

| <b>UTC Project Information</b>  |  |
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| Project Title   | MPC-676 – Optimal Selection of Upgrade and Maintenance Interventions to Minimize Life-Cycle-Cost   |
| University  | University of Colorado Denver<br>Colorado State University   |
| Principal Investigator  | Moatassem Abdallah   |
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| Funding Source(s) and Amounts Provided (by each agency or organization) | <p>USDOT, Office of the Assistant Secretary for Research and Technology<br/>\$54,949</p> <p>University of Colorado Denver<br/>\$40,009</p> <p>Colorado State University<br/>\$18,000</p>   |
| Total Project Cost  | \$112,958  |
| Agency ID or Contract Number  | 69A3551747108  |
| Start and End Dates   | November 12, 2021 to July 31, 2022   |
| Brief Description of Research Project                                   | <p>Operation and maintenance costs are reported to be the longest and most costly phase of buildings and infrastructure systems where it exceeds cost of design and construction. This proposal presents the development an innovation optimization model that can identify optimal selection of upgrade and maintenance interventions to minimize life-cycle-cost or equivalent annual cost of buildings and bridges. The model will be developed in three main steps (1) formulation step where decision variables, objective function and constraints are identified and formulated; (2) implementation step where an optimization algorithm is selected to execute the model computations efficiently; and (3) evaluation step where the performance of the optimization model is verified using case studies. The research team will study two applications of the proposed model, including upgrade and maintenance of buildings and bridges. Furthermore, the team will study the feasibility</p> |

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|  | of expanding the model to analyze multiple assets, such as building portfolio. |
| Describe Implementation of Research Outcomes (or why not implemented)<br><br>Place Any Photos Here |  |
| Impacts/Benefits of Implementation (actual, not anticipated)                                       |  |
| Web Links <ul style="list-style-type: none"> <li>• Reports</li> <li>• Project Website</li> </ul>   |  |