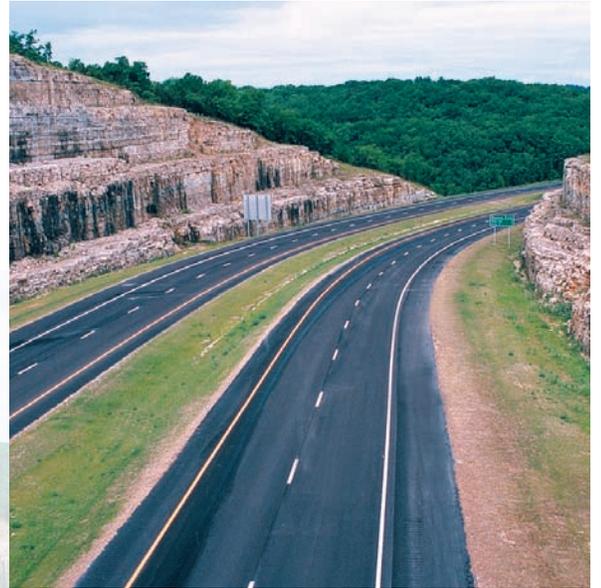
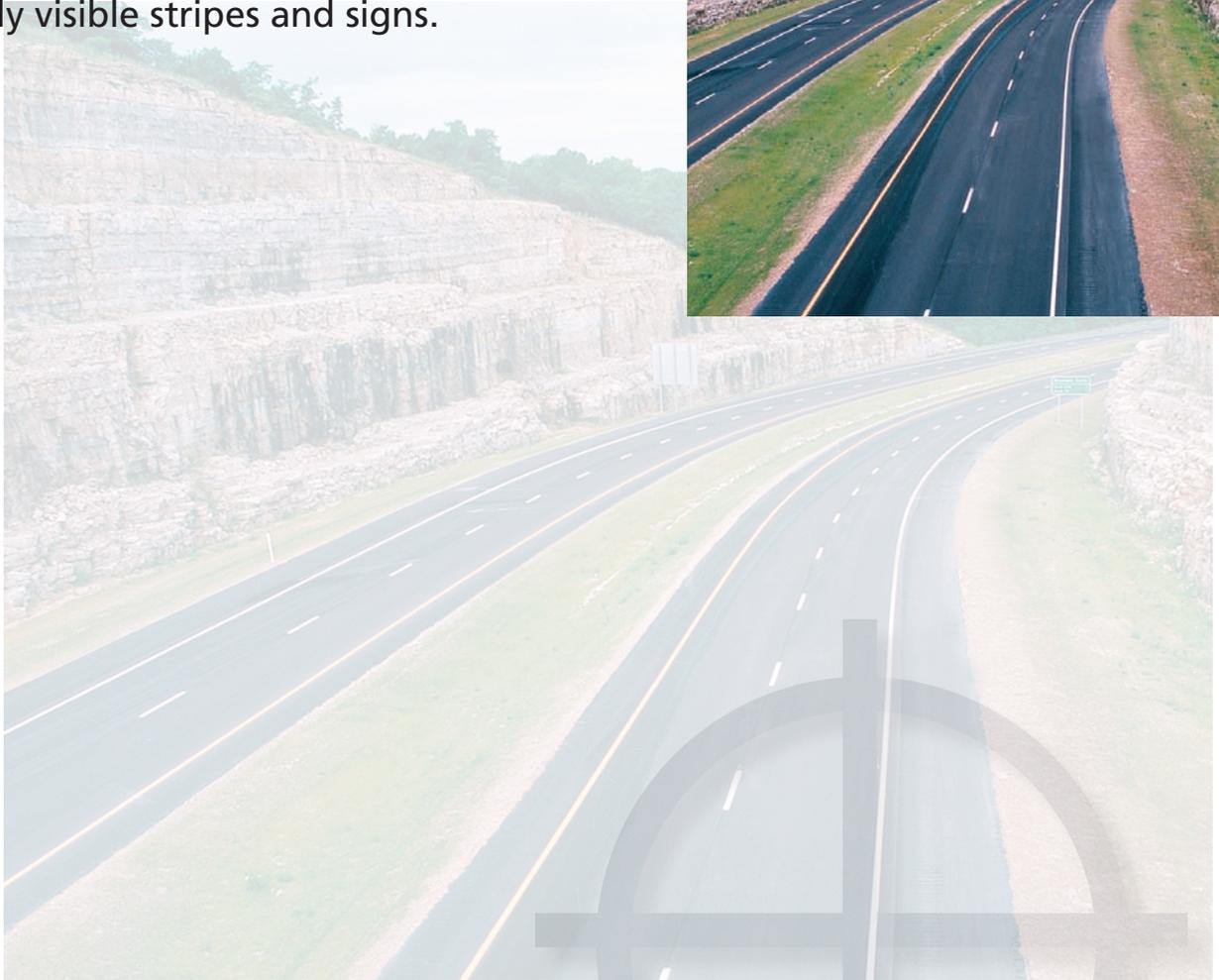


