

Attachment 10

Monroe ORT SOW from DB RFP

OPEN ROAD TOLLING (ORT) TOLL ZONE SCOPE OF WORK (9-24-2010)

This ORT Infrastructure scope of work includes design, engineering, fabrication, delivery and erection of gantries, ORT Toll Zone Buildings, pavements, concrete pads, sidewalks, electrical work, heat ventilation, air conditioning (HVAC) work, conduit duct banks and associated junction boxes necessary for the infrastructure of the open road tolling system.

The NCTA has an agreement with the Toll Systems Integrator, Affiliated Computer Services Inc. (ACS) to design, develop, install and implement a fully automated toll collection system for the Triangle Expressway. The design, fabrication and installation of toll equipment for the Triangle Expressway will be by ACS (Project Manager is Steve Hamilton). It is expected that NCTA will enter into a similar agreement with ACS to provide the fully automated toll collection system for the Project.

The NCTA has an agreement with the Electronic Toll Collection System (ETCS) Integrator, TransCore to design, develop, install and implement a Radio Frequency Identification (RFID) system for the Triangle Expressway. The design, fabrication and installation of the RFID equipment for the Triangle Expressway will be by TransCore (Project Manager is Dan Papiernik). It is expected that NCTA will enter into a similar agreement with TransCore to provide the ETCS for the Monroe Parkway.

The Design-Build Team shall coordinate with Toll System Integrator in the final design and construction of the ORT Toll Zone to readily accommodate the Toll System Integrator components without the need for modifications and to achieve the NCTA tolling performance requirements. Some information contained within this ORT Toll Zone scope of work is typical and may not be applicable for the specific tolling system provided by the Toll System Integrator. However, based upon coordination with the Toll System Integrator in the final design there may be a reduction, deletion or addition of items indicated within this scope of work, which if allowed and necessary, shall result in compensation adjustments in accordance with the 2006 NCDOT *Standard Specifications for Roads and Structures*. Accurate As-Built drawings shall be provided to NCTA at the completion of work indicating all infrastructures installed with locations indicated on the record set of drawings.

Design and construct ORT Facilities in accordance with the following:

- ORT Project Specific Drawings
- Aesthetic Design Scope of Work

Design, construction drawings, as-built drawings, details, and specifications detailed within this scope are the responsibility of the Design-Build Team, unless noted otherwise. Provide all details and plans consistent with industry standards and professional requirements.

ORT Toll Zone Location

Locate each ORT Toll Zone in accordance with the ORT Toll Zone Geometry Design Criteria below and generally at the locations indicated on the ORT Project Specific Drawings. Coordinate the site selection for the ORT Toll Zone with the Toll System Integrator and the NCTA.

Addendum No. 2 September 24, 2010

C202587 (R-3329, R-2559)

ORT Toll Zone Scope of Work

Mecklenburg and Union Counties

ORT Toll Zone locations shall be free from electromagnetic conditions such as proximity to large power sources or communication towers. Following preliminary design of the ORT Toll Zones, a Radio Frequency (RF) Spectrum Analysis will be performed by NCTA's ETCS contractor in order to determine whether or not the proposed ORT Toll Zone is free from electromagnetic conditions that may cause interference with the Radio Frequency Identification (RFID) technology.

Locate all ORT Toll Zones in roadway areas where lane changing and weaving would not be expected.

Accommodate the shoulder acceleration and deceleration lengths for access to the ORT Sites in accordance with the Roadway Scope of Work found elsewhere in this RFP.

Gantry mounted toll equipment will be accessed via a bucket truck. Place ORT Toll Zones to allow for ease of maintenance access under operating conditions.

Protect access drive and gantry columns with guardrail and concrete barrier as shown in the ORT Project Specific Drawings.

