City of Seattle
Department of Transportation

Stone Way N Rechannelization:

Before and After Study

N 34th Street to N 50th Street

May, 2010

INTRODUCTION

Population density in Seattle is increasing within a fully built urban environment. Widening roadways to accommodate additional motor vehicles is frequently not an option within such a built environment. To improve safety and mobility, Seattle will increasingly rely on transportation modes such as bicycling, walking and transit. In order to complete the city's bicycle and pedestrian network, motor vehicle lanes must often be removed to create space for bicycle and pedestrian facilities (often referred to as a "road diet").

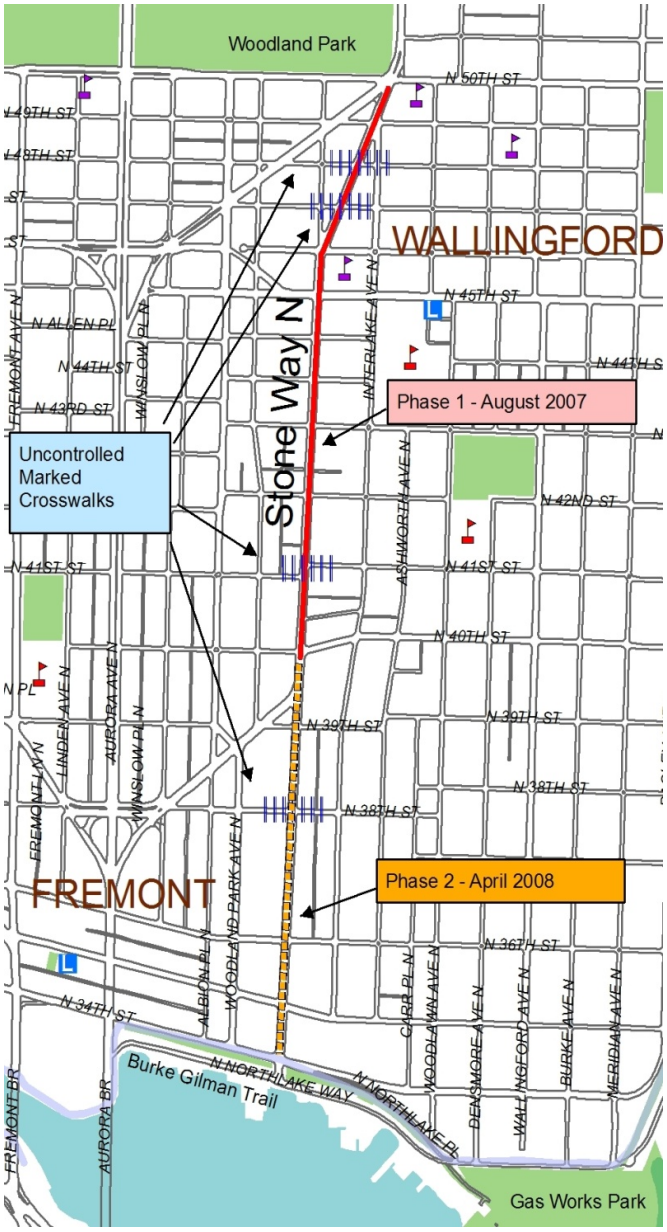


Figure 1

As of April, 2010 Seattle has implemented 24 lane reduction rechannelizations. The first such rechannelizations were implemented in 1972 on California Ave SW and N 45th St. Studies have indicated that lane reductions can result in lower motor vehicle speed, improved pedestrian safety, increased bicycling trips and fewer collisions while maintaining through capacity of the corridor. Implementation of the Bicycle Master Plan, adopted in 2007 and the Pedestrian Master Plan, adopted in 2009, is likely to include similar lane reduction projects in the future. To ensure that these projects result in the expected benefits, the effects of such projects on all road users must be considered and sufficiently studied after implementation.

This case study focuses on Seattle's experience with Stone Way N from N 34th Street to N 50th Street – a distance of approximately 1.2 miles (*Figure 1*). The Stone Way rechannelization was the 23rd such lane reduction project undertaken by the city since 1972. Stone Way is a north-south roadway that carries approximately 13,000 vehicles per day. The roadway connects the Fremont and Wallingford urban villages. Numerous Metro bus routes run along or across the corridor. Adjacent land use is mixed use residential, retail and commercial. Within five blocks of the corridor there are numerous pedestrian generators, including eight schools, two public

libraries, and five parks. Adjacent zoning is primarily Commercial or Neighborhood Commercial. At the south end is the Burke-Gilman Trail and Gas Works Park. At the north end is Woodland Park, the Woodland Park Zoo and Green Lake.

