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<b>16. Abstract</b> The focus of this research is to develop a framework for more sustainable design and construction processes for new bridges, and sustainable maintenance practices for existing bridges. The framework includes a green rating system for bridges. The green rating system is divided into three sections, which are design, construction and maintenance. The three sections are further divided into various criteria. For each criterion the description, intent, and requirements have been established. The requirements were established after reviewing various industry standards. The Delphi survey was conducted at MDOT divisions to assign point values to sections and the criteria. The results of the Delphi survey and scorecard of the rating system are shown in the relevant appendix and/or sections. The certification levels for the rating system are established to categorize sustainable bridges. A bridge can be categorized as Non-Green, Certified, Green, Total Green, and Evergreen, depending on the total score obtained by the project. LCA and LCCA guidelines are also developed to support the sustainability of bridge projects. LCA guidelines include the steps to calculate GHG emissions in a bridge project. It was made an inventory of construction materials and equipment that can be used in bridge projects, and found their emission factors in literature, historical databases, or by using computer tools. Certain products emit less GHG compared to conventional products. Recycled materials such as fly ash, blast furnace slag cement, high performance concrete, and steel produce much less emissions than traditional materials. Sustainable products are listed along with their emission factors and can be used to calculate GHG emissions. LCCA guidelines include steps to calculate the life cycle cost of bridges.			
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