ORT Site Geometry Design Criteria

The following requirements shall apply for all mainline and ramp ORT Toll Zone roadways:

For all Mainline and Ramp ORT Toll Zones:

- For geometric design purposes, the ORT Toll Zone shall consist as a tangent section of 250' with limits from at least 100 feet prior to the first ORT gantry structure centerline to at least 100 feet beyond the second ORT gantry structure centerline.
- Locate all ORT Toll Zones either on horizontal tangent sections, or horizontal curve sections with a radius of 2,000 feet or greater.
- Locate ORT Toll Zones on vertical tangents if possible.
- Do not locate ORT Toll Zones in sag vertical curves,
- Do not locate ORT Toll Zones under structures or on structure,
- Do not place drainage pipes under the area between the first and second gantries or within 25 feet of any conduit or junction box. Ensure no drainage swales lead toward toll or ITS junction boxes.

For Mainline ORT Toll Zones:

- Locate ORT Toll Zones in roadway areas where uniform vehicle speeds above 45 mph are expected.
- Provide a minimum of 1000 feet clear line of sight for drivers approaching Toll Zones.
- Provide ORT Toll Zone pavement cross-slopes which are uniform through the ORT Toll Zone, at 2% cross-slope if possible, and at 4% cross-slope maximum.

- For Ramp ORT Toll Zones:
- Locate Toll Zones a minimum of 250 feet from the center of a ramp terminal intersection.
- Locate ORT Toll Zones a minimum of 350 feet from pavement gore point at exit and entry ramps if possible. Pavement gore point is the intersection of the right outside edge of mainline shoulder and the left outside edge of ramp shoulder.
- Locate ORT Toll Zones Gantries between one-third and one-half of the ramp length as measured from the mainline end of ramp, if possible.
- Locate ORT Toll Zones with a minimum 100 feet between the end of side road intersections and the nearest gantry.
- Locate ORT Toll Zones in roadway areas where uniform vehicle speeds above 35 mph are expected.
- Provide a minimum 1000 feet clear line of sight for drivers approaching exit ORT Toll Zones.
- Provide ORT Toll Zone pavement cross-slopes that are uniform through the ORT Toll Zone, at 2% cross-slope if possible, and at the maximum for the design of the curve.

ORT Toll Zone Gantry

Design, engineer, fabricate, transport and erect watertight gantry structures to which the Toll System Integrator will attach the tolling equipment. Design Gantries in compliance with the *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, 5th Edition*, as published by AASHTO using a minimum wind speed of 90 miles per hour.

Provide two structural gantries at each ORT Toll Zone site, to be similar in appearance and scale. Design each gantry to span the facility width as indicated on the ORT Project Specific Drawings. Design gantries to ensure that the line of sight for cameras, camera lights, and overhead profilers/separators are not obstructed by the structure.

Design and construct gantry structure including scale, materials, color and finish aesthetically consistent with the Monroe Aesthetic Design Guidelines. The front façade or paneling of the gantry shall conceal all ORT Toll Zone tolling equipment (to the extent possible without impairing the tolling accuracy) and cabling from on-coming traffic and should present a straight and clean visual appearance, which is not detracted from by tolling equipment.

The upstream mainline gantry shall be designed to easily accommodate a DMS (DMS may not be installed initially). The requirements for the DMS are contained in the ITS Scope of Work.

Coordinate with the Toll System Integrator for final toll gantry loading and design. Include effect of proposed future roadway widening in load analysis.

Provide vertical clearance in accordance with the ORT Project Specific Drawings in order to maintain proper clearances for the toll collection equipment.

Design and construct an equipment-mounting frame and cantilevered overhead scanner frame as detailed in the ORT Project Specific Drawings to be used for the installation of the toll collection

equipment. Design the gantry structure, equipment mounting frame, and overhead scanner frame to support the equipment specified in the ORT Project Specific Drawings without vibration from wind forces or drafts from vehicles passing under the gantry.

An 8" X 8" divided cable tray shall be located on the top of the truss, concealed by the cladding face, extending the length of the gantry.

Refer to the ORT Project Specific Drawings for conduit, risers and cabling requirements.

Provide conduits or watertight cable trays terminating in the bottom of the divided overhead cable tray and at the at-grade control/ junction boxes at the base of the gantry as shown in the ORT Project Specific Drawings.

