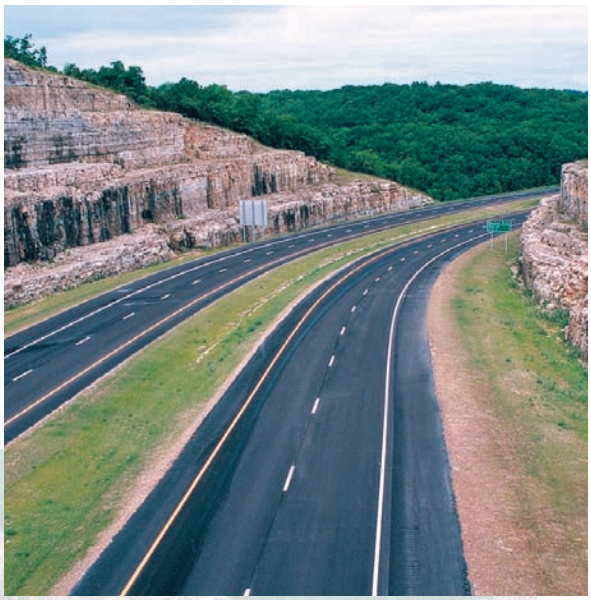
Roadway Visibility

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

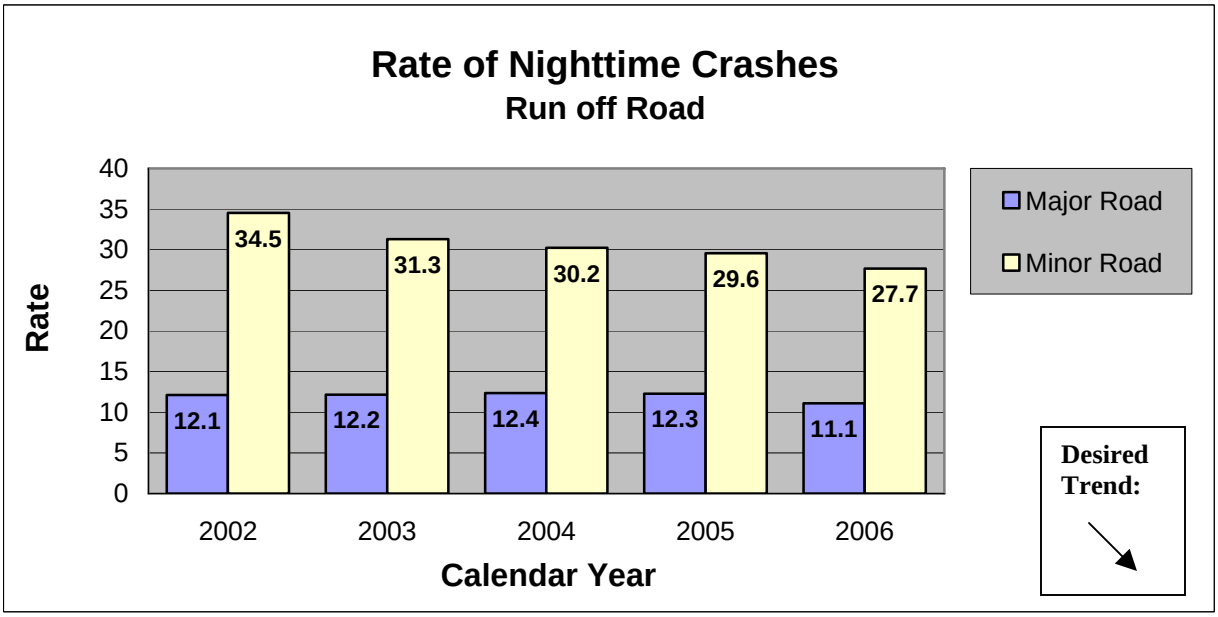
Purpose of the Measure:
This measure tracks the types of crashes where visibility of stripes and signs may be a contributing factor.