---

# Roadway Visibility

*Tangible Result Driver – Don Hillis,  
Director of System Management*

Good roadway visibility in all weather and light conditions is critical to safe and efficient travel. MoDOT will delight its customers by using top-quality and highly visible stripes and signs.



# Roadway Visibility

## Rate of nighttime crashes

**Result Driver:** Don Hillis, Director of System Management  
**Measurement Driver:** Mike Curtit, Assistant State Traffic Engineer

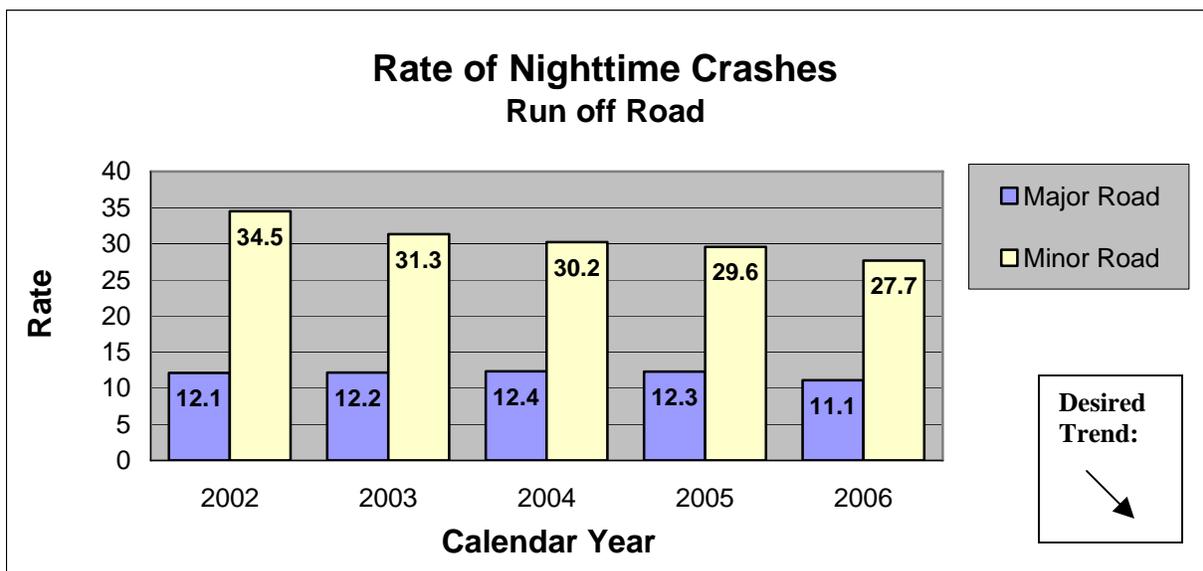
**Purpose of the Measure:**  
This measure tracks the types of crashes where visibility of stripes and signs may be a contributing factor.