Conceal all conduit or cable trays from view within the proposed aesthetic treatment.

Locate hand-holes, stub-outs, junction boxes, or control boxes, for access to equipment cabling and electrical wiring, on the non-traffic side of the gantry structural members.

ORT Toll Zone Facility Conduit and Junction Boxes

Design and construct required conduits and cabling infrastructure necessary to establish the communications path between fiber-optic trunk line, ORT Toll Zone buildings, gantries, cabinets, and junction boxes. Install the number and size of conduits specified in the ORT Project Specific Drawings. Install conduit, boxes, and related equipment in accordance with the ITS Scope of Work.

Coordinate with the Toll System Integrator in the conduit design and installation.

Provide separation between power and communications conduit as specified in the ORT Project Specific Drawings.

Provide underground concrete encased conduit duct bank when crossing new roadways. Install conduit duct banks such that there is a minimum of 18 inches of cover from pavement subgrade to the top of the duct bank. Trenched conduit, directional bores or jack and bore shall be in accordance with *2006 NCDOT Standard Specifications for Roads and Structures*.

Terminate conduit through the floor slab of ORT Toll Zone Buildings above finished floor elevation. Conduit may enter the building thru the side wall if behind the screen wall.

Furnish conduits stubbed out at all concrete pads with plastic bushings (or comparable material) to prevent cables from being damaged when being pulled through conduits or shifting during use. Clearly label each end of the conduits and include conduit plugs, pull line in each conduit, and tracer wire per Article 1098-4 of the *2006 NCDOT Standard Specifications for Roads and Structures*.

The Toll System Integrator will provide and install conduit from the loop splice boxes to the shoulder. Installation of the conduit is required during the paving of the roadway shoulders and must be coordinated closely with the Toll System Integrator.

Provide rigid metallic conduit in above ground installations.

In accordance with the ORT Project Specific Drawings, an additional auxiliary communications box (just outside the building) and related conduit infrastructure for exiting the building, shall be provided for the westernmost and easternmost mainline ORT Toll Zone Buildings.

ORT Toll Zone Buildings

Design, engineer, fabricate, and erect an ORT Toll Zone Building for each ORT Toll Zone as shown in the ORT Project Specific Drawings. The ORT Toll Zone Building will house ITS equipment and roadside toll collection equipment (provided by the Toll Systems Integrator). The Design-Build Team may propose consolidating the number of required buildings if two or more are located in the same general area. Any such proposed consolidation must be approved by NCTA.

Provide the following ORT Toll Zone Buildings:

Toll 74 Toll Zone ID	Toll Zone or Interchange Name	Location/ Direction	Mainline ORT Bldg (11x14)	Gantry Cabinet Only	Cabinet Pad Typical	Ramp ORT Bldg (11x11)
74-1-1	US 74 Business	EB Off			C	1
74-1-2		WB On			C	1
74-2-1	Indian Trail ML	EB ML	1		A	
74-2-2		WB ML		1	B	
	Indian Trail - Fairview Road	no toll				- -
74-3-1	Lake Park ML	EB ML	1		A	
74-3-2		WB ML		1	B	
74-4-1	Unionville - Indian Trail Road	EB On			C	1
74-4-2		WB Off			C	1
	Rocky River Road	no toll				- -
74-5-1	Unionville ML	EB ML	1		A	
74-5-2		WB ML		1	B	
74-6-1	Concord Hwy - US 601	EB On			C	1
74-6-2		WB Off			C	1
	Morgan Mill Rd NC 200	no toll				- -
74-7-1	Lake Twitty ML	EB ML	1		A	
74-7-2		WB ML		1	B	
	Austin Chaney Road	no toll				- -
74-8-1	Wingate ML	EB ML	1		A	
74-8-2		WB ML		1	B	
	Forest Hills School Road	no toll				- -
	US 74 Business	no toll				- -

Design ORT Toll Zone Buildings to be typical in functionality and appearance throughout the project limits.

ORT Toll Zone Building Site

Design each ORT Toll Zone Building Site following the ORT Project Specific Drawings.

