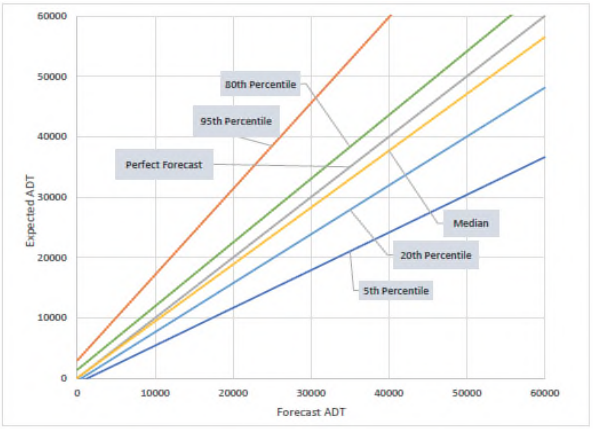
Request for Research Funding for FY 2018-2019			
Requesting Office	Forecasting and Trends	**Priority**	2 of 7
Proposed Title	Florida Traffic Forecast Accuracy and Methods Assessment		
Justification	Traffic forecasts are used throughout Florida to inform decisions about how public dollars are invested in transportation projects. Traffic forecasts inform the selection and prioritization of those projects, the evaluation of their impacts and benefits, and the project design. However, "the greatest knowledge gap in US travel demand modeling is the unknown accuracy of US urban road traffic forecasts" (Hartgen 2013). NCHRP Project 08-110: Traffic Forecast Accuracy Assessment Research is currently aiming to fill that gap and is expected to be complete in January 2019. It uses data from six state DOTs, including Florida District 4 and District 5, as well as four European countries. A major output of that study is the ability to estimate uncertainty windows around a traffic forecast, based on the historic distribution of actual vs predicted traffic. The figure below shows an example of the estimated uncertainty windows. At the time a forecast is made, the analyst can use such a chart to place bounds on their forecast. For example, if the forecast is for 30,000 ADT, the data show that the median expected forecast is about 28,000 ADT, with 90% of past forecasts falling within the range of 18,000 to 45,000 ADT.  NCHRP 08-110 also examined the factors that affect forecast accuracy. For example, the effect of economic conditions on forecasts, differences between existing roads and new facilities, and the extent to which short-term forecasts are more accurate than long-term forecasts. It was able to address these questions with mixed success, limited largely by the inconsistent ways in which different agencies have collected data on past traffic forecasts. Specifically, it does not adequately assess the performance of alternate forecasting methods, such as the difference between traffic count trends and travel models, or between different types of travel models. In Florida, there is an opportunity to overcome these limitations, and in doing so to create a set of uncertainty windows specific to Florida's practice. The major challenge in is compiling available data on past forecasts in a consistent format. In Florida, forecasters use a relatively standard template, "Project Traffic for PD&E and Design: Design Traffic/ESAL Forecasts", which means that these data are widely available, along with important details about the project itself. Further, the template documents growth rates both from a trend analysis and a travel model, with the analyst choosing the approach they judge to be most reasonable for the project. This provides a perfect controlled experiment for comparing the accuracy of those two methods. Beyond identifying whether traffic count trend analysis performs better than travel demand model for a certain type of project, this research will also attempt to evaluate the performance of different versions of the FSUTMS, for example. The better performing methods can be looked at further to identify what works for them. The proposed research will: 1. Start from traffic forecast reports across all Florida districts, enter them into a common database format, and attach post-opening traffic counts for projects that have opened. 2. Use these data to estimate uncertainty windows around Florida traffic forecasts. 3. Evaluate forecast accuracy as a function of forecast method, project type, forecast horizon and other factors. 4. Provide guidance on how this information can be used to improve Florida forecasting practice. 5. Document the process so FDOT staff can maintain and update it going forward.		

