

~~Impact of Midblock Friction on the Analysis of Road Diet Improvements~~

5th Urban Street Symposium

May 24, 2017

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Brandon Purintun, EIT

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When Modeling Midblock Friction at Road Diets **Backfires**

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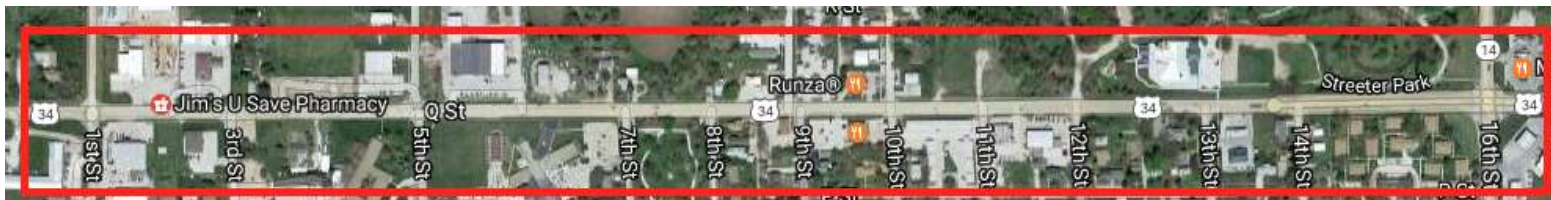
Objective

- Funded project:
 - Recommended practice for road diet implementations of rural highways passing through small urban centers
- Performance metric:
 - Publications
- Mismatch between funding and performance metrics
- Solution:
 - Gap in the literature: impacts of mid-block crossings



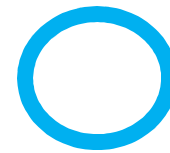
Case Study Site Location

- Aurora, NE
- Highway 34 from 1st Street to 16th Street (~1 mile)



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How rural is this?

- Traffic Flow Rate during Peak 15-minutes
 - Eastbound
 - Coming into town from west: 301 veh/hr
 - Peak eastbound in town: 419 veh/hr
 - Going east out of town: 284 veh/hr
 - Westbound
 - Coming into town from east: 87 veh/hr
 - Peak westbound in town: 304 veh/hr
 - Going east out of town: 185 veh/hr



Data Collection and Reduction

- Video Collection
 - 6 GoPro cameras on extendable poles



- Plagued with inconsistent batteries.
- Have since upgraded...



How rural is this?

- Traffic Counts during Peak Hour
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 - Coming into town from west: 301 veh/hr
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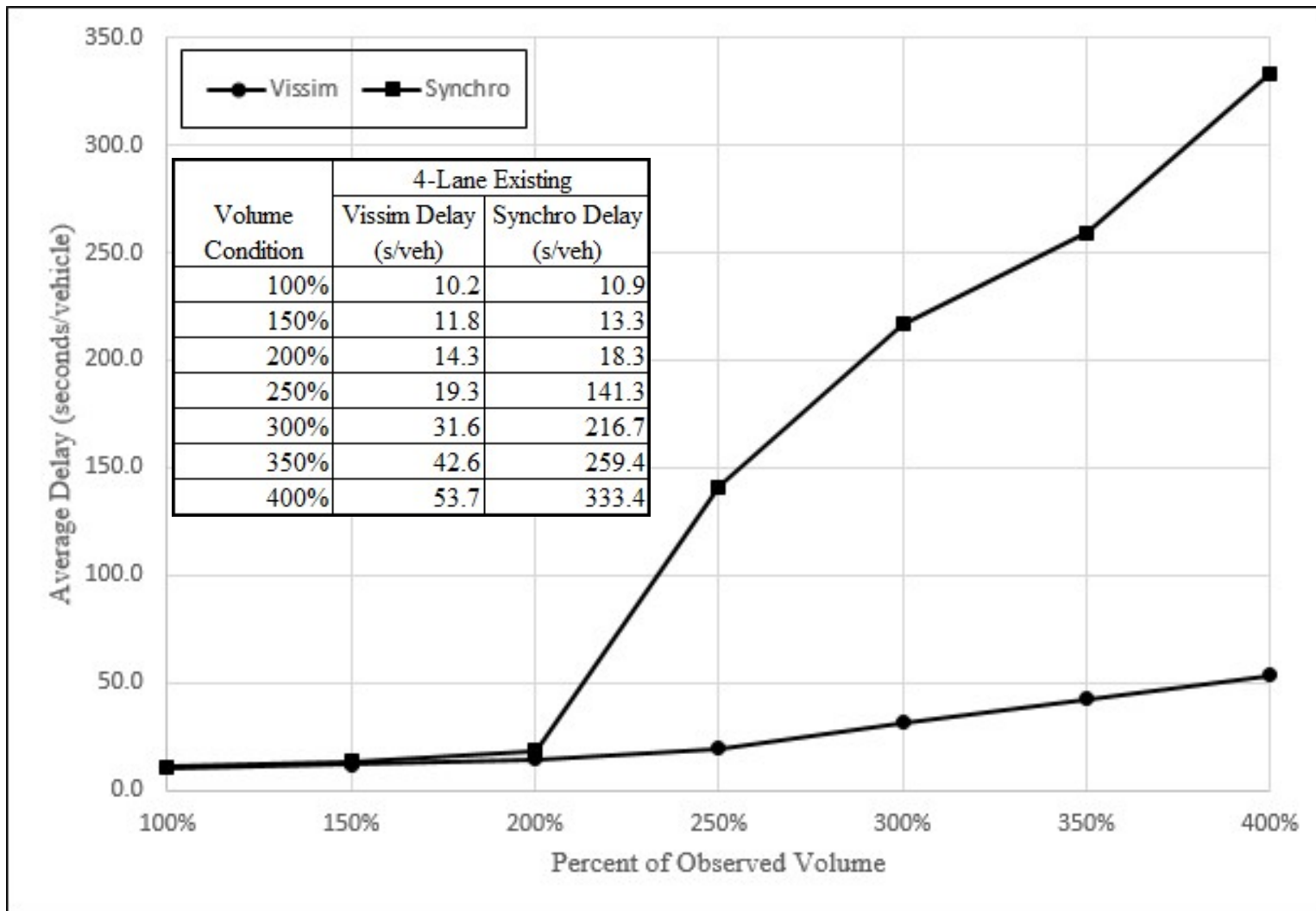


