

## Request for Information



### Advanced Transportation Management System Central Software and Local Signalized Intersection Controller Hardware Solutions

**RFI #2009-122208-2205**

**December 22, 2008**

City of Newport News, Dept. of Purchasing  
Office of the Purchasing Director  
2400 Washington Avenue, 4th Floor, City Hall  
Newport News, VA 23607  
Phone: (757) 926-8031/ Fax: (757) 926-8038  
[www.nngov.com/purchasing](http://www.nngov.com/purchasing)

Sealed responses, subject to the conditions and instructions contained herein, will be received at the above office of the Purchasing Director, until the time and date shown below (local prevailing time), for providing the information requested for consideration to be identified as the City of Newport News' Advanced Transportation Management System Software/Local Signalized Intersection Controller Hardware Standard described in the Request for Information.

**Scope of Work:** To obtain information to identify an Advanced Transportation Management System (ATMS) Software/Local Signalized Intersection Controller Hardware Standard for use in future City of Newport News ATMS and signalized intersection installations and deployments.

**Responses Due: January 16, 2009, at Close of Business**

**Contract Officer:** \_\_\_\_\_  
Bill Lindsey, CPPO, C.P.M., Procurement Administrator, (757) 926-8031

**\*AN ORIGINAL AND TEN (10) COPIES OF YOUR SUBMITTAL IS REQUESTED\***  
In compliance with this Request for Information, and subject to all the conditions thereof, the undersigned offers to furnish the information requested and certifies he has read, understands, and agrees to all terms, conditions, and requirements of this request for information.

Company Name: \_\_\_\_\_

Address: \_\_\_\_\_

City/State/Zip: \_\_\_\_\_

Telephone: \_\_\_\_\_ FAX No.: \_\_\_\_\_

Email address \_\_\_\_\_ Federal Tax ID #): \_\_\_\_\_

Print Name: \_\_\_\_\_ Title: \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

## 1. CONDITIONS AND INSTRUCTIONS

1. All responses must be submitted on and in accordance with this form. If more space is required to furnish a description of information requested, the supplier may attach a letter hereto, which will be made a part of the response. All responses must be submitted in a sealed package, plainly marked using RFI number, date and time.
2. It will be the responsibility of the supplier to see that his response is in this office by the specified time and date. Date of postmark will not be considered. Telephone, fax, electronic and verbal responses will not be accepted.
3. All responses must be signed with the firm name and by a responsible officer or employee. Obligations assumed by such signature must be fulfilled.
4. Direct contact with any City Department other than Purchasing, on the subject of this response is expressly forbidden except with the foreknowledge and permission of the Director of Purchasing or their representative.
5. If City Hall is closed for business at the time scheduled for the response opening, sealed responses will be accepted and opened on the next business day of the City, at the originally scheduled hour.
6. If you have obtained this RFI from our home page or from a source other than directly from the City of Newport News or from demandstar.com, you are not on record as a plan holder. The Purchasing Department takes no responsibility to provide addenda to parties not listed by the City as plan holders. It is the supplier's responsibility to check with our office prior to submitting your response to ensure that you have a complete, up-to-date package. The original copy maintained at our offices, in the RFI file folder, shall be considered the official copy. In the case of any inconsistency between RFI documents submitted to the City, but not clearly listed on the exception page of the document as an exception by the supplier, the language of the official copy shall prevail. Furthermore, any exception or changes made by the supplier may be cause to disqualify your response.
7. The supplier acknowledges that their response does not commit the City of Newport News to pay any costs incurred in the preparation and submission of the response.
8. Questions: Submit questions regarding the RFI in writing to Bill Lindsey, CPPO, C.P.M., Procurement Administrator, no later than January 6, 2009. Questions shall be submitted by email to: [blindsey@nngov.com](mailto:blindsey@nngov.com). Questions and responses may be posted as an addendum to the RFI. The addendum will be posted on the City of Newport News Procurement Website.

## **2. CONTENTS OF RFI RESPONSES (STATEMENTS OF INFORMATION)**

### **2.1 GENERAL**

The City of Newport News is seeking information from suppliers of technical solutions to assist in identifying a Central Signal System Software and Local Controller/Cabinet Hardware standard for use by the City in future installations.

