

Work Zone Diversion Rate & Capacity Reduction

- ▶ Principal Investigator: Professor Eil Kwon, University of Minnesota Duluth
- ▶ Task 3: Work Zone Data Collection
 - 12 work zone sites
 - Traffic volumes
 - Travel time
 - Traffic density and speed
- ▶ Task 4: Determination of Diversion Rates
- ▶ Task 5: Estimation of Work Zone Capacity Reduction



12 Work Zone Sites

WZ	Corridor	Lane Closure Configuration	Lane Width (ft)	Median	Shoulder	Speed Limit (mph)	HV (%)	Note
1	I-35E	2 to 1	12	Tube	Open	55	5.85	Crossover
2	I-35E	2 to 1	12	Tube	Open	55	5.02	Crossover
3	I-694	2 to 1	11	Concrete Barrier	Open	55	8.4	Crossover
4	US-169	2 to 2 (NB) 2 to 1 (SB)	-	-	-	-	7.67	-
5	I-35E	3 to 3	11	Concrete Barrier	Drum	55	4.76	No-lane-close
6	I-694	2 to 2	12	-	-	-	6.86	No-lane-close
7	I-494	3 to 3	11	Open	Concrete Barrier	55	5.28	No-lane-close
8	I-694	3 to 2	-	-	-	-	6.12	-
9	US-169	2 to 1	12	Drum	Open	55	5.93	-
11	I-35W	2 to 2	-	-	-	-	7.71	No-lane-close
12	I-694	2 to 1	12	Concrete Barrier	Open	55	7.64	Crossover
13	I-35	2 to 1	12	Tube	Open	55	10.4	Crossover



Diversion Rates

- ▶ Logit Choice model:

$$\text{Remaining Traffic Flow Rate} = \frac{1}{1 + e^{a * (\frac{T_w - T_b}{T_b}) + b}}$$

where

Remaining Traffic Flow (RTF) Rate = ratio of traffic volume during construction to traffic volume before construction at upstream diversion points

T_w = travel time to the last detector station in the lane closure section during construction

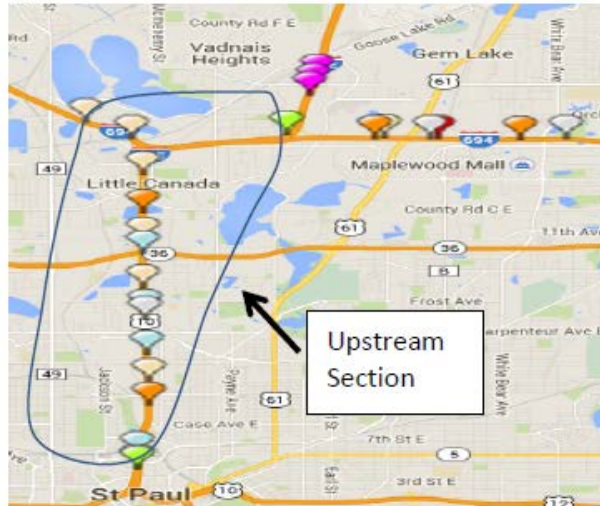
T_b = travel time to the last detector station in the lane closure section during the same period in previous no-construction year

