

Testimony of Troy Woodruff
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to the
U.S. House of Representatives
Committee on Science, Space, and Technology
Subcommittee on Research and Technology

“The Future of Surface Transportation”
June 18, 2014

Mr. Chairman, Ranking Member Lipinski, and Members of the Committee, my name is Troy Woodruff, and I am the Chief of Staff for the Indiana Department of Transportation (INDOT). I appreciate the opportunity to share with you what INDOT is doing related to the future of surface transportation and how research and development (R&D) funding assists in those efforts. Enhancing Indiana’s transportation infrastructure is a priority at INDOT, and we are proud to be led by Governor Mike Pence, who is a true advocate for our state’s transportation system. In fact, Governor Pence has directed us toward three guiding principles as we manage Indiana’s roadways – taking care of what we have, finishing what we started, and planning for the future – and this was not more apparent than his fight to secure additional funding for Indiana’s highway projects. Over two years, Governor Pence’s legislative initiatives have increased state funding for roads and bridges by \$800 million, about \$600 million of which is going to INDOT. Because of his leadership, Indiana’s transportation system will continue to flourish and our innovations will continue to be implemented throughout the nation.

As the “Crossroads of America,” Indiana’s highways are vital to our national transportation network and the state’s economy. More than \$500 billion of freight moves from, to, or within Indiana on our highway system each year. According to the Bureau of Transportation Statistics, Indiana has the fourth highest number of vehicle miles traveled (VMT) per capita, and the twelfth highest total VMT among all U.S. states.

INDOT is committed to efficient management of our capital program and operations activities at the highest satisfaction level and the lowest cost. For more than 75 years, INDOT has collaborated with Purdue University through the Joint Transportation Research Program (JTRP) to research and implement transportation innovations. This program is primarily funded

by federal surface transportation R&D funding and is supplemented by state funds to further develop initiatives. This collaboration focuses on solving current and near-term transportation challenges while improving efficiency and quality, decreasing risk, enhancing innovation, reducing operating costs and saving taxpayer money. The JTRP program has resulted in nationally recognized practices relating to Intelligent Transportation Systems (ITS), and I'm pleased to share some of those in my following testimony.

How federal government surface transportation R&D funding helps initiatives within Indiana



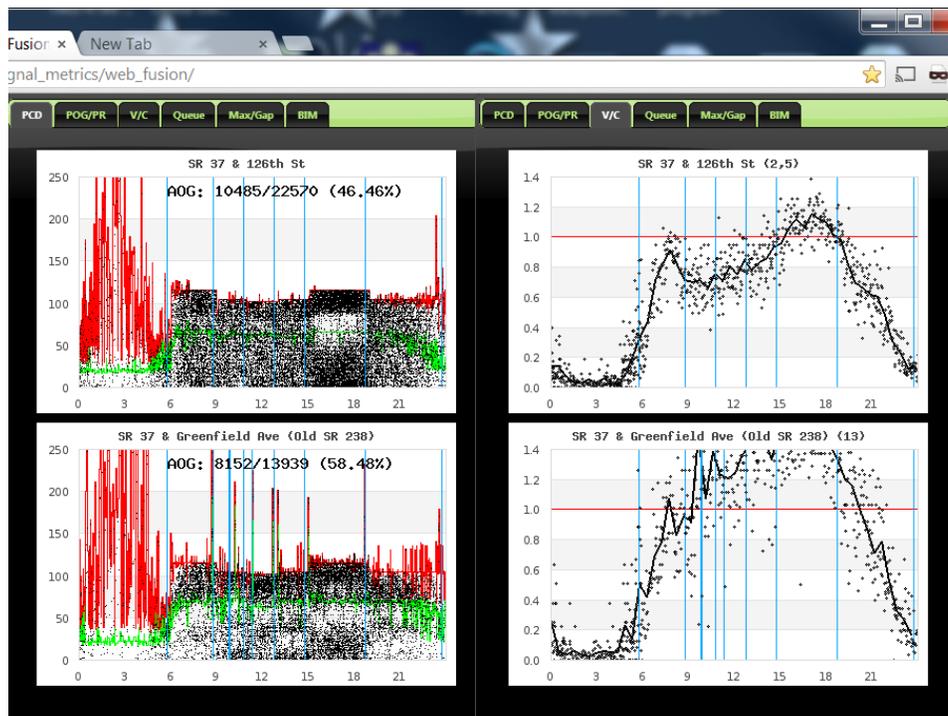
INDOT is solidly committed to R&D and delivers on that commitment through its longstanding partnership with Purdue University and JTRP. JTRP's facilitation of the collaboration between INDOT, higher education institutions and industry leads to implementing innovations that result in continuous improvement in the planning, design, construction, operation, management and economic efficiency of Indiana transportation infrastructure. INDOT's ITS projects in the areas of Mobility, Operations, and Traffic Safety have been particularly successful. This success can be attributed to choosing research that has both a high probability of solving specific challenges that Indiana faces, and those that have a realistic and well-defined near-term path to implementation. Through the JTRP partnership, we are integrating commercial probe vehicle data into INDOT's processes to quantitatively manage our operations activities, shape our infrastructure investment priorities, and measure the impact of those investments.

