NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
METROPOLITAN PLANNING ORGANIZATION

REQUEST FOR PROPOSALS
FROM SYSTEM SUPPLIERS TO DELIVER A COMPUTERIZED
ADAPTIVE TRAFFIC SIGNAL CONTROL SYSTEM

JANUARY 14, 2011
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INTRODUCTION
The North Central Texas Council of Governments (NCTCOG) is requesting written proposals
from system suppliers to deliver a computerized adaptive traffic signal control system, all
necessary hardware and software and system integration services related to the successful
installation and operation of the system which shall include signalized intersections in the cities
of Dallas, Plano and Richardson.

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
NCTCOG is a voluntary association of, by, and for local governments, and was established to
assist local governments in planning for common needs, cooperating for mutual benefit, and
coordinating for sound regional development. NCTCOG’s purpose is to strengthen both the
individual and collective power of local governments and to help them recognize regional
opportunities, eliminate unnecessary duplication, and make joint decisions.

BACKGROUND
Since 1974, NCTCOG has served as the Metropolitan Planning Organization (MPO) for
transportation in the Dallas-Fort Worth (DFW) Metropolitan Area. NCTCOG’s Transportation
Department is responsible for regional transportation planning for all modes of transportation.
The Department provides technical support and staff assistance to the Regional Transportation
Council (RTC) and its technical committees, which compose the MPO policy-making structure.
In addition, the Department provides technical assistance to the local governments of North
Central Texas in planning, programming, coordinating, and implementing transportation
decisions.
PURPOSE AND NEED

In 2009, the Dallas Area Rapid Transit (DART) was awarded funds for the Integrated Corridor Management (ICM) Program by the US Department of Transportation. The ICM Program will target Intelligent Transportation System (ITS) technologies and strategies that can be used to support effective corridor operations such as signal timing coordination in conjunction with integrated freeway mainlanes, High Occupancy Vehicle (HOV) lanes, and transit services provided in the US 75 Corridor. The US 75 Corridor is a major north-south radial corridor connecting downtown Dallas with many of the suburbs and cities north of Dallas. US 75 contains a primary freeway, continuous frontage roads, a light-rail line, transit bus service, park-and-ride lots, major regional arterial streets, bike trails, and significant ITS infrastructure. The planning area consists of three cities: Dallas, Richardson and Plano.

The purpose of this Request for Proposals is to solicit written proposals from system suppliers to deliver a computerized adaptive traffic signal control system, all necessary hardware and software and system integration services related to the successful installation and operation of the system which will include signalized intersections in the cities of Dallas, Plano and Richardson. The ICM has approximately 26 traffic signals.

Traffic congestion is ranked as one of the highest concerns of travelers in the Dallas-Fort Worth area, which causes delay on freeway and arterial facilities. Much of the current congestion is concentrated in critical metropolitan corridors that link activity centers and carry high volumes of people and goods. Improving movement through these critical metropolitan corridors could yield significant benefits in terms of reduced travel time and delays and increased reliability and predictability of travel. The current state-of-the-practice is highly disaggregated. Freeway and arterial networks are often subject to unrestrained demands significantly greater than available
capacity. Capacity is often reduced at bottleneck locations such as major interchanges and bridges. However, the ability to shift travel demands between networks and modes during traffic incidents, roadway work zone activity, adverse weather, or simply unusually large traffic demands is severely hampered by lack of information about current conditions (particularly on the arterial networks), and lack of standardized technical means for sharing that information. There is also a lack of institutional collaboration and coordination, and lack of integrated operational strategies and procedures that focus on maximizing the effectiveness of the entire corridor.

In order to achieve effective corridor management, much work needs to be done on advancing the state-of-the-practice in institutional, operational, and technical integration. One solution is coordination of individual network operations between parallel facilities that creates an interconnected system capable of cross network travel management through ICM plans that will result in a reduction in travel times, delays, fuel consumption, emissions, and incidents, and an increase in reliability and predictability of travel. A model deployment on US 75 corridor will demonstrate how proven and emerging ITS technologies can be used to coordinate the operations between separate corridor networks to increase the effective use of the total capacity of the corridor.

**PROJECT SUPPORT**

The project will be conducted under the guidance and supervision of a Project Review Committee (PRC), which will include members of NCTCOG, the Texas Department of Transportation, and the Cities of Dallas, Plano, and Richardson. The responsibilities of the PRC will be to serve as the principal technical review committee for this project. NCTCOG shall serve as project manager to implement a mutually agreed upon scope of work, to champion the project, and monitor weekly
progress. NCTCOG shall also serve as the contract manager and procurement administrator for the project.

