Traffic Planning Implications of the Operational Characteristics of Roundabouts

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EXISTING SIGNALIZED TRAFFIC PLANNING

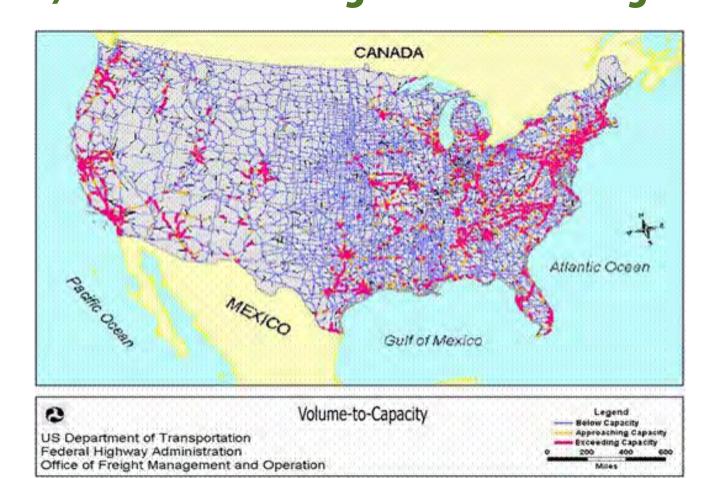
Signalized intersections dictate our existing traffic and roadway planning policies and standards:

- Roadway Capacity/Cross section is dictated by Signal Lane Saturation Rates
- Intersection Spacing Signal Progression
- Access Control



Signal queuing at Orchard Lake Rd. Township, MI

1) Traffic Modeling - Measure Congestion



2) Determine Roadway Widths

Street Classification:	6-Lane Arterial	4-lane Arterial	2-lane Arterial	Major Collector (without parking)	Minor Collector (with parking)	Commercial Local	Industrial Local	Connector Local	Residential Local	Alley *a	Rural Residential Loca
Right of Way (ROW) Width	141'	115'	84'	66'	76'	72'	66'	57'	51' *m	12'- 20'	46'
Roadway Width	107'	83'	52'	40'	50'	50'	44'	36'	30'	12'-20'	28'
Median Width	19'&7' *b	19'&7' *b	None	Optional *c	Optional *c	Optional *c	Optional *c	Optional *c	None	None	Optional *c
No. of Travel Lanes	6	4	2	2	2	2	2	2	1	1	2
Travel Lane Width	12'	12'	12'	12' *d	11'	11' or 12' w/left	12'	10'	16'	12'-20'	0
Designated Bike Lanes?	Υ	Y	Υ	Υ	Υ	Y	N *e	N *e	N *e	N *e	N *e
Bike Lane Width	8'	8'	8'	8'	6' w/parking 8' w/lt turn'	6' or 7' *h	0,	0' or 6' *f	0* *ī	0'	0,
Parking Lane Width	None	None	None	None	8' or None *j	8' or None *j	10'	8' or None *j	7'	None	Not Defined
Lane Striping Req'd (T)ravel, (B)ike, (P)arking	T,B	T,B	T,B	T,B	T,B,P	T,B/P or T,B	None	T,P or None	None	None	None
Min. Parkway Width	10'	10'	10'	8'	8'	6'	6.5'	6'	6' *m	NA	9'
Min. Sidewalk width * k	7'	6'	6'	5'	5'	5'	4.5'	4.5'	4.5'	None	None
Left Turn Lanes Req'd?	Y	Y	Y	N or Y *d	N or Y *j	N or Y *j	N	N or Y *j	N	NA	N
Left Turn Lane Width	12'	12'	12'	0' or 12'	0' or 12'	0' or 12'	0'	0' or 10'	0,	NA	0,
Traffic Volume Capacity 1000 veh/day	>35	15-35	3.5-15	3.5 – 5	2.5 - 3.5	<2.5	<2.5	1.0 - 2.5	<1.0	NA	<0.3
Speed Limit, mph	40 - 45	35 - 45	30-45	30 - 35	25 - 30	25	25	25	25	15	25

Table 7-1
Fort Collins (GMA and City Limits)Street Standards - General Parameters

TRAFFIC PLANNING WITH ROUNDABOUTS

Roundabout Operational Characteristics Allow for:

- Capacity at intersection = narrower roadway widths (road diets)
- Design flexibility due to slower speeds
- Intersection spacing versatility (no progression)
- Improved business access opportunities

CAPACITY COMPARISON - U.S. vs U.K.

US vs UK Traffic Volumes for Arterial Roadways

- Peak hour lane capacity threshold: US = 800-900 vph, UK = 1,400-1,500 vph
- ADT two-lane roadway capacity threshold: US = 15-20,000 vph, UK = 25-30,000 vph

Roundabouts present opportunities to shape the cross section of a corridor in ways that are perhaps different from those afforded by signalized intersections.