INDOT's commitment to R&D is also shown in the annual investment for research. While the annual minimal State Planning and Research (SPR) required investment for research is 25 percent; INDOT routinely averages 40 percent each year.

Specific ways INDOT uses and develops this research to benefit citizens of Indiana

INDOT is aggressively advancing “big data research” on two fronts.

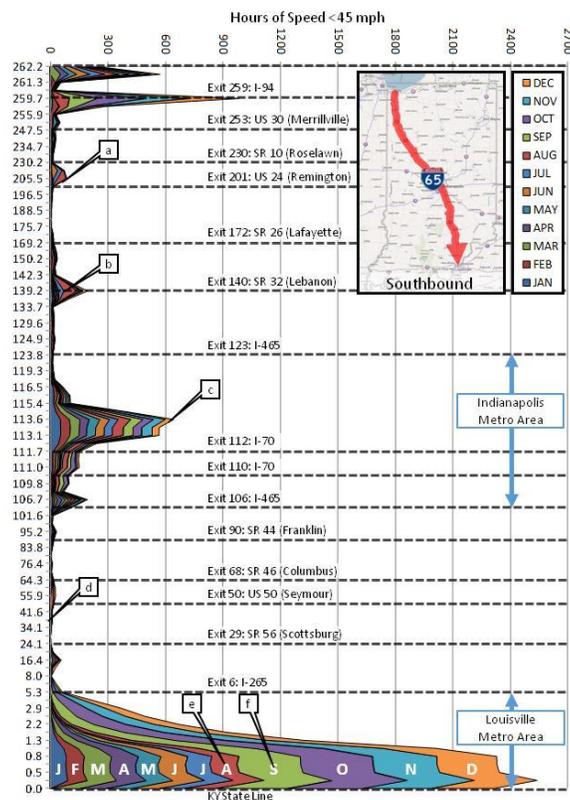
First, at the local level of the signalized intersection, we are leading a multi-state pooled fund study that uses traffic signal event data to develop operational performance measures that allow us to tactically identify emerging problems with allocation of green time and synchronization of traffic along a corridor. To provide some perspective on the magnitude of this data, 100 signals generate over 30 million events per day. For years the traffic signal field was data rich, information poor (DRIP). Our research and partnerships resulted in aggressive national implementation by other transportation agencies as well as the private sector software vendors. In fact, several other states and consultants are using techniques developed in Indiana to evaluate the impact of adaptive control systems deployed as part of FHWA’s Every Day Counts initiative.



What % of vehicles arrive on green?
Engineers can now optimize for this.

What is our volume vs. our capacity?
Engineers can reallocate green time.

Second, at a regional level, we are partnering with private sector probe data providers to develop performance measures and visualization graphics that enable us to prioritize capital projects and identify emerging interstate congestion that requires our attention. Over the past three years, we have been using a data set which now contains over 7 billion speed and location records to develop reports and graphics. From these records, decisions are made to assess the amount of delay our customers experience during events such as weather, crashes, lane restrictions, and work zone queuing. With this data we can also make longer term decisions such as capital program investment.