### **2.2 PROJECT OVERVIEW**

The City of Newport News is in the process of upgrading their Traffic Signal System, which is approximately 20 years old. The upgrade is planned to include new traffic signal controller cabinets; new traffic signal controllers; central traffic control hardware and software; Advance Transportation Management System (ATMS) equipment including Closed Circuit Television (CCTV) Cameras, Dynamic Message Signs (DMS), and vehicle detectors; and new communications infrastructure. The purpose of the Request for Information (RFI) is to initiate a process of to identify a central Signal System Software and Local Controller/Cabinet Hardware standard for use by the City. This standard will be based on the ability of a technical solution to best support the operations and maintenance requirements; a suppliers' history, track record, and experience of supplying quality, successful solutions and equipment; and their long term support of such solutions and equipment. This standard, once established, will be used by the City to purchase local controller hardware and central software. Future purchases that are anticipated are the cabinets, controllers, and central software that will be part of the full system replacement. These purchases may be made directly by the City, other agencies furnishing equipment and/or software for use in the City signal system, or third party contractors supplying equipment and/or software for use in the City signal system. This replacement project is currently scheduled to begin in early 2010. During the first construction phase beginning in 2010, it is anticipated to upgrade approximately 260 traffic signal controllers and cabinets. The project will also install central system software at the City's new traffic operations center that will be created under this planned project. The improvements that will be undertaken are based on the City's Signal System Feasibility Study and ITS Master Plan that were completed in 2006.

Materials and/or software will not be purchased within this RFI. However, suppliers must participate in this initial RFI and subsequent steps in order to move forward through the process if they desire to be eligible to be identified as the City's traffic cabinet/controller hardware and central software standard. An exhibit (Attachment A) depicting the project area is attached for information.

### **2.3 PROPOSED ATMS STANDARD SELECTION PROCESS:**

The City will undertake a multi-step process to identify a central system software and equipment standard. The City reserves the right to modify this process or abandon this process at its discretion at any stage of the process. Following is a narrative description of the proposed process.

1. Suppliers are invited to submit Statements of Information in response to this RFI. Responses to this RFI will be evaluated based on meeting the criteria identified in section 2.4. Respondents meeting all four criteria will be invited to the subsequent phase of the evaluation. Those respondents not meeting the criteria will not be invited to the subsequent phase.
2. A shortlist of suppliers meeting the requirement set forth in this RFI will be invited to present their compliance with the functional requirements of this system, their technical solution, their staff qualifications, and their implementation experience to the Newport News Cabinet/Controller Equipment and Signal System Software Standards Committee for review and evaluation.

3. Based on the presentations and submitted materials, a subset of those suppliers invited to present to the committee will be invited prepare and submit a detailed technical approach and a cost estimate for their proposed solution. The cost estimate will be used to help evaluate the reasonableness of the solution relative to existing and anticipated funding available to the City. Also, these suppliers will be invited to participate in a software bench test where the user interfaces of their solution and equipment will be evaluated in a laboratory setting and the features rated against the system functional requirements.

The Committee will evaluate the technical approach, the implementation experience, staff, bench test results, and proposed costs of the remaining suppliers. The City will identify the solution and hardware that best meets the needs and requirements of the City. This solution will be identified as the City of Newport News standard for traffic cabinet/controller hardware and central ATMS software

## **2.4 RFI EVALUATION CRITERIA:**

The response to the RFI will be evaluated on the criteria described in subsections 2.4.1 through 2.4.4. All criteria must be met to be invited to present to the Committee. Presentation formats, dates and times, specific evaluation criteria, and detailed system functional requirements will be transmitted to those suppliers invited to present to the Committee. Likewise, for suppliers who advance further through the evaluation, formats of materials and testing procedures will be provided in advanced for those evaluation phases.

### **2.4.1 STAFF QUALIFICATIONS**

The statement of information must include an organization chart showing the supplier's project manager and all key personnel and their role in the project, along with 1-page resumes for up to 5 key personnel. If associate suppliers are proposed, their proposed role and up to two staff resumes of no more than 1-page may be submitted. For the Prime supplier and all associate suppliers, please state the full name and role of each firm participating on the supplier's team, and clearly indicate which supplier is the prime. Include a letter from each associate vendor committing to their role on the team, where appropriate.

