

Wrong Way Crashes in North Carolina Update

In an effort to determine the magnitude of wrong way crashes in North Carolina, an initial study was done in July 2006 to determine if additional initiatives (enforcement, engineering, etc.) were warranted to prevent future crashes from occurring. The initial study, which defined freeways as two-way median divided facilities with full control access, indicated that wrong way crashes accounted for less than 0.2% of all freeway crashes for the six year period of 2000-2006. Furthermore, the initial study indicated that alcohol was a primary factor in wrong way crashes, accounting for 43% (70 out of 162) of the crashes. While no additional engineering countermeasures were suggested in the initial study, a number of recommended legislative actions from the Governors' Driving While Impaired (DWI) Task Force were passed into law on July 27, 2006.

Now that some time has passed since the initial wrong way crash study was completed, an update is necessary to see if there has been any change in the crash trends. Using the same definition for freeways established in the initial study, the update of wrong way crashes in North Carolina for the previous seven years (2006-2012) seems to suggest that while these crashes still only make up about 0.2% of all freeway crashes and the total number of crashes have fluctuated from year to year, there has been an overall decrease in these crashes.

Year	Freeway Wrong Way Crashes (2006-2012)					Freeway All Crashes (2006-2012)				
	Total Crashes	Fatalities	A Injuries	B Injuries	C Injuries	Total Crashes	Fatalities	A Injuries	B Injuries	C Injuries
2006	28	15	10	18	15	17,972	150	240	1,947	6,881
2007	42	13	10	16	20	18,054	146	206	1,995	6,772
2008	27	9	2	15	22	16,449	138	185	1,765	5,937
2009	20	2	6	8	12	17,958	95	183	1,826	6,423
2010	30	3	1	18	20	19,037	147	188	1,732	6,578
2011	26	8	7	19	11	17,691	133	182	1,688	5,998
2012	27	9	3	14	13	17,706	101	182	1,544	6,086
Totals	200	59	39	108	113	124,867	910	1,366	12,497	44,675

A review of the wrong way crashes presented the following crash facts:

- From 2006 to 2012, there were 200 wrong way crashes in North Carolina.
- From 2006 to 2012, there was a 4% decrease in wrong way crashes.
- From 2000 to 2012, there was a 21% decrease in wrong way crashes.
- 50% of all these crashes were injury crashes (10% - A Injury, 23% - B Injury and 17% - C Injury).
- 48% of all wrong way crashes were alcohol related.
- 24% of all wrong way drivers were 20 to 29 years of age.
- 21% of all wrong way drivers were 60 years of age and above.
- 72% of all wrong way crashes and 67% of all fatal wrong way crashes occurred on Interstate routes.
- 53% of all wrong way crashes occurred on I-40 (31%), I-85 (13%) and I-95 (9%).
- Mecklenburg County was the number one county in which wrong way crashes (11%) occurred.
- 43% of all these crashes occurred in the Top 6 Counties (Mecklenburg, Forsyth, Wake, Haywood, Durham and Guilford Counties).
- 52% of all wrong way crashes occurred in the rural areas of North Carolina.
- Charlotte was the number one city in which wrong way crashes (10%) occurred.
- 28% of all these crashes occurred in the Top 5 Cities (Cities of Charlotte, Raleigh, Winston Salem, Durham and Greensboro).
- 47% of all wrong way crashes occurred in the Top 4 Divisions (NCDOT Divisions 5, 10, 7 and 9).
- 47% of all wrong way crashes occurred between the hours of Midnight and 5:59am.
- 48% of all wrong way crashes occurred between the months of February and June.

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At the National Wrong Way Driving Summit held on July 18-19, 2013, representatives from 23 states gathered to discuss the national picture and trends associated with wrong way crashes. The National Transportation Safety Board (NTSB) reported the five common data results associated with their review of wrong way driving crashes are as followed: 1) drivers were intoxicated, 2) older drivers, 3) potential medical impairment, 4) improper ramp use and 5) crash severity typically resulted in fatalities. The NTSB also reported that there was an over representation of wrong way driving crashes occurring in lane one (driving lane closest to the median). Based on their review of wrong way driving, the NTSB has recommended the adoption of a 0.05 Blood Alcohol Content (BAC) limit and adding wrong way driving messages to existing Global Positioning System (GPS) navigational systems. The NTSB has also recommended that the Federal Highway Administration (FHWA) issue a Highway Safety Improvement Program (HSIP) policy memo on establishing wrong way driving programs.

Other discussions at the National Wrong Way Driving Summit provided the following common themes:

- It is hard to determine the exact entry points of wrong way driving, therefore making it hard to treat a specific location.
- Older drivers are often confused when there are too many signs at a given location and they tend to look for/at pavement markings in these cases.
- Wrong way driving crashes/incidents are more likely to occur at locations in which two ramp entry/exit points are closely spaced.
- Some states have used a systematic approach to use Highway Safety Improvement Program (HSIP) funds to address wrong way driving crashes.
- Some states have used cell phone/Bluetooth data (direction, speed, vehicle movements) to track wrong way driving.

