



## Roadside Toll Collection System

### I-485 Express Lanes

## Request for Information

**Due Date:**

December 20, 2019 | 4:00 PM EST

**Email Delivery Address:**

[svc\\_i485Express\\_RTCS@ncdot.gov](mailto:svc_i485Express_RTCS@ncdot.gov)

**Proposal Delivery Address:**

North Carolina Turnpike Authority

Transportation Building

1 South Wilmington Street

Raleigh, NC 27601

Attn: Marvin Butler

**Issue Date: November 18, 2019**

**Updated through Addendum 1 (December 6, 2019)**

## Table of Contents

- I. INTRODUCTION AND PURPOSE.....3**
- II. PROJECT OVERVIEW .....4**
- III. ANTICIPATED BUSINESS RULES AND POLICIES.....5**
- IV. REQUEST FOR INFORMATION .....6**
  - 1. Intent..... 6
  - 2. Requested Information..... 7
  - 3. RFI Inquiries ..... 10
  - 4. Revisions to the RFI..... 11
  - 5. Presentation Meeting ..... 11
- V. RFI RESPONSES .....11**
  - 1. Contact Information..... 11
  - 2. Cost Incurred Responsibility ..... 11
  - 3. Liability ..... 11
  - 4. Confidentiality & RFI Ownership..... 12
  - 5. Response Format ..... 12
  - 6. Submittal..... 12

## 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 Roadside Toll Collection System (RTCS) for the anticipated I-485 Express Lanes. The intent of this RFI is to provide NCTA with an assessment and understanding of the RTCS services that are currently available. The information gathered from this RFI will support the development of a Request for Proposals (RFP) for the I-485 Express Lanes RTCS. The RFP will provide for the design, test, installation, operations, and maintenance of the RTCS. It will also provide for operations and maintenance of some components of the Intelligent Transportation System (ITS). To develop an RFP that encourages innovation regarding express lanes RTCS and ITS technology and operations, NCTA is seeking information on best practices and technical solutions. NCTA is particularly interested in driving quality, efficiency, innovation, and continuous improvement.

Please respond to this RFI per the schedule below:

<b>SCHEDULE</b>	
(NCTA reserves the right to modify the schedule at any time and for any reason.)	
Issue Date	November 18, 2019
Questions Due Date (Time)	December 2, 2019 (4:00 PM EST)
NCTA Inquiry Responses Issued	December 6, 2019
Response to RFI Due Date (Time)	December 20, 2019 (4:00 PM EST)
Presentation Meeting Dates	Week of January 6, 2020
<b>General Information</b>	
Contact Person	Marvin Butler NCTA Chief of Staff
Response Delivery	<u>Email:</u> svc_i485Express_RTCS@ncdot.gov  <u>Physical Mailing Address:</u> North Carolina Turnpike Authority Transportation Building 1 South Wilmington Street Raleigh, NC 27601
Posting Locations	www.ncdot.gov www.ibtta.org www.tollroadsnews.com

## II. Project Overview

In an effort to improve travel time reliability and traffic flow in the Charlotte area, NCDOT and NCTA are developing an interconnected express lane network located within critical transportation corridors. The I-485 Express Lanes Project (Project) is one of the three projects planned for the network and is located along the I-485 loop around Charlotte between I-77 and US-74. This segment of I-485 currently carries between 86,000 and 154,000 vehicles per day and experiences congestion on a regular basis.

The I-485 Express Lanes Project will add a single express lane in each direction along the median for 17 miles, between I-77 and US-74 (Independence Boulevard). The Project will also add one general purpose lane in each direction of I-485 between Rea Road and Providence Road. The Project will include a total of five (5) All-Electronic Tolling (AET) zones in each direction, for a total of ten (10) tolling locations. The design-build project is currently under construction and is planned to open to traffic by Fall of 2022.

The tolled express lanes on I-485 will be integrated to the NCTA toll collection program and will be compatible with NCTA's interoperable partners. NCTA's current toll collection program includes the operation of approximately 36 miles of toll expressway facilities, including the Triangle Expressway near Raleigh and the Monroe Expressway near Charlotte. As part of these operations, the toll collection program processes over 71 million transactions annually. The program also includes account management operations of the I-77 Express Lanes. During the next few years the program is expected to continue to grow as the Complete 540, Mid-Currituck Bridge, US-74 Express Lanes, and I-77 Express Lanes South projects are completed.

Current I-485 Express Lanes Project information and descriptions can be found on the NCDOT website: <https://www.ncdot.gov/projects/i-485-express-lanes/Pages/default.aspx>.

In order to provide Respondents with additional design details and the latest available Project design documentation, **Appendices A to L** are included as a separate attachment to this RFI ([https://connect.ncdot.gov/business/Turnpike/Documents/485RTCS\\_RFI\\_Appendices.pdf](https://connect.ncdot.gov/business/Turnpike/Documents/485RTCS_RFI_Appendices.pdf)).