### **2.4.2 LOCATION QUALIFICATIONS**

The supplier must have a North American Office, the supplier's project manager must be based in North America, and the supplier must demonstrate the availability of permanent, North American based maintenance and technical support staff able to answer technical support phone call during normal business hours for the City of Newport News (8AM – 5PM, Eastern Time) and able to provide on-site support within 24-hours. If associate vendors will be utilized, they also must meet the location requirements and the technical support requirements for the components they will be providing.

### **2.4.3 FEATURES OF TECHNICAL SOLUTIONS**

The solution proposed by the supplier in response to the RFI shall have the following technical features:

- Centrally distributed system (not closed loop system)
- Meets High-Level Functional Requirements in "Attachment B"
- Meets NEMA TS-2 standards
- Support multiple central operation facilities

### **2.4.4 EXPERIENCE QUALIFICATIONS**

The solution proposed by the supplier in response to the RFI shall have been in current operation in at least three existing North American deployments for at least one year. The following system features shall be a characteristic of at least two of these deployments.

- A minimum of one hundred and fifty (150) TS-2 Type 1 controllers.
- IP/Ethernet protocols for communications to at least 75% of field controllers on a communications network consisting of primarily fiber optic cable.

- Shall be operated from a traffic operations center (TOC) or similar facility and shall be a central, distributed processing system (not a closed loop system).

For those suppliers who are able to demonstrate a solution meeting the requirements of sub-section 2.4.4, alternate technical solutions may be presented to the committee for consideration if invited to subsequent phases of the evaluation.

## 2.5 LETTER OF SUBMITTAL

Submit *one* original (conspicuously marked “ORIGINAL”) and ten (Total of eleven documents) complete copies (including any/all special attachments, certifications, etc.) of the statement of information package. Include all information requested and any other information thought to be relevant to completely address the Request for Information (RFI) requirements. Also provide a copy of the materials in portable document format (PDF) on CD ROM or DVD. Each proposal shall be organized and bound separately, and shall include as a minimum, the following to be considered *responsive* to the RFI: Limit response to 10 pages exclusive of resumes, reference forms.

- a. Cover letter.
  - b. Provide a description of the supplier and statement of information and understanding of the project as it relates to the criteria in section 2.4.
  - c. Reference list of at least three (3) localities and/or firms that have requested similar work which your firm has provided services for; include names, addresses, and telephone numbers. At a minimum, references must be provided for the deployments cited in section 2.4.4.
1. Response Preparation:
- a. Responses shall be signed by an authorized representative of the supplier. All information requested should be submitted. Failure to submit all information requested may result in the requesting agency requiring prompt submission of missing information. Responses which are substantially incomplete or lack key information may be rejected.
  - b. Responses should be prepared simply and economically, providing a straightforward, concise description of capabilities to satisfy the requirements of the RFI. Emphasis should be placed on completeness and clarity of content.
  - c. Each copy of the response should be bound or contained in a single volume where practical. All documentation submitted with the proposal should be contained in that single volume.
  - d. Ownership of all data, materials and documentation originated and prepared for the RFI response shall belong exclusively to the City of Newport News and shall be subject to public inspection in accordance with the Virginia Freedom of Information Act. Trade secrets or proprietary information submitted by a supplier shall not be subject to public disclosure under the Virginia Freedom of Information Act; however, the supplier must invoke the protections of Section 2.2-4342 (F) of the Code of Virginia, in writing, either before or at the time the data or other material is submitted. The written notice must specifically identify the data or materials to be protected and state the reasons why protection is necessary. The proprietary or trade secret material should be submitted in a separate sealed envelope and marked proprietary. The classification of an entire proposal document, line item prices and/or total solution prices as proprietary or trade secrets is not acceptable and will result in rejection of the response.