STUDY BACKGROUND

In July, 2007 Stone Way N was repaved from N 34th St to N 45th St. Prior to the paving project, the street consisted of 4 general purpose travel lanes. Uncontrolled marked crosswalks existed at N 38, N 41, N 47 and N 48 St. There were no bike facilities on the street. (*Figure 2*)

Before Rechannelization, looking south from 35th St	After Rechannelization, looking south from 35th St

Figure 2

The following factors contributed to the decision to rechannelize:

- The guidelines for uncontrolled marked crosswalks changed in 2004. As a result, the uncontrolled marked crosswalks along this corridor did not meet current guidelines and would have to be removed.
- The Bicycle Master Plan adopted in 2007, specified bicycle facilities on the corridor.
- The paving project provided a leveraging opportunity to make changes.

After the paving project was complete, the roadway was rechannelized in two phases:

- In August, 2007 the street was striped from N 40th St to N 50th St to provide 2 general travel lanes, a two-way left turn lane and bike facilities (combination of bike lanes and sharrows). Marked crosswalks were retained at N 41, N 47 and N 48 St. The marked crosswalk at N 38th St no longer met our guidelines and was removed.
- In April, 2008, the street was rechannelized between N 34th St and N 40th St. The marked crosswalk at N 38th St was restored.

This study compares data from the following time periods:

- 'Before' period includes April 5, 2005 through August 6, 2007 when the roadway was four general purpose lanes.

- 'After' period includes August 7, 2007 to December 4, 2009, which reflects both the interim channelization and the final channelization.

SPEED

The speed limit on this street is 30 miles per hour. There is a gradual grade uphill in the northbound direction. Speed data was collected at N 38th and N 42nd Streets. Speeds declined at both locations after channelization changes were complete. 'Before' data was collected prior to repaving in June, 2007. 'After' data was collected in June, 2008 and again in October, 2008 after channelization changes were complete. Speed studies in October, 2008 reveal a stabilization in motor vehicle speeds.

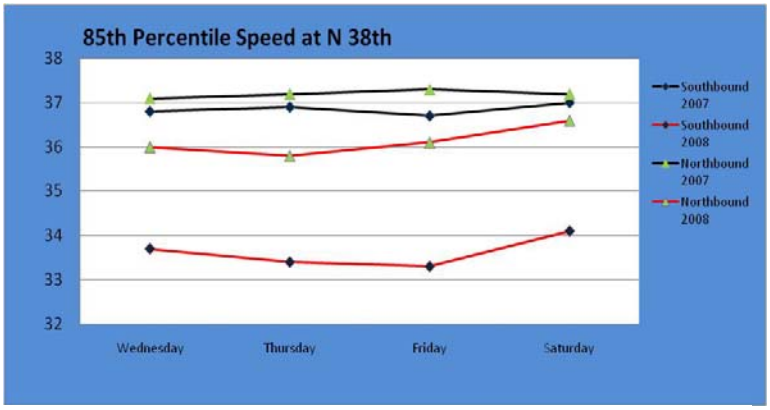


Figure 3

85th percentile speed is the speed at or below which 85% of motor vehicles are traveling. This is commonly used to set and measure compliance with speed limits. Prior to rechannelization, 85th percentile speed was approximately 37 mph. After rechannelization, 85th percentile speeds dropped approximately one mile per hour northbound and three miles per hour southbound (*Figure 3*). Actual traffic speed is nearer to the posted speed limit as a result of the rechannelization. With one lane of traffic, a lead vehicle traveling at the speed limit can set the pace for traffic.

