



## Research Problem Statement

ODOT Research Section  
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### I. TITLE

17-051 A Comparative Study of Materials for Concrete Patch Repair

### II. PROBLEM

Patch repair is a commonly used method for rectifying localized deterioration and damage in reinforced concrete members. As our existing infrastructure continues to age and funds for repair and new construction are increasingly tightened it is essential for the Oregon DOT to specify constructable and durable repair materials that are also cost effective. Of particular concern is the long-term performance of patch repair materials, particularly those exposed to deicing chemicals. In Oregon  $MgCl_2$  with corrosion inhibitor is the main deicing chemical used and a current study by the authors of this proposal is investigating the impact of  $MgCl_2$  on the current inventory of ODOT bridge deck concrete. Little is known about the performance of repair materials subject to the  $MgCl_2$ -based deicers. Further, ODOT currently has limited repair materials on the approved materials list and there is a desire to have 1) quantifiable information to compare the performance between different materials 2) improve current specifications and guidance to ensure successful use of repair materials and 3) develop criteria to identify other acceptable sources for patch repair. This information represents a significant improvement on ODOT's current approach and thus represents an important benefit for ODOT.

### III. PROPOSED RESEARCH, DEVELOPMENT, OR TECHNICAL TRANSFER ACTIVITY

The proposed research project will involve three main tasks:

1. Review of current concrete repair practices and materials of ODOT's and other DOT's having similar durability issues (e.g. corrosion, freeze/thaw, other). Also to investigate resources related to the use of  $MgCl_2$  + corrosion inhibitor-based deicers. The objective is to short list the best options that are currently used based on performance and best practices.
2. The research team will work with ODOT to select and procure the different repair materials for investigation. Materials currently on the approve materials list as well as additional materials based on on discussions with ODOT and the outcomes of Task 1 will be selected.
3. Laboratory investigations will be done to characterize and evaluate each repair product. These will include: working time, strength gain versus ambient temperature, durability factors such as, abrasion, impact, shrinkage, and, permeability (water and chlorides), along and performance factors such as: cracking, bond and life cycle cost analysis.
4. From Tasks 1-3 modifications will be suggested to ODOT's current specifications and the research team will develop a best practices guide that includes selection criteria guidance document for new/alternative repair materials.

### IV. POTENTIAL BENEFITS

As result of current and foreseeable economic challenges and accompanying reduction in State and Federal funds for new infrastructure, it is critical to extend the service life of existing transportation assets in Oregon. Repair of reinforced concrete structures, constitutes a large part of the efforts to achieve this goal. The proposed research will provide ODOT the tools to 1) identify repair materials with advantageous characteristics for repair of ODOT structures 2) modify existing best practices documents to ensure long-term performance of repairs with these materials and 3) develop selection criteria for new/alternative repair materials. As the main benefit of this research ODOT will be able to extend the lifespan of their existing infrastructure in an economically viable way.

## V. IMPLEMENTATION

The project will involve comparative, experimental and analytical studies to accomplish the tasks identified above. Main implementation outcomes of the study will be **1)** best practices guide **2)** selection criteria for new/alternative repair materials **3)** identification of currently available materials that satisfy the performance criteria established by this project. The research team will work with ODOT to revise, publish and distribute as appropriate the best practices guide and to provide selection criteria for new/alternative repair materials. Also, the current list of accepted materials for repair may be augmented based on the findings of this research project for currently available materials.

## VI. LIST OF REFERENCES *(optional)*

## VII. CONTACT INFORMATION

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