A brief description of these appendices can be found below:

- **Appendix A - Sample Gantry**  
Includes sample of cross-sectional design of toll zones gantries on the I-485 Express Lanes Project.
- **Appendix B - I-485 AET and ITS Schematic**  
Includes a strip map schematic that shows major signs, toll point, ingress/egress, and ITS device locations on a single plan. This is a "living document" updated with each contractor submittal.
- **Appendix C - Suggested KPI Categories**  
Includes a list of suggested KPIs, performance requirements and frequency of measurement.
- **Appendix D - I-485 ITS Concept Plans**  
Includes ITS-related conceptual drawings used by the I-485 Express Lanes Project Design-Build team to complete the project's ITS design plans.
- **Appendix E - NCTA Express Lane Signing Typical Layouts**  
Includes NCTA standards for express lanes signing design (including delineators) used by the I-485 Express Lanes Project Design-Build team to complete the project's signing design plans.

- **Appendix F - NCTA Standard Express Lane Drawings**  
Includes NCTA standards for express lanes toll gantry and toll cabinet designs used by the I-485 Express Lanes Project Design-Build team to complete the project's AET design plans.
- **Appendix G - AET Pull Off Areas Standard Detail**  
Includes detailed design for AET maintenance pull-off areas.
- **Appendix H - ITS Final Early Works Plans**  
Includes ITS plans related to early construction work taking place along the median. It includes plans for median conduit runs and devices.
- **Appendix I - AET Site Locations**  
Includes design plans showing the location of AET sites and their corresponding maintenance pull-off areas.
- **Appendix J - NCTA ITS Standard Details**  
Includes NCTA standards for ITS design used by the I-485 Express Lanes Project Design-Build team to complete the Project's ITS design plans.
- **Appendix K - NCTA Express Lane Pavement Marking Standards**  
Includes NCTA standards for express lanes pavement markings design used by the I-485 Express Lanes Project Design-Build team to complete the project's pavement marking design plans.
- **Appendix L - Sample MVD Sensor Locations**  
Includes drawings showing sample cross-sections of MVD poles (best case, worst case). This is not a formal submittal.
- **Appendix M – Existing Traffic Information**  
Includes average weekday hourly volumes and weekday peak period speed summaries for the existing I-485 corridor.

### III. Anticipated Business Rules and Policies

NCDOT and NCTA are currently developing the business rules and policies for the Project. However, all technologies will be evaluated to best serve all stakeholders. For the purpose of this RFI, the following assumptions can be made:

- NCTA ~~will be developing currently expects to develop~~ a new High Occupancy Vehicle (HOV) rideshare program for the Project where ~~these~~ vehicles will be required to pre-register to travel on the express lanes at no cost. The rideshare program could use Automatic Vehicle Identification (AVI) technology ~~and a pre-registered program or other methods~~ to qualify HOV customers.
- ~~The rideshare program would be independent from the existing I-77 HOV program (which as currently planned not to be applicable to the I-485 Express Lanes) that uses declarable transponders and the NC Quick Pass HOV App. However, for the purposes of this RFI, NCTA is interested in information related to the classification and identification of HOV users, as currently operating on the I-77 Express Lanes.~~
- The rideshare program is expected to be independent from the existing I-77 Express HOV program, which uses declarable transponders and the NC Quick Pass HOV App. NCTA does not currently expect the business rules for I-77 Express to be applicable to the I-485 Express Lanes. However, for the purposes of this RFI, NCTA is interested in information related to technology and

methodologies for detecting and identifying HOV customers, as well as system configuration capabilities in the event HOV business rules are revised to match I-77 Express.

- The express lanes will operate under the following classification scheme; only the vehicle classes listed below will be allowed to travel on the express lanes.
  - “Low Occupancy Vehicle”
    - Two-axle motor vehicles other than motorcycles, without trailers, not larger than L:22’ W:8.5’ H:12’, with less than three occupants.
  - “Registered High Occupancy Vehicle”
    - Two-axle motor vehicles, without trailers, not larger than L:22’ W:8.5’ H:12’, pre-registered HOV, with three or more occupants.
  - “Motorcycles”
    - Motor vehicles with two or three wheels not larger than a Low Occupancy Vehicle.
  - “Transit Vehicles”
    - Recognized non-profit transit agency buses, rubber-wheeled trolleys, and vans used for mass transportation under applicable laws.
  - “First Responder Vehicles”
    - Law enforcement vehicles, emergency fire and rescue vehicles and emergency medical service vehicles.
  - “Extended Vehicles”
    - Two-axle motor vehicles exceeding the length of a Low Occupancy Vehicle or two-axle motor vehicles traveling with a one-axle trailer.
- Roadside level enforcement actions as well as other back office tools are expected to be implemented to enforce HOV use on the facility.
- Toll fees on the express lanes will be segment-based and will be adjusted based on traffic flow patterns. Trip building will not be required.