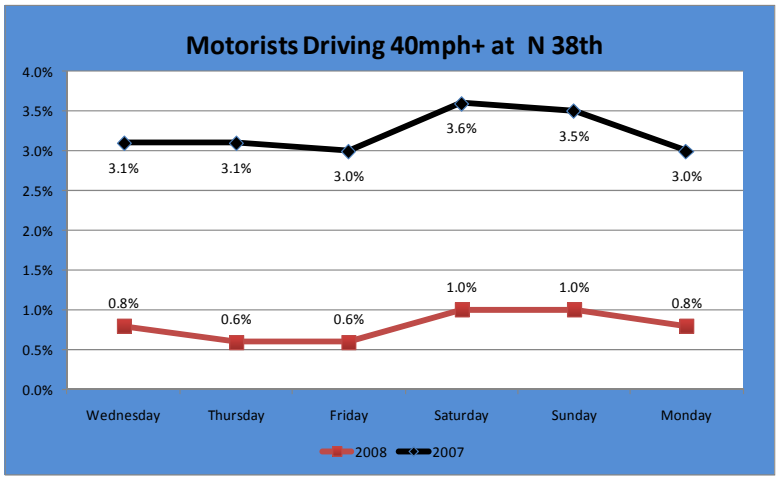


Figure 4

More dramatically, the number of motor vehicles exceeding the speed limit by 10 miles per hour or more dropped approximately 75%. When the road was four-lanes wide, approximately 4% of motor vehicles (150 vehicles per day) were traveling in excess of 40 miles per hour. After the rechannelization 1% or less (25 vehicles per day) were traveling more than 40 miles per hour. (*Figure 4*)

Lowering vehicle speed is critical to pedestrian safety because both the driver and the pedestrian have more time to react to situations, and the chance of a pedestrian surviving a

crash decreases sharply as a vehicle's speed increases. (A study in the United Kingdom (*Killing Speed and Saving Lives*) showed that reduced speed improves pedestrian safety. Research revealed that a pedestrian has an 85% chance of survival if struck by a vehicle traveling at 20 MPH, and only 15% if the vehicle is traveling at 40 MPH.

VOLUME

Mode Split

Motor vehicle traffic volume decreased approximately 6% in the corridor after the channelization changes were complete. Meanwhile, bicycle traffic increased 35%. (*Figure 5*) Some of the decline in motor vehicle traffic may reflect the state of the economy (the recession that began in January 2008) but the concurrent increase in bicycle trips indicates there may also be a mode shift associated with the new channelization. At the morning southbound peak hour, there are 93 bicycles and 658 motor vehicles – meaning that bicycles represent almost 15% of the peak traffic volume on Stone Way.

Stone Way N at N 42nd St	Change 2007-10
Daily Motor Vehicle Traffic	-6%
Six-hour Bicycle Count	35%

Figure 5

Motor Vehicle ADT

Citywide, traffic volumes declined on many Seattle arterials between 2006-08. (see http://www.seattle.gov/transportation/tfdmaps.htm) Consistent with this finding, volume on Stone Way declined slightly during the same time period. At N 42nd Street, motor vehicle volume decreased 6% after rechannelization. (*Figure 6*) At N 48th Street, volume decreased 15%. (*Figure 7*) Generally, the decline was greatest in the northern segments of the corridor.

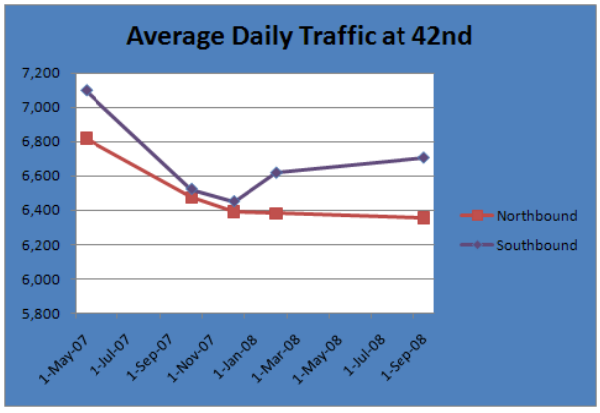


Figure 6

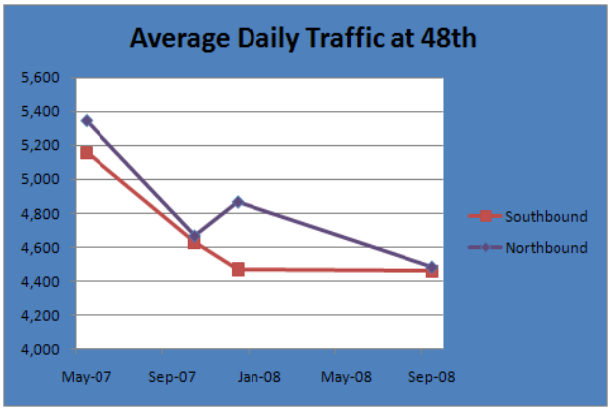


Figure 7

Peak Motor Vehicle Volume

Peak traffic volume is measured in peak flow as well as AM/PM peak hour volume. The peak flow on Stone Way N is southbound in the morning, northbound in the afternoon as people

