NCDOT & Waze Automated Road Closures

By North Carolina Department of Transportation
12/28/2023

Benefits Statement

NCDOT developed an automated system to share real-time road closure data with Waze, improving traffic management and driver safety. This system efficiently reroutes drivers around closures, reducing the risk of secondary crashes and shortening information dissemination time. User feedback led to improvements differentiating closures from construction activities, enhancing accuracy. NCDOT's efforts have made it a leading state in sharing full closures with Waze, benefiting North Carolina's roadways and travelers.

In this case study you will learn:

1. NCDOT's DriveNC.gov has provided travel info since 2000. NCDOT aimed to enhance its data sharing with navigation systems like Waze, enabling automatic road closure notifications.

2. A two-way data agreement with Waze was established a decade ago. NCDOT worked on an in-house solution after manual closures posed challenges.

3. Automatic Waze rerouting around road closures improves safety. The efficient process reduces information dissemination time. Ongoing improvements enhance accuracy, making NCDOT a leader in sharing closures.

Case Study #174

Version Number: 1

NOCoE

BACKGROUND

The North Carolina Department of Transportation (NCDOT) has been providing travel information to the public via the internet since 2000. The DriveNC.gov website provides day-to-day and emergency travel conditions through an interactive map. NCDOT staff and partners in all 100 counties enter information about crashes, work zones, road closures, and other incidents that impact travel into the Traveler Information Management System (TIMS) in real-time. This information populates the DriveNC.gov website and alerts media,emergency responders, school bus managers, and commercial navigation systems like Google, Waze, and Apple Maps of travel disruptions.
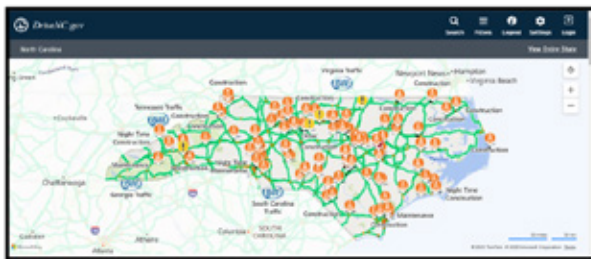
NCDOT recognizes most travelers use commercial navigation systems and wants to provide the best possible information to these systems for optimized traveler information. Navigation companies use data from NCDOT's system every day. For several years Waze, a crowdsourced traffic and navigation company, ingested the TIMS incident feed and displayed the incidents on their map and through announcements during the journey. Before this project, Waze considered the NCDOT information only as "hazards" and announced them but did not reroute travelers around road closures. An NCDOT employee or a Waze volunteer had to manually draw on the Waze map to effectively reroute traffic through the app.

The manual process was timely, and the NCDOT looked to achieve automatic rerouting on Waze. Waze requires that agencies provide a proprietary "closure feed" to reroute traffic automatically. NCDOT explored existing commercial off-the-shelf solutions to communicate with Waze through different vendors, but eventually landed on creating an in-house solution. Very few states have succeeded in developing an in-house solution to communicate road closures with Waze.

TSMO PLANNING, STRATEGIES AND DEPLOYMENT

NCDOT entered into a two-way data sharing agreement with Waze through their Connected Cities Program (now known as Waze for Cities) nearly a decade ago. This partnershipallowed the NCDOT to provide data to Waze through an automated data feed, ensuring that travelers have access to correct and real-time information enroute to their destination.

Initially, NCDOT provided Waze the standard data many other states share including:

• Vehicle collisions

• Vehicles stopped on the road or shoulder

• Road construction

• Traffic congestion

• Trees or powerlines blocking the roads due to storms

• Flooded roads

• Snow and Ice causing road closures

When Hurricane Florence impacted North Carolina in 2018, NCDOT entered over 2,500 events (downed trees, fallen powerlines, flooded roads and bridges, etc.) in TIMS. Some of these events were automatically published to Waze, but road closures had to be manually entered so that travelers would not be directed to roads that were closed. Entering the closures was a balance between a very valuable service to those trying to navigate through the affected areas with a process that added responsibilities to an already busy staff managing a wide breadth and sheer quantity of incoming requests. So, the NCDOT began working to create an in-house method to automatically publish road closures to Waze.

