



Wrong-Way Driver Detection & Notification Systems Request for Information

Due Date:

January 13th, 2023 | 4:00 PM EST

Email Delivery Address:

svc_NCTA_WWDDNS@ncdot.gov

Proposal Delivery Address:

North Carolina Turnpike Authority
Transportation Building
1 South Wilmington Street
Raleigh, NC 27601
Attn: Manish Chourey

Issue Date: November 7, 2022

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I. Introduction and Purpose

This Request for Information (RFI) is being issued by the North Carolina Turnpike Authority (NCTA), a division of the North Carolina Department of Transportation (NCDOT), for information related to the possible future deployment of wrong-way driver detection & notification (WWDD&N) systems. The intent of this RFI is to provide NCTA with an assessment and understanding of the WWDD&N systems that are currently available. The information gathered from this RFI may support the development of a Request for Proposals (RFP) for WWDD&N systems for future NCTA projects, including the Complete 540 project currently under construction. The RFP would provide for the design, test, installation, operations, and maintenance requirements of the WWDD&N systems. This RFI is meant to focus on solutions for interchange ramps. A separate effort is being conducted to focus on detection & notification on the mainline. To develop an RFP that encourages innovation regarding WWDD&N technology and operations, NCTA is seeking information on best practices and technical solutions in this field. NCTA is particularly interested in the proven effectiveness of such systems, and their ability to leverage existing infrastructure.

Please respond to this RFI per the schedule below:

| SCHEDULE | |
|--|---|
| (NCTA reserves the right to modify the schedule at any time and for any reason.) | |
| Issue Date | November 7, 2022 |
| Questions Due Date (Time) | December 12, 2022 (4:00 PM EST) |
| NCTA Inquiry Responses Issued | December 21, 2022 |
| Response to RFI Due Date (Time) | January 13, 2023 (4:00 PM EST) |
| Presentation Meeting Dates | Week of January 23, 2023 |
| General Information | |
| Contact Person | Manish Chourey NCTA Chief Technology Officer |
| Response Delivery | <p><u>Email:</u> svc_NCTA_WWDDNS@ncdot.gov</p> <p><u>Physical Mailing Address:</u> North Carolina Turnpike Authority Transportation Building 1 South Wilmington Street Raleigh, NC 27601</p> |
| Posting Locations | <p>www.ncdot.gov www.ibtta.org www.tollroadnews.com www.itsa.org www.traffictechnologytoday.com</p> |

II. Project Overview

At this time, NCTA is not seeking information on WWDD&N systems for current and future express lane projects. This RFI is focused only on controlled access expressway projects.

NCTA currently operates two toll facilities: the Triangle Expressway and the Monroe Expressway.

The Triangle Expressway is a six-lane, 18.8-mile expressway facility that was completed in December of 2012. Interchanges were added to the route in 2017 and 2019. An expansion of the Triangle Expressway is currently underway. The three construction projects that comprise this expansion are known as "Complete 540". Current Complete 540 project information and descriptions can be found on the NCDOT website: <https://www.ncdot.gov/projects/complete-540/Pages/default.aspx>. A second expansion of the Triangle Expressway is currently in the planning stages (STIP R-2829). This project, when completed, will complete the I-540/Toll NC 540 outer loop around the Raleigh metropolitan area.

The operations of the Triangle Expressway and Complete 540 are (and will be) monitored from the NCDOT Statewide Transportation Operations Center (STOC) located at 1636 Gold Star Drive, Raleigh, NC 27607. The Monroe Expressway is a four-lane, 18.0-mile expressway facility that was completed in November 2018. Monroe Expressway project information and descriptions can be found on the NCDOT website: <https://www.ncdot.gov/projects/monroe-expressway/pages/default.aspx>

The operations of the Monroe Expressway are (and will be) monitored from the NCDOT Metrolina Regional Transportation Management Center (MRTMC) located at 2327 Tipton Drive, Charlotte, NC 28206. Currently the Monroe Expressway communicates with the MRTMC via a pair of third party leased line facilities. A direct NCDOT fiber link from the project to the MRTMC is expected to be completed in 2024. This facility is currently in operation from 5:30am to 9:00pm. Outside of these hours, the expressway is monitored from the STOC. A direct NCDOT fiber link does not exist between these facilities; such a link is expected to be completed by 2025. Currently, communication is being provided by the NC IT network, a combination of DOT-owned fiber and leased third-party facilities.

