A Case For Narrower Arterial Streets

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Over the last several decades, the term transportation has become synonymous with streets and highways.

However, streets and highways are *components* of a transportation system.

A comprehensive and balanced system includes several modes and facilities that can be used by people of all ages, physical abilities, and income levels.

Arterial street corridors are an element of transportation systems that should be accessible to everyone, and they should be places to travel *to* instead of merely places to travel *through*.

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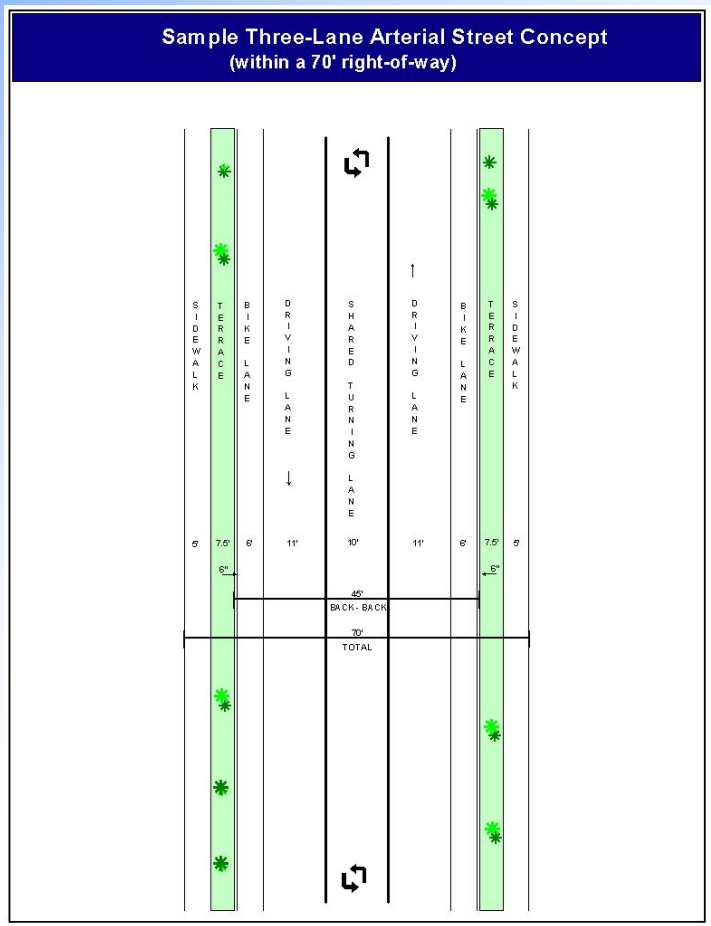
Suggested Treatments for Arterial Street Corridors

1. Build three-lane streets and/or two lane boulevards instead of four-lane arterials.



Three-lane streets work well when arterial corridors contain driveways…

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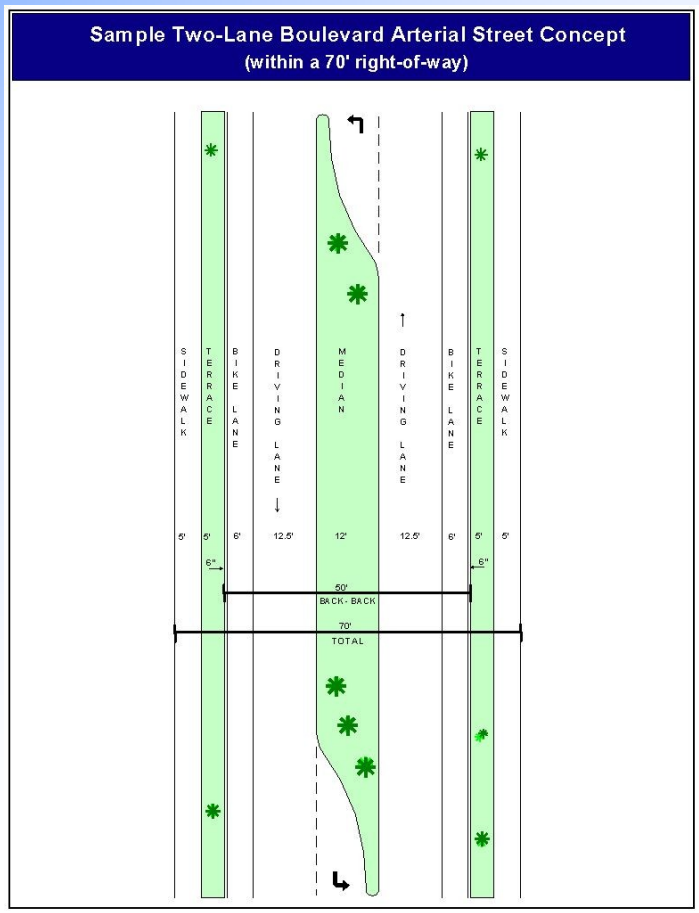
Suggested Treatments for Arterial Street Corridors