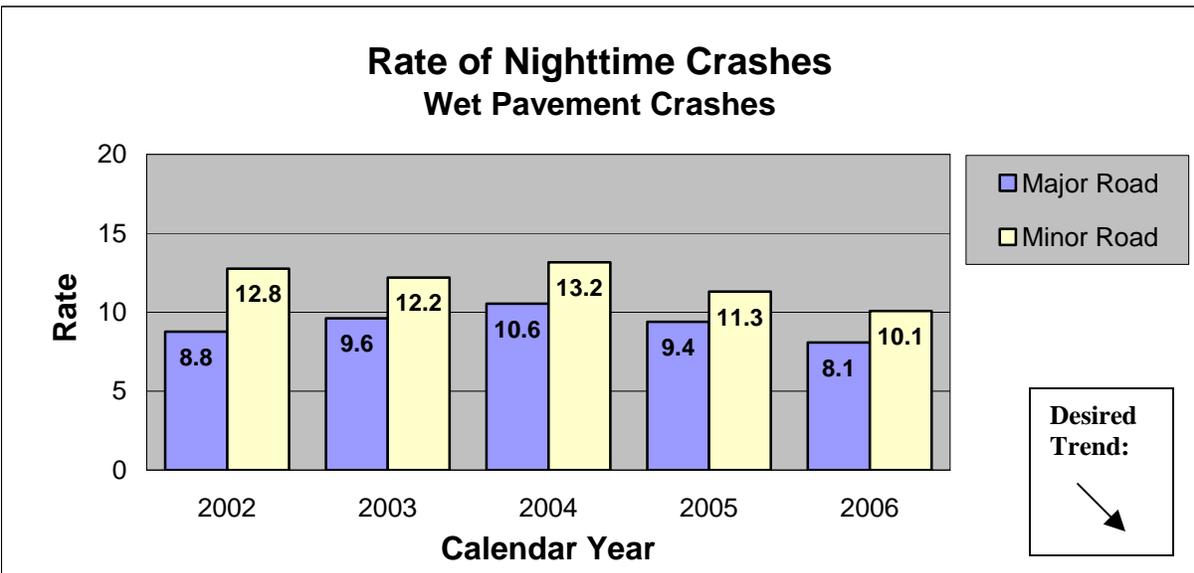
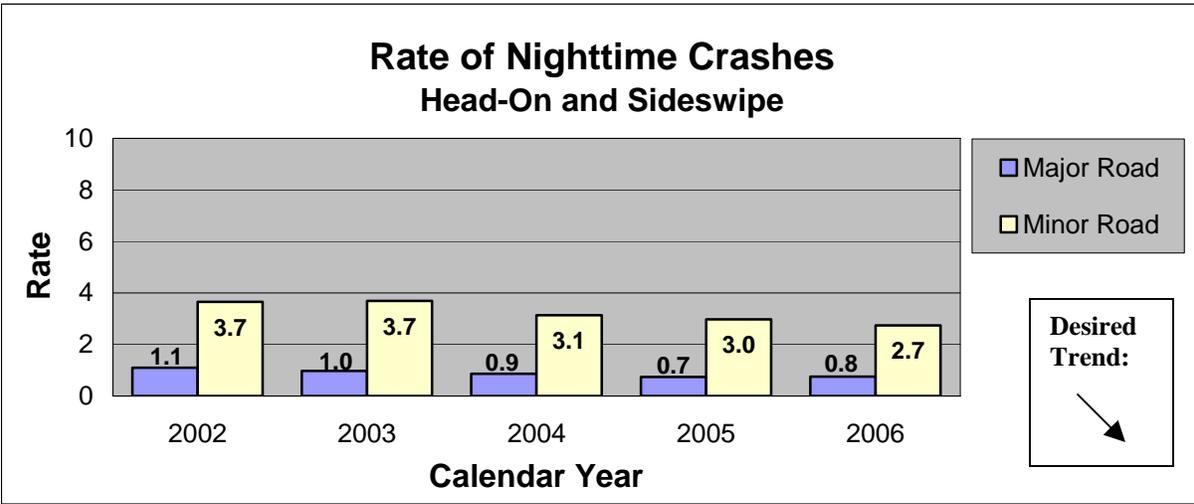
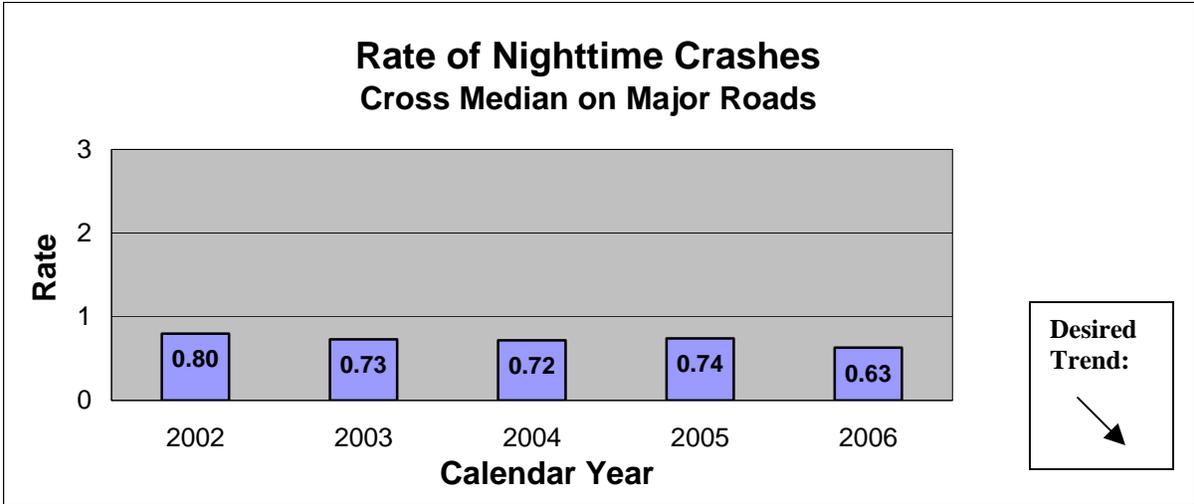
**Measurement and Data Collection:**  
To measure the rate of nighttime crashes, data is collected from the statewide crash database to identify crashes that occur during night conditions. Further filtering of the data divides these night crashes by major and minor roadways. Major roadways are generally 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:**  
This data remains unchanged since the last publication due to late availability of 2007 nighttime crash rates. The rate of nighttime crashes on major and minor roads has decreased for each measure except for head-on and sideswipe crashes on major roads. The rate of head-on and sideswipe crashes on major roads has remained virtually flat from 2002 to 2006. The previous years' rates were also updated with current crash data.