a, b = calibration parameters for each work zone

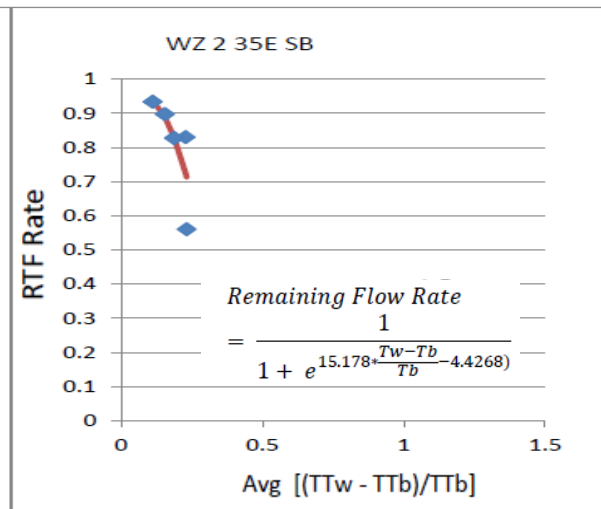
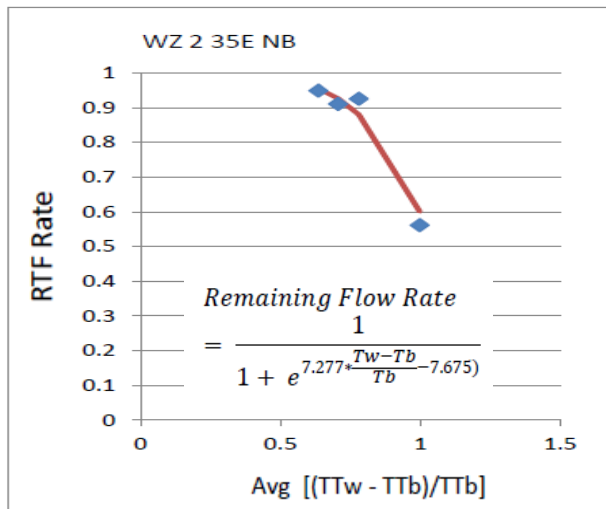
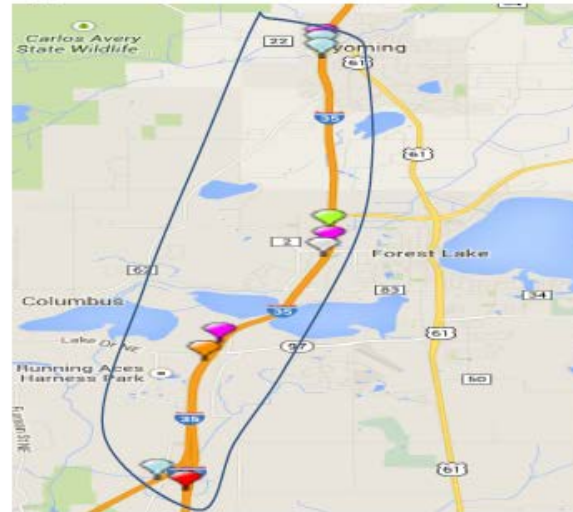


I-35E (SP 0282-34) Diversion

NB



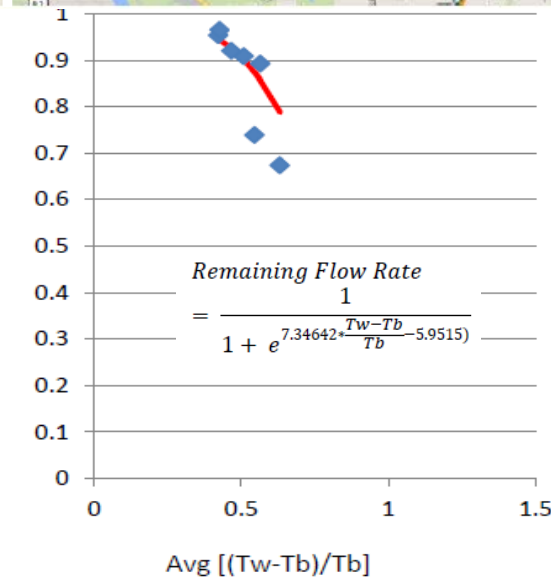
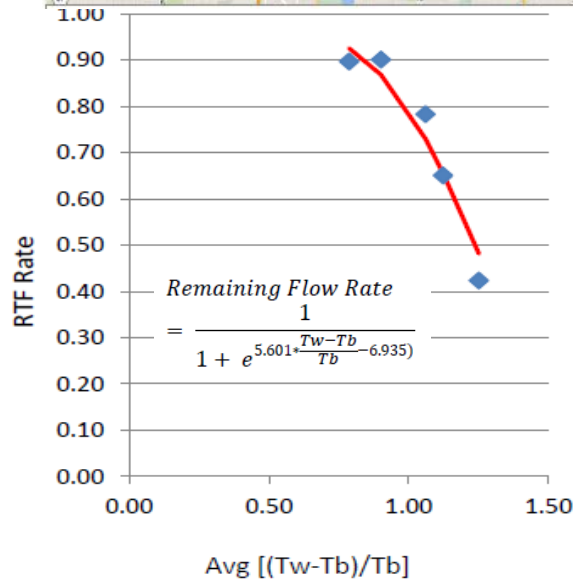
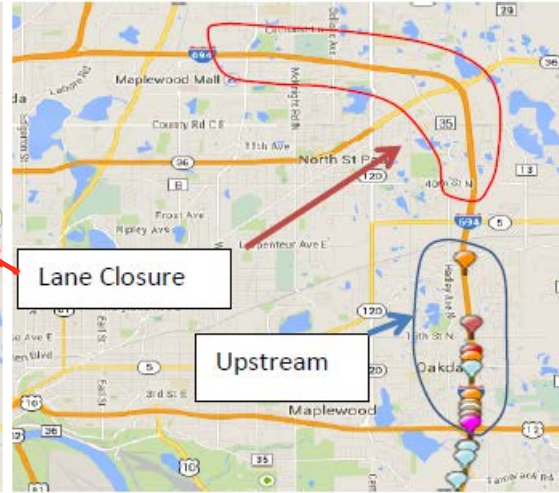
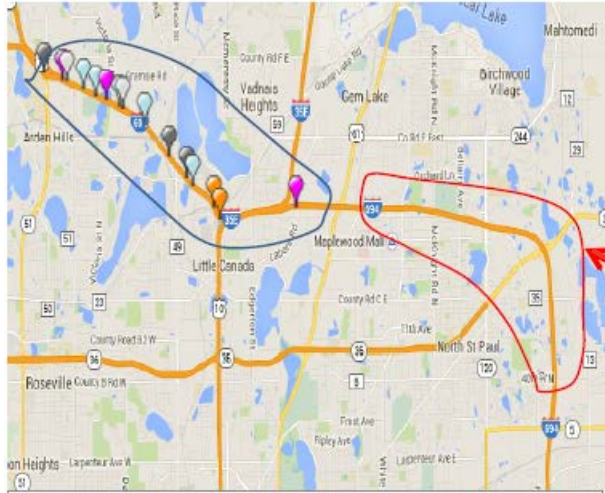
SB