**WORK PROGRAM**

The work program for the Computerized Adaptive Traffic Signal Control System is summarized by the tasks outlined below. Consultants are invited to propose modifications to these tasks and to exercise creativity in responding to the project’s needs. Modifications to the tasks and task sequencing which will improve the effectiveness of the study effort, while containing costs, are encouraged.

**SCOPE OF WORK**

Describe your approach for each of the project tasks.

**Task 1.0 - Software Delivery**

The proposed Computerized Adaptive Traffic Signal Control System Software shall be already developed, working, and fully operational at a minimum of three municipal locations in the United States and requiring minimal modifications except specific customization for installation and operation in the three cities, such as arterial and intersection graphics. Software architecture shall be "industry accepted," expandable and shall work under the Windows Operating System XP SP2 or later and an Ethernet Local Area Network environment. Any vehicle detection necessary for the functionality of the adaptive system shall be provided and installed by the vendor as part of this system.

The vendor shall provide contact information for references for a minimum of three municipal agencies in the United States with experience in the deployment, integration and use of the system being proposed by the vendor.
The following is a list of primary functional requirements that the System Software is required to meet:

- Control and monitoring of NEMA, 170 and 2070 traffic signal controllers for approximately 26 existing traffic signals.
- Provide, install and integrate a pedestrian module for approximately two of the existing traffic signals described above.
- It is desirable that the system shall be compatible with the existing local controller hardware (NazTec NEMA TS2 Type 2 Model 980 in Richardson, NazTec Type 2070L in Plano) and software (Version 6.1 in Richardson, Version 65.0P in Plano) and the master system software (Streetwise from NazTec for both Richardson and Plano) and local controller hardware (C-170 in Dallas) and the master system software (Escort for Dallas).
- Collect and analyze intersection traffic data (volumes, occupancy, degree of saturation etc.) in real time.
- Use the traffic data to create new timing patterns dynamically in accordance with traffic variations in real time and automatically implement the timing patterns. The timing patterns shall optimize the traffic flow on the arterials for each traffic pattern. The optimization may include dynamic changes in cycle length, offsets, splits, phasing or any other parameters that achieve the same effect.
- The system shall detect and provide alarms when elements of the adaptive system malfunction. It is desirable that the alarms shall provide English descriptions of the malfunctions, as opposed to coded information.
- The system shall provide the capability to backup and store critical configuration data and traffic data for future use and reporting. The system shall maintain a minimum of three months of data prior to overwriting.
• The system shall provide the capability to provide user-friendly reports on configuration information, daily operation and collected data.

• The system shall provide remote access via a personal computer (PC), laptop computer or Personal Digital Assistant (PDA) device with the appropriate software and user credentials.

• The system shall provide capability for the operator to establish a manual override function for signal changes.

• The system shall provide security and access hierarchy provisions with a minimum of three levels of access (Administrator, Manager/Supervisor, Operator).

• The system shall have the ability to run a fixed time of day pattern if necessary.

• The vendor shall provide system integration and local signal detection.

• The system shall provide graphic video display of intersection/arterial system operations.

• The system shall provide the capability for uploading and downloading from a PC, laptop computer, or PDA device.

The following feature is desired, but not required. The System should be designed such that these features can be incorporated into the System at a future date if desired:

• Integration of closed-circuit television (CCTV).

Describe any other optional features provided by the System.

Task 2 - System and Local Controller Hardware and Software

The System Supplier shall identify all necessary hardware and software that is required for system operation and the functions that each hardware device serves. This includes all communication hardware. The cities use existing wireless communication systems for
communicating between signals and the central operating system or Traffic Management Center (TMC). It is desirable that the communication hardware shall be Internet Protocol (IP) broadband and accommodates future CCTV connections.

Other hardware to be identified by the vendor includes any and all local and system detection hardware and software necessary for the proper operation of adaptive control. All hardware and software that is to be supplied by the vendor shall be clearly identified. It is envisioned that an existing local area network (LAN) of PCs will access the system and that city-supplied laptop computers or PDAs will be used to remotely access and control the system. Laptop computers, PCs and PDAs are not a part of this contract and will be provided by others. The vendor shall install the software on at least one laptop and one PC for each of the three cities, in addition to providing assistance as necessary for loading software onto additional laptops or PCs. Software licenses shall be provided as a part of this contract, at no additional cost for a minimum of 10 PCs and 5 laptops and 10 PDAs.

The central system and each signal installation shall provide a watchdog circuit to reset the system in the event of a malfunction. The system shall also provide a recovery function in case of power failure or power anomalies.

