



Oklahoma Department of Transportation  
200 N.E. 21<sup>st</sup> Street  
Oklahoma City, OK 73105-3204

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October 11, 2013

Office of Transportation Operations, HOTO-1  
Federal Highway Administration  
1200 New Jersey Avenue, SE,  
Washington, DC 20590

RE: Revised Request for Permission to Experiment- 3D Crosswalk

To whom it may concern,

In accordance with the guidelines provided in the Manual on Uniform Traffic Control Devices (MUTCD) section 1A.10, Traffic Engineering Division would like to formally request permission to experiment and study the effects of implementing 3D Crosswalk pavement markings to which the crosswalk appears slightly raised to the driver.

- A. The Oklahoma Division 5 Traffic Engineer, along with the City of Snyder, came to the Oklahoma Department of Transportation (ODOT) Traffic Engineering Division with a request for improving the visibility of an existing crosswalk on US-62B. The City of Snyder and Division 5 Traffic Engineer were very concerned about this crosswalk location due to a small child being struck in the existing crosswalk earlier in the year. After reviewing several possibilities to improve the visibility of this particular crosswalk in Snyder, Tarek Maarouf had come across the promising idea of creating an optical illusion where the crosswalk appears to be slightly raised.
- B. ODOT Traffic Engineering Division studied multiple 3D pavement marking images, but were unable to find one that matched our needs. Most of the 3D pavement markings we found were from a side angle and we wanted the crosswalk to appear elevated from the driver's perspective. The 3D crosswalk design also had to follow certain rules, such as not changing the continental striping of the crosswalk in color, size, or shape so as to follow MUTCD guidelines as well as ODOT Traffic Standards. Our design retains the continental crosswalk as detailed in MUTCD section 3B.18, but contains additional paint between the stripes. We also tried to stay within the directives provided in the FHWA: MUTCD – Official Ruling 3(09)-24(l)- Application of Colored Pavement that states,

"The FHWA's position has always been, and continues to be that subdued-colored aesthetic treatments between the legally marked transverse crosswalk lines are permissible provided that they are devoid of retroreflective properties and that they do not diminish the effectiveness of the legally required white transverse pavement markings used to establish the crosswalk."

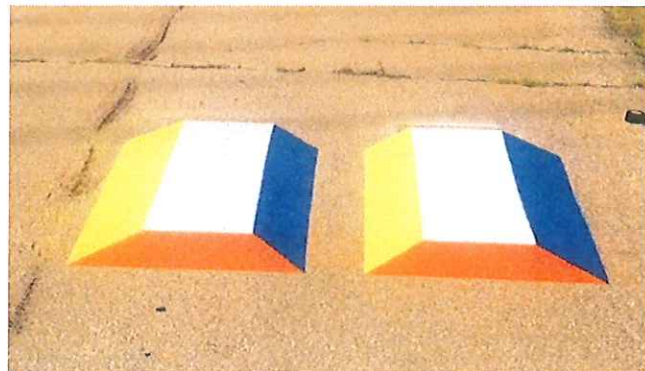
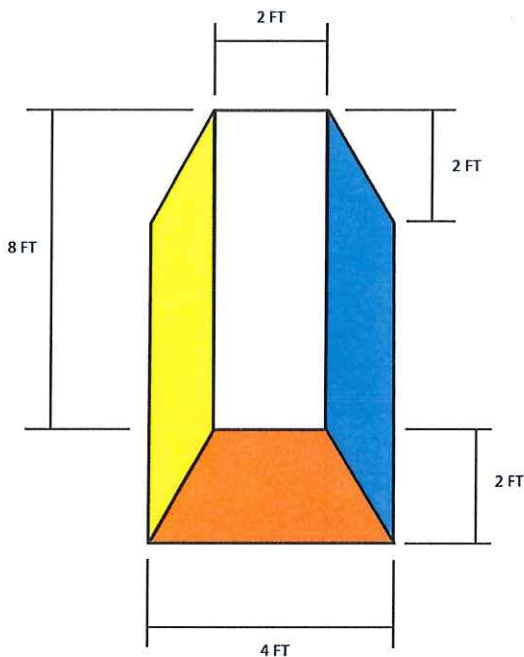
*"The mission of the Oklahoma Department of Transportation is to provide a safe, economical, and effective transportation network for the people, commerce and communities of Oklahoma."*



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We then came up with several designs that created the image of a slightly raised crosswalk. On August 27<sup>th</sup>, 2013 Ken Phillips and I drove out to a test facility to paint the design options on concrete and asphalt pavements. The test crosswalk was produced with spray paint using the standard white continental crosswalk, blue and yellow to produce a shadow effect, and orange to further enhance the crosswalk. We preferred orange since it is typically used to caution drivers which is what we wanted to further indicate.