Impact	The results of this research will impact Florida forecasting practice in two ways: First, the ability to estimate uncertainty windows around those forecasts will allow the analyst to evaluate whether an important project decision, such as the choice of number of lanes, would change if the forecast were at the high or low end of that uncertainty window. Second, this research will allow for an assessment of the accuracy of different forecasting methods. Furthermore, it will investigate the strengths and weaknesses of the current practices and provide a guideline for improvement. Together, this will guide decisions about investing in travel models and other analysis tools towards those methods that are most effective, considering accuracy, cost, and overall utility.
Affected Offices	?????
Existing Work	There are three related projects that feed directly into this research. 1) NCHRP Project 08-110 is discussed above, 2) Florida District 4 conducted a Traffic Forecast Sensitivity Analysis, and 3) Florida district 5 created a traffic forecast accuracy database. The latter two projects are identified in the related contracts section. The method from NCHRP 08-110 will be used in combination with the data from D4 and D5 to conduct this research, which will be statewide and go beyond any of the three projects individually. Much of the existing work on forecast accuracy relates to either toll roads or rail transit projects, and has identified issues where actual demand tends to be less than forecast. The tolling research includes a 2006 NCHRP study (*1*) and a series of reports by Bain and his co-authors (*2–5*) finding that actual toll road traffic was, on average, 23% lower than predicted. There have been a series of evaluations by the Federal Transit Administration (FTA) and others evaluating the accuracy of transit forecasts (*6–10*), also finding that actual demand tends to be less than forecast, but that transit forecasts are becoming more accurate over time. Flyvbjerg has conducted a series of studies on mega-projects (*11*, *11*, *12*), with similar findings. There have been some studies untolled roadway forecasts, with much of the work based on European projects (*13–17*), and more limited analysis in the US (*18–20*). These studies have tended to find less bias than in toll and transit, with NCHRP 08-110 finding that, on average, actual traffic on untolled roads is about 5% less than forecast. NCHRP 08-110 is the only study to empirically estimate uncertainty windows, and that method is proposed for extension to Florida. 1. Kriger, D., S. Shiu, and S. Naylor. *Estimating Toll Road Demand and Revenue*. Publication NCHRP Synthesis 364. Transportation Research Board, 2006. 2. Bain, R., and J. Plantagie. Traffic Forecasting Risk: Study Update 2004. Strasbourg, France, 2004. 3. Bain, R., and L. Polakovic. Traffic Forecasting Risk Study Update 2005: Through Ramp-up and Beyond. *Standard & Poor's, London*, 2005. 4. Bain, R. Error and Optimism Bias in Toll Road Traffic Forecasts. *Transportation*, Vol. 36, No. 5, 2009, pp. 469–482. https://doi.org/10.1007/s11116-009-9199-7. 5. Bain, R. And Now, the Traffic Report. *Tollways, Journal of the International Bridge, Tunnel and Turnpike Association*, 2010, pp. 69–76. 6. U.S. Department of Transportation: Federal Transit Administration. *Predicted and Actual Impacts of New Starts Projects: Capital Cost, Operating Cost and Ridership Data*. 2003. 7. Federal Transit Administration, and Vanasse Hangen Brustlin. *The Predicted and Actual Impacts of New Starts Projects -- 2007: Capital Cost and Ridership*. 2008. 8. Pickrell, D. H. Urban Rail Transit Projects: Forecast Versus Actual Ridership And Costs. Final Report. 1989. 9. Schmitt, D. A Glance at Transit Forecasting Uncertainty & Accuracy Using the Transit Forecasting Accuracy Database. Orlando, FL, Dec 09, 2015. 10. Schmitt, D. A Transit Forecasting Accuracy Database: Beginning to Enjoy the 'Outside View.' Presented at the Transportation Research Board 95th Annual Meeting, Washington, D.C., 2016. 11. Flyvbjerg, B. Policy and Planning for Large-Infrastructure Projects: Problems, Causes, Cures. *Environment and Planning B: Planning and Design*, Vol. 34, No. 4, 2007, pp. 578 – 597. https://doi.org/10.1068/b32111. 12. Flyvbjerg, B., M. K. S. Holm, and S. L. Buhl. How (In)Accurate Are Demand Forecasts in Public Works Projects?: The Case of Transportation. *Journal of the American Planning Association*, Vol. 71, No. 2, 2005. 13. Andersson, M., K. Brundell-Freij, and J. Eliasson. Validation of Aggregate Reference Forecasts for Passenger Transport. *Transportation Research Part A: Policy and Practice*, Vol. 96, No. Supplement C, 2017, pp. 101–118. https://doi.org/10.1016/j.tra.2016.12.008. 14. Welde, M., and J. Odeck. Do Planners Get It Right? The Accuracy of Travel Demand Forecasting in Norway. *EJTIR*, Vol. 1, No. 11, 2011, pp. 80–95. 15. Kjerkreit, A., and J. Odeck. Post Evaluation of Road Investment Projects: How Correct Are the Estimated Future Benefits in the Case of Norway? 2007.