REFERENCE FORMS

**Reference 1**

Name of Business, City, County, or Agency	Street Address	City & State	Contract Dates
Contact	Title	Telephone	Email Address
Description of Work Performed:			

**Reference 2**

Name of Business, City, County, or Agency	Street Address	City & State	Contract Dates
Contact	Title	Telephone	Email Address
Description of Work Performed:			

**Reference 3**

Name of Business, City, County, or Agency	Street Address	City & State	Contract Dates
Contact	Title	Telephone	Email Address
Description of Work Performed:			

**Attachment B – High-Level System Functional Requirements**

ATTACHMENT A  
PROJECT AREA MAP

ATTACHMENT B

HIGH-LEVEL SYSTEM FUNCTIONAL REQUIREMENTS

## **1 Platform/Architecture & System Administration Requirements**

### **1.1 High Level System Description**

These requirements describe an arterial traffic management system that purchased as part of the ATMS following the preparation of design plans and specifications. It includes the necessary central system hardware and software to monitor and control approximately 500 traffic signal controllers and 500 system detectors in an Ethernet network over city-owned fiber optic cables. Newport News will have two fully functional traffic management center locations having the same functionality—one at the Operations Center and one at City Hall. The system shall be sufficiently stable to run continuously (i.e. 24/7) and unattended outside of standard hours.

The proposed system shall have a central architecture, where the central system will communicate directly with each local traffic signal to provide signal controller upload and download database capabilities (i.e. no field master locations).

The system shall have a client-server architecture and be Microsoft Windows-based, with an intuitive graphical user interface (GUI), mapping and display functionality, and seamless cutting and pasting between standard Windows applications such as Microsoft Office Word and Excel. All system information shall be stored in a centralized multi-user database. It shall monitor system components and alert operators of unexpected conditions, log all important activity, provide device status displays on command, and allow the creation of a variety of reports to help operators manage system performance.

The system shall include centralized traffic control functionality such as traffic responsive plan selection, and allow intersections to dynamically move from one control group to another. However, control should be distributed and should an intersection lose communications with the central system, it should revert to its local time base coordination plan. The system shall accommodate the future application of transit vehicle priority and existing and future emergency vehicle preemption.

### **1.2 System Architecture**

Modern traffic management systems are typically designed around a computer cluster acting as server(s) to a constellation of operator workstations acting as client(s). This is typically described as a “client-server” architecture. The server(s) manage field communications (center to field device), and collect and process field device data into traffic information. The system provides traffic information to human operators through the operator workstations. It also makes available historical information

## **Attachment B – High-Level System Functional Requirements**

through reports generated from a database. The system shall have a client-server architecture that accommodates multiple concurrent users.

### ***1.2.1 Operating System (OS)***

The operating system for servers shall be Microsoft Windows 2008 Server Standard Edition (or the equivalent of a later version if available). The operating system for client workstations and laptops shall be Microsoft Windows Vista Professional (or the equivalent version if newer Microsoft operating system is available).

### ***1.2.2 Local Area Network (LAN)***

The LAN shall be gigabit Ethernet. Hardware shall be provided to connect servers, workstations, printers and other devices. A switch shall be provided at each field cabinet, traffic management center, and access point locations that can accommodate all LAN devices with 25% spare capacity. The network shall be based on a Gigabit Ethernet platform over single-mode fiber optic cabling configured in a ring topology to field devices. Where possible based upon available diversified cable routes, physical rings shall be established to provide reliable communications between field devices and the central system. The ATMS Gigabit Ethernet network shall be segmented so that it is not a part of the Citywide IT network in order to minimize data latency and bandwidth conflicts associated with distributing digital video across the ATMS network.

A multi-point serial concentrator shall be provided for connectivity to dial-up remote access modems.

Layer-3 network switches shall be provided to connect LANs at the Operations Center and Newport News City Hall traffic management center locations as well as field device locations.

Firewalls shall be provided and be appropriately configured for proper security for interfaces with other City departments, external organizations, and/or the Internet.

### ***1.3 GPS Clock***

A Network Time Protocol (NTP) clock using Global Positioning Systems (GPS) to maintain accurate time shall be provided. It shall be the NTP server on the LAN from which all devices obtain their time. A secondary/backup time server shall be established for the system using either publicly available NTP servers over the Internet, or via the City's intranet.

### ***1.4 Uninterruptible Power Supplies (UPS)***

Uninterruptible Power Supplies shall be included that can support all central system components—including workstations—running without disruption for at least the first 30 minutes of a power outage. The UPS shall initiate an orderly shutdown of all operating systems prior to loss of UPS power. At least two rack-mount UPS' shall be provided for the central servers. Each UPS shall be no larger than 3RU high and shall have the server loads distributed between them. Dual power supply cords from each server shall be divided between two UPS devices. UPS power management software shall be provided for connected servers to fail over to the secondary UPS in the event the other UPS fails or is taken off-line

## **Attachment B – High-Level System Functional Requirements**

for maintenance, exchanging batteries, etc. The software shall provide the functionality to automatically shut-down the attached servers only if both of the UPS devices lose primary power.