1. Build three-lane streets and/or two lane boulevards instead of four-lane arterials (cont.).



…but two-lane boulevards are ideal for streets that have little or no direct driveway access.

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Suggested Treatments for Arterial Street Corridors

2. Substitute roundabouts for traffic signals at major intersections.

Single-lane roundabout in Howard, Wisconsin

Single/double-lane roundabout in Coralville, Iowa

- Single-lane roundabouts at intersections with two- or three-lane streets
- Single/double lane roundabouts at intersections with four-lane streets
- Single/double lane roundabouts can also serve as transition points along segments

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Suggested Treatments for Arterial Street Corridors

3. Minimize driveway access to the street.

   Driveways along arterial streets often constrain capacity and can be hazardous to pedestrians, bicyclists, and motorists.

   Capacity and safety can be improved by reducing the number of driveways along arterial corridors.

   Do not flank the streets with frontage roads or with buildings that do not face the street.

   Instead, develop buildings that face the street and can be reached by driveways along intersecting streets, through alleys, and by local streets in neighborhoods.

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Why Implement These Treatments?

1. Believe it or not, it's already happening in some communities.

Examples of lane reduction projects on arterial streets with volumes exceeding 20,000 vehicles per day

Street Section	Change	ADT Before Change	ADT After Change
Lake Washington Blvd. (Kirkland, Washington)	4 lanes to 2 lanes + TWLTL* + bike lanes	23,000	25,913
Grand River Blvd. (East Lansing, Michigan)	4 lanes to 2 lanes + TWLTL* + bike lanes	23,000	23,000
Danforth Street (Toronto, Ontario)	4 to 2 lanes + bike lanes, 4 to 2 lanes + turning pockets + bike lanes	22,000	22,000
North 45th Street (Seattle, Washington)	4 lanes to 2 lanes + TWLTL*	19,421	20,274
Edgewater Drive (Orlando, Florida)	4 lanes to 2 lanes + TWLTL* + bike lanes	20,501	18,131
Main Street (Santa Monica, California)	4 to 2 lanes + TWLTL*, 4 to 2 lanes + median + bike lanes	20,000	18,000

*A TWLTL is a two-way left turn lane situated between the two driving lanes.

Sources: *Road Diets – Fixing the Big Roads* by Dan Burden and Peter Lagerwey (1999); *Edgewater Drive Before & After Re-Striping Results* by the City of Orlando Transportation Planning Bureau (November 1, 2002).

