

2023-2024 KERN COUNTY GRAND JURY



ROADWAY MARKING RETROREFLECTIVITY

Nighttime Visibility on Kern County Roadways

Release Date

June 13, 2024

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Nighttime Visibility on Kern County Roadways



Photo By: Mark Ross

SUMMARY:

Do you have difficulty seeing roadway striping at night? You are not alone. Anyone who has had a hard time seeing roadway markings while driving at night will understand the importance of retroreflectivity. For drivers, being able to clearly see roadway markings, especially in rainy or low-light conditions, is critical to avoiding collisions.

Retroreflectivity describes the ability of a surface to return light to its source and is used to enhance the visibility of roadway markings in low-light and night-time conditions.

Reducing transportation related fatalities and serious injuries are primary goals of the U. S. Department of Transportation, Federal Highway Administration (FHWA). Accordingly, the FHWA has revised its Manual on Uniform Traffic Control Devices (MUTCD) to require agencies responsible for roadway maintenance to develop and implement a method for maintaining minimum retroreflectivity for pavement markings. The purpose of including this new standard in the MUTCD is to advance safety and mobility by assisting drivers with nighttime visibility.

For roadways in Kern County, the Grand Jury asked the following questions:

- A. Are the agencies that are responsible for roadway maintenance aware of the new standard in the MUTCD that requires the implementation of a method to maintain roadway marking retroreflectivity at or above minimum levels?
- B. Are these agencies actively preparing their respective maintenance methods in accordance with the new standard, and will they be ready for implementation by September 2026, as required?
- C. What are the agencies doing now to maintain roadway markings, especially regarding markings that fall below minimum low-light and night-time visibility requirements?

PURPOSE OF INQUIRY:

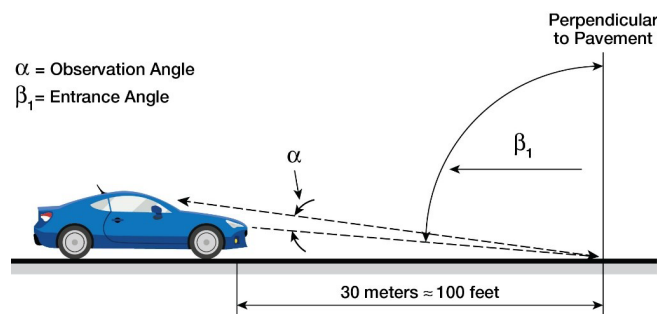
The 2023-2024 Kern County Grand Jury (Grand Jury) investigated the functions and operations of the Kern County (County) and Bakersfield City (City) Public Works Departments (PWDs) pursuant to California Penal Code §§925 and 925a, which authorize the Grand Jury to investigate and report on various county departments and incorporated cities of the county.

METHODOLOGY:

The Grand Jury interviewed staff from the City and County PWDs and researched various FHWA and California Department of Transportation (Caltrans) documents related to the standards and specifications for traffic control devices. The Grand Jury also reviewed the Caltrans Highway Design Manual, Caltrans Standard Specifications, Caltrans Public Road Data for 2022, the City of Bakersfield PWD Engineering Design Manual and the Kern County Development Standard, Division 9, Traffic Engineering.

DISCUSSION OF FACTS:

- A. The MUTCD is the national standard for all traffic control devices installed on any street, highway, or bicycle trail open to public travel.
- B. The FHWA published a Final Rule in the Federal Register (Vol. 87, No. 150) regarding the new standard. The Final Rule became effective September 6, 2022, and mandates a four-year compliance date. Therefore, applicable agencies have until September 6, 2026, to implement the new standard.
- C. Edition 11 of the MUTCD was published by the FHWA in December 2023. It includes the new standard in Section, 3A.05, which requires that roadway maintenance agencies develop a method to maintain a certain level of visibility for roadway striping.
- D. Retroreflectivity is the perceived brightness of an object relative to the amount of light falling on it. For roadway markings, it is specified using the international standard of 30-meter geometry. (See Below)



