Title:	Analyze the Use of Green Pavement Markings - Intersection Safety for Non-Motorized Users
The Problem:	Non-motorized user crash rates have increased in the past several years. The number of people choosing to walk and bicycle has also increased in recent years. As a result, agencies are looking into strategies to improve safety while encouraging walking and biking. One strategy that holds promise and used by agencies is green pavement markings to bring attention to a bicycle facility including bike boxes to improve the intersection safety for non-motorized users. Individual jurisdictions within Texas have applied for and received approval under IA-14, including Austin, El Paso, McAllen, Odessa, and Ft. Worth. TxDOT has not applied for MUTCD Interim Approval for the Green Colored Pavement (IA-14). This research will provide on-the-ground evidence on the impact of green colored pavement at intersections on safety. This research will provide TxDOT with the necessary input to either apply for MUTCD Interim Approval for the Green Colored Pavement (IA-14) and/or respond to FHWA's request for TxDOT's official response to cities' request for MUTCD interim approval. City streets are also governed by the Texas MUTCD (TTC 544.001) and they need interim FHWA approval to use this treatment on their streets. Local TxDOT districts are required to respond to the local agency's request. These positions may vary by district and require staff to investigate and to perform the due diligence to develop a position on the proposed application. The Texas Department of Transportation currently holds no position or data to evaluate the use of green-colored pavement at intersections to increase safety. This lack of data not only affects the safety of bicyclists but also hinders the planning and design of traffic devices to improve safety, and the inconsistent application of green pavement markings throughout Texas undermines the goal of uniform traffic control devices. The role of safety for various segments is highlighted in

Technical Objectives:	This research seeks to investigate and address the following primary issues: • Use of green-colored pavement markings as a safety device • Evaluation of the safety impact of use of green-colored pavement markings at intersections where extra attention may be beneficial to bicyclist safety. • Evaluation of green-colored pavement marking materials cost, durability, and ongoing maintenance costs. • TxDOT position of green colored pavement markings when required by other agency applications for interim use The researchers shall address the following: 1. The researchers will evaluate usage by bicyclist and pedestrian approaches and provide at least two pilot locations- likely in Houston and Austin. The research approach may include bicycle and pedestrian counts, STRAVA crowd-sourced pedestrian and bicyclist data (already purchased by TxDOT), questionnaires, as well as observational surveys of pedestrian, bicyclist and motorist behaviors. These activities might be collected at intersections with green-colored paint and at control intersections without green paint. The research will be used to provide a report with recommended best-practices on the implementation of green-colored paint and as a cost-benefit analysis of the usage of green-colored pavement markings to improve safety for non-motorized users. 2. This research will provide guidance to TxDOT on planning, design and implementation of green pavement markings at intersections and might include: 3. • An assessment of test methods for green pavement markings to improve safety at intersections for non-motorized users 4. • An assessment of test methods for the evaluation of motorists' and non-motorized users' behavior related to green-colored pavement markings. 5. • Characterization and quantification of whether green-colored paint at intersections reduces crashes and/or improves safety. 6. • Incorporating green-colored paint at intersections in project development, design and implementation. 7. • Unique site characteristics that affect pedestrian, bicyclist, and surrounding motorist behaviors to improve safety. 8. Task 1. Review state of the practice on use, material types, and durability and maintenance costs of green pavement markings at intersections. 9. Task 2. Identify test locations and test variables that might include: non-motorized user and motorized user behavior; safety data; utilization (counts); STRAVA data; or other variables. 10. Task 3. Gather data based on plan developed in Task 2 and perform analysis related to: 11. 1. Signalized and unsignalized locations 12. 2. Large 4 to 6 lane intersections 13. 3. Small intersections 2 lanes 14. 4. Potentially diamond interchanges or other intersection types 15. 5. Interactions between bicyclists/pedestrians 16. Task 4. Evaluate information and based on workshop with research panel to develop guidance on green pavement markings at intersection. The expectation of this project is that the end product will obtain a TRL level 7.
Desired Deliverables:	1. Technical memorandum for each task completed. 2. Monthly progress reports. 3. Value of Research (VoR) that includes both qualitative and economic benefits, to be included in the final research report. 4. Research report documenting the findings of the research, including new safety prediction models and updated features within the TRSD spreadsheet program. 5. Project Summary Report.
Proposal Requirements:	1. Utilize the "Proj/Agre" and "PA_Form" templates located at the TxDOT RTI website. 2. Proposals will be considered non-responsive and will not be accepted for technical evaluation if they are not received by the deadline or do not meet the requirements stated in RTI's University Handbook, which is also located at the RTI website. 3. Proposals should be submitted in PDF format, 1 PDF file per proposal. File name should include project name and university abbreviation. 4. This project will be tracked during the life of the project using a Technology Readiness Level (TRL) scale. For more information about the use of a TRL, click.