Analysis Methodology

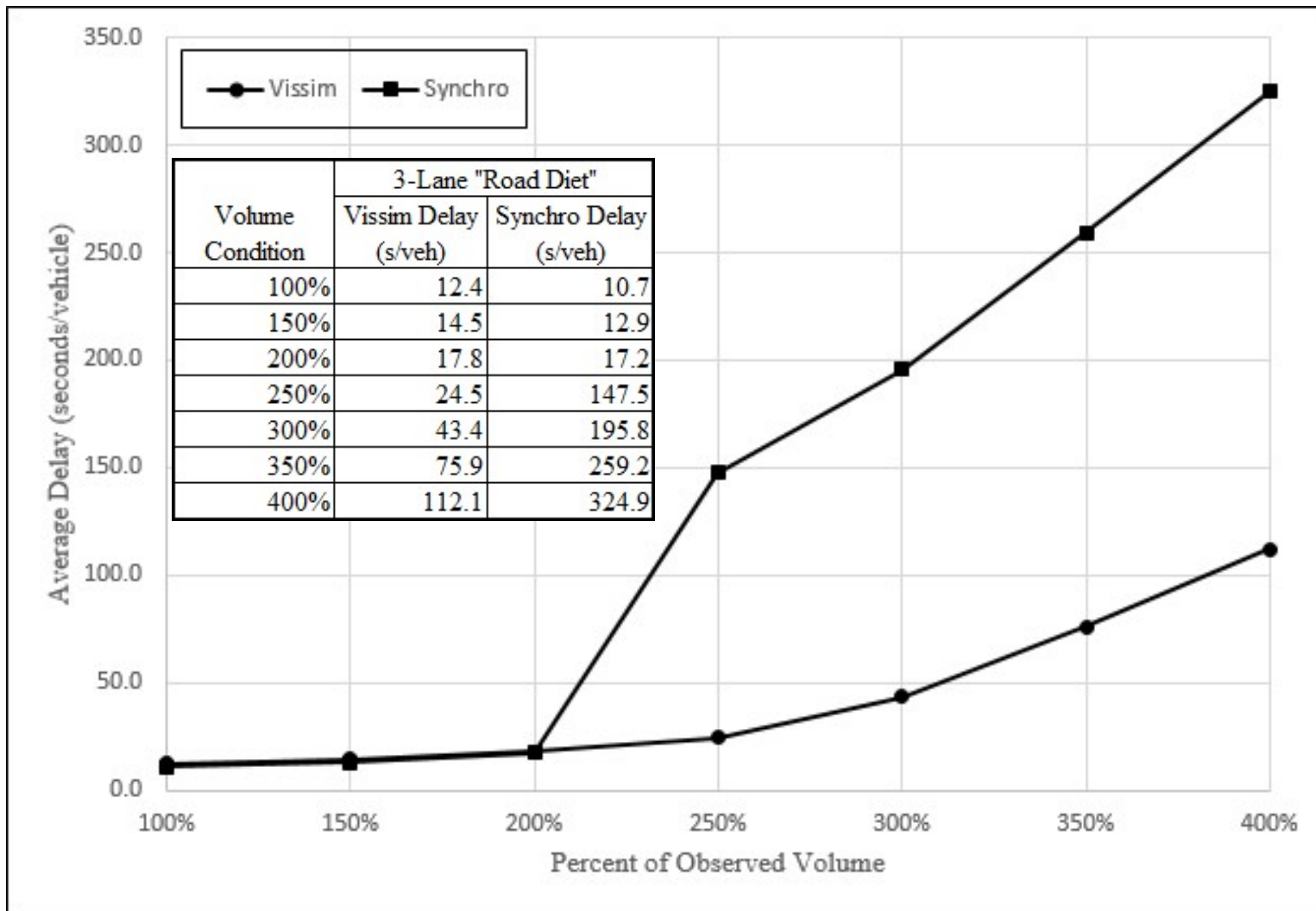
- Two software applications
 - Synchro
 - Existing and road diet condition
 - Useful for consistent signal optimization
 - VISSIM
 - Existing and road diet condition
 - With and without driveways
 - Sensitivity analysis by:
 - Overall volume multiplier
 - Heavy-vehicle percentage
 - Multiplier of midblock turn movements