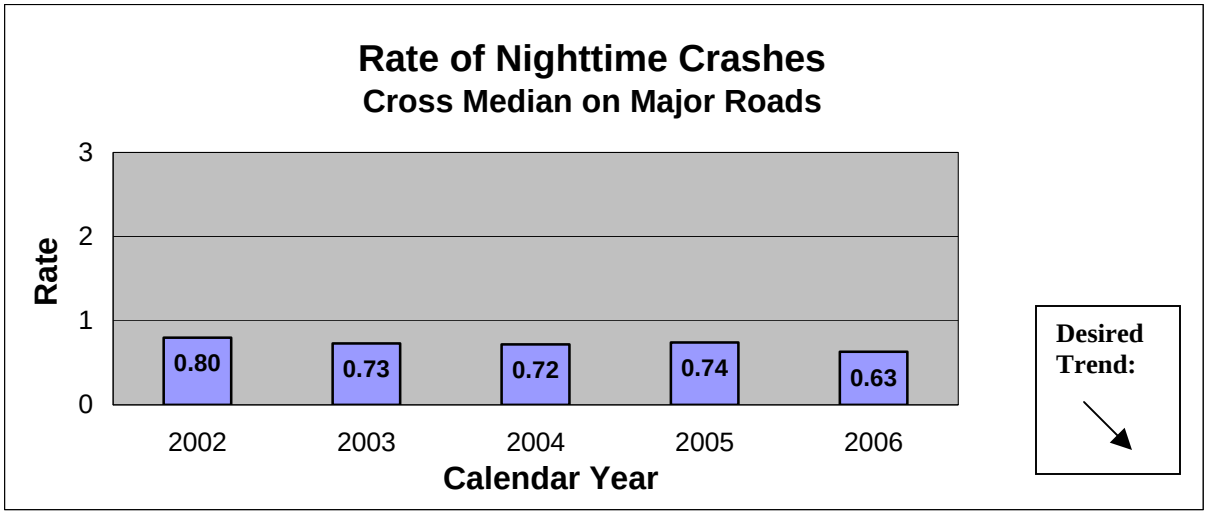
Measurement and Data Collection:
To measure the rate of nighttime crashes, data is collected from the statewide crash database to identify crashes that occur during night conditions. Further filtering of the data divides these night crashes by major and minor roadways. Major roadways are generally used 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.

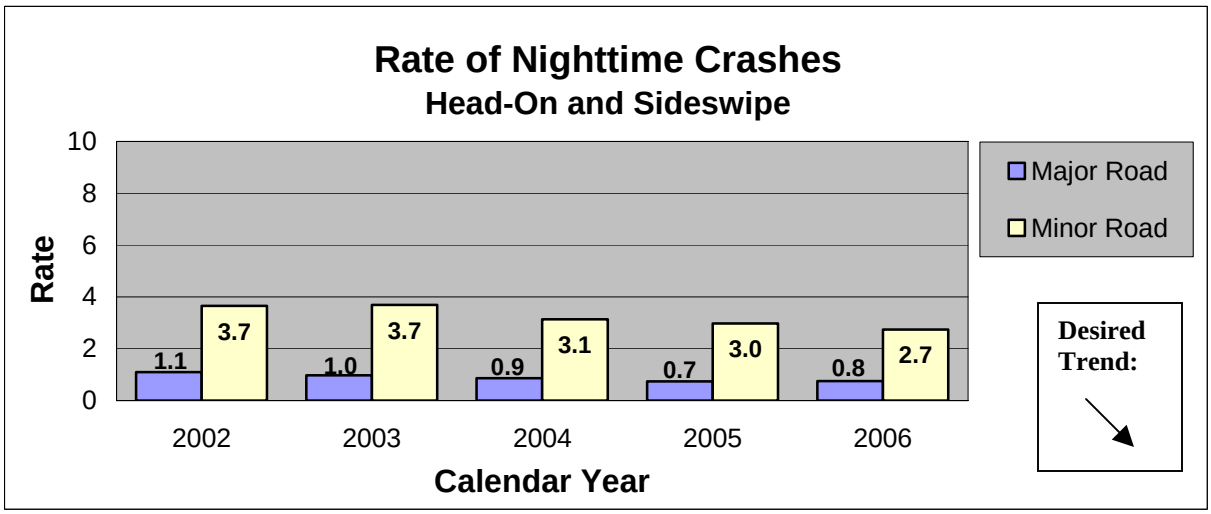
Improvement Status:
The rate of nighttime crashes on major and minor roads has decreased for each measure except for head-on and sideswipe crashes on major roads. The rate of head-on and sideswipe crashes on major roads has remained virtually flat from 2002 to 2006. The previous years' rates were also updated with current crash data.