As part of the recently completed Smooth Roads Initiative (SRI), over 188,000 new signs, over 12,000 new emergency reference markers on interstates, over 150,000 delineators on guardrail and guard cable, and approximately 3 million feet of highly reflective pavement tape were installed. In addition, edgeline rumble stripes are being installed on SRI routes.

The guidelines for the Better Roads, Brighter Future program include upgrading the signing, continuing to implement the new pavement marking system, adding edgeline rumble stripes, and including centerline rumble stripes on two lane roadways. The pavement tape that will be used as a part of Better Roads, Brighter Future program will be a "wet reflective" tape that has improved visibility during wet pavement conditions.





# Roadway Visibility

## *Percent of signs that meet customers' expectations*

**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 and the 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 by MoDOT employees driving a road at night, recording the location and condition of the signs, particularly how visible the signs are with headlights. Data for this measure is collected by doing night sign logs on randomly generated road segments. MoDOT employees collect the data annually in the fall, and update it each October.

**Improvement Status:**

Over 90 percent of signs on major highways are in good condition. This represents a 6 percent increase from last year. Currently 80 percent of our signs on minor roads are in good condition. This represents a 7 percent increase from last year.

The Smooth Roads Initiative, which was completed in 2006, improved signing on the major routes. The Better Roads, Brighter Future program, which will be completed by the end of 2011, also emphasizes signing improvements on major routes. MoDOT performs annual inspections of every sign in Missouri and does random quality assurance reviews targeted at signing.



# Roadway Visibility

## *Percent of stripes that meet customers' expectations*

**Result Driver:** Don Hillis, Director of System Management  
**Measurement Driver:** Jim Brocksmith, Technical Support 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.

