW Corvallis as it currently is, as ODOT proposes to change it, and as it could be with a roundabout, which would save money, improve traffic flow and improve safety:

← Current layout with traffic signal

Current ODOT proposal with traffic signal →





← Possible roundabout solution

Note that:

- Right and left turns are easily accomplished without waiting
- pedestrians need to cross only a single traffic lane at a time, in an area where cars are moving at relatively low speed
- Bicycles can safely and conveniently get through the intersection with good visibility
- The roundabout requires no extra roadway space