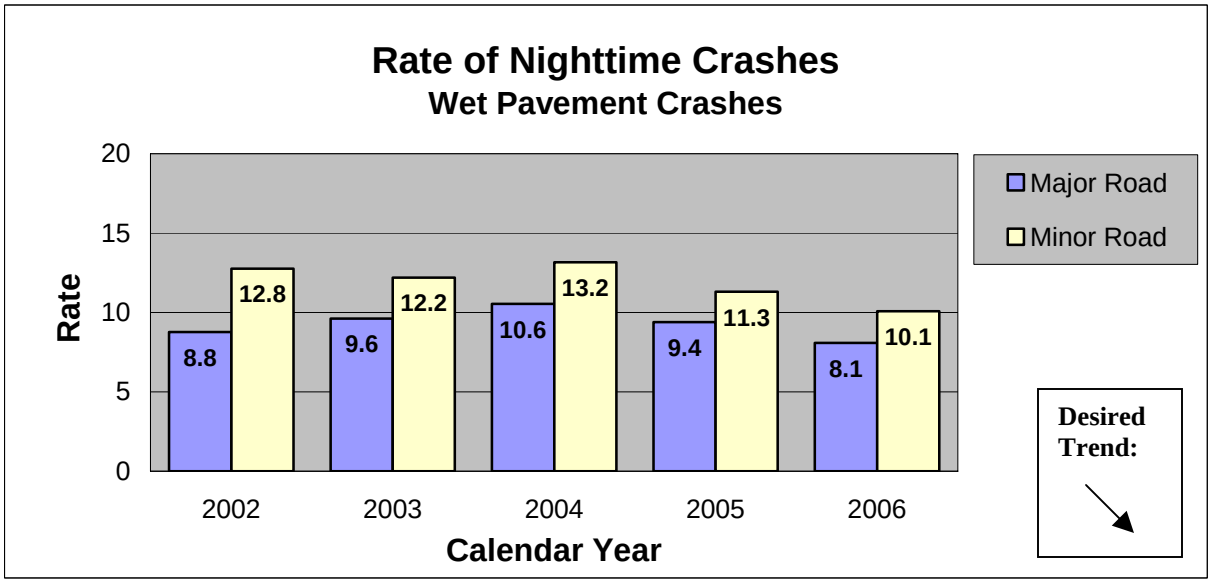
As part of the recently completed Smooth Roads Initiative (SRI), over 188,000 new signs, over 12,000 new emergency reference markers on interstates, over 150,000 delineators on guardrail and guard cable, and approximately 3 million feet of highly reflective pavement tape were installed. In addition,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




Rate of Nighttime Crashes
Cross Median on Major Roads
Rate
3
2
1
0
0.80
0.73
0.72
0.74
0.63
2002
2003
2004
2005
2006
Calendar Year
Desired Trend:


Rate of Nighttime Crashes
Head-On and Sideswipe
Rate
10
8
6
4
2
0
1.1
3.7
1.0
3.7
0.9
3.1
0.7
3.0
0.8
2.7
2002
2003
2004
2005
2006
Calendar Year
Major Road
Minor Road
Desired Trend:


Rate of Nighttime Crashes
Wet Pavement Crashes
Rate
20
15
10
5
0
8.8
12.8
9.6
12.2
10.6
13.2
9.4
11.3
8.1
10.1
2002
2003
2004
2005
2006
Calendar Year
Major Road
Minor Road
Desired Trend:

Roadway Visibility

Percent of signs that meet customers' expectations

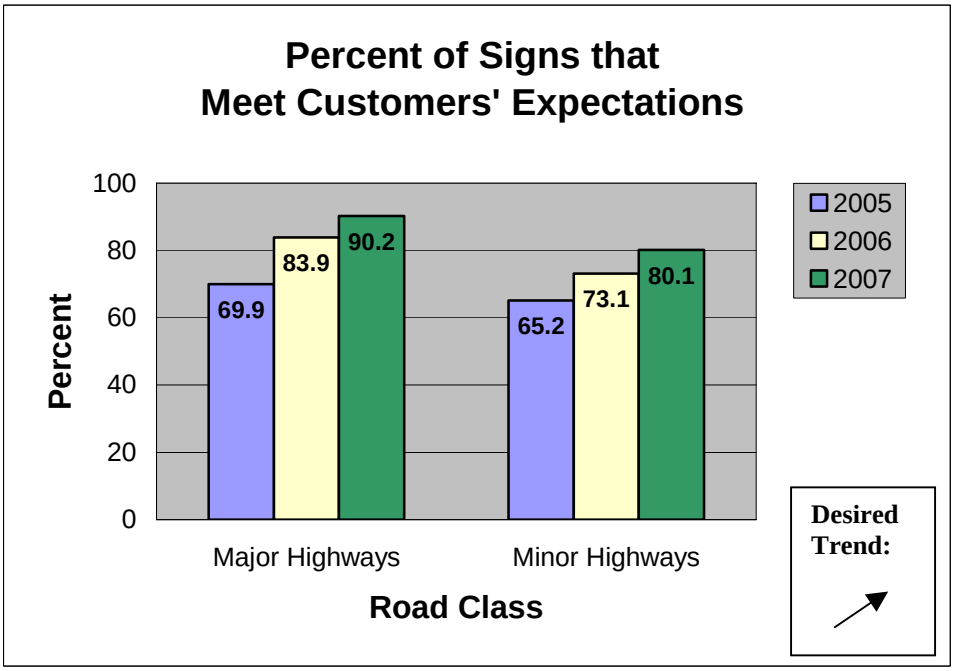
Result Driver: Don Hillis, Director of System Management
Measurement Driver: Mike Curtit, Assistant State Traffic Engineer

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

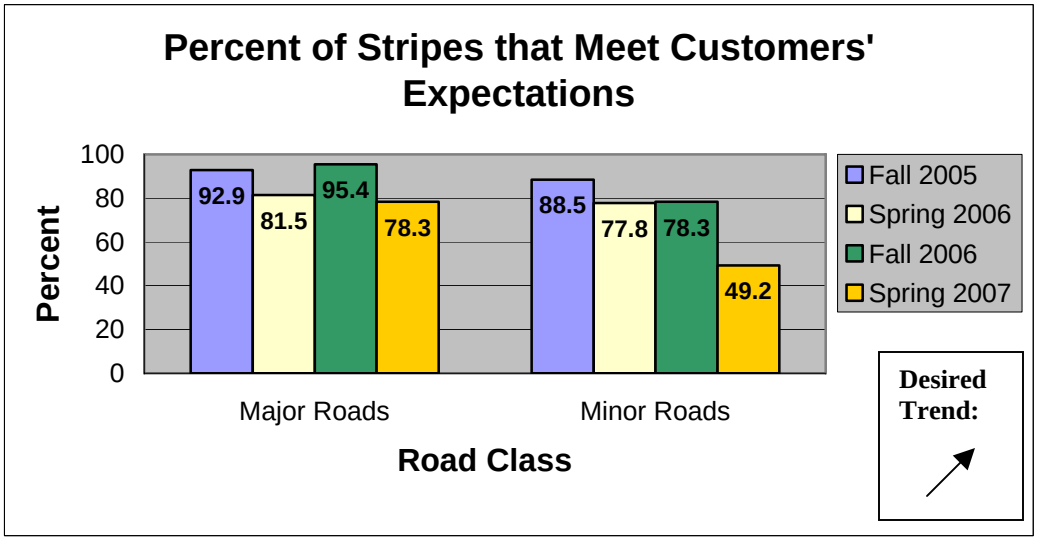
Result Driver: Don Hillis, Director of System Management
Measurement Driver: Jim Brocksmith, Technical Support Engineer

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^2/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 several large snow and ice events that significantly impacted striping. On the major roads, the impact was significant but the durable markings installed on the SRI program performed well. On minor roads the impact was very significant with only approximately 50 percent of the roads having acceptable striping. The minor road drop is also related to the reduction in new striping done in 2006, with the conversion to the two-year striping cycle and a more durable high-build paint.