Do not locate the ORT Toll Zone Buildings adjacent to areas that may be subject to the infiltration of water, steam, humidity, heat or other adverse atmospheric or environmental conditions. Avoid site locations that are below water level or near ponding water because of rainfall events. Grade the ORT Toll Zone Site such that water flows away from the buildings.

Locate ORT Toll Zone Buildings away from sources of Electro Magnetic Interference (EMI) including electrical power supply transformers, motors, Magnetic Resonance Imaging (MRI) and X-ray equipment, radio transmitters, radar transmitters, and induction heating devices in order to minimize interference with future communications cabling.

Do not locate ORT Toll Zone Buildings adjacent to sources of constant, excessive, low or high frequency noise, such as air-handling equipment, pumps, and the like.

Do not install equipment and utilities not specifically required for the equipment building, including utility pipes, wiring, cabling, ductwork or other electrical equipment within, through, or under the ORT Toll Zone Building.

Coordinate final positioning of the ORT Toll Zone Building at each site with the Toll System Integrator.

General Configuration

Reference the layout of the ORT Toll Zone Building in the ORT Project Specific Drawings. All mainline ORT Toll Zone Buildings shall be 11-feet x 14-feet and all ramp ORT Toll Zone Buildings shall be 11 feet x 11 feet. Design finish ceiling height to be not less than 9 feet as measured from the finished floor elevation.

Buildings

Provide ORT Toll Zone Buildings of steel, lightweight concrete, or masonry construction that is aesthetically consistent with the Monroe Aesthetic Design Guidelines and does not require painting and/or routine maintenance. Provide prefabricated, pre-cast or conventional masonry brick/block on-site construction. Do not provide timber structures. Provide durable, watertight, secure, facility requiring minimal maintenance. Provide a roofing system with a minimal 20-year warranty, which does not utilize housing shingles.

Design ORT Toll Zone Buildings for a 2 hour fire rating, unless superseded by the North Carolina Fire Code standards.

All conduit and utility penetrations shall be sealed watertight.

Architectural Plans

Prepare an architectural plans package for the ORT Toll Zone Buildings, to include the Architectural, Structural, Electrical, HVAC, and Mechanical Plans, and other documents necessary for a complete turnkey construction of the ORT Toll Zone Buildings. Submit Design calculations including structural, foundations, HVAC and electrical calculations for all components of the ORT Toll Zone Building with plans submitted. A professional engineer registered in the state of North Carolina shall seal all designs, plans and calculations. Design ORT Toll Zone Building to meet all zoning and building code requirements. Prepare the ORT Toll Zone Building plans and designs in accordance with the North Carolina Building Code, latest edition. Provide facility plans that are accurate, legible, and complete in design, drawn to appropriate scales and furnished in reproducible form. Obtain all required permits to construct and occupy ORT Toll Zone Buildings.

Foundation/Sidewalk/ Concrete Maintenance Pad

As shown in the ORT Project Specific Drawings, construct concrete pads that will serve as the building foundation (will serve as maintenance pad, sidewalk, etc.) and equipment cabinet foundations. The building and equipment cabinet foundations shall be 8-inches thick minimum.

The HVAC unit and generator will be located on the building foundation concrete pad as detailed in the ORT Project Specific Drawings.

The ORT Toll Zone Building shall include a 6-inch curb that separates the foundation from the adjacent parking surface. Refer to the ORT Project Specific Drawings for requirements. Provide a ramp from the adjacent parking surface in the vicinity of the door for loading/unloading.

Maintenance Parking

As shown in the ORT Project Specific Drawings, design and construct the Maintenance Parking. The pavement design in the Pavement Management Scope of Work for “All other Service Roads” shall be used for the Maintenance Parking.

HVAC

The Design-Build Team shall design the HVAC system in coordination with the Toll Collection System Integrator. Current heat load requirements provided by the Toll Collection System Integrator require a minimum of a 2-ton HVAC unit for the mainline buildings and a 1-ton HVAC unit for the ramp plazas. These load requirements are based upon estimated toll collection and ITS equipment that will be provided for the Monroe Parkway.