Task 3 - System Implementation
The System Supplier shall integrate all of the traffic signals in this contract for each of the cities. City forces will install all hardware including controller hardware and the communication system. The vendor shall make the appropriate personnel available to assist in the installation as needed. The integration of all equipment at the city facilities (City Hall/TMC) is the responsibility
of the vendor. Addresses of the three city facilities will be provided to the vendor. It is the responsibility of the vendor to arrange access to city facilities or equipment during city working hours a minimum of 10 working days in advance. Working days are defined as days of normal operation in that city.

Task 4 - System Support

The vendor shall provide necessary on-site and off-site support as appropriate during the system implementation, integration and testing. A testing plan shall be provided by the vendor, subject to review and approval by city staff, a minimum of 15 working days after notice to proceed or award of contract. The vendor shall participate in testing the system and provide a record of the system acceptance test in the form of a traceability matrix. In addition, upon full completion and acceptance of the system, the vendor shall support the software (error corrections and updates) for a period of 5 years.

Task 5 - Documentation/Training

System Supplier shall provide the following system documents in electronic and paper (minimum one copy for each city) format:

- System Operations/Configuration Manual
- User Manual
- Maintenance Manual

The outline and content of these documents shall be subject to approval by the Cities and NCTCOG. The vendor shall provide training for both engineering and maintenance staff during all aspects of implementation and system operations. No more than 40 hours of training shall be assumed for this task.
Task 6 – System Details/Product Specifications for Computerized Adaptive Traffic Signal Control System

This work shall consist of furnishing, configuring, system integration and any incidental work necessary for placing into operation an adaptive traffic control system, which detects and collects vehicle data by processing vehicle detection information and automatically optimizes the operation of traffic signals in response to real time traffic demands. The system shall have remote monitoring and configuring capability, and shall be compliant with applicable IEEE and NEMA standards. The equipment shall meet the NEMA environmental, power, surge and other ratings according to the latest NEMA specifications. Watchdog circuits and automated recovery from power failure or power irregularities shall be provided as part of the system. The system provided shall include all equipment listed and described in this document and shall include any incidental items necessary for the proper operation of the system according to design.

6.1 Material

Cabling and devices provided through this contract shall be suitable for the environment in which they are placed and designed for multiple repetitions of connection and disconnection. Equipment and material shall be of new stock unless the contract expressly provides for relocation of existing units or use of units furnished by others. New equipment and material shall be the product of established manufacturers, conform to applicable requirements of CALTRANS 170 Specifications, ICEA, IMSA, ITE, MUTCD, NEMA, RETMA, NEX and applicable regulations of the National Board of Fire Underwriters and National Board of Electrical Underwriters. Product cut sheets or appropriate documentation shall be provided for review and approval by the cities and NCTCOG prior to installation.
6.2. System Components

The adaptive traffic control system shall consist of a vehicle detection system, field elements and field processors which shall be shelf or rack mounted in the traffic signal control cabinets. It is desirable that the system be compatible with the traffic signal controllers, communication system, and central operating system of each of the three participating cities. The adaptive traffic control system shall include a pedestrian module for two intersections. Final locations for these pedestrian intersections will be provided. A preliminary listing of locations is provided in the table on page 15. The adaptive traffic control system shall include the operating software and the interface to the TMC at each city. The system software shall provide the capability of remote configuration, monitoring and reporting at each city’s TMC and laptop configuration at the controller. The system shall collect archivable real time traffic data, including vehicle counts, stop delay and vehicle presence, and real time queue lengths along each approach. The detection shall be capable of detecting multiple vehicles within a single detection zone.

Level of service display and a minimum of 12 detection zones per intersection quadrant are also desirable. This information shall be provided at the TMC for each of the three applicable cities, using the system provided through this contract and the communications system provided by each city. The system software shall communicate to the signal controllers on a real time basis.

If cameras are used for detection, the following attributes are desirable:

- Views selectable at the applicable TMC without cable swaps,
- Cameras providing a minimum of 30 frames per second color video,
- Cameras in a secure, weather rated housing.

6.3. Processing Unit (PU)
The PU shall be available with either a NEMA TS1/TS2 or type 170 detector interface, according to the needs of each city. It is desirable that outputs be compatible with NEMA TS1 and NEMA TS2 standards.

The PU shall provide historical split information and shall compute and deploy optimized signal splits based on historical information or predetermined traffic signal timing plans, if the system goes into an emergency mode or is no longer capable of adaptive function.

The PU shall suspend, for the necessary time, its inputs to a controller when calls of a higher priority are received due to pedestrians, emergency vehicles equipped with preemption, or other determined parameters set by the TMC for each of the three cities.

