

## 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.



## 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.

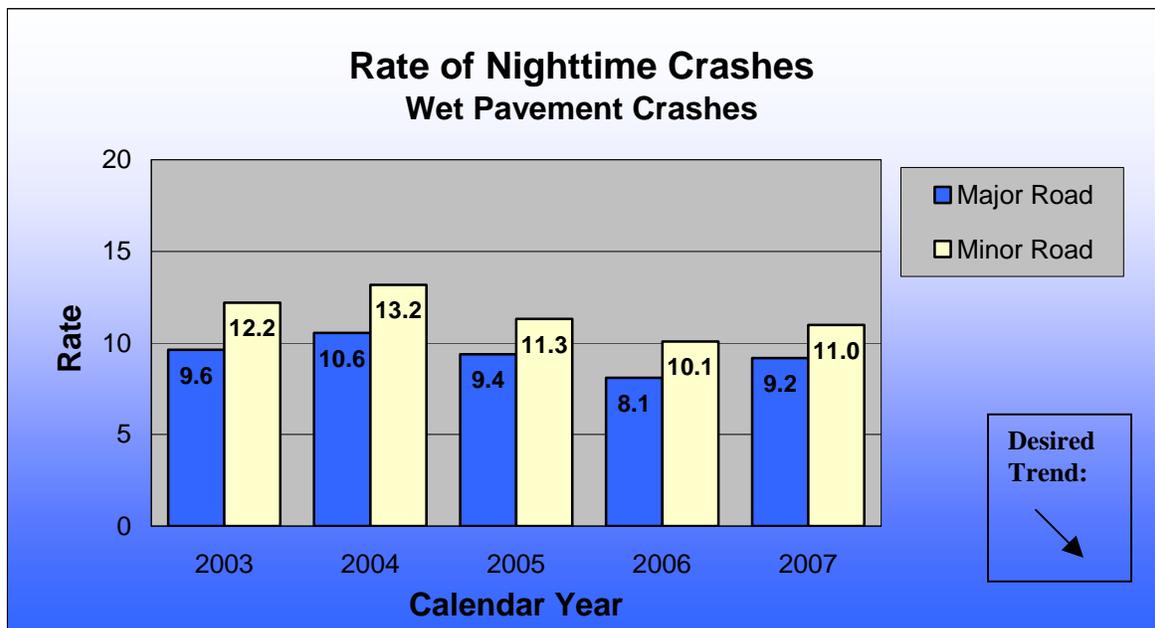
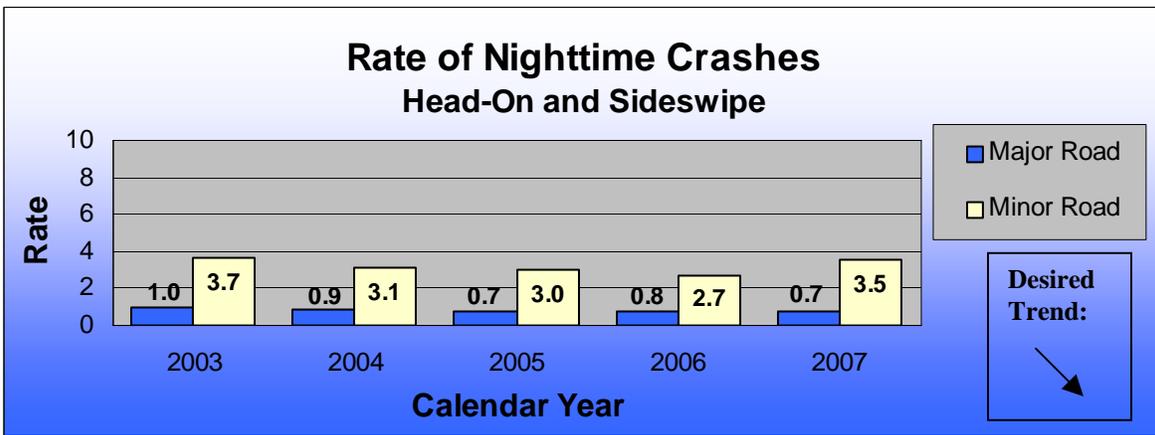
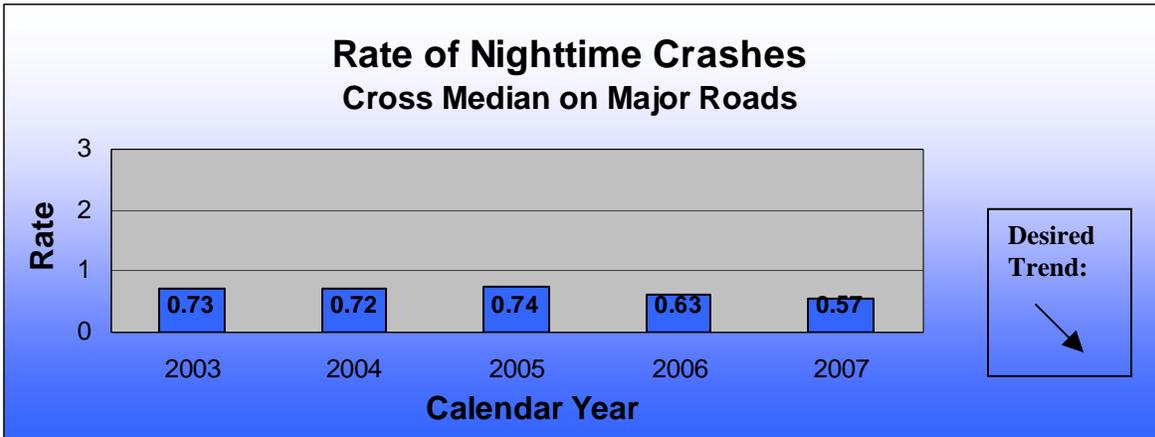
**Improvement Status:**

