Impactful Resilient Infrastructure Science and Engineering (IRISE) - Project Scope of Work - (FY 2021-22 Annual Work Program)

SUMMARY PAGE

Project Title: Identifying Major Causes of Construction Accidents for the Paving Industry in Pennsylvania

Person Submitting Proposal: Lev Khazanovich

Proposed Funding Period: 09/01/2021 - 09/01/2022

Project Duration: 12 months

Project Cost: $85,000
**Project Title:** Identifying Major Causes of Construction Accidents for the Paving Industry in Pennsylvania

**Problem Statement:** According to the National Institute for Occupational Safety and Health (NIOSH), every year more than 100 workers are killed, and 20,000 are injured in the highway and street construction industry. A significant portion of the accidents is caused by traveling vehicles entering the construction zone. Prevention of these types of accidents is a subject of an extensive research program sponsored by the FHWA and state transportation agencies. However, almost half of the accidents is from the movement of construction equipment and other construction-related activities. This problem is well recognized by the transportation agencies and the industry. Nevertheless, a review of the safety-related research publications indicates that most of the construction safety-related research is focused on building construction. The majority of accident data is related to building construction and even so, the data is very general providing little information on active and specific risk prevention. In addition, documented accidents (fatal or injury outcome) are only the tip of the iceberg in the construction safety analysis. Other industries such as aerospace, coal mining, petrochemical, and nuclear power have successfully implemented near-misses management. This permitted them to significantly improve their safety programs, including implementation of innovative safety technologies and training.

**Project Objectives:** Identify and rank dangerous scenarios, taking into consideration near-misses, in highway and street construction in Pennsylvania. Develop recommendations for avoiding or minimizing dangerous scenarios in the future and providing qualitative information for the improvement of safety training and development of safety-related equipment.

**Project Scope:** The proposed studies will identify historical data related to the road construction accidents in Pennsylvania. Federal and Pennsylvania state agencies data on the accidents as well as PennDOT’s records on near misses' situations will be collected with as many details as possible. To achieve these goals, insurance companies will be contacted to get information on the historical insurance claims. A survey of the contractors and interviews with workers will also be conducted. The collected information will be summarized and categorized. The current training procedures and safety devices will also be evaluated. The highest priority scenarios for virtual training will be selected and recommendations for improvement of the safety equipment will be provided.
Task Statements:

The objectives of this project will be realized through the completion of the following tasks:

Task A: Literature review of construction safety for the paving industry

A literature review of previous safety research developed with an exclusive focus on the paving industry work zone will be conducted. Past statistics and the evolution of the paving industry accidents and near misses will be summarized. The research team will also look at existing technology and training procedures developed to improve safety inside the work zone.

Task B: Risk database

Official historical accident and near-miss data (if available) inside highway and street work zones will be collected from National and State agencies as well as from insurance companies, contractors’ associations, and contractors. The classification of the data will be based on gravity (fatal, injury or near-miss), involved worker and equipment, work activity, time of the day, season, etc. Based on this classification, a risk database with the most dangerous scenarios for the PA paving industry will be assembled.

This task will be developed concomitantly and in connection with the project titled “Identifying the Major Causes of Work Zone Accidents and Health Hazards in the Highway Industry” submitted for extra funding to the Center for Construction Research and Training (CPWR).

Task C: Safety Survey

The research team will develop surveys for contractors’ personnel. The surveys will be focused on the differences in perception of risks between administration, safety management personnel and workers from both contractors and subcontractors. The surveys will be elaborated based on the historical data (risk database) collected from agencies and others, as described in Task B. We also expect to collect important information on near-miss experiences from workers that were not officially reported.

Task D: Safety training review

Based on the risk database (Task B) and safety surveys (Task C), the research team will review the main safety training processes currently in use by the Pennsylvania paving industry.

Task E: Recommendation and mitigation

We will provide immediate recommendations to improve or developed additional safety training regarding the most dangerous scenarios. Practical mitigation actions will also be proposed with a direct focus on specific work activities.

Task F: Draft Final Report

Comment [SdSL1]: Not sure how to do this. The names of the projects are very similar. Do we want to say that if it gets accepted, then...?
A draft final report will be prepared to document project activities, findings, and recommendations.

**Task G: Final Report**

A Final Report taking into consideration comments that were received on the Draft Final Report will be prepared.

**Deliverables:**
The following deliverables will be provided based on completion of the above tasks:

- **Deliverable #1** – A memo with the literature review on construction safety with focus on the paving industry work zones.
- **Deliverable #2** – A memo summarizing the historical accident and near miss data collection and evaluation resulting in the risk database.
- **Deliverable #3** – A memo summarizing the results of the safety survey and its relation to the risk database.
- **Deliverable #4** – A memo report evaluating the current PA paving industry safety training
- **Deliverable #5** – A memo report containing the projects safety recommendations and mitigation strategies.
- **Deliverable #6** – A draft final report, due 11 months from project initiation.
- **Deliverable #7** – Final report, due 12 months from project initiation.

**Key Personnel:**

*Principal Investigator:* Dr. Lev Khazanovich will provide the technical expertise, project management, and oversight on all project activities.

*Other Key Staff:*

Faculty: Dr. Joel Haight will provide technical expertise for all tasks of the project.

Postdoctoral Associate: Dr. Lucio Salles de Salles will assist Dr. Khazanovich on all tasks of the project.

*Other Personnel:*

Two students will contribute to the successful completion of this research effort as described below:

Grad Assistant 1 (TBN)

Undergraduate student (TBN)
**Proposed Person-Hours by Task:**

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<th>Team Member</th>
<th>Task A</th>
<th>Task B</th>
<th>Task C</th>
<th>Task D</th>
<th>Task E</th>
<th>Task F</th>
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**Key Project Team Members, Estimated Hours Per Task**

**Other Project Team Members, Estimated Hours Per Task**

| TBD, Grad Student     | 102    | 200    | 50     | 0      | 40     | 40     | 632    |
| TBD, Hourly Student   | 0      | 30     | 20     | 0      | 0      | 10     | 0      | 60    |
| Total                 | 166    | 394    | 361    | 130    | 98     | 81     | 1300   |

**Schedule:**

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**Budget:** The total project cost is $85,000.

**Acknowledged By:**

Lev Khazanovich  
Principal Investigator

**CASE NUMBER 23386755-24/48HRS**