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| UTC Project Information | |
| Project Title | MPC-696 – Numerical Modeling and Parametric Analysis of Grouted Coupler Connections under Varying Impact Loading Conditions |
| University | Utah State University |
| Principal Investigator | Andrew D. Sorensen, Ph.D.  Mohsen Zaker Esteghamati, Ph.D. |
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| Funding Source(s) and Amounts Provided (by each agency or organization) | USDOT, Office of the Assistant Secretary for Research and Technology $75,000  Utah Local Technical Assistance Program  $75,000 |
| Total Project Cost | $150,000 |
| Agency ID or Contract Number | 69A3551747108 |
| Start and End Dates | October 11, 2022 to July 31, 2024 |
| Brief Description of Research Project | Grouted coupler connections are a common connection type used in Accelerated Bridge Construction (ABC). Evaluation for seismic performance of typical ABC column-footing connections has been undertaken in high earthquake prone states like Utah, California, Nevada, and Idaho. However, apart from the dynamic load exhibited by earthquake, the deformation and failure behavior of these connections to vehicular impact is also critical and warrants investigation. This study will seek to develop a sophisticated finite element model would account for an accurate representation of the coupler/rebar interface, energy transfer from the impacted column location through the coupler into the foundation, and material strength degradation. The model will be validated with existing experimental data collected at the USU SMASH Lab. The experimental data consists of single coupler and full scale column testing. The results of the experiments and modelling will also be compared to normal column connections to see if any major differences warrant separate damage index calculations. |
| Describe Implementation of Research Outcomes (or why not implemented)  Place Any Photos Here | This project directly aligns with the USDOT strategic goal of Safety, equipping designers with better information for designing resilient structures. As a result, bridges constructed using ABC techniques will be more capable of withstanding unexpected impacts, thereby enhancing their safety and reliability for public use. |
| Impacts/Benefits of Implementation  (actual, not anticipated) | The results show that low velocity vehicle impact can greatly lessen a bridge pier's capability to withstand subsequent seismic loading. As such, more investigation into a bridge pier's condition should be undertaken following an impact event. |
| Web Links   * Reports * Project Website | * MPC Final Report – [Numerical Evaluation of Precast Columns with Grouted Splice Sleeve Connectors under Sequential Impact and Seismic Loads](https://www.ugpti.org/resources/reports/details.php?id=1194) |