# ABSTRACT

Lovell, Matthew D. Ph.D., Purdue University, August 2010. Long Term Behavior of Integral Abutment Bridges.
Major Professor: Robert Frosch.

Integral abutment (IA) construction has become the preferred method over conventional construction for use with typical highway bridges. However, the use of these structures is limited due to state mandated length and skew limitations. To expand their applicability, studies were implemented to define limitations supported by rational analysis rather than simply engineering judgment. Previous research investigations have resulted in larger length limits and an overall better understanding of these structures. However, questions still remain regarding IA behavior; specifically questions regarding long-term behavior and effects of skew. To better define the behavior of these structures, a study was implemented to specifically investigate the long term behavior of IA bridges. First, a field monitoring program was implemented to observe and understand the in-service behavior of three integral abutment bridges. The results of the field investigation were used to develop and calibrate analytical models that adequately capture the long-term behavior. Second, a single-span, quarter-scale integral abutment bridge was constructed and tested to provide insight on the behavior of highly skewed structures. From the acquired knowledge from both the field and laboratory investigations, a parametric analysis was conducted to characterize the effects of a broad range of parameters on the behavior of integral abutment bridges. This study develops an improved understanding of the overall behavior of IA bridges. Based on the results of this study, modified length and skew limitations for integral abutment bridge are proposed. In addition, modeling recommendations and guidelines have been developed to aid designers and facilitate the increased use of integral abutment bridges.