The PU shall optimize the flow of traffic at both intersections and arterials based on the possible states of traffic, within certain defined parameters, rather than required splits, cycles and offsets.

The PU shall be capable of functioning in a detector mode or adaptive mode selectable by time of day and day of week. It is required for the system to have the capability to revert to timing plans and back to adaptive mode based on remote control from the TMC.

6.4. Vehicle Detection
Detection zones shall detect multiple vehicles within a single detection zone. When a vehicle is detected, the detection information shall be available via a display at the TMC and via a laptop computer connected at the controller. An operator at the TMC or with a laptop at the controller shall be able to communicate directly with the system using a standard Internet Browser or interface provided as a part of the adaptive system.
6.5. Cable

The Ethernet cable shall be shielded, environmentally hardened Ethernet cable appropriate for outdoor use.

The operating temperature shall be from -40° C to +70° C. The cable shall conform to the applicable ISO/IEC 11801 Category 5e, NEMA WC 63, and ANSI/TIA/EIA 568-B.2 Category 5e standards. The cable shall be without splicing or joints for a single run. The contractor shall obtain instructions from the manufacturer about alternate architecture and shall supply Ethernet extenders when the length of a single run of Ethernet cable exceeds 320 feet. Ethernet cable connections shall meet the manufacturer’s standards and testing shall follow the manufacturer’s guidelines.

Power cable shall be 14 AWG three-conductor cable. This cable shall comply with the requirements of IMSA Specification 19-1.

6.6 Adaptive Traffic Signal Control

The adaptive traffic control module shall be contained within the PU. The PU shall communicate with neighboring PUs over an Ethernet network. The PUs shall communicate information such as the green and red status of signal, queue lengths, and traffic volumes in real time. Based on such information received from adjacent signals and local traffic data, the PU shall optimize the phasing sequence, duration, and initiation of movements in order to optimize traffic flow on arterials as well as arterial networks.

The adaptive traffic control shall not use common cycle lengths but shall use principles of robotics and artificial intelligence to optimize traffic flow. The optimization shall be real time using principles of finite state changing machine and shall not involve switching between cycle
lengths. The system shall not be in transition at any time but shall respond to real-time inputs with changing of states.

The supplier’s engineers shall configure the adaptive traffic signal control system for optimal operation of the arterial or arterial network. Traffic flow and anomalous traffic conditions shall be programmed into the adaptive traffic signal control system.

The parameters for the adaptive traffic signal control shall be capable of being configured remotely over the Ethernet network. The control application shall be capable of being loaded on a computer with Windows Operating System XP SP2 or later. The software shall also display traffic signal status and detector information.

6.7. Installation
The adaptive traffic control system shall be installed as recommended by the manufacturer and as documented in the installation materials provided by the supplier. A factory certified representative from the supplier shall be on-site as necessary for system integration, installation, configuration, testing and troubleshooting. The testing plan for the system acceptance shall be based on the manufacturers’ requirements. All requirements of the system and all requirements of the Request for Proposals shall be tested and documented to provide verification that all requirements have been met prior to system acceptance.

6.8. Warranty
The adaptive traffic control system shall be warranted to be free of defects in material workmanship for a minimum of two years.
During the warranty period, technical support shall be available from the supplier via telephone within eight hours of the time a call is made by the user during normal working days. Normal working days are defined as Monday through Friday on non-federal holidays. It is desirable that technical support also be provided on weekends and holidays. This support shall be available from factory certified personnel or factory certified installers.

6.9 Maintenance and Support

The supplier shall maintain an adequate inventory of parts to support maintenance and repair of the adaptive traffic control system. Replacement parts shall be available for delivery within 30 days of an order at the supplier's current pricing.

The supplier shall maintain an ongoing program of technical support for the adaptive traffic control system. This technical support shall be available via telephone, or via personnel sent to the installation site upon placement of an order at the supplier's current pricing and terms of sale for on-site technical support services.