In addition, we have used this data for both enhanced traveler information, as well as communicating to the media. When we took the bold step of closing I-65/I-70 in downtown Indianapolis to get in and get out quickly for a bridge and pavement rehabilitation project, this data was used both to justify the closure and to monitor the reliability of established alternate routes.

Programs and policies most helpful to Indiana

Policies that are most helpful to Indiana are those that allow the greatest flexibility to focus resources directly on the specific challenges of the state at that point in time. Indiana's focus is to look for solutions that can be scaled appropriately to size and scope, and integrate into, grow and evolve with the larger system. INDOT avoids piecemeal solutions that function in silos. I offer an example of how this approach has worked. A recent research project was borne from examining how we collect reimbursements for damage to traffic signals and ITS infrastructure, to a more widespread program that examines damage to all state property. We began implementing this program in 2011, and by June 2014, our financial estimates indicate we are on track to collect more than \$6 million this fiscal year, ending June 30, an increase of 86% since 2011.

What Indiana is doing to implement Intelligent Transportation Systems

INDOT's ITS system monitors traffic and delivers traveler information that improves transportation reliability across the state. INDOT has both urban and rural statewide ITS traffic monitoring capabilities that are managed from two traffic management centers – one in Indianapolis and one in northwest Indiana serving the greater Chicago traffic.

Two examples of our implementation efforts include replacing current models of infrastructure-based sensors with emerging crowd-sourced technologies such as Bluetooth MAC Address re-identification and data derived from GPS/cellular probe vehicles. In addition, we are partnering with manufacturers in the traffic signal industry to upgrade their equipment capabilities making available the results of our research to all users, nationwide.

Importance of an improved strategy for addressing the impacts of weather on surface transportation

INDOT's research and implementation strategy is focused on better integration with existing national weather data sources to proactively manage and measure our response to weather events. We are currently researching whether private sector probe data can serve this purpose for us.

Effect this research will have to help mitigate roadway congestion and safety

Research data allows for more informed and better decision making. When INDOT's staff can plan and execute well (e.g., design better snow routes), road conditions recover more quickly, therefore improving mobility and safety.

What will be the role of connected vehicles?

Connected vehicles will affect the realm of possibilities that improve safety and mobility for all vehicles. INDOT is finding the private sector probe data we are purchasing, which fuses vehicle telematics and mobile phone data, to be our most cost-effective near-term opportunity. This is allowing us to develop new techniques and business processes for using this data, without extensive investment in roadside equipment. Longer term, we anticipate more growth in this area and are looking forward to working with the various industries that are currently developing solutions on this front. We hope many of the new devices and tools are manufactured in one of our thriving Indiana auto parts factories.

Conclusion

INDOT has a proven record of success and leads the nation in Traffic Signal Optimization and System Performance Measures. INDOT's applied research activities focus on investment in those short- to medium-term well-defined implementable solutions that have an immediate use by our end-users. We do not pursue high risk, long-term conceptual projects. With increased flexibility in the use of our funds, we look forward to continuing to work with academia and industry to further Indiana's, and our nation's, transportation system.

In closing I would like to again express my appreciation to this Committee for the opportunity to share INDOT's strategy and successes in the field of transportation R&D, and I am happy to respond to any questions you may have on these topics.

Summary of Testimony

- INDOT seeks flexibility in funding opportunities. INDOT places priority on investment in those short- to medium-term, well-defined implementable solutions that have an immediate use by our end-users. We do not pursue high risk, long-term conceptual projects.
- INDOT is committed to transportation R&D and the depth of that commitment is demonstrated in its annual investment for research. While the annual minimal SPR required investment for research is 25 percent; INDOT routinely averages 40 percent each year.
- The longstanding partnership with Purdue University through the Joint Transportation Research Program results in collaboration between INDOT, higher education institutions and industry to implement innovations that result in continuous improvement of Indiana's transportation system.
- INDOT ITS has recently focused on benefits obtained through data analysis, including data from probe vehicles as well as data from infrastructure embedded technology. This allows for better capital investment decision making and real-time decision making by measuring how well we responded to an event.
- INDOT is a leader in the nation in Traffic Signal Optimization and System Performance Measures. Techniques have been implemented by other transportation agencies as well as private sector software vendors, and several other states and consultants are using Indiana-developed techniques as part of FHWA's Every Day Counts initiative.