I-694 (SP 6286-56) Diversion

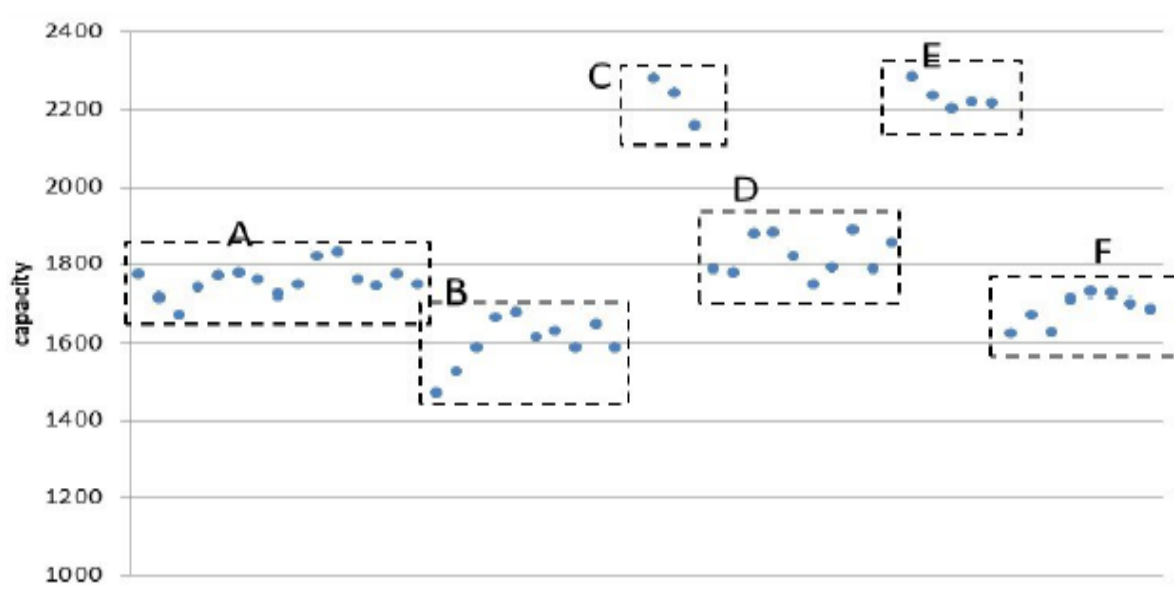
EB

WB



Work Zone Capacities

- ▶ Post-Breakdown Capacity: defined as the 85th percentile of queue discharge rate
- ▶ Grouping of capacity values depending on lane closure configurations and median types



Work Zone Capacities

Lane Config	Lane Width	Median Type	Capacity (pc/h)	Capacity (veh/h)	Standard Deviation	Group	Remarks
2 to 1	12	Tube Delineator with Crossover	1750	1669	33.7	A	WZ-1,2
2 to 1	12	Concrete Barrier with Crossover	1685	1579	37.7	F	WZ-12 p value of T-Test with Group A : 0.0024
2 to 1	11	Concrete Barrier with Crossover	1601	1478	61.5	B	WZ-3 p value of T-Test with Group F : 0.0042
2 to 2	12	-	2231	2158	27.5	E	WZ-11, No-lane-close
3 to 2	-	-	1819	1723	48.1	D	WZ-8 p value of T-Test with Group E : 1.9E-10
3 to 3	11	Open	2228	2136	50.7	C	WZ-7, No-lane-close, Concrete Barrier Shoulder p of T-Test with Group E : 0.94