This RFI is primarily concerned with the deployment plan and details of the WWDD&N system with regards to the Complete 540 project, as that project is under construction, and therefore any deployment plan that results in changes in construction needs to be considered quickly. However, the information obtained will also be applicable to possible phased deployments for the existing Triangle and Monroe Expressways.

III. ITS Overview

1. Triangle Expressway

The existing Triangle Expressway Intelligent Transportation System (ITS) has the following features:

- 1) 72-strand fiber-optic trunkline is provided throughout the facility
- 2) Digital closed-circuit television (CCTV) cameras are located approximately every 1.3 miles. Each interchange has a CCTV camera located generally at the Y-line.

- 3) Microwave vehicle detection (MVD) stations are located:
 - a. Approximately every one mile for mainline detection, and
 - b. On every on-ramp and off-ramp at the interchanges.
- 4) Ten Dynamic Message Signs (DMS) are located at key points along the mainline.
- 5) 120/240V power is provided to all device locations (no solar).
- 6) Generally, 12-strand fiber-optic drop cables are provided to all device locations.

2. Monroe Expressway

The existing Monroe Expressway ITS has the following features:

- 1) 48-strand fiber-optic trunkline is provided throughout the facility
- 2) Digital closed-circuit television (CCTV) cameras are located approximately every 0.8 miles. Each interchange has a CCTV camera located generally at the Y-line.
- 3) Inductive loop vehicle detection system (VDS) stations are located:
 - a. Two per segment between interchanges, for mainline detection, and
 - b. On every on-ramp and off-ramp at the interchanges.
- 4) Ten DMS are located at key points along the mainline.
- 5) 120/240V power is provided to all device locations (no solar).
- 6) Generally, 12-strand fiber-optic drop cables are provided to all device locations.

3. Triangle Expressway Expansion (Complete 540)

The first phase of Complete 540 ITS will have the following features:

- 1) 144-strand fiber-optic trunkline throughout the facility
- 2) Digital closed-circuit television (CCTV) cameras located approximately every 1.3 miles. Each interchange has a CCTV camera located generally at the Y-line.
- 3) Microwave vehicle detection (MVD) stations are located:
 - a. Two per segment between interchanges, for mainline detection, and
 - b. On every on-ramp and off-ramp at the interchanges.
- 4) Five DMS are located at key points along the mainline, and two DMS are located on NC 55 Bypass.
- 5) 120/240V power is provided to all device locations (no solar).
- 6) Generally, 6- or 12-strand fiber-optic drop cables are provided to all device locations.
- 7) The following infrastructure for projected WWDD&N system use is provided for in the design at each off-ramp:
 - a. A pair of Type III Pedestals (see Appendix B) approximately 300' from the stopbar (for mounting enhanced/"smart" signs by others,
 - b. 120/240V Power drop, and
 - c. Dark fiber drop.

IV. Pilot Projects

From 2017 to 2020, NCTA deployed a series of pilot projects on the Triangle Expressway and Monroe Expressway, to study WWDD&N technology options. The sites, and their current status, include:

- 1) Davis Drive Off-Ramp from Northbound Toll NC 885 (formerly Toll NC 147):
 - a. Microwave Detection & Notification – In operation
 - b. Thermal Detection (only) – Present but not in operation
- 2) Old Salem Street Off-Ramp from Southbound Toll NC 540 Detection & Notification – Dormant
- 3) NC 54 Off-Ramp from Northbound Toll NC 540 (detection only) – Present but not in operation
- 4) Green Level West Road Off-Ramp from Northbound Toll NC 540 – Detection & Notification - Tested and then decommissioned following testing
- 5) Toll NC 540 Mainline Toll Site near Green Level West Rd. – Present but not yet in operation under the new toll integration project
- 6) Monroe Expressway Mainline Toll Sites One and Seven – In operation (part of toll system)

The following types of detection have been piloted: microwave, thermal camera, LIDAR, toll system inductive loops.