When compared to all crashes that occurred on North Carolina's freeways, the percentage of wrong way crashes has remained the same from the initiation of the first statewide study and this update. Due to the relatively small percentage of wrong way crashes, the first study did not offer any potential countermeasures but suggested that a continued strong emphasis on reducing all alcohol/impaired driving related crashes could have significant/positive impacts on reducing the number of wrong way crashes on our freeways. While the percentage of wrong way crashes continues to be very small and because it is often hard to determine an exact treatment location(s), perhaps a systematic approach may offer some benefit to further reduce the number of wrong way driving crashes. Additional pavement markings and signage at interchange entry/exit ramp locations in which two ramps are closely spaced could offer immediate benefits in helping to reduce these crashes. Some states have even lowered their sign heights in an effort to reduce driver confusion at interchange ramp locations with numerous signs the driver must process. As a result of the National Wrong Way Driving Summit, a Guidebook for Mitigating Wrong Way Driving Incidents is being developed and should offer additional assistance on ways to further reduce these types of crashes on our freeways.

The NCDOT will seek to create a research project that will review the locations where the reported wrong way crashes have occurred within our state. Through partnership with a university, the research would help to develop an inventory of the interchange layouts, design features and traffic control devices at the locations where the wrong way movement initially occurred and provide a toolbox of best practices for reducing wrong way movements at these locations and other locations with similar roadway characteristics.

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Appendix A

Wrong Way Driving Crashes Risk Map

Wrong Way Driving Crashes Risk Map

Criticality of Achievement	Increasing Age of Drivers	<ul style="list-style-type: none"> * Management awareness of the increasing number of older drivers from the baby boomer generation * Awareness that older drivers look for pavement markings and are confused when there are too many signs 	<ul style="list-style-type: none"> * Careful consideration of adjusting sign heights to accommodate drivers * Consideration of adding wrong way arrows and stop bars on exit ramps * Possible addition of reflective signpost sheeting and delineation 	<ul style="list-style-type: none"> * Installation of all proven wrong way safety countermeasures * Consistent interchange signing, pavement markings and delineation throughout the state
	Number of Alcohol Related Crashes	<ul style="list-style-type: none"> * Monitoring of alcohol related wrong way crashes * Management awareness that approximately 50% of wrong way crashes are alcohol related and 90% of these same crashes occur at night 	<ul style="list-style-type: none"> * Continue strengthening of legislation to prevent repeat DWI offenders from driving * Mandate interlock system for repeat DWI offenders * Using Traffic Management Centers to alert other drivers of these incidents 	<ul style="list-style-type: none"> * Bad press for not attempting to implement safety countermeasures to help reduce the number of wrong way crashes * Declining public opinion of NCDOT as safety champions
	Statewide Number of Side by Side Exit Ramp Locations	<ul style="list-style-type: none"> * Driver awareness of confusion sometimes experienced at these locations * Hard to determine the exact freeway entry point of wrong way driver crashes * Management awareness of these phenomenons 	<ul style="list-style-type: none"> * Pilot test sign height adjustments * Pilot test wrong way pavement markings and stop bars on exit ramps * Pilot test reflective signpost sheeting * Pilot test wrong way delineation 	<ul style="list-style-type: none"> * Plan of action to improve safety at these locations * Systematic approach to address wrong way driver crashes * Use existing GPS navigation technologies to provide wrong way movement alerts
		Decrease in the Number of Wrong Way Driver Crashes	Number of Wrong Way Driver Crashes Relatively Unchanged	Increase in the Number of Wrong Way Driver Crashes
Actual Variability in Number of Wrong Way Driver Crashes				

Risk Assessment	
High (Red)	Unacceptable. Major disruption likely. Different approach required. Priority management attention required.
Moderate (Yellow)	Some disruption. Different approach may be required. Additional management attention may be needed.
Low (Green)	Minimum impact. Minimum oversight needed to ensure risk remains low.

Risk Management is not a new concept to the North Carolina Department of Transportation

¹ The North Carolina DOT (NCDOT) has implemented risk management that addresses risks to organizational objectives, asset conditions, achieving performance targets and complying with environmental regulations.

² The 2010 FHWA Corporate Risk Assessment report notes that the "A major concern is the austere fiscal environment and resulting loss of personnel by State Highway and Transportation Agencies." The report stated that not maintaining sufficient organizational capacity (people, knowledge and system) will affect the future delivery of the transportation program. Agencies like NCDOT are developing data warehouses, virtual libraries and document management systems to capture the existing institutional knowledge and mitigate such risks. They are also implementing training and mentoring programs to document the business intelligence and facilitate knowledge transfer to address the risk of such loss of institutional knowledge.