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Orlando's Edgewater Drive lane reduction project produced the following results:

- Lower crash rates and frequencies
- Lower injury rates and frequencies
- A lower percentage of vehicles traveling over 36 mph
- A reduction in traffic volumes on parallel and connecting streets
- Increased pedestrian and bicyclist activity
- Residential and commercial property value increases along and near the corridor that are now consistent with the county's overall annual increases

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Average peak travel times (in minutes) along a heavily signalized section of Edgewater Drive before and after the lane reduction project

	A.M. Peak (7:00 a.m. – 9:00 a.m.)		P.M. Peak (4:00 p.m. – 6:00 p.m.)	
Direction	Before Project	After Project	Before Project	After Project
Northbound	3.3 minutes	4.2 minutes	3.5 minutes	3.8 minutes
Southbound	3.2 minutes	4.1 minutes	3.7 minutes	**3.5 minutes**

Source: *Edgewater Drive Before & After Re-Striping Results* by the City of Orlando Transportation Planning Bureau (Nov. 1, 2002)

Result: Minimal travel time increases along a heavily signalized segment.

It is possible that travel times could have remained the same or even improved if the signals had been replaced by roundabouts.

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2. Traffic capacity and efficiency along arterial streets could improve.

It sounds odd, but it makes sense when the following factors are considered:

Factor 1: Constant and predictable traffic flow can be achieved.

Motorists can exit the travel lanes to make left turns.

Factor 2: Smaller gaps will typically exist between vehicles.

Since gaps are often smaller when speeds are lower, a street's capacity can rise when speeds fall.

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Factor 3: Greater efficiency and capacity at major intersections can be realized.

The capacity of roundabouts is greater than the capacity of signalized intersections. For example:

- Average delay per vehicle at an intersection that has a total major street volume of 1,000 vehicles per hour and 10 percent left turns.

· Signalized intersection delay per vehicle: 13.5 seconds
· Roundabout intersection delay per vehicle: 1.75 seconds

Delay reduction per vehicle with a roundabout: **11.75 seconds**

- Average delay per vehicle at an intersection that has a total major street volume of 1,000 vehicles per hour and 50 percent left turns.

· Signalized intersection delay per vehicle: 16 seconds
· Roundabout intersection delay per vehicle: 3 seconds

Delay reduction per vehicle with a roundabout: **13 seconds**

Source: *Roundabouts: An Informational Guide* by the Federal Highway Administration (2000).

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Factor 4: Fewer mid-block friction points will exist.

Efficiency and safety can be improved by minimizing the number of driveways between intersections.

