

Request for Research Funding for FY 2019-2020

Requesting Office	Forecasting and Trends	Priority	3 of 7
Proposed Title	Microsimulation: Department Assessment and Guidance		
Justification	<p>The use of microscopic traffic simulation models in traffic operations, transportation design, and transportation planning is common within FDOT and focuses on the need to solve complex problems that do not lend themselves to traditional analysis techniques. Microscopic traffic simulation models mimic vehicle interactions that occur within the transportation system and provide a convenient environment for analyzing multiple scenarios in a fast, inexpensive, and risk-free manner.</p> <p>While the Department relies on microsimulation models to evaluate the state highway network and potential design alternatives, there is limited guidance in the development and application of these models available to practitioners. The Department's use of microsimulation models, while widespread, is disjointed. There is little collaboration, direction or understanding of how these models are applied by each of the disciplines within the Department. Additionally, much of the Department's simulation work is consultant driven which results in an overreliance on external resources to develop and analyze facility modifications through microsimulation processes.</p>		
Impact	<p>This research is expected to ultimately support the Department's long-term goals and vision. Envisioned as an integral product to bridge a common practice between separate work groups, this research is expected to improve the Department's microsimulation modeling practice through guidance and training. Additionally, results from this research will lead to the development and utilization of more effective and accelerated understanding, review and delivery of Department guided microsimulation projects.</p>		
Affected Offices	Forecasting and Trends, Transportation Systems Management and Operations (TSM&O)		
Existing Work	<p>Learning About and Using the Research in Progress (RiP) Database http://www.trb.org/main/blurbs/176215.aspx</p> <p>As a minimum, the Transportation Research International Documentation (TRID) and the Research in Progress (RIP) online databases should be reviewed by an expert in the research subject matter to assure research effort and resources shall not duplicate prior or ongoing work. TRID: https://trid.trb.org/Results RIP: https://rip.trb.org/</p>		
Keywords Used In Existing Work Search (Cannot leave blank)	Microsimulation, State Guidance, Training, Needs, Clearinghouse		
Related Contracts (Give contract numbers)			
Funding Request	\$300,000	Anticipated Duration	24 Months
Project Manager	Thomas Hill Raj Ponnaluri	Contracting Method	University Contract: Dr. Mohammad Hadi
Urgency	Score 1	<p>This project is timely as the Department initiates major capacity projects around the state. These projects include design, operations, planning and ITS considerations which require microsimulation applications. State guidance is necessary for consistent expectations among Department practitioners of varying technical backgrounds. The resulting reduction</p>	

		in the potential for misunderstanding will help to improve the efficiency and quality of microsimulation modeling that will lead towards successful project delivery.
Implementability	Score 1	This proposed research project will research and provide direction for microsimulation practices in Florida. It is expected that additional work will develop from this project including: development of training workshops, continued office coordination, platform implementation and other efforts as identified through the project. It is not anticipated that this additional work will require research funds.

Project Benefits (Succinct, complete explanation)

Work directed by this scope will provide the following:

- **Identify the extent of microsimulation needs and applications throughout the department.** This effort will define how microsimulation is applied by discipline (i.e., Planning, Operations, PD&E etc.), how microsimulation files are generated (in-house or consultant) and the level of internal expertise for development and review of projects.
- **Provide an assessment of available guidance for broad agency application.** Microsimulation guidance is provided in the Traffic Analysis Handbook and the PD&E Manual; however, this guidance is focused on individual processes and may not be suitable for general department guidance. Research will focus on defining the fidelity of model outputs, developing comprehensive standards for model development while making use of established practices, and development of a comprehensive microsimulation model development and review guide. The guide will clearly define best practices for model development addressing data, network inputs, model validation and calibration standards, and new technologies such as connected and autonomous vehicles (CAVs), transportation network companies (TNCs), and other disruptive services. The intent of this guidance is to define and provide instruction on modeling topics for a broad range of users and abilities.
- **Assess available microsimulation platforms and applications.** Current Department guidance identifies PTV Vissim as the primary platform for developing microsimulation models. This work effort will evaluate a wide range of microsimulation platforms that could potentially meet Department needs considering their application to support a multi-resolution modeling process and ability to address advanced transportation technologies. Additionally, work will explore the benefits and constraints of Department support for a singular platform or multiple microsimulation software platforms. Considerations for this work effort are project level applications, data requirements, programming ease of use, and interoperability with other department owned modeling platforms.
- **Define department training needs.** Limited Department sponsored training is available for micro-simulation and multi-resolution model training. A unified approach to address Department needs is desired that outlines actions and expected results. A thorough examination and understanding of model outputs, such as travel time increases, vehicle delays, excessive queuing etc., is necessary to efficiently derive tangible outcomes considering safety, TSM&O, capacity and design applications. This work effort will outline potential training approaches and recommend a lead office for development and delivery of training and guidance.
- **Provide direction on the application of a multiresolution model practice.** Multiresolution modeling offers many benefits to assess latent travel demand, project traffic distribution, and time-of-day conversion of model outputs. This effort will build on Department research to establish appropriate applications considering urban vs rural environments, project strategy (ITS, PD&E, etc.), development costs, and project timelines.
- **Explore the development of microsimulation clearinghouse practices.** Over the course of a project's development a singular location can have multiple microsimulation models developed for project analyses due to project delay, low priority, limited funding, changing configurations or other peripheral factors. Modeling files can often become outdated, lost or corrupted over time and require redevelopment. This work effort will leverage Department resources for the efficient use and storage of microsimulation files. Work will explore the application of a microsimulation model clearinghouse and compare cost considerations between long term storage and model development. Additional considerations for the microsimulation clearinghouse include data sharing, model interoperability, access and storage

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
<input type="checkbox"/> Materials Enhancement		
<input type="checkbox"/> Materials Savings		

○ Time Savings		
○ Lives Saved/Injuries Prevented		
○ Other (Explain)		This project will promote consistency of practice, encourage and enhance training, and clearly define expectations for microsimulation projects.

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