The following types of enhanced/"smart" signs have been piloted: backlit flashing LED wrong-way sign, rectangular rapid flashing beacons (RRFB), "stacked" LED traffic signal beacons, and flashing border LED wrong-way sign.

Detailed information about these pilot projects can be found in the Appendices.

V. Appendices

To provide Respondents with additional design details and the latest available Project design documentation, **Appendices A to F** are included as a separate attachment to this RFI.

<https://connect.ncdot.gov/business/Turnpike/Pages/WrongWayDriverRFI.aspx>

A brief description of these appendices can be found below:

- **Appendix A – ITS and Tolling Concept Maps**
Includes ITS-related conceptual wall maps for the Triangle Expressway, Complete 540, and Monroe Expressway.
- **Appendix B – Complete 540 Released for Construction ITS Plans**
Fully engineered ITS plans for the projects currently under construction.
- **Appendix C – Triangle and Monroe Expressway As-Built ITS Plans**
Fully engineered as-built ITS plans for the facilities.
- **Appendix D – NCTA ITS Standard Details**
Includes NCTA standards for ITS design.
- **Appendix E – NCTA WWDD&N Pilot Projects**
Includes details of the various pilot projects deployed on the Triangle Expressway and Monroe Expressway.
- **Appendix F – ITS Vendor information**
Includes manufacturer details of the various ITS devices on the Triangle Expressway and Monroe Expressway.

VI. Anticipated Business Rules and Policies

No business rules and policies have yet to be defined for the deployment of WWDD&N systems for NCTA or NCDOT facilities.

VII. Request for Information

Interested parties may submit responses to this RFI in accordance with the guidelines and schedule set forth herein. This RFI does not constitute a Request for Qualifications (RFQ), a Request for Proposals (RFP), or any other solicitation document. This RFI does not commit the NCTA to contract for any supply or service whatsoever, nor will any response to this RFI be considered in the evaluation of any response to a solicitation document.

None of the materials provided in response to this RFI will be used to evaluate potential suppliers of products and vendors requested or used in any way as part of the evaluation of proposals received in response to any future RFPs. Vendors are advised that materials provided in response to this RFI may be used as a basis for developing requirements and specifications to support the NCTA's development of the RFP.

1. Intent

The intent of this RFI is to provide the NCTA with an assessment and understanding of current best practices and technology related to the design, installation, integration, testing, and operation and maintenance of wrong-way driver detection & notification systems as they apply to interchange off-ramps. This RFI is also intended to provide NCTA with information about future products and innovative solutions within this area. Strong emphasis should be given to the cost-effectiveness of the solutions and their ability to leverage existing infrastructure.

The NCTA is specifically interested in:

- Deployment strategies
- Detection technology & location
- Notification strategies
- Deterrence
- Implementation Testing
- Maintenance & Operations
- Connected and Automated Vehicle (CAV) impacts

Interested parties are invited to provide information on their solutions, systems, innovations, and services that are applicable to this RFI. Specific topics that may be considered in the written RFI response, as well as for discussion in person, are listed in the following section. Respondents are encouraged to respond to each topic in the written RFI response and are encouraged to expand in areas where they can and omit those areas where they do not have experience. As part of the cover letter of the written response, Respondents should provide a brief description of their firm and their experiences with WWDD&N design, installation, testing, and operations. If there are other areas, topics, or subjects

that the Respondents would like NCTA to consider in this RFI, please feel free to include those in the written response.

