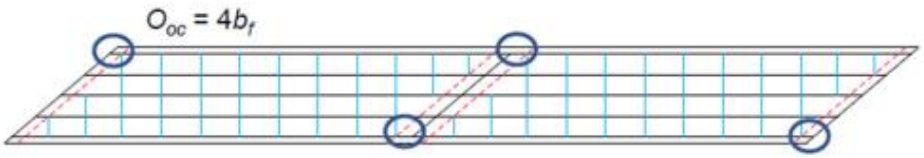
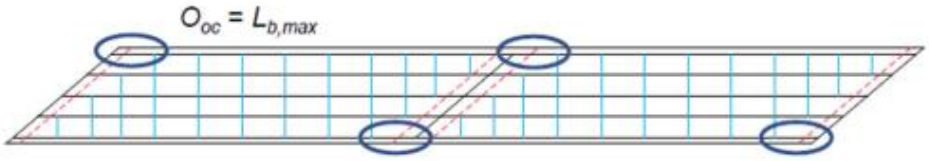
Request for Research Funding for FY 2023-2024			
Project Number (Research Center Use Only): STR-24-04			
Requesting Office	CO Structures Design	**Priority**	4 of 5
Proposed Title	Improved Cross-Frame Framing Arrangements for Straight-Skewed Steel I-Girder Bridges		
Justification	FDOT Projects BEB13 and BED03 have demonstrated that straight-skewed steel I-girder bridges designed with contiguous cross-frame framing arrangements can develop large cross-frame forces in the vicinity of the obtuse corners of the spans. Limited additional studies have shown that these large forces can be reduced significantly by offsetting the intermediate cross-frame closest to the obtuse corners by a targeted maximum girder unbraced length from the supports, L_{bmax}, then inserting the additional cross-frame lines maintaining a generous offset relative to the girder supports. Figure 1 shows a typical contiguous cross-frame framing arrangement with an obtuse-corner offset of $O_{oc} = 4b_f$, based on AASHTO LRFD Commentary guidance. In contrast, Figure 2 displays an improved arrangement with $O_{oc} = L_{bmax}$.  **Figure 1. Example two-span continuous bridge with contiguous cross-frame lines and offsets of $O_{oc} = 4b_f$ from the supports at the obtuse corners of the spans.**  **Figure 2. Example two-span continuous bridge with contiguous cross-frame lines and offsets of $O_{oc} = L_{bmax}$ from the supports at the obtuse corners of the spans.**		
Impact	A methodical study to demonstrate more comprehensively the benefits of this simple change in the cross-frame offsets relative to the supports can significantly impact design policy for new construction. This study can be performed with relative ease by varying the cross-frame framing parameters in the bridges with contiguous cross-frame lines studied in the previous research.		
Affected Offices	CO Structures Design Office		
Existing Work	NCHRP Report 725 Guidelines for Analysis Methods and Construction Engineering of Curved and Skewed Steel Girder Bridges (2012) Andrew J. (2016) Bechtel. Improving Cross-Frame Design to Reduce the Effects of skew in Steel I-Girder Bridges. University Transportation Research Center (UTRC) Zhou, James., Bennett, Caroline., Matamoros, Adolfo., Li, Jian., & Rolfe, Stan. (2016). Skewed Steel Bridges: Effect of Cross-Frame Layout on Lateral Flange Bending Stresses. Report No. K-TRAN: KU-13-3		
Keywords Used In Existing Work Search **(Cannot leave blank)**	Skewed steel bridge analysis, Lean-on bracing		
Related Contracts (Give	BE535, BEB13, BED03		

contract numbers)			
Funding Request	$50,000	**Anticipated Duration**	6 months
Project Manager	Vickie Young	**Contracting Method**	Direct to Georgia Tech/ Via Consulting firm
Urgency	4	This project scored fourth in a rating of 25 research ideas by FDOT's Central and District Structures Design Offices.	
Implementability	3	This project can be implemented with a revision to the Structures Design Guidelines and AASHTO LRFD Commentary guidance.	

Project Benefits (Succinct, complete explanation)

This project will change the current code and design policy. Using fewer cross-frames in future bridge construction due to the reduced cross-frame force and would make construction more cost efficient.

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**
○ Materials Enhancement		More efficient and cost-effective details.
○ Materials Savings		Reduced cross-frame forces means less material
○ Time Savings		Lighter steel might accelerate construction time
○ Lives Saved/Injuries Prevented		
○ Other (Explain)		

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