UTC Project Information	
Project Title	Impact of Construction Eccentricity on Direct Pier-to-Pile Connections for Permanently Cased Shaft (CFST) Piles
University	UW
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Funding Source(s) and Amounts Provided (by each agency or organization)	ABC-UTC funds: $70,000 Match Funds: $35,000
Total Project Cost	Total Funds: $105,000
Agency ID or Contract Number	Accelerated Bridge Construction University Transportation Center (ABCUTC) 69A3551747121
Start and End Dates	01/01/2021 - Active
Brief Description of Research Project	For seismic design of transportation structures, there are competing demands including: economy, strength, stiffness, inelastic deformation capacity, and seismic resilience. Prior research at the University of Washington (UW) demonstrates that concrete-filled steel tubes (CFSTs) can meet these competing demands. This proposed research builds on the prior CFST research to develop direct pier-to-pile connections specific for use in wide range of transportation systems including bridges, high speed rail (HSR), and port structures. Initially finite element analyses (FEA) were conducted to develop the connection and experimental test matrix. Specific study parameters include embedment depth and the addition of a ring to enhance mechanical bond. This initial study resulted in an initial test matrix that is currently being conducted, to study these aspects of the connections. However, there is an important, yet unstudied parameter, which is the placement of the reinforcing steel cage. In construction, it is likely that the pier will not be placed at the exact center of the pile, but instead will be placed with some eccentricity relative to the center of the pile. This eccentricity is likely to be very important but is not possible to study analytically. Here, it is proposed to investigate the impact of eccentricity on the transfer mechanism and damage using large-scale experimental specimens. It is expected that two tests will be conducted which will be complementary with and extend current research that is being sponsored by Pacific Earthquake Engineering Research (PEER) center (referred to as PEER herein). The results will be used to determine design methods and nonlinear analytical

	models for these new connections. The overall goals of the proposed research are to: Investigate impact of construction eccentricity on direct pier-to-CFST pile connections. Investigate the seismic response and resilience, including damage, of selected CFST connections using large-scale testing. Build on experimental study using validated FEA models to investigate unstudied parameters including pier-to-pile diameter ratio. • Develop, in collaboration with WSDOT and Caltrans as well as other interested transportation agencies, new design methods for these connections
Describe Implementation of Research Outcomes (or why not implemented) Place Any Photos Here	The outcomes will be tracked and reported once they are identified.
Impacts/Benefits of Implementation (actual, not anticipated)	The impacts will be tracked and reported once they are identified.
Web Links • Reports • Project website	https://abc-utc.fiu.edu/research-projects/uw-research-projects/impact-of-construction-eccentricity-on-direct-pier-to-pile-connections-for-permanently-cased-shaft-cfst-piles/