

## Rate of nighttime crashes-4a

**Result Driver:** Don Hillis, Director of System Management

**Measurement Driver:** Mike Curtit, Assistant State Traffic Engineer

### Purpose of the Measure:

This measure tracks the types of crashes where visibility of stripes and signs may be a contributing crash factor.

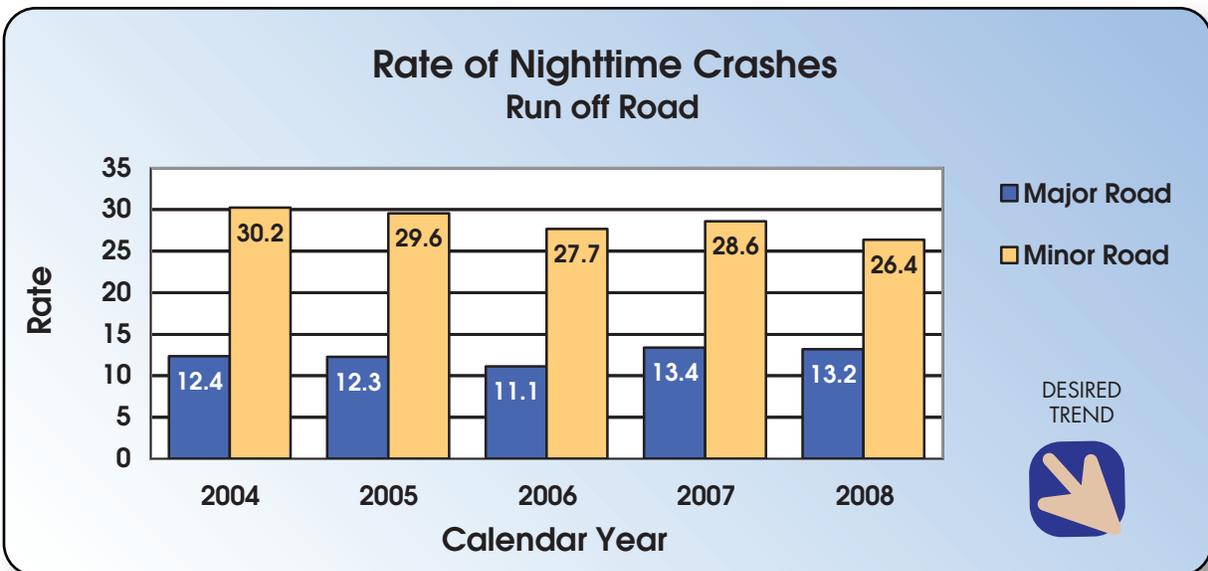
### Measurement and Data Collection:

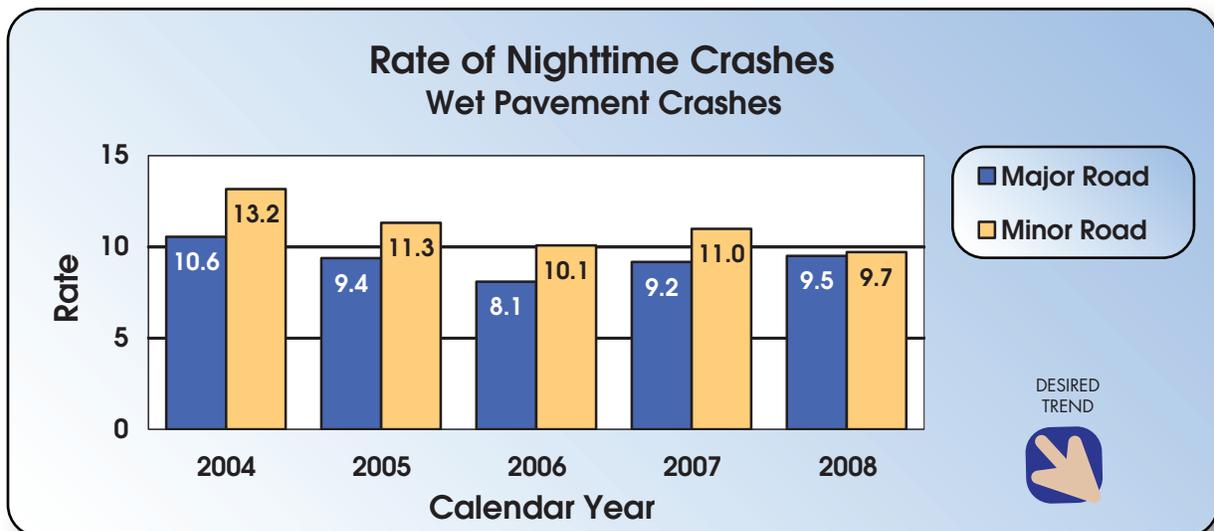
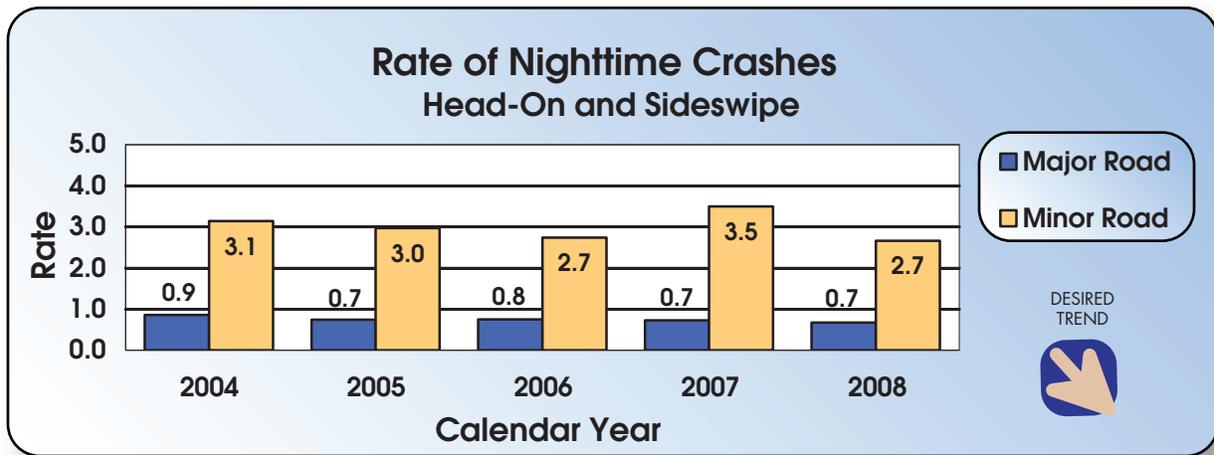
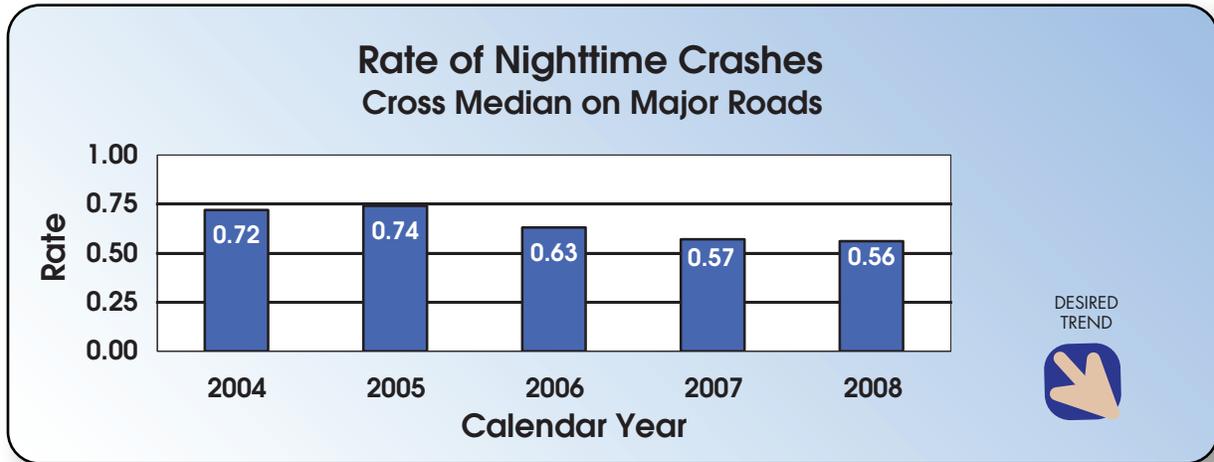
Data is collected from the statewide crash database to identify and measure the rate of nighttime crashes. Further filtering of the data divides these night crashes by major and minor roadways. Major roadways are generally used for statewide or interstate travel and minor roadways are generally used for local traffic needs. Crash rates are calculated using the average annual daily traffic counts and are expressed in the unit, per 100 million vehicle miles (HMVM), which is the national standard for expressing crash rates. This is an annual measure with the data updated each April.

### Improvement Status:

The crash rate for run-off-road crashes decreased slightly on major roads and decreased seven percent on minor roads. The crash rate for cross-median crashes on major roads also decreased just slightly. The crash rate for head-on and sideswipe crashes continues to be stable for major roads, but decreased 23 percent this last year on minor roads. The crash rate for wet pavement crashes increased three percent for major roads, but decreased 12 percent for minor roads. Crashes during winter weather events for 2007 and 2008 were similar, but were significantly higher than previous years. Most of this increase continues to be in the non-injury crash categories.