2. Requested Information

NCTA requests that Respondents provide information with respect to the following areas of interest:

A. Deployment Strategies

- 1) The Monroe Expressway and Triangle Expressway (when Complete 540 is finished) contain a variety of interchange designs, including diamond (with traffic signals at the terminus), diamond (with roundabout at the terminus), diverging diamond, and various types of partial cloverleaves (parclos). These designs can be seen in detail in the ITS plans.
- 2) NCTA is interested in learning about different approaches to deployment at each type of interchange. For instance, one strategy might be to deploy at all off-ramps regardless of interchange design or characteristics; or, sites with certain characteristics may receive WWDD&N treatments while others may not, based on the comparative likelihood of a wrong-way driver event.

B. Detection Technology & Location

- 1) What types of detection are most effective in detecting wrong-way movements with the fewest false positives?
- 2) Where are the most effective locations to deploy this technology? Are multiple locations needed?
- 3) How are emerging technologies in video analytics affecting the choice of detection alternatives?

C. Notification Strategies

- 1) What is vendor recommendation regarding communications media/technology?
- 2) Note vendor experience with overcoming latency due to notifications passing thru firewalls over a fiber-optic network.
- 3) Are there cost-effective means to confirm that a detected vehicle has reached the mainline (as opposed to self-correcting)?
- 4) Comment on the effectiveness and timeliness of email, text message, and pop-up notifications.
- 5) Comment on the value of video clips versus still shots.

D. Deterrence

- 1) What measures are recommended to deter/correct the wrong-way driver before reaching the mainline?
- 2) If enhanced/"smart" signage is recommended, comment on the various types common in the industry. Have any proven to be superior? Comment on details like sign size, height above ground, etc.

E. Implementation Testing

- 1) Discuss test plans, parameters, durations, and types of test vehicles recommended for implementation.
- 2) Discuss how traffic control can be best utilized to cost-effectively ensure a high degree of system accuracy during testing.

F. Maintenance & Operations

- 1) Recommended maintenance approach for the WWDD&N system. Discuss preventive maintenance cycles, system failure repairs, system monitoring technology and methodology, system alerts, and client user interface.
- 2) Recommended fieldwork approach when conducting maintenance work, considering the space available in the interchanges and the location of WWDD&N equipment.
- 3) Recommended technologies and methodologies to reduce roadside maintenance and/or lane closures while meeting all accuracy and performance requirements set in place by NCTA.
- 4) Recommended maintenance approach if communications are installed in the NCDOT/NCTA ITS network. **Note:** Due to security concerns, NCDOT does not allow remote access to the NCDOT ITS network.
- 5) Recommended technology, tools, and methods to allow NCTA to monitor and audit the performance of the WWDD&N system.
- 6) Recommended approach to communicate, track, and test WWDD&N system upgrades.
- 7) Recommended approach to communicate and track WWDD&N system failures.
- 8) What Key Performance Measures (KPMs) should be considered and tracked with regards to WWDD&N performance?

G. Connected and Automated Vehicle (CAV) impacts

- 1) How does the increasing representation of CAV on our roads affect the choice of WWDD&N technology?

Please feel free to provide any additional ideas, suggestions, or information within the submission guidelines deemed helpful to the NCTA in developing the requirements for this effort.

3. RFI Inquiries

Respondents may submit questions regarding this RFI by utilizing the form included as a separate attachment. All questions should be submitted to the contact email address provided in Section V.1. All questions received in writing by the due date listed in Section I (Request for Information Overview) will receive responses by NCTA; all questions and responses will be posted anonymously, unless marked "Confidential", to the NCTA business website at: <https://connect.ncdot.gov/business/Turnpike/>. The Respondent question form can be found at: <https://connect.ncdot.gov/business/Turnpike/Documents/Forms/AllItems.aspx>

Questions marked "Confidential" will be responded to via email, to the sender of the question (only).

4. Revisions to the RFI

If it becomes necessary to revise the RFI before the due date for Responses, NCTA shall provide addenda to all prospective Respondents that were sent this RFI or who are otherwise known by the NCTA to have obtained this RFI. Addenda to the RFI will be posted on the NCTA website. It remains the responsibility of all Respondents to check the NCTA website for any addenda issued prior to the submission of Responses.