<table>
<tr><td></td><td colspan="3">16. Odeck, J. The Accuracy of Toll Traffic Forecasts: Empirical Evidence from Norway. Presented at the Transportation Research Board 95th Annual Meeting, 2016.
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25. RSG. *Managing Uncertainty and Risk in Travel Forecasting: A White Paper*. Publication FHWA-HEP-14-030. Federal Highway Administration, Washington, D.C., 2013.</td></tr>
<tr><td>Keywords Used In Existing Work Search

(Cannot leave blank)</td><td colspan="3">Traffic, Forecast accuracy</td></tr>
<tr><td>Related Contracts (Give contract numbers)</td><td colspan="3">Initial work has been conducted in Florida on two related contracts. The proposed research will build upon these District 4 and 5 projects to conduct the assessment statewide, and to conduct the specific analyses proposed, which were not done in these initial projects.

Florida DOT District 4 Traffic Forecasting Sensitivity Analysis (Contract C-9520)

Florida DOT District 5 Traffic Forecast Accuracy Database (Task Work Orders from D/W Contract C-9F38)

All FDOT PD&E contracts that produce traffic forecasts for design or funding decisions</td></tr>
<tr><td>Funding Request</td><td>$150,000</td><td>Anticipated Duration</td><td>12 months</td></tr>
<tr><td>Project Manager</td><td>Thomas Hill, Central Office</td><td>Contracting Method</td><td>RFP to all registered vendors</td></tr>
<tr><td>Urgency</td><td>1</td><td colspan="2">The project (NCHRP 08-110) that serves as the starting point for this research is expected to be completed in January 2019. Work on this research can begin at that point, enabling the benefits to be realized quickly. NCHRP sometimes has implementation grants available for recently completed research, raising the possibility of leveraging FDOT funds if the research proceeds in a timely fashion.</td></tr>
<tr><td>Implementability</td><td>1</td><td colspan="2">NCHRP 08-110 identifies the process for how to do this analysis but is data-limited. FDOT has the necessary data in its forecast reports. Implementation is low-risk.</td></tr>
<tr><td colspan="4">Project Benefits (Succinct, complete explanation)

This research is expected to result in three primary benefits:

1. By providing a means of generating uncertainty windows around traffic forecasts, planners and engineers will be able to evaluate whether important project decisions, such as the number of lanes or prioritization of projects, changes if the actual value were at the high or low end of the uncertainty window. This will allow planners and engineers to manage the risk inherent in predicting future traffic, and the local estimates will ensure that the windows are specific and relevant to Florida. In turn, this will help ensure that Florida invests public dollars in the best possible set of transportation projects, and that those projects are sized appropriately.</td></tr>
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2. By providing an assessment of the accuracy of different traffic forecasting methods, this research will help ensure that public dollars spent on travel models and traffic forecasts are focused on the most effective approaches. It further allows the accuracy of those models and methods are improved over time.
3. It will build credibility in the forecasts and analyses generated by FDOT. It will do this by establishing a transparent process for measuring the accuracy of Florida traffic forecasts. By explicitly acknowledging the uncertainty window around forecasts, FDOT can avoid being criticized for forecasts that are not perfectly accurate, but still fall within that window. By basing the analysis on Florida data, FDOT can avoid being criticized for forecast errors that occur in other states.

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**
o Materials Enhancement		
o Materials Savings		The benefit is to ensure that Florida invests public dollars in the best possible set of transportation projects, and that those projects are sized appropriately. This can be evaluated in future traffic forecast reports by documenting whether the new approach changes a project decision.
o Time Savings		The benefit is to ensure that public dollars spent on travel models and traffic forecasts are focused on the most effective approaches. This can consider accuracy, as well as cost and overall utility. The proposed research can be used to measure the benefit of different approaches, specifically as it relates to accuracy.
o Lives Saved/Injuries Prevented		
o Other (Explain)		The benefit is to build credibility in the forecasts and analyses generated by FDOT. While credibility is difficult to quantify, the research does enable FDOT to create "success metrics" based on the percent of time a forecast falls within the predicted window, or the percent of time the project is built with the "right" number of lanes.

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