- C. Below are the dimensions we have used and an image of the actual crosswalk that we painted at our test facility.



- D. To further enhance our vision for a slightly raised crosswalk, we began researching other similar 3D applications. We came across Chicago Department of Transportation's (CDOT) experiment with 3D pavement markers. The study CDOT conducted was a series of 3D pavement markers prior to a residential area crosswalk along with 'Look for Pedestrians' wording. The experiment used Sekisui Jushi Corporation's Thunder Type pavement markings. According to the report Nicole M. Cambridge, M.A. produced titled 'Effect of Symbol Prompts and 3D Pavement Illusions on Motorist Yielding at Crosswalks' (2012), the initial effectiveness was high, but that the motorists' yielding behavior wore off over time.

Even with this slightly raised crosswalk appearance, we assume that the initial effectiveness will be great, but predict similar outcome to CDOT's experiment with the novelty of the design wearing off with time. While we expect some drop in yielding

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behavior after the 3D crosswalk has been in place for a period of time, we feel that this new design will greatly protect pedestrians from drivers that are new to the area or passing through for the first time and are not expecting a mid-block crossing.

- E. The dimensions and appearance of the 3D Crosswalk shown above were solely designed within ODOT Traffic Engineering Division and are not protected by a patent or copyright.
- F. ODOT Traffic Engineering Division would like to have this crosswalk design in operation for at least two years. The proposed area is located in Snyder, Oklahoma which is in Kiowa County. The existing crosswalk that we would like to enhance with our painted raised appearance is located on US-62 Business east of C Street which is a two-way, two-lane road with an Annual Average Daily Traffic (AADT) of 620 vehicles per day and a posted speed of 30 mph through town. Please see attachment for aerial image of existing area and crosswalk.
- G. The Oklahoma Department of Transportation Planning Division will be studying this location to assess if the raised image is improving drivers' awareness of the crosswalk. We would like to measure the 3D Crosswalk's effectiveness on drivers similar to the way that Chicago Department of Transportation successfully observed their project. We will compare the crash data, vehicle to vehicle as well as pedestrian, before and after the crosswalk pavement marking is implemented and verify cause and type of crash. With the OkDOT Planning Division, we plan to measure when and where drivers touch their brakes to slow down for the crosswalk to measure the percentage of drivers yielding to pedestrians in and near the crosswalk. This will also include observing and tracking not only the initial driver that approaches the crosswalk, but also the reaction of any vehicle-drivers behind the initial driver.

We will have an observer in an unmarked vehicle out in the field prior to and after the 3D pavement marking installation. Points will be marked in the field for the observer to note how far out a vehicle brakes. We will also be using radar equipment to verify speed. A few other items we would like to know more information on when observing the raise crosswalk would be the relative age of drivers, whether a driver really checks both directions for pedestrians in the crosswalk, whether or not the raised look would encourage drivers to swerve around the portion that looks raised to them. To adequately view many of these behaviors we will be videotaping the drivers' approach.

- H. After the experimentation time is over, if the data indicates that the additional pavements markings produce a safety concern, the Oklahoma Department of Transportation will return the site back to its original condition.
- I. The Oklahoma Department of Transportation Traffic Engineering Division will provide FHWA with semi-annual progress reports

Thank you for your consideration. If you have any questions or concerns please contact me at (405)522-5817.

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Sincerely,

A handwritten signature in blue ink that reads "Lauren P. Ludwig".

Lauren P. Ludwig, P.E.  
Professional Engineer  
Traffic Engineering Division  
Oklahoma Dept. of Transportation

A handwritten signature in blue ink that reads "Harold R. Smart".

Harold R. Smart, P.E.  
Chief Traffic Engineer  
Traffic Engineering Division  
Oklahoma Dept. of Transportation

Enclosures (15)

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AN EQUAL OPPORTUNITY EMPLOYER

# Snyder, Oklahoma