The crash rate for run-off-road crashes increased 21 percent on major roads and three percent on minor

roads. The crash rate for cross-median crashes on major roads decreased 10 percent. The crash rate for head-on and sideswipe crashes has been stable for major roads over the past three years, but increased 30 percent this last year on minor roads. The crash rate for wet pavement crashes increased 10 percent for major roads and nine percent for minor roads. Crashes during winter weather events increased significantly in 2007. Most of the increase was non-injury crashes.

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.





## 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 our 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:**

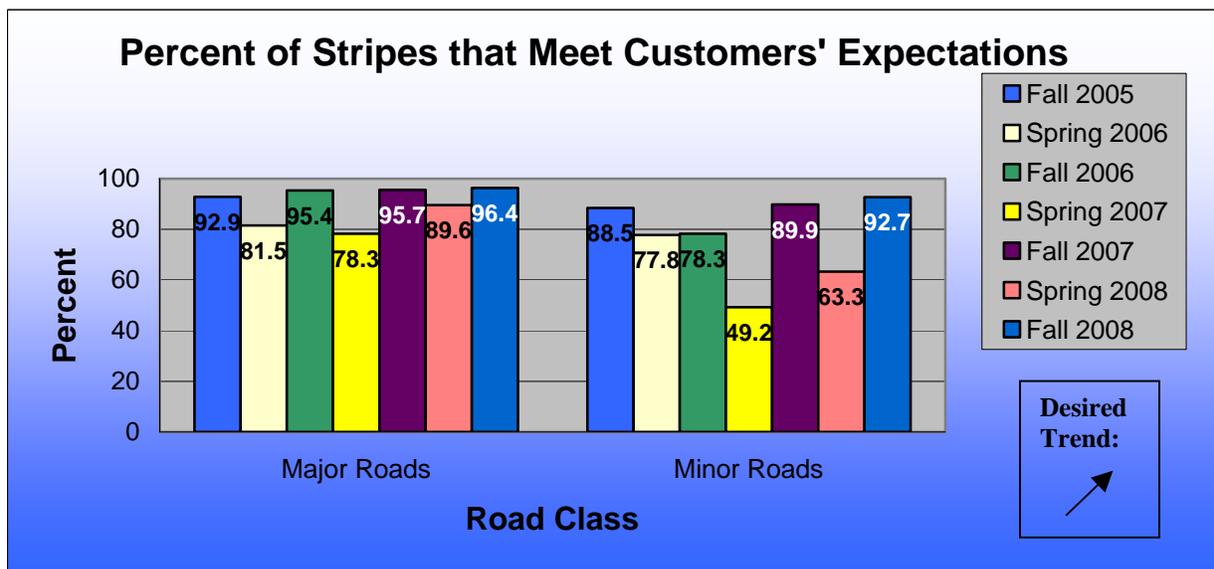
Striping quality attributes that define user expectations have been developed based on an industry-wide literature review. The attribute selected for this measure is the retroreflectivity of the striping or the visibility of the striping at night. Retroreflectivity is measured as the amount of light 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 May to reflect the condition of the markings coming out of the winter when they are typically the poorest.

**Improvement Status:**

The data was analyzed in respect to the above benchmarks MoDOT set as the minimum acceptable level of retroreflectivity. The summer of 2008 was challenging for striping activities because an abundance of rain. However, for the fall of 2008 both the major and minor roads have the highest percentage acceptance since we began collecting data in 2005. These improvements came even as we changed the materials used in pavement from durables to paint.

MoDOT has realized savings of approximately \$4 million dollars with the change to primarily paint; however, the winter performance of the paint is expected to be less than the durables previously used. MoDOT has started using contrast markings on concrete to improve daytime visibility. We are also working on materials and methods to improve the visibility of markings on rainy nights.



## 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:**

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 4,581 evaluations performed by MoDOT staff between January and December of this calendar year resulted in a 97 percent satisfaction rating for work zone visibility (a negative perception of visibility was recorded in three percent of the evaluations). This rating is two 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.

