

**NEVADA DEPARTMENT OF TRANSPORTATION**  
**FFY 2014 RESEARCH PROBLEM STATEMENTS**

**I. PROBLEM TITLE**

**Evaluation of the Benefits of Open Graded Friction Course (OGFC) on NDOT Category-3 Roadways**

**II. PROBLEM DESCRIPTION**

NDOT use OGFC on category 1-3 highways. It is believed that OGFC provides safety and noise reduction benefits to our highway users. It is also a sacrificial layer. Recent studies and experiences from other agencies question some of the perceived benefits of OGFC.

Further, OGFC costs approximately 25% more than the dense graded hot mixed asphalt (DG HMA). OGFC does not contribute to the pavement structural strength and does not get any structural strength number in the design. It is considered as a functional layer.

Over the last two decades, many state agencies have dropped OGFC from their state highways. The proposed research project will evaluate the perceived benefits of OGFC such as noise reduction, improved friction, raveling prevention.

Construction practices, design, and material characteristics of OGFC vary state to state and country to country. We cannot get a good picture of our OGFC from the studies of other agencies.

**III. OBJECTIVE**

The objectives:

- To evaluate the OGFC for friction characteristics
- To evaluate the OGFC for noise reduction
- To evaluate the OGFC for its contribution in reducing the pavement distresses especially raveling.

Anticipated deliverables:

A research report analyzing noise and frictional characteristics and pavement distresses of OGFC and DG HMA sections. It is expected that the distress, noise and friction testing will not be needed beyond 5 years.

**IV. CUREENT PRACTICE and RELATED RESEARCH**

NDOT use OGFC on all Category 1-3 roadways. It is believed that OGFC will:

- Improve frictional characteristics. This will improve traffic safety.
- Improve pavement marking visibility.

- Improve driver visibility.
- Reduce road noise.
- Provide benefit in reducing hydroplaning during rain/runoff events, and it can help eliminate splash effects and sheet flow across pavement during light to (perhaps) moderate flows.
- Be a sacrificial layer.

The Center for Transportation Research, University of Texas at Austin did a survey on the OGFC practices in the US and published a report in December 2007. It was found that out of 47 states responded to the survey, 17 states use OGFC, 8 States currently testing OGFC and 21 states do not use OGFC. Out of these 21 states that do not use OGFC, 8 states used OGFC in the past and discontinued over the years. The reasons for discontinuing OGFC vary among states. Some reasons are:

- Severe safety problem in the form of icing
- Heavy salt usage in winter conditions
- Did not meet the criteria due to the weather. Water got into the pores and there was freezing in the winter.
- Bad winter coupled with poor material selection

Washington State DOT does not use OGFC on any of their pavements on a regular basis. A decade ago, they have initiated a quieter pavement study. As part of their quieter pavement study, WSDOT constructed 3 sections with OGFC and tested those sections for pavement noise for a few years. They have completed noise testing on 2 out of 3 of their OGFC sections and published reports of the findings in June 2012. OGFC was quieter than dense graded HMA only for a few months. Based on the tests, they have decided not go with OGFC in the future.

## **V. RESEARCH METHODOLOGY**

NDOT will construct a minimum of 2 projects in the northern and southern Nevada. Each project will have a mile long section without OGFC. Pavement surface will be monitored for friction for a few years on a monthly basis at the beginning, then quarterly basis, then every 6 months. We can stop monitoring the test sections, when it is determined that the change in the friction is not significant enough to continue monitoring (NDOT Pavement Analysis section have the equipment and personnel for friction testing). Similarly pavement surface will be tested for noise in the similar fashion (NDOT Environmental services have the equipment and personnel for noise testing). In addition to the above, drive tests will be done to assess the pavement marking visibility and driver visibility when it is raining in the area where the test sections are located. Also pavement distresses especially raveling will be recorded for a few years but does not need to be on a monthly or quarterly basis. All the testing will be done on the adjoining sections of with and without OGFC. The sections without OGFC will act as the control section. All of the construction and testing will be done on NDOT Category-3 roadways.

This project can be implemented on a few 3R projects in the north and south on any Category-3 roadways. Test sections are not expected to cost more to build.

The researches will analyze the data and provide recommendations to NDOT for further action. The recommendations can be:

- Reevaluate the mix design of OGFC.
- Reevaluate the need for OGFC on some of our roadways.
- Need more evaluations with more test sections that are spread throughout the state to capture the material source variations.
- Do nothing. Everything is good.

#### **VI. IMPLEMENTATION POTENTIAL**

The implementation stage will be “Specifications & Standards with Full Deployment Stage”.

No institutional, political, or socio-economic barriers are expected. This research will result in deliverables that are ready for implementation.

#### **VII. URGENCY AND PAYOFF POTENTIAL**

NDOT spends millions of dollars every year on OGFC. If this research results indicate that the NDOT’s OGFC does not serve the purpose of noise reduction and improved friction, then we can eliminate the need for OGFC on some of our Category 3 roadways. A delay means that we will not be able to capture the savings that amount to millions of dollars.

#### **VIII. ESTIMATED BUDGET**

Estimated research budget will be \$200,000. This does not include the NDOT’s cost to build the test sections.

#### **IX. DATE AND SUBMITTED BY**

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