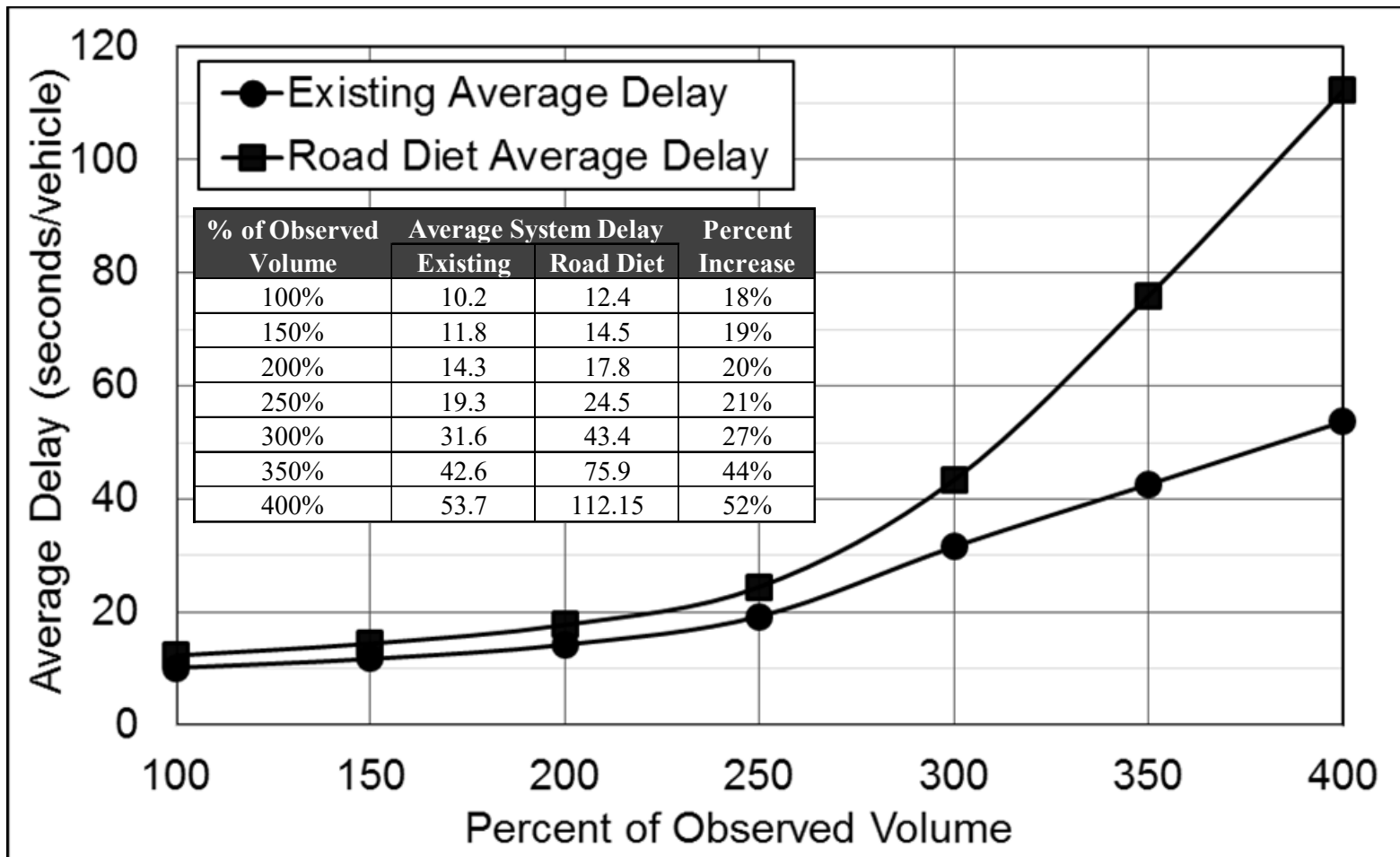
Existing Roadway Geometry Volume Sensitivity Analysis