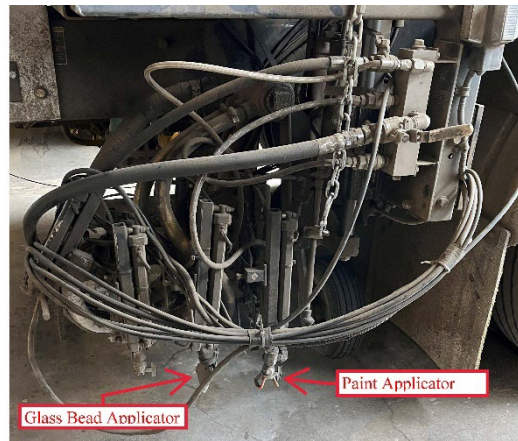
Standard-30-meter-Geometry
from: FHWA Technical Report SA-22-028

- E. The State of California has its own Manual on Uniform Traffic Control Devices (CA MUTCD). Revision 8 of the CA MUTCD includes the new standard in its Section 3A.03.

- F. Both the County and City PWDs require compliance with the CA MUTCD in their respective Development Standards and Engineering Design Manual.
- G. Both the County and City apply glass beads, at a ratio of seven pounds per gallon, to their roadway marking paints to provide retroreflective performance. The beads are partially embedded into the paint but also exposed. If the beads get damaged or knocked out of the paint, the retroreflectivity will degrade, even though the marking may still be visible. Generally, the retroreflectivity of pavement markings will fade before the paint itself.



County Large Capacity Striping Truck



Inset: Paint and Bead Applicators



Glass Beads
Photos By: Grand Jury

- H. The intent of developing the maintenance method required by the standard is to provide a **systematic means for ensuring that roadway marking retroreflectivity is continually at or above minimum requirements.**
- I. Use of the maintenance method will not only determine when pavement markings need to be refreshed but will also allow for scheduling the restriping of deficient markings in a timely manner.
- J. The FHWA provides guidance for the development of the required maintenance method in its Technical Report Number FHWA-SA-22-028. The report states that, *Agencies can use the information in this report to help determine which retroreflectivity maintenance method or combination of methods best suits their needs.*

- K. The County PWD is responsible for the maintenance of approximately 3,320 miles of roadways, approximately 2,186 of these require striping.
- L. The City PWD is responsible for maintenance of approximately 1,260 miles of roadways, approximately 567 of these miles require striping.
- M. The current method used for scheduling annual restriping programs for both the County and the City PWDs is based on historical data related to when the striping was previously replaced or refreshed.
- N. Both the County and the City PWDs review their maintenance database records from previous years and determine which areas of their respective jurisdictions have the oldest roadway markings. The road striping crews will then focus on these areas throughout the painting season (typically March through October). The crews will occasionally be sent elsewhere, however, depending on service requests from citizen complaints or if directed by the respective PWD Traffic Engineer.
- O. The County and City PWDs use water-based paint with retroreflective glass beads for their maintenance programs.
- P. The range of service life for thermoplastic marking material is more than twice that of water-based paint. However, the cost of material, equipment, and installation is significantly higher.
- Q. Citizens can submit complaints regarding pavement markings to either the County or the City through their websites.
 - For the County:
<https://www.kernpublicworks.com/services/transportation/road-maintenance/report-a-problem>
or use the MyKern App
 - For the City:
<https://www.bakersfieldcity.us/559/Report-a-Service-Request>
or use the Bakersfield Mobile App
- R. For restriping of existing roadway markings, both the County and the City PWDs use water-based paint, which has a service life range of 6 months to 3 years depending on local conditions.
- S. For new or resurfaced roadways that are installed under Capital Improvement Projects, developers for both the County and the City are required to use thermoplastic paint for roadway markings. The range of service life for thermoplastic marking material is from 1 to 7 years. When the thermoplastic striping is refreshed both PWDs use water-based paint over the thermoplastic paint.

FINDINGS:

- F1. Both the County and the City PWDs are aware of the new requirement to develop a method for maintenance of retroreflectivity but neither have yet formalized, adopted, or implemented their respective methods.

