

Data to Drive Decisions



By North Carolina Department of Transportation

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Benefits Statement

The North Carolina Department of Transportation (NCDOT) utilizes data and technology, particularly probe speed data, to enhance traffic management, reduce crashes, and save time and money. Real-time incident detection and signal timing improvements help save lives by minimizing crashes and saving time for travelers by reducing congestion. Data-driven decision-making also leads to efficient resource allocation, saving money. Public benefits include real-time traffic information and collaboration with other agencies through data sharing. This enables better transportation planning and promotes safety analysis, without additional costs.

In this case study you will learn:

1. How NCDOT utilizes diverse data sources, including probe speed data, for improved traffic management and decision-making.
2. How the TSMO plan integrates performance measures, promoting a culture of active traffic management.
3. How probe speed data benefits 30+ public agencies, enhances navigation apps, and signifies NCDOT's commitment to ongoing service improvement.

BACKGROUND

The North Carolina Department of Transportation (NCDOT) is constantly evolving its practices with the advances of technology and availability of data to be able to make well-informed decisions to improve transportation. Existing and emerging data sources, such as probe speed, crowdsourced and connected vehicle, enable NCDOT to actively manage traffic better. This data with emerging analytics tools improves daily travel for motorists, resource management, situational awareness, and decision making.

In 2008, NCDOT committed to probe speed data in place of physical infrastructure on freeways, with this expectation that the data would continue to improve. Probe speed data allows NCDOT to monitor real-time congestion, report performance measures, prioritize signal timing needs, and conduct research and planning. Before probe data, physical infrastructure, like in-pavement loops and microwave vehicle detection were used to capture traffic volumes and speeds. The data has improved significantly since 2008. NCDOT recently piloted an arterial analytics tool using probe data.

TSMO PLANNING, STRATEGIES AND DEPLOYMENT

The NCDOT TSMO Strategic Plan casts the vision for how data and performance measures will be integrated into each of the core focus area. The goals specific to performance measures include:

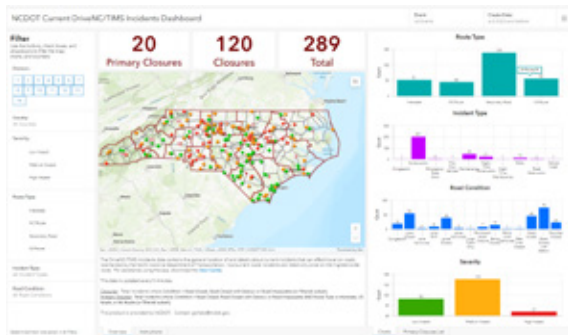
- Outcome-based performance measures to drive decisions and continuous improvement.
- Department culturally aligned with mobility performance measures.
- NCDOT culture committed to active traffic management.

- A variety of data sources, including probe data, are used to improve operations and drive decisions as outlined below.
- **TMC Operations:** TMCs responding to incidents and disseminating traveler information use data for:
 - Incident detection - Speed maps and pre-programmed alerts of anomalies in travel times.
 - Real-time conditions reporting - More efficiently and reliably provide conditions to motorists through NCDOT's traveler information website and Dynamic Message Signs (DMS)
 - Travel time dissemination - Post accurate commuter and work zone travel times to message boards using probe speed data.
 - Incident Timelines - Create timelines of major incidents that include traffic conditions during the incident to better facilitate After Action Reviews with emergency responders.
- **Traveler Information:** Real-time data increases NCDOT's credibility and enables motorists to make more informed decisions regarding their trips. Data improves incident mitigation and reduces the likelihood of secondary incidents.
- **Signal System Timing:** NCDOT leverages probe data to improve our ability to identify the systems that need to be retimed. Availability of data more frequently improves monitoring and identification of inefficiencies. This provides a mechanism to aggregate system performance metrics to near-real-time identification of inefficient systems, moving North Carolina one step closer to true active management on our arterial networks.

COMMUNICATIONS PLANNING AND EXECUTION

The public and governing officials frequently ask for current and historical traffic speeds and congestion levels. Delivering easily under-

stood traffic information is important and drives improved performance. Data can be downloaded from probe speed data platforms and analyzed. It is delivered via standard reporting methods or through interactive dashboards for internal, external, and public use which allows consumers to view traffic information through charts and graphs without needing access to a specific platform.



Evaluation of Active Traffic Management during COVID period: NCDOT used probe speed data to monitor the effectiveness of ramp meters. Ramp meters in North Carolina were deactivated in 2020 due to the lack of traffic demand. Using probe speed data, congestion scans, travel time, and travel time reliability, the NCDOT made a data-driven decision about when to reactivate the system. This same approach allowed the NCDOT to adjust the signal timing based during the pandemic. On a macro level, NCDOT developed reports to communicate travel time and congestion level differences between 2019, through the pandemic decrease, and to current conditions. Data was used to evaluate arterial performance and freeway performance across the entire state to inform the Secretary of Transportation and the Governor's Office of traffic congestion changes.

Communicating Data: Externally, probe speed and Location Based Services (LBS) data is used to provide information requests like average speeds, congestion, and other traffic data. These requests have come from different sources, like the Wake County School

System requesting an updated travel time chart around the city of Raleigh to optimize bus routes. Other requests include travel time and volumes during holidays from the media. Some probe speed data platforms give the capability to create simulation videos of the average congestion over the entirety of a specific day on a combination of road segments, which can be provided to news outlets and made available on NCDOT's website.

OUTCOME, BENEFITS AND LEARNINGS

Supplementing physical infrastructure with emerging data, technology, and tools to analyze and monitor traffic and trends helps NCDOT be more efficient and improve coverage of the entire transportation system. With platforms providing real time and historic traffic, it is easier than ever to investigate underperforming corridors and improve the performance of signal systems.

The probe speed data was purchased through the Eastern Transportation Coalition and can be shared with any public agency in NC. Approximately 30 public agencies have taken advantage of their free access to the data that NCDOT has purchased. These agencies are using the data for planning transportation projects, performing safety analysis, corridor management, and research traffic issues.

The public benefits from receiving real-time information in navigation applications that consume NCDOT's Application Programming Interfaces (APIs) that provide real-time construction and crash information. NCDOT ingests many other data sources to assist with active traffic management. NCDOT is constantly investigating other data sets, tools and best practices for data management and is committed to continuous improvement in the services provided to travelers in North Carolina.