5. Presentation Meeting

As part of this RFI, NCTA is allotting time for the option to meet individually with Respondents for presentation and discussion of their response. The meetings would be limited to no more than 1 hour and up to five representatives in attendance on behalf of the firm. The presentations should only focus on the firm's response to the requested information. Meetings are expected to be held the week of January 23, 2023 in Raleigh at the NCDOT Building located at 1 South Wilmington Street, Raleigh, NC 27601, or virtually via Teams Meeting. NCTA will contact Respondents to schedule the meeting. NCTA may elect to not hold the meeting and follow up directly with Respondents with more detailed questions or to clarify submissions. The presentation meeting, if held, will be for information gathering purposes. An invitation for a presentation meeting shall be construed as neither an engagement in a pre-selection process nor an evaluation.

VIII. RFI Responses

1. Contact Information

All correspondence shall be directed to: svc_NCTA_WWDDNS@ncdot.gov. Respondents shall not attempt to contact NCDOT and/or NCTA representatives directly.

2. Cost Incurred Responsibility

The NCTA shall not be liable for any costs incurred by the Respondent in preparation of its response, in participating in a presentation meeting, or in performing any other activities related to submitting a response to this RFI.

3. Liability

This RFI is completely voluntary and is not a pre-qualification for any future procurement. This RFI has been issued to obtain information only and is not a request for services or is it intended to result in a contract or agreement with any Respondent.

This solicitation for information does not commit the NCTA to publish a RFQ, RFP, or award a contract. Any company regardless of size or service specialty is encouraged and welcomed to participate in this RFI.

4. Confidentiality & RFI Ownership

Trade secrets or similar proprietary data, which the Respondent does not wish disclosed to persons other than personnel involved with this RFI, will be kept confidential to the extent permitted by N.C.G.S. § 132-1.2 if identified as follows: Each page shall be identified in boldface at the top and bottom as "CONFIDENTIAL." Any section of the RFI that is to remain confidential shall also be so marked in boldface on the title page of that section. Regardless of what is labeled as confidential, the determination as to whether or not it shall be determined by North Carolina law.

In addition to the above, the State intends to keep every Response received confidential as a whole until such time as an RFQ/RFP has been awarded or canceled (the "Confidentiality Period"). After the expiration of the Confidentiality Period, all Response information will be subject to the normal confidentiality provisions of the State as set out above.

Exception: Respondents expressly acknowledge that the concepts, methods, equipment, and procedures presented in a response may be wholly or partially incorporated into an RFQ/RFP.

5. Response Format

Cover Letter

Please include a cover letter (2-page maximum) with the RFI submittal package. A single point of contact shall be identified along with the person's title, email address, phone number, and mailing address. An overview of the firm's background shall be included, providing highlights about the company, products, services, and existing projects.

Response to RFI

It is NCTA's preference that the RFI response be between 10-30 pages, but no more than 50. The cover letter is not included in the 50-page maximum. The RFI responses shall have a font size of 10 or above and be submitted using one-sided, letter-size (8½ x 11-inch) paper. Brevity and conciseness are appreciated. It is encouraged that the response is limited to the Respondent's reaction and understanding of the concepts in this document. Ideas and approaches may be used by NCTA in a future solicitation document. For purposes of this RFI, information regarding the Respondent's history, background, and personnel should be limited to the cover letter. Resumes should not be submitted.

6. Submittal

RFI response submittals shall be emailed in PDF format to: svc_NCTA_WWDDNS@ncdot.gov.

Alternatively, submittals may be physically delivered to the physical address shown below. Note: submittals in physical form must arrive at NCTA by the due date listed in the RFI schedule. If submitting by mail, please provide three (3) copies as well as a PDF on a USB drive. No materials submitted by the Respondents will be returned.

North Carolina Turnpike Authority
Transportation Building
1 South Wilmington Street
Raleigh, NC 27601-1453
Attn: Manish Chourey

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