Request for Research Funding for FY 2022-2023			
SPR Subpart B Project: TEO-23-12			
Requesting Office	State Traffic Engineering and Operations Office	**Priority**	12 of 23
Proposed Title	Dynamic Wireless Power Transfer Technology Testing at the SunTrax		
Justification	As electric vehicle (EV) adoption increases, so does the need for charging infrastructure. Different types of charging technologies are available to address multiple use cases. Currently, there are multiple mature and widely deployed wired charging technologies. Wireless power transfer (WPT) as a method to recharge EVs has been a focal point of research and development and is an emerging technology. There are three types of WPT systems: • "Static" WPT is installed in a parking space and charges the vehicle only while parked. • "Quasi-dynamic" WPT is a natural extension of static technology in which vehicles are charged while they are stopped, but not necessarily parked. This can include applications such as charging at a stop-light or taxi charging while waiting in a queue. • "Dynamic" WPT (DWPT) takes this concept even farther and provides power to the vehicle while it is travelling down the road. Fully dynamic WPT has the potential to infinitely extend the useable range of EVs. There are four main components that go into a WPT system, broken into "grid side" and "vehicle side": (a) Vehicle Electronics, (b) Vehicle Assembly, (c) Ground Assembly and (d) Wall Box. Vehicle side components include vehicle electronics and the vehicle assembly, which is also called the secondary coil. Deployment of these components will be dependent upon OEM adoption of WPT technologies. The "grid side" components include wall box and ground assembly, which is also called the primary coil. These provide the link between the utility power connection and the vehicle; just as plug-in chargers do. FDOT has developed the EV Infrastructure Master Plan that lays out how FDOT is developing and preparing Florida's infrastructure for wider EV adoption. WPT was identified as one of the advanced technologies to facilitate charging vehicles as they drive on a roadway. FDOT intends to conduct testing and feasibility testing of WPT technologies before the technology is implemented in the field and widely adopted. One of the implementable WPT technologies FDOT desires to test is "dynamic" WPT. FDOT intends to test the feasibility of dynamic WPT technology implementation at the SunTrax. The project will require equipping a segment of SunTrax test track with in-pavement charging coils and modifying a vehicle to add a WPT receiver. The embedded coils in the pavement will inductively charge the vehicle in motion when the vehicle drives over the coil. The project may involve coordinating with multiple stakeholders including FDOT, vehicle owner or operator, vehicle OEM, WPT vendor, and electric utility. The project will include the following tasks: **Task 1:** Task 1 will be focused on the project development and following sub-tasks. • Literature review of various WPT systems • Stakeholder coordination • Industry maturity and capability review **Task 2:** Task 2 will be focused on test plan development and stakeholder coordination to implement the project. • Develop test plan for testing at the SunTrax • Outline the test requirements • Coordinate with SunTrax to understand the availability and characteristics of the test beds • Coordinate with vehicle OEM and WPT system providers and other stakeholders involved in the project **Task 3:** Task 3 will be focused on actual testing. • Conduct testing in coordination with all stakeholders and follow the procedure outlined in the test plan • Validate the test requirements **Task 4:** Distribute test outcomes with the stakeholders • Document test outcomes and share with the FDOT and other identified partners • Develop and deliver presentation to the stakeholders		

	Task 5: Mainstreaming Recommendation • The research team will develop a set of recommendations for mainstreaming WPT systems for various modes of transportation • The research team will develop a draft policy for the state agencies to prioritize corridors for facilities for WPT implementation with timeline.		
Impact	The project will help FDOT to understand how dynamic WPT system works and if technology is feasible for FDOT to implement and install.		
Affected Offices	State Traffic Engineering and Operations Office and FTE Traffic Operations		
Existing Work	Several ongoing research and development works exist in other states. But none of these are specifically designed for Florida specific conditions. The research are available here.		
Keywords Used In Existing Work Search	Wireless Power Transfer, Dynamic		
Related Contracts (Give contract numbers)	NA		
Funding Request	**Total Cost: $3.4 M** • **Equipment and Installation Cost:** $3.1M • **Research Work:** $300,000	**Anticipated Duration**	18-24 months
Project Manager	PM: John Easterling Co-PM: Edith Wong	**Contracting Method**	Anticipated procurement method (e.g., supplement to existing project, RFP to all registered vendors, direct contract with university)
Equipment	**Equipment and Installation Cost:** Grid Side Electronics – $1.5M Grid Side Coils – $1M Grid Side Installation – $500K Vehicle System – $100K	The expectation is for a minimum power level of 200 kW and a test track length of approximately 200 feet. The estimated cost also includes a receiver for a single vehicle.	
Urgency	1	The need for charging infrastructure will become critical as the ownership of electric vehicles increases. This research will lay the groundwork that will be need for future implementation of wireless electric vehicle charging technologies within the public roadway network to support electric vehicle penetration.	
Implementability	1	This project will implement the WPT system on the roadside and vehicle side. This an implementation only project with evaluation component included in it.	

Project Benefits (Succinct, complete explanation)

EV charging technologies has taken off as more mandates emerge to make the vehicles environmentally more sustainable. WPT systems can help convert the vehicles more environmentally friendly by providing the needed power wirelessly as the vehicles sits idle, or stop for a while, or drive on a segment of roadway equipped with WPT systems. The research project will evaluate the feasibility of the dynamic WPT system and test it at the SunTrax testing facility.

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	Determine if dynamic WPT system is feasible charging solution	Power system data, data from ground assembly, data from vehicles and OEMs
○ Materials Savings	NA	
○ Time Savings	NA	
○ Lives Saved/Injuries Prevented	NA	
○ Other (Explain)	Technology Enhancement	New technology, environmental benefits, fuel efficiency, feasibility testing of dynamic WPT in Florida specific condition

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