



Research Problem Statement

ODOT Research Section
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I. TITLE

17-057 Safety Risk Analysis for Planning the Timing of Work Operations in Construction Work Zones

II. PROBLEM

ODOT places a high priority on planning and undertaking construction projects that are safe, timely, cost efficient, and of high quality. In some cases, however, projects do not go as planned. Setbacks may arise due to a variety of reasons such as abnormal weather, unexpected site conditions, and resource limitations. When the possibility for problems occurring is not recognized and mitigated during project planning, additional time and/or project funds may be needed. This potential issue is present on all projects and especially during the daily operations of highway preservation projects, which are often conducted at night with live traffic close by. When this situation occurs, ODOT Project Managers (PMs) are placed in a difficult position. They must determine whether to authorize additional time on a daily shift as an exception, weighing the cost and quality to be gained from the overall project delay versus the safety risk of extended exposure of workers to live traffic on the roadway.

ODOT currently has a policy for each region or district that provides guidance on when work zone operational hours are available for certain construction projects. When planning operational hours, consideration is currently given to the distribution and timing of daily traffic volumes on the roadway. However, these operational hours are typically revised and set infrequently. Daily traffic pattern data for specific roads and directions, composition of traffic, average daily traffic volume, time of year, weather patterns, and other information could be used to further understand whether a time extension poses additional safety risk. This additional data, however, is not compiled in one location or into a summary document for use by each ODOT PM. Currently, ODOT PMs typically either enforce the pre-established hours or use his/her own observations or institutional knowledge to make a decision whether the time extension is desirable. It is unknown whether the pre-set operation hours established by the region/district are more or less risky, given the specific road, time of year, current weather conditions, etc. ODOT could benefit from further research to develop guidance for PMs who are making decisions about project operational hours.

III. PROPOSED RESEARCH, DEVELOPMENT, OR TECHNICAL TRANSFER ACTIVITY

The goal of the proposed research is to help ODOT improve decision-making through more accurate safety risk assessment when faced with potentially extending operational hours on construction projects. Safety risk management will be improved through both increased availability of crash data and the development of a process for accurately assessing and incorporating frequency, severity, and exposure when calculating risk. The proposed tasks to be undertaken are as follows:

1. Conduct a literature review to identify recommended practices for assessing safety risk in work zones. Include a review of how the annual regional times/policy guidelines are established and the factors that are considered when establishing the times/guidelines. Literature exists that provides initial guidance (e.g., Lindheimer et al. 2012; Ullman et al. 2005) and a starting point for application to ODOT's needs.
2. Analyze work zone traffic data from selected construction projects to determine if the end-time per shift (i.e., the time in which the contractor is completely off the roadway) poses more or less risk given the probability and severity of a potential accident. Probability of an accident will be determined by past records when accidents occurred in construction work zones. Review pre-established timeframes in each region to determine if some projects are "more risky" when operating within that timeframe or not.

3. Analyze work zone crashes to expose factors (and their magnitudes) within accident scenarios that could predict a higher level of risk for current highway preservation projects.
4. Based on best practices for safety risk assessment that are described in literature, along with the results from Tasks 2 and 3, develop a process that incorporates the risk factors identified and enables PMs to more accurately quantify the safety risk present for planned and proposed operations. The process could be individualized per road segment, direction, etc. if differentiation in risk factors according to different site and project criteria is found.
5. Prepare a research report that presents the findings of the research, and provides the recommended risk management process to ODOT for implementation in practice.

IV. POTENTIAL BENEFITS

The proposed research is expected to enable determining a project- or workday-specific safety risk profile that indicates low, medium, and high risk times during highway preservation projects. Having this capability will dictate when additional safety measures need to be taken to account for increased risk factors due to riskier days, times, or other conditions. The research results will also provide a sense of how many current projects fall into a higher risk category for accidents. Ultimately, widespread implementation of the research findings and guidance is expected to lead to less hazardous, and thus safer, construction projects.

V. IMPLEMENTATION

The results will be used by the Traffic-Roadway Section, and implemented through the State Traffic-Roadway Engineer. The results will also be used by the Statewide Construction Office for these types of projects and implemented through communication and education of the Construction Project Managers statewide.

VI. LIST OF REFERENCES *(optional)*

- Lindheimer, T., Heaslip, K., Louisell, W., and Gardiner, K. (2012). “Development of a Work Zone Safety Audit Risk Assessment Tool.” 91st Annual Meeting of the Transportation Research Board (TRB), Washington, DC.
- Ullman, G.L., Ullman, B.R., and Finley, M.D. (2005). “Evaluating the Safety Risk of Active Night Work Zones.” Report 0-4747-2, Project Number 0-4747, Texas Department of Transportation and Federal Highway Administration, April 2005.

VII. CONTACT INFORMATION

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