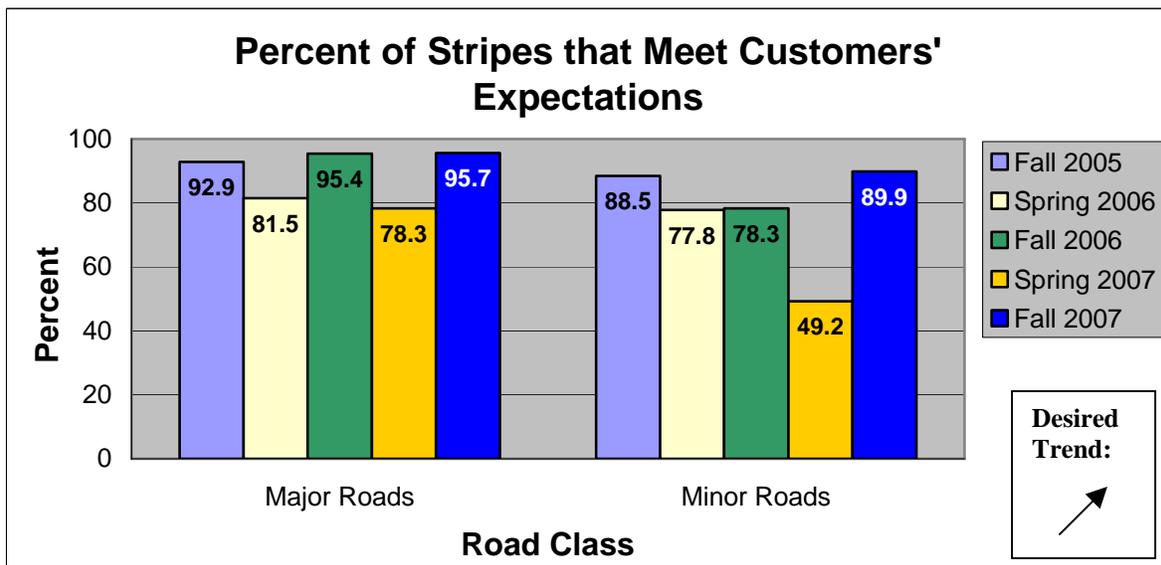
**Measurement and Data Collection:**

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 millicandellas per meter squared per lux (mcd/m<sup>2</sup>/lux).

**Improvement Status:**

The data was analyzed in respect to the above benchmarks MoDOT set as the minimum acceptable level of retroreflectivity. Fall readings are taken in October and November as the striping season is ending. Spring readings are taken in May to reflect the condition of the markings coming out of the winter when they are typically the poorest. The winter of 2006-2007 had a significant impact on the readings for Spring 2007. The readings for the fall of 2007 show significant improvement over the spring readings. The percent exceeding the benchmarks for both major and minor roads is the highest recorded to date. This reflects the continued implementation and performance of our pavement marking system.

The roadway visibility plan for major roads is definitely showing improvements. MoDOT continues to look at new, cost effective products to improve the visibility and durability of pavement markings. Also, the Striping Quick Action Team is working on recommendations for better use of both equipment and funding for striping.



# Roadway Visibility

## Percent of work zones meeting expectations for visibility

**Result Driver:** Don Hillis, Director of System Management  
**Measurement Driver:** Brian Chandler, Traffic Liaison 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:**

Using a formal inspection worksheet, central office and district employees evaluate visibility of construction, MoDOT and permit work zones across the state. Each evaluation consists of a subjective assessment of engineered and operational factors affecting visibility. The evaluator assigns a pass, fail or n/a rating to each of these individual factors and a pass or fail rating for their overall perception of the work zone visibility. The overall perception ratings are compiled quarterly and reported via this measurement.

**Improvement Status:**

Compilation of the 490 evaluations performed by MoDOT staff between January and March of this calendar year resulted in a 96 percent satisfaction rating for work zone visibility (a negative perception of visibility was recorded in 4.4 percent of the evaluations). This rating is one percent higher than last calendar year’s ratings. Such progress is attributable to the greater emphasis MoDOT has placed on providing quality temporary traffic control installations that effectively direct, guide and inform users through and around construction and maintenance work zones on the state highway system.