- F2. Although the County and City PWDs routinely restripe roadways based on length of time since they were last painted, they do not currently have a systematic method to ensure that roadway marking retroreflectivity is continually at or above a minimum level as required by the new standard.
- F3. The County and City PWDs are not currently restriping all markings that are water-based paint with glass beads within their expected service life timeframe of between 6 months to 3 years. The glass beads wear off and the paint fades before the markings can be refreshed.
- F4. A reduction in the frequency of application of thermoplastic paint instead of water-based paint may justify the additional costs.
- F5. The County and City PWD databases used for determining their respective roadway striping schedules do not include sufficient historical data to effectively track and schedule the replacement of roadway markings in accordance with the new standard.
- F6. For citizen complaints, both the City and County websites/apps are difficult to navigate to report problems related to roadway markings.

COMMENTS:

The focus of this report has been on the Kern County and City of Bakersfield Public Works Departments. However, the FHWA MUTCD is the law governing all traffic control devices and non-compliance can ultimately result in the loss of federal-aid funds as well as in a significant increase in tort liability.

The Grand Jury urges all agencies and officials responsible for maintaining roadways to plan for the development of a systematic approach to maintaining the required minimum levels of retroreflectivity for roadway markings before September 2026. Accordingly, responses to the findings and recommendations of this report are invited from all incorporated cities in Kern County.

RECOMMENDATIONS:

The 2023-2024 Kern County Grand Jury recommends the Kern County Board of Supervisors and the Bakersfield City Council direct the Public Works Departments:

- R1. By January 1, 2025, review the guidance provided by the FHWA in their Technical Report SA-22-028, and determine the most appropriate maintenance method, or combination of methods, that will be developed to assure minimum retroreflectivity levels will be maintained for the roadway markings within their jurisdictions. (Finding 1)
- R2. By February 1, 2025, develop the formal written Method for Maintaining Pavement Marking Retroreflectivity that will be used to systematically track and schedule replacing or refreshing roadway markings that fall below the minimum retroreflectivity requirements. (Finding 2)

- R3. By April 1, 2025, perform an analysis to determine whether, and consequently where, it would be cost beneficial to restripe the roadways in their respective jurisdictions with thermoplastic paint. (Findings 3 and 4)
- R4. By June 1, 2025, develop the database required to establish a roadway marking schedule. The database should consider the agencies policies and practices regarding the use of pavement marking materials and should include information specific to the roadway, average daily traffic, and weather conditions of the local area. (Finding 5)
- R5. By November 1, 2024, the Kern County and Bakersfield City websites/apps should be modified to include a user friendly, specific service request for roadway markings. (Finding 6)

NOTES:

- The Kern County Board of Supervisors and the Bakersfield City Council should post a copy of this report where it will be available for public review.
- Persons wishing to receive an email notification of newly released reports may sign up at: <https://www.kerncounty.com/government/other-agencies/grand-jury>
- Present and past Kern County Grand Jury Final Reports and Responses can be accessed on the Kern County Grand Jury website: <https://www.kerncounty.com/government/other-agencies/grand-jury>

RESPONSE DEADLINE:

- **REQUIRED WITHIN 90 DAYS FROM:**
 - Kern County Board of Supervisors to Findings 1 through 6 and Recommendations 1 through 5
 - Bakersfield City Council to Findings 1 through 6 and Recommendations 1 through 5
- **INVITED RESPONSES FROM:**
 - Kern County Cities and Special Districts responsible for roadway maintenance

RESPONSES ARE REQUIRED PURSUANT TO CAL. PENAL CODE §§933(c) AND 933.05 TO:

- **PRESIDING JUDGE
SUPERIOR COURT OF CALIFORNIA
COUNTY OF KERN
1415 TRUXTUN AVENUE, SUITE 212
BAKERSFIELD, CA 93301**
- **FOREPERSON
KERN COUNTY GRAND JURY
1415 TRUXTUN AVENUE, SUITE 600
BAKERSFIELD, CA 93301**

Reports issued by the Grand Jury do not identify individuals interviewed. Cal. Penal Code §929 requires that reports of the Grand Jury not contain the name of any person or facts leading to the identity of any person who provides information to the Grand Jury.