generally travel downtown to jobs and back home to the residential areas of north Seattle at night. Peak traffic volumes followed a similar pattern as the average daily volume – that is, they decreased slightly. At N 42nd Street peak flow dropped less than 5% (Figure 8) while offpeak flows actually increased approximately 2%. At N 48th Street, both peak flow and off-peak flow declined. Peak flow declined 13% while offpeak flow declined approximately 5%. (*Figure 9*). Peak traffic volume declined at rates similar to those seen in the ADT decline, indicating that the roadway has maintained its ability to accommodate peak traffic volume even after the rechannelization.

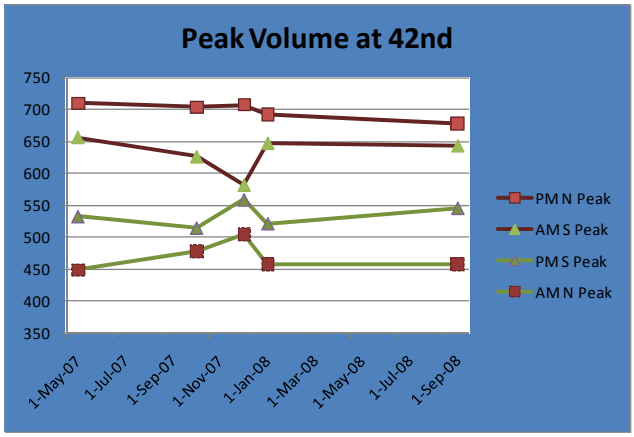


Figure 8

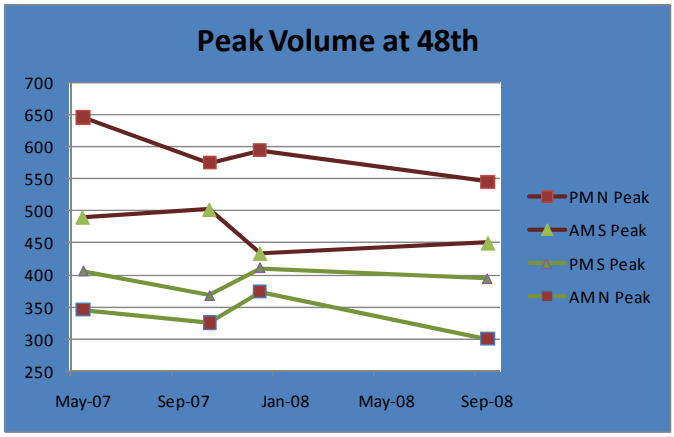
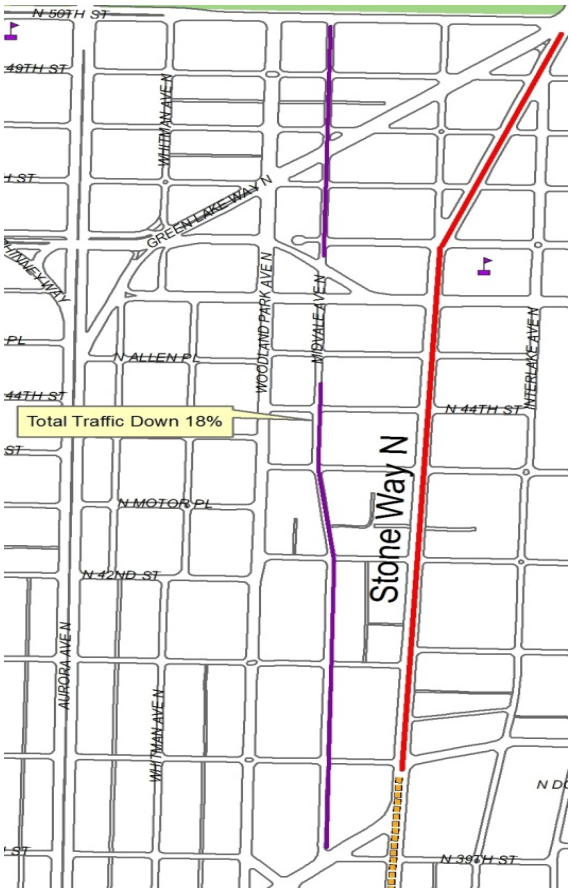