Road Diet Geometry Volume Sensitivity Analysis



Total Delay divided by Number of Vehicles Existing and Road Diet Geometry



Trip Generation for Mid-block Generators

Trip Generation Rates

Weekday, Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m.

Code	Description	In	Out	Units	Location	Name	Count	In	Out
817	Nursery (Garden Center)	2.49	2.49	1,000 SF	SE of 1st	Schneider's Hardware Home G	11	27	27
811	Construction Equipment Rental Store	0.28	0.71	1,000 SF	NE of 1st	Sargent Drilling	8	2	6
880	Pharmacy/Drugstore with Drive-Through	4.96	4.96	1,000 SF	NW of 3rd	Usave	5	25	25
841	Automobile Sales	1.05	1.57	1,000 SF	NE of 3rd	ROE Chevy	2	2	3
843	Automobile Parts Sales	2.9	3.0	1,000 SF	NW of 5th	O'Reilly	8.5	25	26
811	Construction Equipment Rental Store	0.28	0.71	1,000 SF	NE of 5th	John Deer Tractors	28	8	20
843	Automobile Parts Sales	2.9	3.0	1,000 SF	NW of 7th	Boondocks	3	9	9
932	High-Turnover (Sit-Down) Restaurant	5.9	3.9	1,000 SF	SW of 9th	China Garden	2	12	8
320	Motel	0.3	0.2	Rooms	NE of 9th	Modern Motel	10	3	2
932	High-Turnover (Sit-Down) Restaurant	5.9	3.9	1,000 SF	SW of 10th	Pizza Hut (1/2 of parking lot)	2	12	8
932	High-Turnover (Sit-Down) Restaurant	5.9	3.9	1,000 SF	SW of 10th	Runza	2	12	8
814	Variety Store	3.41	3.41	1,000 SF	E of 13th	Pump & Pantry	3	10	10
841	Automobile Sales	1.05	1.57	1,000 SF	NE of 11th	Ford Dealer (1/2 of parking lot)	7	7	11
932	High-Turnover (Sit-Down) Restaurant	5.9	3.9	1,000 SF	NE of 16th	McDonald's (1/2 of parking lot)	1.7	10	7
945	Gasoline/Service Station with Convenience	6.8	6.8	Fuel Pos.	SE of 16th	Casey's	8	54	54
925	Drinking Place	7.5	3.9	1,000 SF	NE of 16th	Overtime	6	45	23

Summary: 263 247



Mid-block Friction Logic

- As network volume increases, excess capacity is lost and interruptions to the traffic flow from mid-block entry-points will play a role.
- For existing geometric configuration:
 - Vehicles making left-turn movement into business/residential driveway will impede flow in the through lane.
- For road diet geometric configuration:
 - Fewer gaps to pull into with all through traffic in one lane instead of two.



Mid-block Friction Results

- **Delay in both networks went down significantly.**
- Investigated network configuration and output parameters:
 - Generally speaking, for every vehicle exiting at a mid-block generator another one enters.
 - Roughly same total number of vehicles in network at any given time.
 - Increase in total number of vehicles in network counted for delay measures.
- Additional other networking issues identified that invalidated the research results enough to pull the paper.



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