#### IV. Request for Information

Interested parties may provide and submit responses to this RFI in accordance with the guidelines and schedule set forth herein. This RFI does not constitute an 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, integrating, testing, and operation and maintenance of RTCS and ITS as they apply to express lanes operations. This RFI is also intended to provide

NCTA with information about future products and innovative solutions within this area. The NCTA is specifically interested in:

- Toll system equipment
- Installation process, procedures and timeline estimation for a single tolling zone
- Building and transmission of a complete transaction
- Transaction accuracy improvements
- Traffic monitoring methods
- Dynamic pricing algorithm
- Vehicle occupancy detection and enforcement technology
- Integration of toll system and ITS
- Operations and maintenance of toll system and ITS
- Dynamic pricing operations and maintenance
- System auditing methods and technology

NCTA defines “complete transaction” as a transaction formed within the RTCS that has all information required to accurately bill the customer. For an AVI transaction, a complete transaction must include the transponder number, both agency and serial numbers, vehicle classification, and fare. For an Image-Based transaction, a complete transaction must include an overview and ROI image of the plate designated for revenue collection, plate state, number and type for the plate in the provided images, vehicle classification and fare assignment.

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 express/managed lanes 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. Roadside Toll Collection System Design

- 1) System’s ability to integrate with the Kapsch Janus 2 multi-protocol readers and IAG-3 antennas that will be provided by NCTA. The AVI system design will require full multiprotocol (SeGo, 6C and TDM) functionality.
- 2) Equipment required to accurately capture and correlate automatic vehicle identification (AVI) data, license plate images and related information, and automatic vehicle classification (AVC).

**Note:** The RTCS design will be restricted to overhead equipment only (no in-pavement equipment will be allowed). Also, NCTA expects for the system to capture color license plate images.

- 3) System's compatibility to be installed on a single cantilever truss gantry, see **Appendix F - NCTA Express Lanes Standard Drawings**
- 4) System's ability and expected performance for both length-based and axle-based classification using only overhead equipment and no in-pavement sensors.
- 5) System's need for additional tolling or ITS equipment on the general-purpose lanes and/or ramps to capture specific data in support of dynamic pricing and fare assignment.
- 6) System's ability to accurately form transactions in an express lane, while preventing any transaction formation from vehicles in the adjacent general-purpose lane for all lane geometries shown in **Appendix A - Sample Gantry**.

**Note:** As shown in the provided drawings, the express lanes will be separated from the general-purpose lanes by a 2' to 4' buffer with striping and tubular delineators spaced no more than 8' apart longitudinally.

- 7) Recommended technology and methods to capture and record toll rate sign changes that could be correlated to recorded transactions. Discuss functionality to photographically record every rate change on each toll rate signs and track these photographic records within the system.
- 8) Recommended technology, tools, and methods to detect and accurately process pre-registered HOV transactions and/or switchable transponder declarations.
- 9) Recommended technology, tools, and methods for HOV enforcement.

**Note:** As part of the I-485 Express Lanes design, NCTA and NCDOT are making provisions for roadside enforcement areas where possible. Refer to **Appendix B - I485 AET and ITS Schematic** for proposed enforcement area locations.

- 10) Recommended technology to provide continuous backup power to toll sites in the event of extended localized power outages. Some sites will not be suitable for permanent installation of generators.

#### B. Intelligent Transportation System Design

- 1) System's flexibility to integrate to the Wavetronix SS HD detectors expected to be installed by the Design-Build team.

2) Recommended additional ITS devices to support pricing strategy.

2)3) Identify connected vehicle data solutions to support dynamic pricing systems.

3)4) System's compatibility with variable message sign communication protocols.

4)5) Recommended UPS capabilities for cameras and toll rate signs.

5)6) System's flexibility to integrate to wrong-way detection systems.

#### C. Dynamic Pricing

- 1) Recommended dynamic pricing approach. Discuss how the recommended approach provides traffic management opportunities while maintaining performance levels. Describe benefits and potential risks.
- 2) Recommended intervals of traffic data used to create rates.



**Note:** Dynamic pricing for the I-485 Express Lanes Project may be based on historical volumes and densities or real time densities and displayed to the driver “near real time”.

- 3) Recommended pricing intervals based on past experiences and implementations.
- 4) Advantages and disadvantages of the proposed pricing structure.
- 5) Recommended user interface(s) that could be used to interact with dynamic pricing. Include details about recommended functions and layout of the user interface.
- 6) System’s flexibility to allow for tuning of the dynamic pricing in parallel to a time of day solution.
- 7) Recommended approach to optimize and tune the dynamic pricing algorithm based on data collected from general-purpose lanes and express lanes.