Provide a 10-year life-cycle cost analysis comparing possible mechanical systems using electric, natural gas and propane alternatives for final selection of HVAC System. Provide the most cost effective system, to include the cost of obtaining the initial services.

Furnish ORT Toll Zone Buildings with one heating-ventilation-air-conditioning (HVAC) unit.

Provide a thermostat and install heating and cooling ducts to minimize interference with wall surface area and conflicts with electrical and communication conduits, cable trays, and cabling.

Exterior Doors

Provide exterior access doors that swing outward following the ORT Project Specific Drawings. Provide exterior doors constructed of steel with steel frames. Design and install exterior door to accommodate future access-control keypads and proximity card readers, which shall be installed by the Toll System Integrator. Provide keyed door locks for interim/back-up security. Provide door construction to suitably protect, and seal, and prevent the ingress of water, moisture, dust, gases and wind driven rain into facility.

Doors, frames and hardware shall be extra heavy duty, full flush as defined in SDI A250.8 and shall have a minimum 2-hour fire rating in accordance with ANSI/UL 10C, "Positive Pressure Fire Tests of Door Assemblies", unless superseded by the North Carolina Fire Code Standards.

Additionally, the doors to the ORT Toll Zone Building shall be unobstructed such that a vehicle or portable lift could access these locations.

Interior Finishes

Fully insulate ceiling/roof, exterior walls and any interior partitions. Wall slabs have 2-inch insulation and ceiling shall have 1-inch insulation embedded in the concrete.

Provide exterior walls and ceiling fully finished with moisture resistant, paper-less, high impact gypsum board.

Provide industrial non-slip tile flooring material.

Paint the ORT Toll Zone Building interior with a durable paint material. The interior finish color should be high, bright white semi-gloss.

Lighting

Provide interior lighting consisting of T8 industrial fluorescent lighting fixtures with wall mounted occupancy sensor and manual on/off. Provide a minimum 50 foot-candles of illumination at a 30-inch work plane. Provide battery operated backup emergency packs with integral halogen heads at entrance/ exit. Provide lighting point-by-point calculations for interior lighting as part of Architectural Plan submittal.

Provide motion sensor control, with manual on/off switch, exterior lighting to provide an average maintained lighting level of 1.0 footcandle with a uniformity ratio of 3:1 to 4:1 for the access to the ORT Toll Zone Building and the maintenance parking area. Provide full cut-off exterior lighting fixtures as defined by IESNA and shall be International Dark-Sky Association (IDA) compliant. Provide lighting point-by-point calculations for exterior lighting as part of Architectural Plan submittal. Exterior lighting shall not illuminate the roadway in such a way that it would distract drivers.

Electrical

Provide electrical service to the ORT Toll Zone Buildings.

Mainline ORT Toll Zones:

- Electrical service to the Mainline ORT Toll Zones shall be 120/240V three-phase service.
- Provide an operating voltage of 120/240V at minimum 200 amps.
- Provide electrical power panel in a conventional NEMA 1 surface mount panel board enclosure, which supplies power to the electronic toll and ITS equipment.
- Provide at a minimum a 200 amp Main Breaker with a minimum of 42 circuits.
- Provide at a minimum two (2) two pole breakers coordinated with the Toll System Integrator (typically 50 or 80 amps) and the remaining breakers at 20 amps rated at minimum 18K AIC.

Ramp ORT Toll Zones:

- Electrical service to the Ramp ORT Toll Zones shall be single-phase service.
- Provide an operating voltage of 120/240V at minimum 100 amps.
- Provide electrical power panel in a conventional NEMA 1 surface mount panel board enclosure, which supplies power to the electronic toll equipment.
- Provide at a minimum a 100 amp Main Breaker with a minimum of 24 circuits.
- Provide at a minimum two (2) two-pole breakers coordinated with the Toll System Integrator (typically 50 or 80 amps) and the remaining breakers at 20 amps rated at minimum 18K AIC.

