

UTC Project Information	
Project Title	Design of Integral Abutment Bridges in Extreme Climate
University	The University of Oklahoma
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Agency ID or Contract Number	DTRT13-G-UTC36 SPTC14.1-52
Start and End Dates	August 1, 2014 – July 31, 2016
Brief Description of Research Project	<p>PROBLEM: Integral Abutment Bridges (IAB) are bridges without any expansion joints within the bridge deck or between the superstructure (deck and girders) and the abutments. An IAB provides many advantages during construction and maintenance phases of a bridge service life. The complex interactions occurring in an IAB between the superstructure, abutments, foundations, and soils, however, are still poorly understood. Lack of national design standards for IABs has led to a contradictory and confusing array of design and construction practices. These issues are further exacerbated by the impact of extreme variations in temperature and moisture.</p> <p>PROPOSED SOLUTION: The research will utilize data collected from an instrumented Oklahoma IAB and computer models to develop readily implementable design and construction guidelines for IABs in areas with extreme variations in temperature and moisture. Using available climate data, such as the Oklahoma Mesonet, expected temperature and soil moisture changes across USDOT Region 6 will be established. Computer models of IABs will be used to conduct a parametric study using these variations. The parameters considered will include: types, numbers, orientation, length and different installations of abutment piles; different embankment and foundation soil conditions; various abutment backfill materials such as Expandable Polystyrene (EPS) blocks, Controlled Low Strength Material (CLSM) and compacted and non-compacted granular fill; and length and skew of the bridge. The computer models will include simplified computer codes LPILE and GROUP as well as a sophisticated fully-coupled computer code TeraDysac. Effect of moisture variations in</p>

	<p>the embankment, backfill, and subsurface soil will be incorporated into the models using unsaturated soil mechanics principles. The results of the parametric study and discussions with Oklahoma Department of Transportation (ODOT) bridge engineers will be used to develop readily implementable design and construction guidelines for IABs. The developed guidelines will then be refined through discussions with bridge engineers.</p>
<p>Describe Implementation of Research Outcomes (or why not implemented)</p> <p>Place Any Photos Here</p>	
<p>Impacts/Benefits of Implementation (actual, not anticipated)</p>	
<p>Web Links</p> <ul style="list-style-type: none"> • Reports • Project website 	