Figure 9

NEIGHBORHOOD TRAFFIC

Residents sometimes worry that rechannelization projects will result in traffic diversions onto residential streets. The results on Stone Way N show traffic has not diverted to adjacent streets. In fact, motor vehicle traffic on parallel routes has decreased even more substantially than the slight decline recorded on Stone Way.

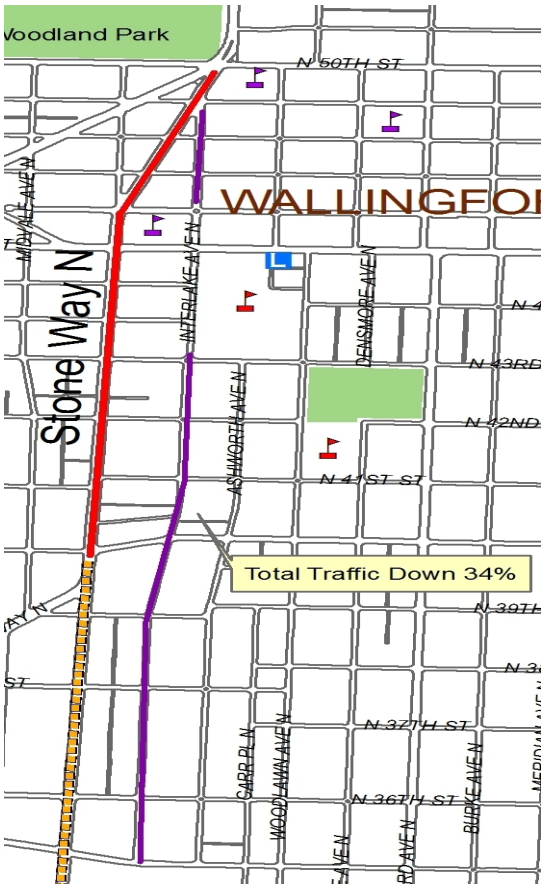
Midvale



Midvale Ave N @ N 42nd St			
	May, 2007	September, 2008	Change
AM Peak	35	25	-29%
PM Peak	47	44	-6%
Average Daily (ADT)	389	320	-18%