Coordinate with the Toll System Integrator in the design of the electrical loading, ampere capacity rating, circuit poles, etc. for the final power panel design.

Coordinate with the Toll System Integrator to establish electrical power and communication/data service requirements for each toll gantry.

Provide building electrical power to lights, switches, receptacles, HVAC system and other infrastructure items for operating and managing the ORT Toll Zone Building.

Provide the ORT Toll Zone Buildings with 125 volt rated duplex receptacles 10-foot centers at 18 inches above finished floor.

Coordinate with the local utility company(ies), make application(s) in the name of NC Turnpike Authority, and pay all deposit fees to provide necessary electrical and communication services for the ORT Facility(ies). The Design-Build Team shall be responsible for any application and connection fees. The Design Build Team shall be responsible for any utility service installation from the service tap to the ORT Toll Zone Buildings. The Design-Build Team will not be responsible for paying the monthly power bills.

Grounding

Provide a grounding system at all new and revised ORT Toll Zone Building electrical service points unless otherwise specified. In addition to NEC requirements, test grounding electrode resistance at connection point to electrical service ground bus for a maximum of 20 ohms. Furnish and install additional ground rods to grounding electrode system as necessary to meet test requirements. Submit a completed Grounding Test Results form. Provide a length of marker tape 12-inches below finished grade directly over grounding electrodes and conductors.

Lightning Protection

Design and install Lightning Protection System for the ORT Toll Zone Building and Gantry in conformance with and certified by the Lightning Protection Institute (L.P.I.) Installation Code LPI-175. Products shall comply with Underwriters Laboratories, Inc. Master Label Code 96A and NFPA 780. The lightning protection system installer shall submit a UL Master Label and L.P.I. system certification upon completion of the Work.

Standby Generator

Furnish and install a permanent mounted standby generator for uninterrupted electrical service in the case of electrical service failures. The table below shows sizes of generator anticipated for the ORT Toll Zones. Coordinate with the Toll System Integrator in confirming the size of the standby generators.

Anticipated Standby Generator to Power ORT Facility

Mainline Toll Zone - 60 kW

Ramp Toll Zone - 45 kW

Provide standby generator to power each complete ORT Toll Zone to include toll equipment, video tolling cameras and lights, sensors, DMS on gantries, lighting, electrical system, security system, monitoring and HVAC services. Size the propane standby generator to provide 100 percent ORT Toll Zone backup power plus 25% additional capacity for a minimum of 72 hours. Provide standby generator with an automatic transfer switch designed to run after 5 seconds of power outage. Evaluate and include a method for reducing the noise impact caused by the power generators to residences near proposed ORT Toll Zone Building locations. Provide fuel tank with a level sensing device that will interface with future building automation system provided by others. Install a transfer switch to interact and directly communicate with building automation system for critical status indications. Provide Tolls Systems Integrator with Interface

Control Documents (ICDs) for generator and transfer switch to facilitate communications. Design propane fuel tank system compliant with all local, State, and Federal requirements and comply with NFPA 54, National Fuel Gas Code.

Provide a generator in an outdoor-rated housing, with generator mounted on concrete pad by ORT building with clearances required by code. Include a muffled exhaust system for the generator.

Screen Wall

Design decorative screening/wall to visually shield the motorist from viewing the ORT Toll Zone Buildings, including the maintenance parking area and generator pad. Provide decorative screening/wall around two sides of the ORT Toll Zone Building, as shown in the ORT Project Specific Drawings. When roadways are located on two sides of the ORT Toll Zone Building, provide a decorative screening/wall around three sides of the ORT Toll Zone Building, screening the traffic facing sides and the rear side of the building. Design decorative screening/wall consistent with the aesthetic design of the noise wall and retaining wall designs as shown in the Monroe Aesthetic Design Guidelines. Between the wall and the building, provide a washed stone (or similar) surface to facilitate maintenance on conduit entering the building.

Drilling, Foundations, and Supports

Coordinate drilling activities and installation of any foundations or supports with the Toll System Integrator to avoid damage to underground conduit installation.