NCDOT's first attempt to automate the road closure notifications was not successful in 2020. The NCDOT modified its existing software to provide the information required by the Waze system, however, its data feed was rejected without any explanation or justification. NCDOT applied for and was awarded a grant by the North Carolina FHWA State Transportation Innovation Council (STIC) Incentive Program, which allowed the NCDOT to fund the collaboration and development efforts between the Mobility & Safety Division,the Department of Information Technology (DIT), and the Geographic Information System (GIS) office to build the automated feed.

COMMUNICATIONS PLANNING AND EXECUTION

The work required to make this project successful was broken down into two categories; (1) modifying TIMS system to automatically output the data in a compatible format for Waze, and (2) setting up a secure external feed hosting system to allow Waze to access

the data. For Waze to be able to read and accept the closure data, it must be saved into a JSON or XML file, with polyline data that resembles the geometry of the roadway in Waze, matching road names, and the directionality of the closure.

▼ 25 {10}
    id   : 648708
    type : ROAD_CLOSED
    subType : ROAD_CLOSED_CONSTRUCTION
    reference : NC_DOT
    startTime : 2022-12-05T21:07:00Z
    endTime : 2023-05-18T21:07:00Z
    street : Moonlight Rd
    description : Construction - DriveNC.gov
                  648708
    polyLine : -77.49168 36.17423 -77.48705
               36.17561 -77.48078 36.18005
               -77.47538 36.18441 -77.46199
   36.18836
    direction : BOTH_DIRECTIONS

NCDOT changed the procedures for entering incident data as a line versus a point to meet the data requirements. The Waze Reverse Geocoding API was used to determine the road name. Road and direction fields in NCDOT's system are used to determine the closure directionality. The procedural changes required several training and re-training sessions across all of the TIMS users in the DOT, nearly 500 people.

The required data is now automatically created by the TIMS system and included in the JSON data feed when a closure is entered and saved into the system. At the completion of internal testing to verify the new data formatting was correct, NCDOT's IT Services created a secure, externally accessible, CIFS v2 data feed to be entered into the Waze system for consumption. After extended coordination and months of in-house development, NCDOT was able to reorganize the data feed into a format accepted by Waze. The automated closure data starting populating in the Waze system in December 2022.

OUTCOME, BENEFITS AND LEARNINGS

Waze users are now automatically routed around closed roads removing any distraction to the driver that would occur when looking for an alternate route. Rerouting drivers awayfrom road closures caused by crashes will lower the number of secondary crashes that occur due to a road closure, improving the safety of the North Carolina roadways.
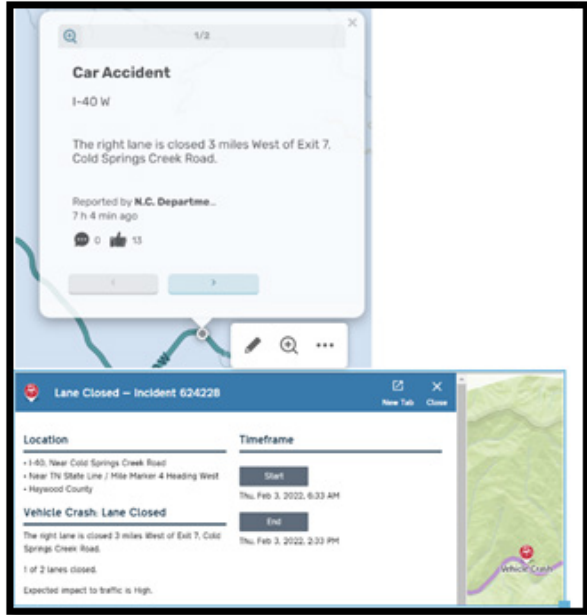
The new feed is more efficient for the TMC operators who once had to manually enter this information and has reduced the time it takes for the information to get to the public. The new process shortens the entry process from about twenty minutes to as little as five.

NCDOT received feedback from Waze volunteers and users after launch. NCDOT did a patch release in January of 2023 that improved the feed beyond the original deployment. This update allows both systems to differentiate between closures and construction activities that are constant or variable (based on the time of day). For example, if a road is closed at night for construction, neither system will show a closure during the day causing unnecessary rerouting.

NCDOT is one of the leading eastern states in the number of full closures shared with Waze due to the great work of NCDOT's Web Team, GIS and Traffic Systems Operations.