Figure 10

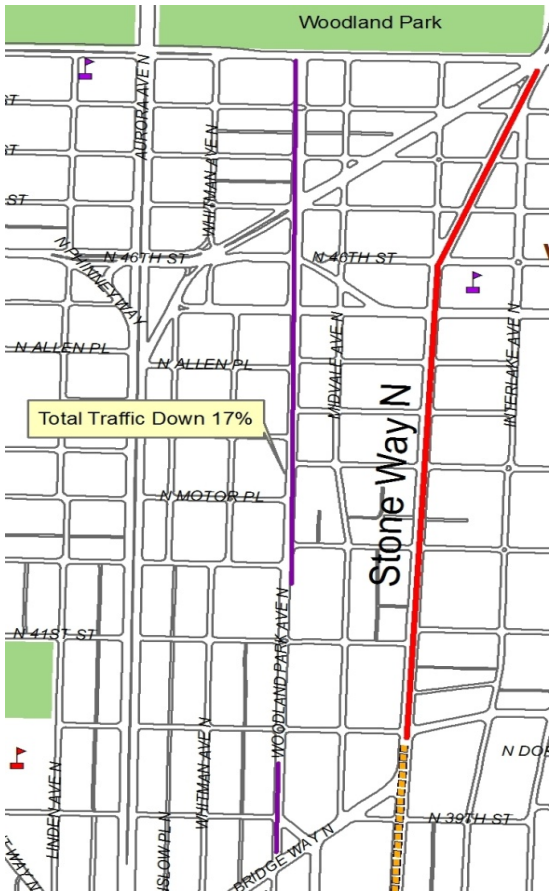
Interlake



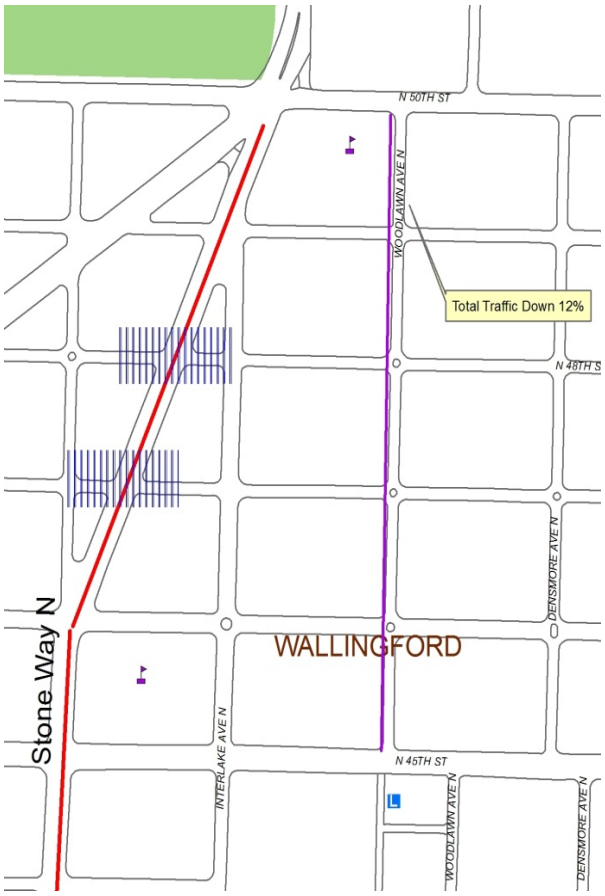
Interlake Ave N @ N 42nd St			
	May, 2007	September, 2008	Change
AM Peak	45	23	-49%
PM Peak	44	36	-18%
Average Daily (ADT)	389	258	-34%

Figure 11

Woodland Park



Woodlawn



Woodland Park Ave N @ N 42nd St			
	May, 2007	September, 2008	Change
AM Peak	133	118	-11%
PM Peak	125	128	2%
Average Daily (ADT)	1392	1151	-17%

Figure 12

Woodlawn Ave N @ N 50th St			
	May, 2007	September, 2008	Change
AM Peak	66	84	27%
PM Peak	83	78	-6%
Average Daily (ADT)	811	716	-12%