The roadway visibility plan for major roads is definitely showing improvements. As MoDOT enters the second year of implementing high-build paint on the minor roads, improvements due to the longer life expectancy of the paint will be realized. Also, implementation of the recommendations of the Striping Quick Action Team will provide for better utilization of both equipment and funding for striping.

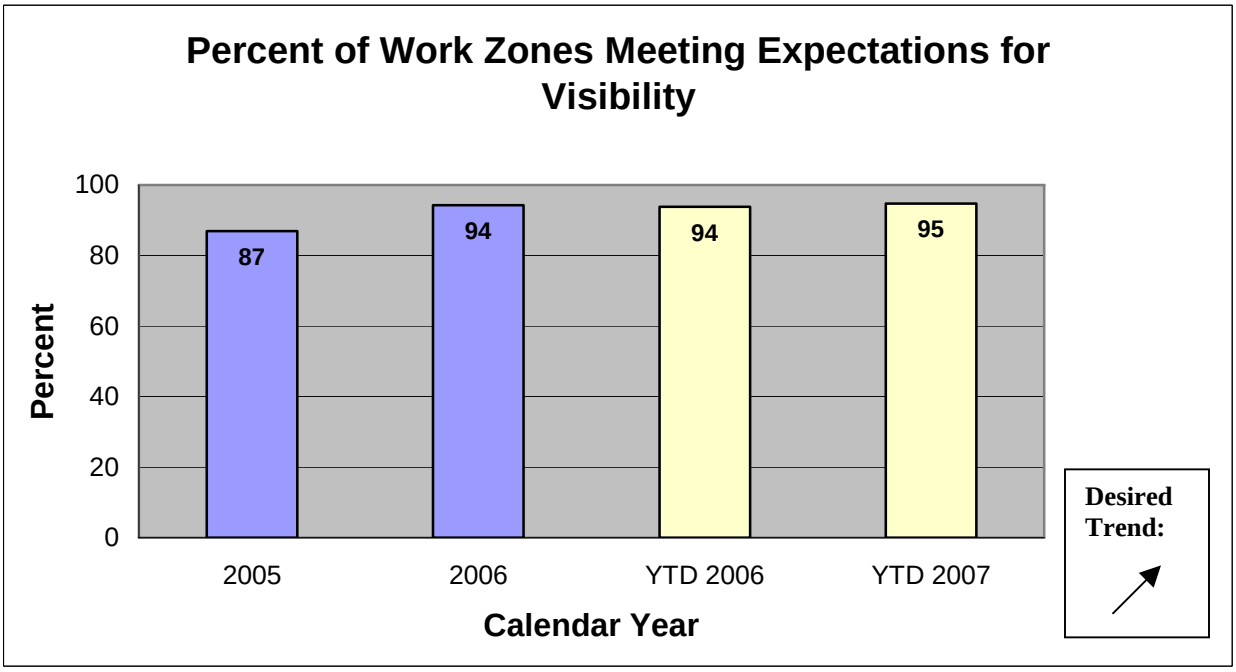


Roadway Visibility

Percent of work zones meeting expectations for visibility

Result Driver: Don Hillis, Director of System Management
Measurement Driver: Scott Stotlemeyer, 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, Construction and Materials, Maintenance, Traffic 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. Note: This inspection program began in June 2005.

Improvement Status:
Compilation of the 2,896 evaluations performed by MoDOT staff between January and September of this calendar year resulted in a 95 percent satisfaction rating for work zone visibility (i.e., a negative perception of visibility was recorded in 5.3 percent of the evaluations). This rating is 0.9 and 0.5 percent higher than last calendar year's year-to-date and year-end ratings, respectively – a year the department showed a 7.3 percent improvement in work zone traffic visibility when compared to the previous year's inspection results. 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.