

Request for Research Funding for FY 2019-2020

Requesting Office	CO Structures Office	Priority	5 of 5
Proposed Title	Temperature Effects in Match Cast Segmental Bridge Construction		
Justification	<p>Segments with high span-to-width ratios can experience warping or bowing of the match cast segment due to thermal gradients caused by the high temperatures in the adjacent newly cast concrete. This warping effect can lead to a significant gap between segments that is difficult to close during post-tensioning or can result in a joint in a previous segment reopening. There are two main factors for this type of bridge construction that need further investigation. First, at what limit of wing span to segment length does this become an issue? Second is the type of curing methods that are feasible and available that can eliminate this problem. Integrating the two factors together to determine what ratio requires certain curing methods is the primary objective of this research.</p> <p>At the conclusion of the research project, guidance will be provided on the geometry of segments that may require methods to reduce the thermal gradient during match casting. That guidance will help to eliminate gaps from opening in the joints during the erection of segments, eliminating additional work, time, and cost to mitigate the problem during construction.</p> <p>This will be a synthesis and analytical study.</p>		
Impact	This research aims to provide guidance which will mitigate problems during construction due to thermal gradients between match cast segments. This research will help to avoid construction delays and assure good quality.		
Affected Offices	State Construction Office, they have been involved in discussion of this work.		
Existing Work	<p>Prediction Model for Concrete Behavior—Final Report, 2008</p> <p>Experimental and Finite Element Investigations on the Temperature Field of a Massive Bridge Pier caused by the Hydration Heat of Concrete, Construction and Building Materials, Volume 192, Issue 0, 2018, pp 240-252</p> <p>Temperature Induced Deformations in Match Cast Segments, PCI Journal, July – August 1995</p>		
Keywords Used In Existing Work Search (Cannot leave blank)	match cast thermal, segmental bridge construction thermal, segmental bridge match cast curing		
Related Contracts (Give contract numbers)			
Funding Request	\$200,000	Anticipated Duration	2 years
Project Manager	Will Potter/Vickie Young	Contracting Method	Direct contract with university (UF)
Urgency	3	The need to provide enhanced construction guidance for the fabrication of the segments is required to prevent construction and future maintenance issues. It will also assist the design office in project reviews to ensure segment dimensions are being considered related to constructability.	
Implementability	3	Further research, including physical testing or instrumentation of match cast segments for a bridge project, may be required before complete guidance can be provided. That additional research may be requested as an amendment to this project or under a separate request.	
Project Benefits (Succinct, complete explanation)			

Results from this project will be used to develop specifications which ensure good quality match cast segmental bridge pieces during construction. Projects which use the specifications will be less likely to have construction delays due to problems during segment casting. Minimizing the construction issues will provide sound structures that will minimize future costly maintenance problems.

Project Benefits (Select all that apply and explain)	Quantifiable Benefits (units, dollars, etc...if applicable)	Methodology or Data Sources Used to Determine Quantifiable Benefits. If not applicable, please give justification of project benefits
<input type="radio"/> Materials Enhancement		Better, more consistent, precast segment quality
<input type="radio"/> Materials Savings		
<input type="radio"/> Time Savings		Avoidance of construction delays
<input type="radio"/> Lives Saved/Injuries Prevented		
<input type="radio"/> Other (Explain)		

*Comments should explain and support urgency, financial benefit, and implementability scores