#### D. System Maintenance

- 1) Recommended maintenance approach for ITS and toll system. Discuss preventive maintenance cycles, system failure repairs, system monitoring technology and methodology, system alerts, and client user interface.
- 2) Recommended field work approach when conducting maintenance work, considering the space available on the express lanes and the location of cabinets per the documents provided in **Appendix A - Sample Gantry** and **Appendix I - AET Site Locations**. Information about traffic control, equipment accessibility, and safety should be included.

**Note:** Toll sites will have left shoulders as narrow as 6’ and no right shoulder. AVI cabinets may be installed on the left shoulder of the express lanes or on the toll gantry column. Toll equipment cabinets will be generally placed on the right shoulder of the general-purpose lanes. Additionally, camera lowering devices will not be installed unless the cameras are not serviceable by bucket truck.

- 3) Recommended approach to maintain the AVI system provided by NCTA.
- 4) Recommended technologies and methodologies to reduce the roadside maintenance and/or lane closures while meeting all accuracy and performance requirements set in place by NCTA.
- 5) Recommended maintenance approach if it is required for the toll system vendor to maintain ITS devices and fiber conduits that will be installed in the NCDOT ITS network.

**Note:** Due to security concerns, NCDOT does not allow remote access to the NCDOT ITS network. Refer to the communications schematic on sheet 10 of **Appendix D - ITS Concept Plans** for information on the planned distribution of devices between the toll and ITS networks.

#### E. System Operations

- 1) Recommended technology, tools and methods to allow NCTA to monitor and audit the performance of the toll system and ITS.
- 2) Recommended technology, tools and methods to allow the NCTA Back Office and Customer Service Center to correlate customer disputes with transaction data collected by the RTCS and later report the customer issues to the RTCS.
- 3) Recommended tool(s) to allow NCTA to audit messaging displayed on toll rate signs and confirm messaging in reference to customer inquiries.
- 4) Recommended system tool(s) to audit dynamic pricing, fare assignment and transaction accuracy.
- 5) Database access that could be provided to NCTA for system auditing and reporting purposes.

- 6) Available remote access to database, toll system and ITS.
- 7) Recommended approach to communicate, track and test system upgrades.
- 8) Recommended approach to communicate and track system failures.

#### F. Key Performance Measures

**Appendix C - Suggested KPI Categories** includes KPI categories that NCTA considers necessary to maintain a minimum level of program quality: reliability, accuracy, responsiveness, efficiency, and customer satisfaction. The penalties for underperformance or bonuses for performance above expectations have not been determined at this point. NCTA is seeking comments on these KPIs, please provide a response to the following questions:

- 1) What are the advantages and disadvantages of the KPI categories listed?
- 2) Are there additional KPIs that should be considered?
- 3) What is the vendor's ability to meet the KPI categories listed?
- 4) Should some KPIs be adjusted?

#### G. Infrastructure Design

**Appendices D – L** include concept plans and design plans that provide a more detailed description of the technology infrastructures that will be designed and constructed by the Design-Build team as part of the I-485 Express Lanes Project. NCTA is seeking comments on the following topics to gain a better understanding of the Respondent's ability to integrate to the infrastructure that will be provided.

- 1) ITS and toll system network design and recommended approach to efficient utilization. Information about the preferred network location of ITS components that would be critical to dynamic pricing should be included.
- 2) Location and design of toll gantries.
- 3) Location and design of the maintenance areas.
- 4) Location of MVDs, cameras and toll rate signs.
- 5) MVD network design and its ability to support the proposed pricing strategy. If it would not be enough, provide an alternative solution.
- 6) Recommendations for toll system network redundancy for the entire corridor.

**Note:** The Design-Build team will provide a redundant path from I-77 interchange to the Metrolina Traffic Management Center (MRTMC). However, no fiber connection from the east end of the project to the MRTMC will be available for at least five years.

#### H. Additional Comments

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 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/485RTCS\\_RFI\\_QuestionsForm.docx](https://connect.ncdot.gov/business/Turnpike/Documents/485RTCS_RFI_QuestionsForm.docx).

#### 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 which 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 6, 2020 in Raleigh at the NCDOT Building located at 1 South Wilmington Street, Raleigh, NC 27601. 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.

### V. RFI Responses

#### 1. Contact Information

All correspondence shall be directed to: [svc\\_I485Express\\_RTCS@ncdot.gov](mailto:svc_I485Express_RTCS@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 Request for Qualifications (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. In spite 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 max) 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 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\\_I485Express\\_RTCS@ncdot.gov](mailto:svc_I485Express_RTCS@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: Marvin Butler

**THE REMAINDER OF THIS PAGE IS INTENTIONALLY LEFT BLANK.**