As part of the improvements included in the Better Roads, Brighter Future program, over 290 miles of edgeline rumble strips/stripes and almost 120 miles of centerline rumble stripes have been installed.





## Percent of signs that meet customers' expectations-4b

**Result Driver:** Don Hillis, Director of System Management

**Measurement Driver:** Mike Curtit, Assistant State Traffic Engineer

### Purpose of the Measure:

This measure will track whether the department's sign policy, design standards and sign replacement policy are resulting in visible signs that meet customers' expectations.

### Measurement and Data Collection:

Sign-quality attributes that define user expectations have been developed based on an industry-wide literature review. The attributes selected for this measure are those that can be captured during a night sign log. A night sign log is conducted on randomly generated road segments. MoDOT employees drive a road at night, recording the location and condition of the signs, particularly how visible the signs are with headlights. MoDOT employees collect the data annually in the fall, and update it each October.

### Improvement Status:

Over 91 percent of signs on major highways are in good condition. Almost 81 percent of signs on minor roads are in good condition. This represents a slight increase from last year for both major and minor roads.

In the last twelve months, MoDOT's sign shop has produced over 101,000 new signs for the districts. In addition, six trainings in four different districts on proper sign installation and handling procedures were performed. MoDOT continues to perform annual inspections of every sign in Missouri and does random quality assurance reviews targeted at signing.



## Percent of stripes that meet customers' expectations-4c

**Result Driver:** Don Hillis, Director of System Management  
**Measurement Driver:** Jim Brocksmith, Traffic Liaison Engineer

### Purpose of the Measure:

This measure tracks whether MoDOT's striping policy, processes and materials used are resulting in visible stripes that meet customers' expectations.

### Measurement and Data Collection:

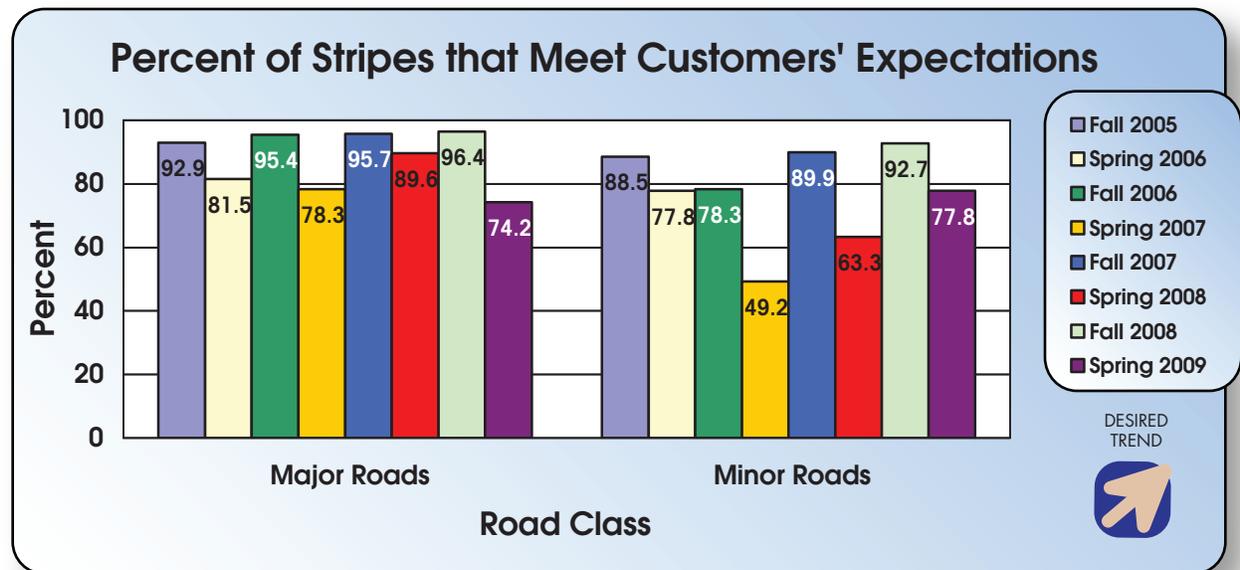
Striping quality attributes that define user expectations have been developed based on an industry-wide literature review. The attribute selected for this measure is the retroreflectivity of the striping or the visibility of the striping at night. Retroreflectivity is measured as the amount of light from vehicle headlights that is returned to the driver. We have established retroreflectivity benchmarks of 150 for white and 125 for yellow. These benchmarks were chosen because they are at the high end of what research and other states consider minimum acceptable levels. Data is collected by taking retroreflectivity readings on randomly selected road segments in the fall and spring of each year. This data is then compared to the benchmarks. Traffic volumes, winter weather and pavement condition all have an impact on the performance and durability of striping. The measurement unit for retroreflectivity is millicandelas per meter squared per lux (mcd/m<sup>2</sup>/lux). Fall readings are taken in October and November as the striping season is ending. Spring readings are taken in April, May and June to reflect the condition of the markings coming out of the winter when they are typically the poorest.