### **1.5 Multiple Site Access**

The system shall allow multiple users from one or more locations (i.e. both traffic management centers, field network locations, etc.) to access the system concurrently over an Ethernet-attached network interface, virtual private network (VPN) over the Internet, or via dial-up remote access telephone lines.

### **1.6 Data Backups**

Hard drive images for each server and workstation shall be provided on DVD that can restore all computers to their settings at system acceptance, i.e., including all installed software and all database configurations.

Engineering/IT will backup the ATMS server(s) from City Hall as part of normal backup routines for remaining IT application servers.

## **2 System Capacity**

The system shall accommodate at least 500 controllers.

The system shall accommodate at least 50 control groups (i.e. coordinated systems).

The system shall accommodate at least 500 system detectors.

The system shall accommodate at least 20 concurrent users, including remote users.

## **3 Security/Reliability**

### **3.1 Start-up and Shutdown**

At initial startup, the system shall begin normal operation with no prior state information.

The system shall save all data and end all processes in an orderly manner at user-initiated system shutdown.

The system shall save all data and end all processes in an orderly manner upon shutdown of the operating system.

Startup and shutdown operations shall be logged and/or initiate a user-defined alarm, where possible.

### **3.2 User Access Permissions**

The system shall recognize different levels of user permissions that allow user-configurable read and/or write access to various system functions. Three permissions levels to which users can be assigned shall be pre-configured:

- Administrator (full access)

## **Attachment B – High-Level System Functional Requirements**

- User (full access with the exception of low-level OS and system administration functions not needed on a daily basis such as setting user permissions, adding or removing system devices, etc.)
- Limited user (read-only access)

All login and logout activity shall be logged.

### **3.3 Remote Access**

Users shall be able to access the system remotely via dial-up or VPN over the Internet. Web browser-based remote access shall also be supported.

### **3.4 Paging**

The system shall have the ability to send pages. The system shall be configurable to page numbers at user-defined alarm conditions. The system shall allow the user to configure which number(s) are paged for different alarm conditions. The system shall be configurable to page different numbers at different times of day and day of the week.

### **3.5 Clock Synchronization**

The system shall be able to broadcast time to servers, workstations, field controllers, and field devices at user defined intervals. Servers shall keep their system time synchronized with the NTP server at all times. Workstations shall synchronize their clocks to the NTP server at login.

## **4 System Feature Requirements**

### **4.1 Graphical User Interface**

The graphical user interface (GUI) shall be the primary means to access system features and displays. It shall conform to Microsoft Windows standards and be consistent, intuitive and easy-to-navigate. It shall make use of menus, dialog boxes and icons, to minimize reliance on a manual for most tasks.

Keyboard shortcuts shall be provided for common system functions.

The system shall use traffic engineering terminology throughout.

Displays shall not affect system performance.

### **4.2 System Map**

The system shall support the display of a system map of the City of Newport News with icons denoting system devices and various status levels for different devices. The map will be dynamic in nature such that the background can be updated without reconfiguring the system device icons.

## **Attachment B – High-Level System Functional Requirements**

System maps shall support a variety of vector and raster graphics formats as the background. Supported vector formats shall include:

- ESRI shape files
- CAD drawings (.dwg, .dxf, .dgn)
- Spatial database engine (SDE) layers

Supported raster file formats shall include:

- Bitmap (.bmp)
- JPEG (.jpg)
- Tagged Image File Format (TIFF) (.tif)

### **4.3 Panning, Zooming, and Layers**

The system map shall support panning and zooming.

The system map shall support multiple layers so that different types of background information can be turned on and off as desired. Panning and zooming shall not cause layers to misalign. For ESRI shape file layers, the user shall have the ability to change colors, fonts and line weights. The user shall be able to re-order layers without removing and re-adding.

The user shall be able to set a minimum zoom level for each layer and system device on the map. This shall be the zoom level beyond which the layer or device is not viewable. This controls the level of detail/information shown when viewing a wide geographic area.

Map icons shall be user-selectable and change in size commensurate with the zoom level.