6.10. Locations

It is anticipated that the approximate distribution and locations of field services provided will be as follows:

- City of Dallas – Two (2) Adaptive Systems without pedestrian optimization locations
- City of Richardson – Fifteen (15) Adaptive Systems without pedestrian optimization locations
- City of Plano – Nine (9) Adaptive Systems (seven Adaptive Systems without pedestrian optimization locations, two locations need pedestrian optimization.)
# Proposed Adaptive Signal Installation Locations

<table>
<thead>
<tr>
<th>Intersection Number</th>
<th>Main Street</th>
<th>Cross Street</th>
<th>Notes</th>
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<tbody>
<tr>
<td><strong>Dallas</strong></td>
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<tr>
<td>1</td>
<td>Greenville</td>
<td>Amberton</td>
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<tr>
<td>2</td>
<td>Greenville</td>
<td>Walnut</td>
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<tr>
<td><strong>Richardson</strong></td>
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<td>3</td>
<td>Greenville</td>
<td>Buckingham</td>
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<td>4</td>
<td>Greenville</td>
<td>Centennial</td>
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<td>5</td>
<td>Greenville</td>
<td>Spring Valley</td>
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<td>6</td>
<td>Greenville</td>
<td>Polk</td>
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<td>Main</td>
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<td>8</td>
<td>Greenville</td>
<td>Jackson</td>
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<td>9</td>
<td>Greenville</td>
<td>Arapaho</td>
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<tr>
<td>10</td>
<td>US 75</td>
<td>Arapaho</td>
<td>Requires Ethernet extender</td>
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<tr>
<td>11</td>
<td>Greenville</td>
<td>Collins</td>
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<td>12</td>
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<td>Campbell</td>
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<td>Plano</td>
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<td>15</td>
<td>Plano Road</td>
<td>Lookout</td>
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<td>16</td>
<td>Plano Road</td>
<td>Renner</td>
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<td>PGBT</td>
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<td><strong>Plano</strong></td>
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<tr>
<td>18</td>
<td>Avenue K</td>
<td>Plano Pkwy</td>
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<tr>
<td>19</td>
<td>Avenue K / Municipal</td>
<td>14th St</td>
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</tr>
<tr>
<td>20</td>
<td>Avenue K / Municipal</td>
<td>15th St</td>
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<td>21</td>
<td>Avenue K</td>
<td>18th St</td>
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<td>Park</td>
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<td>Parker</td>
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<td>Park</td>
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<td>25</td>
<td>Parker</td>
<td>Archerwood</td>
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<tr>
<td>26</td>
<td>US 75</td>
<td>Parker</td>
<td>Requires Ethernet extender</td>
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SCHEDULE
The consultant will develop a schedule of tasks according to the project schedule and related task schedule described in detail in the scope of services. The timetable shall not exceed four months from the date the consultant is authorized to proceed. The consultant schedule shall be based on an anticipated Notice To Proceed (NTP) in April 2011 and a completion deadline by July 31, 2011. NCTCOG may issue phased NTPs for each of the three jurisdictions.

CONSULTANT SELECTION CRITERIA
The Consultant Selection Committee (CSC) will review all proposals and select a firm it considers qualified to undertake the project. The following criteria will be used to evaluate the proposals:

1. Project Understanding 25 percent
2. Scope of Services 25 percent
3. Project Manager/Staff Qualifications 20 percent
4. Project Cost 15 percent
5. Firm Qualifications/Consultant References 10 percent
6. Study Schedule 5 percent

If the CSC determines that interviews will be required before a final decision can be made, the interviews will take place at the NCTCOG offices in Arlington, Texas, on Tuesday, March 1, 2011. Proposers should be willing and able to attend these interviews, if necessary. Consultants who are invited to an interview will be notified the week of February 21, 2011, that an interview has been scheduled. Costs for developing the proposal and costs attributed to interviews (and subsequent negotiations) are at the proposer’s own expense and will not be reimbursed by NCTCOG.
Other requirements are that the Disadvantaged Business Enterprise participation must meet the 4.84 percent goal indentified for this type of procurement and that an Affirmative Action Plan is included in the Proposal. Failure to comply with these requirements may result in finding the Proposal non-responsive.

Following final negotiations of the work plan and costs satisfactory to NCTCOG, the consultant will be asked to execute a contract with NCTCOG. A Notice to Proceed will be issued upon execution of the contract. NCTCOG reserves the right to reject any and all proposals, to contract for any or all portions of the project with the selected consultant, or to hire multiple firms.

The successful responder(s) to this Request for Proposals is expected to provide qualified personnel to accomplish each portion of the work in this study. NCTCOG will maintain the right to request the removal of any personnel found, in its opinion, during the course of work on this project, to be unqualified to perform the work.

The Sample Contract, provided in this transmittal, contains federal requirements which must be included with all proposals submitted. Appendices C through K of the sample contract contain compliance requirements and certification forms which must accompany the proposal. Failure to comply with these requirements may result in finding the Proposal non-responsive.

All questions (including technical, contract, or administrative questions) regarding the services required should be submitted to Marian Pardue, Grants and Contracts Manager, by email to mpardue@nctcog.org. Please submit all inquiries by Friday, January 29, 2011. NCTCOG reserves the right to respond to inquiries as it deems necessary.