For the spring readings in 2009 we changed the amount and the way the readings are collected. The sampling size used was reduced both in the length of the samples and the number of samples used. We still have a statistically significant sample. These changes were implemented to reduce the costs associated with the data collection.

### Improvement Status:

The data was analyzed in respect to the above benchmarks MoDOT set as the minimum acceptable level of retroreflectivity. The winter of 2008-09 was in general a rather mild winter, which means reduced damage to striping due to snowplows. The exception to this would be the southeastern part of the state in districts 9 and 10 that had a significant ice storm in December of 2008. The resulting low readings on the major roads in this part of the state are a large part of the decline to some of the lowest readings recorded in the spring. The results on the minor roads equal the best results we've seen in spring readings.

We are expanding the use of wet reflective markings with the retro-fitting of approximately 2,400 miles of major roads with rumble stripes over the next two years. In addition, approximately 5,300 miles of minor roads will have edgelines added over the next four years.



## Percent of work zones meeting expectations for visibility-4d

**Result Driver:** Don Hillis, Director of System Management

**Measurement Driver:** Dan Smith, Traffic Management & Operations Engineer

### Purpose of the Measure:

An important factor in evaluating the department's performance in temporary traffic control design, deployment, operation, and maintenance is the measurement of the effectiveness of the visual guidance provided to motorists in our work zones. This measure tracks how well the department meets customers' expectations of visibility in work zones on state highways.

### Measurement and Data Collection:

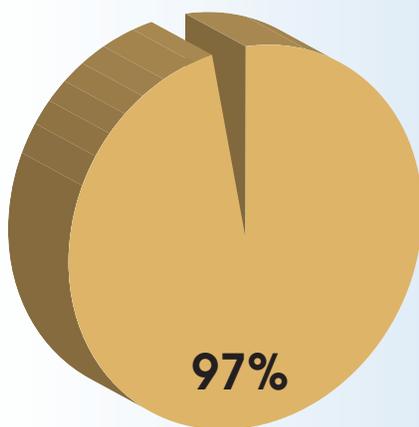
On January 1, 2009, MoDOT provided a Work Zone Customer Survey for the traveling public to provide evaluation of the visibility within work zones across the state. Each survey has several questions that address the early warning of work zones, visibility of signs and signals, did the cones, barrels or striping guide the person through the work zone, and did the work zone look clean and organized. The evaluator assigns a yes, no, or n/a rating to each of the

questions. The overall ratings are compiled quarterly and reported via this measurement. The survey is on MoDOT website at the following address: <http://www.modot.gov/workzones/Comments.htm>.

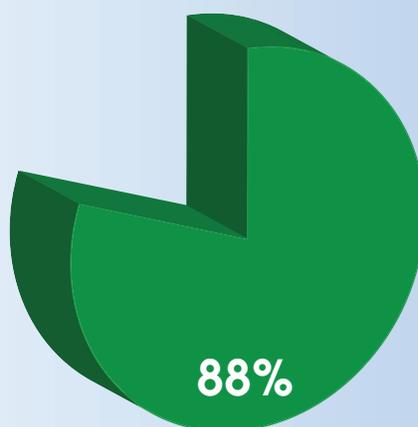
### Improvement Status:

Compilation of the 1,294 surveys performed by the traveling public and MoDOT staff between January and June of this calendar year resulted in an increase of positive satisfaction rating from 88 to 92 percent for work zone visibility. Since this is the first year the traveling public has had an opportunity to provide formal feedback on work zones, no historical data is available. For comparison purposes, the 2008 yearly average results of our technical staff inspections are included. The revised evaluation technique will allow MoDOT to align our priorities with that of our customers.

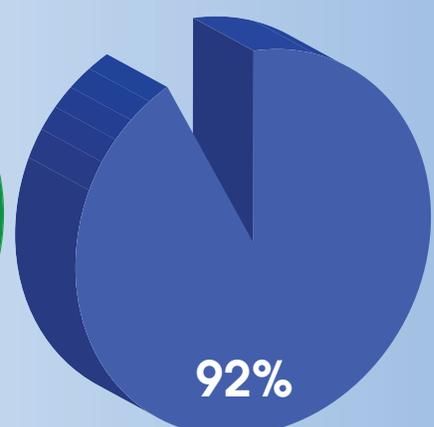
### Percent of Work Zones Meeting Expectations for Visibility



2008 Average



1st Quarter 2009



2nd Quarter 2009

Calendar Year

DESIRED  
TREND