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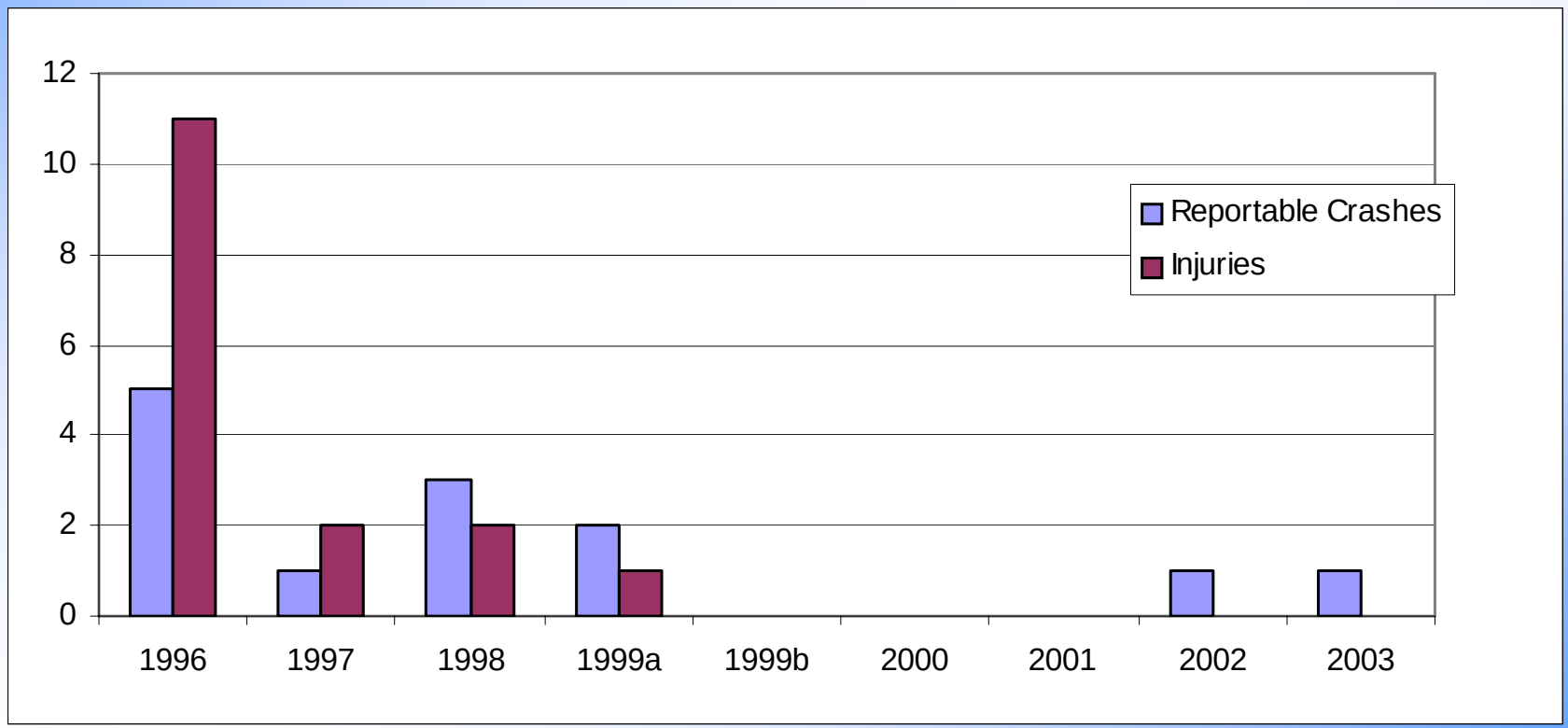
3. The roundabouts will improve safety for motorists, pedestrians, and bicyclists at major intersections

Example: Reportable crashes and injuries at the Lineville Road/Cardinal Lane intersection in the Village of Howard, Wisconsin (1996-2003)



1999a: January 1, 1999 – July 31, 1999 (before roundabout – still a two-way stop)
1999b: August 1, 1999 – December 31, 1999 (during and after roundabout construction)

Sources: Brown County Sheriff's Department crash records (1996-2001), Wisconsin Department of Transportation intersection crash summaries (2002-2003).

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Average annual crash statistics and cost estimates for major intersections along a signalized segment of East Mason Street in Green Bay, Wisconsin, between 2001 and 2003

Intersection	Average Number of Reportable Intersection Crashes Per Year	Estimated Property Damage Cost Per Year*	Average Number of Injuries Per Year	Estimated Injury Cost Per Year*
Webster Avenue	10.3	$64,000	7.0	$279,000
Baird Street	10.6	$66,000	8.0	$319,000
Bellevue Street	10.3	$64,000	9.3	$371,000
Lime Kiln Road	11.6	$72,000	9.3	$371,000
Main Street	7.6	$47,000	5.6	$223,000
TOTALS	**50.4**	**$313,000**	**39.2**	**$1,563,000**

*The property damage and injury cost estimates used in this table are based on average property damage and injury cost estimates developed by the National Safety Council in 2002.

Crash Data Source: Wisconsin DOT crash summary data (2001-2003).

How much money (not to mention physical and emotional pain) could be saved each year by replacing even a fraction of the nation's signals with roundabouts?

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4. Pedestrian comfort and accessibility could improve significantly.

Pedestrians walking along and crossing Edgewater Drive before and after the driving lane reduction project

Direction	Pedestrians Before Project	Pedestrians After Project	Change	% Change
Northbound & Southbound (walking along the street)	1,398	1,481	83	6%
Eastbound and Westbound (crossing the street)	738	1,151	413	56%
TOTALS	**2,136**	**2,632**	**496**	**23%**

Note: The before and after pedestrian counts were completed during a typical fall weekday (excluding Monday and Friday).