Figure 13

COLLISIONS

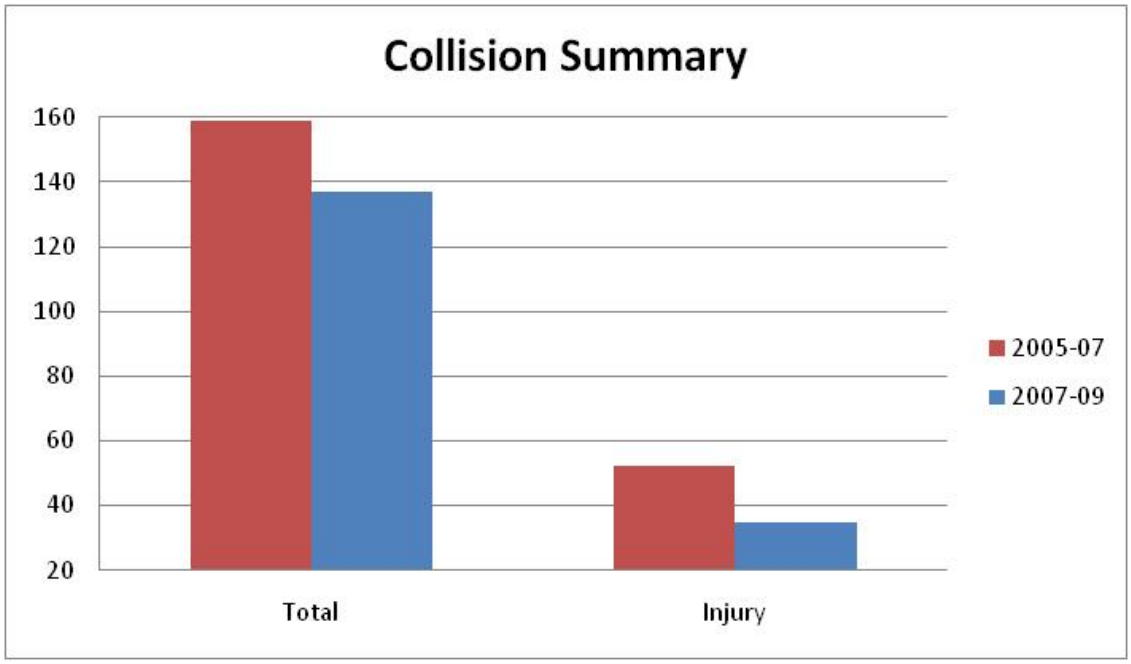


Figure 14

Collision records from April 5, 2005 through August 6, 2007 were compared with records from August 7, 2007 to December 4, 2009. This roughly compares the 28 months before Phase 1 was implemented to the 28 months after Phase 1 was implemented.

During this time period, total collisions declined 14%. Injury collisions declined 33%. Angle collisions declined 56%. Pedestrian collisions declined 80% (from 5 to 1). Left turn collisions declined 25%. Parked car collisions declined 15%.

While the number of cyclist collisions did not change (7 in each period), because the number of cyclists using the corridor has increased, the collision rate has declined. In other words, the number of bicycle collisions per bicycle trip has declined.

With motor vehicle volume having decreased in the corridor, the trend in collision rates is more difficult to determine. Assuming a 5-10% decline in motor vehicle volume, the collision rate for injury collisions, angle collisions, pedestrian collisions and left turn collisions seems to have declined.

COLLISIONS BY TYPE			
	2005-07	2007-09	Change
Right Turn	1	0	-100%
Pedestrian	5	1	-80%
Sideswipe	14	6	-57%
Angle	34	15	-56%
Left Turn	12	9	-25%
Parked Car	34	29	-15%
Head On	1	1	0%
Pedalcyclist	7	7	0%
Rear End	17	28	65%
Total	**159**	**137**	**-14%**
Injury	52	35	-33%
Percent Injury	33%	25%	

Figure 15

The number of rear-end collisions increased, especially between N 39th St and N 41st St. This type of collision increased 65% during the study period (from 17 to 28) in spite of the overall reduction in the number of collisions. Since most of the increase was attributable to the section of roadway where there was a transition from 4 lanes to 3 lanes during the interim period between August 2007 and April 2008, one possible explanation is that drivers had difficulty making left turns in this transition area. While these types of collisions tend to be minor in nature, SDOT will again examine the rate of rear-end collisions within the next two years to determine if the rate in fact declined after the roadway was rechannelized south of 40th Street.

CONCLUSIONS

1. Speed has declined. Motor vehicle speed is now closer to the posted speed limit of 30 mph. Top speeders – those traveling over 40 mph - declined more than 80% while 85th percentile speed declined approximately 3 mph.

2. Collisions have declined. It's statistically difficult to determine collision trends based on two-year comparison periods, but the results are encouraging. Total collisions have declined 14%. More importantly, the most traumatic types (injury and pedestrian) have sustained the steepest declines. The bicycle collision rate is down. Injury collisions are down 33%.

3. Pedestrian crossings are safer. Pedestrian collisions have been reduced 80%. Marked crosswalks are now compliant with federal and city guidelines.

4. Bicycle volume has increased. The volume of cyclists increased 35% from 2007-2010.

5. Motor vehicle traffic has not diverted to neighborhood streets. Daily traffic counts on parallel streets are down by 12- 34%.

6. Peak hour capacity has been maintained. Average daily motor vehicle volumes have declined, especially north of N 45th St. Although the decline is consistent with citywide trends in the midst of the recession, the increase in bicycle trips indicates that mode shift is at least part of the explanation for the motor vehicle decline. In some cases south of N 45th St, peak hour motor vehicle volumes increased slightly. This confirms that the corridor has sustained its capacity to carry the same number of motor vehicles in spite of the reduction in the number of general travel lanes.

	
Before Rechannelization, looking north at 3815 Stone Way N	After Rechannelization, looking north at 3815 Stone Way N

Figure 16