I-94 and County Highway P, Oconomowoc, WI





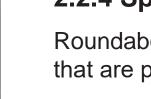
Main St. and Century Ave., Waunakee, WI

Cross Section with

RESOURCES



FHWA Roundabout Guide Second Edition -2.2.4 Spatial Requirements



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2. TRB Access Management Manual

The TRB Access Management Manual also documents the fact that our U.S. roadway cross-section needs for urban arterial roadways and associated ADT capacities are predicated on the needs of the operations of the signalized intersections along a corridor, not the link itself.

The Access Manual provides a basis to indicate that there may be an increase in available roadway capacity of 25-30% on arterial roadways (with signals) that implement good access control and other roadway features, including:

- No on-street parking
- Less frequent intersection and driveway spacing
- Turn lanes to include TWLTL, rights, and left lanes as appropriate



3. UK Design Manual for Roads and Bridges -**Traffic Capacity of Urban Roads**

UK Roadway Planning Standards where roundabouts are a predominant intersection type provide further supporting guidance in this area. Peak hour directional capacity thresholds: UK = 1,400-1,500 vph

ADT two-way roadway capacity thresholds: UK = 28-30,000 vph

CORRIDORS

Four-roundabout corridor



Huffman Road Corridor, Anchorage, AK

- No Roadway Widening (3 Lanes), road diet
- Access Control Opportunities = Good Business Circulation

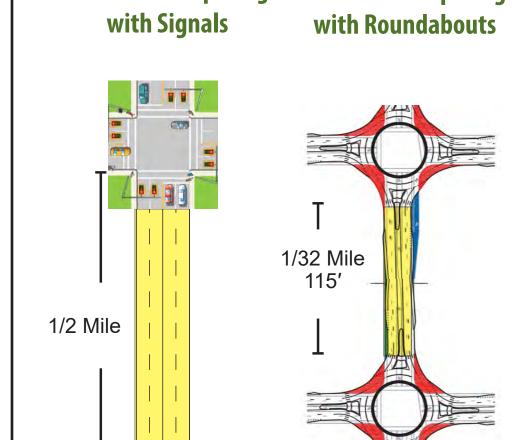
Five-roundabout corridor



STH 78/92 Corridor, Mt. Horeb, WI

Maintained 2-lane cross-section while accommodating future traffic growth

INTERSECTION SPACING



No Signal Progression

Two-lane bridge with flared entry roundabout



SR 99 / SR 104 / Twin Cities Road, Galt, CA Closely spaced Maintains 2-lane bridge



STH 83 & USH 18 / Blackwood Dr. & USH 18, Wales, Waukesha County, WI Maintained intersection spacing

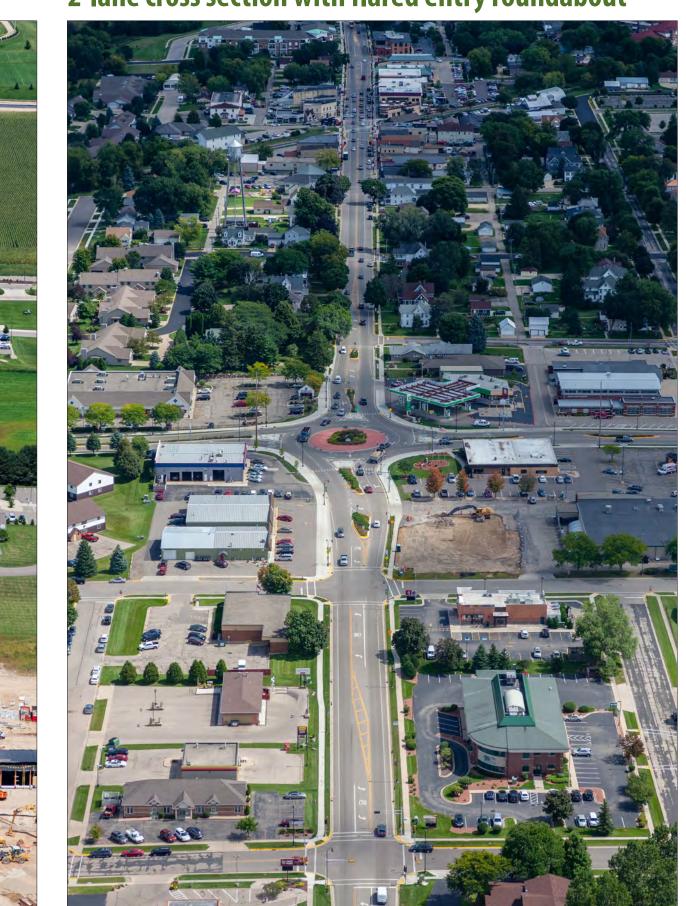
- Integrates site designs of new businesses into corridor designs
- Improved business access and circulation

CROSS SECTION WIDENING COMPARISON

Flared Entries **Provide Capacity** at Intersection



2-lane cross section with flared entry roundabout



Roadway widening cross section is dictated by signals