Source: *Edgewater Drive Before & After Re-Striping Results* by the City of Orlando Transportation Planning Bureau (November 1, 2002).

Orlando study's conclusion: People find it easier to cross now that the street has three driving lanes instead of four.

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5. Bicyclist safety and accessibility could improve significantly.

People bicycling along and across Edgewater Drive before and after the driving lane reduction project

Direction	Bicyclists Before Project	Bicyclists After Project	Change	% Change
Northbound & Southbound (biking along the street)	295	368	73	25%
Eastbound and Westbound (biking across the street)	80	118	38	48%
TOTALS	**375**	**486**	**111**	**30%**

Note: The before and after bicyclist counts were completed during a typical fall weekday (excluding Monday and Friday).

Source: *Edgewater Drive Before & After Re-Striping Results* by the City of Orlando Transportation Planning Bureau (November 1, 2002).

Fewer driving lanes + striped bicycle lanes = better bicycling conditions

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6. Narrower arterial streets with roundabouts typically cost less to build and maintain than four-lane arterials with signals.

Example: *Construction of an arterial street in De Pere, Wisconsin*

Original project: Four-lane street with signals at two intersections.

Original cost estimate: $2,100,000

Modified project: Three-lane street with wide curb lanes and roundabouts at two intersections.

Actual construction cost: $1,752,485

Estimated Construction Cost Savings: $347,515 (16.5 percent)

Sources: *2002-2006 Transportation Improvement Program for the Green Bay Urbanized Area;* Brown County Highway Dept.

And

Less right-of-way + less pavement + no signal equipment or electricity = lower maintenance costs.

Scheuring Road in De Pere, Wisconsin
(December 2004)

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Examples of roundabout and signal costs in Brown County…

Construction cost estimates for single-lane roundabouts and signals at intersections in Howard, Wisconsin, in 2001

Intersection	Costs for Roundabouts	Costs for Signals	Savings with Roundabouts
Cardinal/Glendale	$115,000	$250,000	$135,000
Cardinal/Woodale	$179,300	$313,000	$133,700
Woodale/Velp	$190,700	$445,000	$254,300
TOTALS	**$485,000**	**$1,008,000**	**$523,000**

Source: Brown County Highway Department (2001).

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7. These modifications would help to create a more equitable transportation system.

<u>The streets will be more accessible to people who cannot drive because of:</u>

- Age (too young or old to drive)
- Income level (cannot afford to buy and/or maintain a vehicle)
- Physical condition (cannot drive due to physical disabilities)
- Other factors (mental disabilities, etc.)

8. These modifications could help to improve property values and encourage investment and reinvestment along arterial street corridors.

Helped to spur investment in Delray Beach, Florida, and West Palm Beach, Florida…

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Conclusion

Some of the potential benefits of these concepts include:

- Improved traffic carrying capacity and efficiency even after the number of overhead driving lanes is reduced.
- Significant reductions in reportable crashes and injuries at major intersections.
- Reductions in the number of mid-block crashes caused by lane changes and sudden stops.
- Reduced property damage and injury costs associated with motor vehicle crashes.
- Improved safety, comfort, and accessibility for pedestrians and bicyclists.
- Improved comfort for people who live along and near arterial corridors.

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More potential benefits…

- Lower construction and maintenance costs.
- Improved system equity through the enhancement of accessibility for drivers and non-drivers of all ages, physical abilities, and income levels.
- Improved property values and investment potential along arterial corridors that could result from making the corridors more appealing places to live, work, and shop.
- The creation of attractive gateways to the downtowns and other parts of communities.

If it is possible to move large volumes of traffic and create safe, accessible, and attractive corridors that cost less to build and maintain,

why not do it?

Read the full paper at

www.co.brown.wi.us/planning/transportation.html

Questions?

Comments?