The system shall allow the user to define saved map views that can be selected later. For instance, users should be able to select a saved map view to quickly zoom to a particular control group or geographic area of the city.

### **4.4 Adding and Modifying Devices or Objects**

These devices shall be selectable from the map so the user can view status and properties, or edit parameters or settings. These icons shall update in real-time at a refresh rate of once per second to show high-level status such as the mode of operation at an intersection.

The user shall be able to assign system detectors to directional links to show congestion levels based on the measurements of those system detectors and user-defined thresholds. Link congestion status shall be updated a minimum of once per second.

The map GUI shall provide a straightforward means to add devices to the map, remove devices from the map, or move devices on the map.

## **Attachment B – High-Level System Functional Requirements**

The map shall support display of a user-editable legend defining icons.

The user shall be able to assign hyperlinks to icons on the map so that clicking on the hyperlink automatically opens a web browser window to the specified URL (e.g. Intranet/Internet address).

## **5 Intersection Monitoring**

The system shall provide the user the ability to monitor individual intersections to view their operation and status in real-time.

### **5.1 Intersection Maps**

The system shall provide the ability to view static and dynamic intersection information in real-time. At a minimum, static information shall include intersection geometry (number of lanes, turn lane lengths, cabinet locations, pole locations, detector locations/zones, and ITS devices). Dynamic information shall include current plan, phase status, coordination status, alarm status (if any), pedestrian activity, and preemption/priority status. The refresh rate shall be once per second.

### **5.2 Time-Space Diagrams**

The system shall include a time-space diagram viewer for a selected series of intersections that shows “green bands” for coordinated phase green times and offsets. The time-space diagrams shall also show the actual green usage for the previous cycle.

## **6 Traffic Control**

### **6.1 Distributed Control**

The system shall be distributed. The central software shall make the most use of the memory, processing and programming capabilities of the local controllers, storing timing plans and parameters in the local controller to the extent possible. However, the system shall have centralized traffic control functions, effectively acting as a master controller over multiple groups of intersections, where those group assignments can be changed by time-of-day or other traffic responsive thresholds.

### **6.2 Manual Control**

The system shall allow the user to manually override the current program in effect for any intersection or group. The manual override should be programmable to allow for override for a specified time period.

### **6.3 Central Flash**

The system shall allow the user to place an intersection or control group in flash mode by time-of-day and day-of-week.

## **Attachment B – High-Level System Functional Requirements**

### **6.4 Time-Based Control**

The system shall include a scheduler that allows the user to program time-of-day, day-of-week, and day-of-year schedules for each control group. Keeping with the principle of distributed control, the timing plans should be stored locally to the extent possible.

### **6.5 Traffic-Responsive Plan Selection**

The system shall provide a traffic-responsive plan selection (TRPS) algorithm that can initiate transition to a new timing plan based on user-defined thresholds of system detector measurements over a user-defined interval. The thresholds should allow for various inputs by time-of-day and evaluate data in increments of 10 for 15 minute intervals.

The TRPS algorithm shall limit the amount of switching between plans that is allowed.

### **6.6 Dynamic Grouping**

The system shall be able to dynamically move intersections from one group to another by time of day, TRPS, or operator intervention.

### **6.7 Transit Vehicle Priority/Emergency Vehicle Preemption**

To accommodate future needs, the system shall be able to interface with local bus priority and emergency vehicle preemption functions. All priority and preemption activity shall be logged and easily reportable.

## **7 Database Features**

All system data shall be stored in a database management system (DBMS) back-end. The DBMS shall support common data exchanges with other databases using Open Database Connectivity (ODBC) or similar open exchange formats. All DBMS entries shall be checked for data type and allowable range to ensure data integrity.

### **7.1 Intersection Controller Data**

Users with appropriate access permissions shall be able to upload or download each controller's database to the DBMS. Uploads and downloads shall not interrupt normal operation of the controller, unless a download involves changes that require the controller to reinitialize. The system shall ensure an upload or download is done in full or not at all.

The system shall allow the local controller database to be compared with the DBMS with discrepancies logged. The user shall be able to select which database to apply to resolve the discrepancy. A system-wide discrepancy report will be generated on a daily basis and automatically stored on the primary system servers.

## **Attachment B – High-Level System Functional Requirements**

The system shall allow a user to make a copy of a controller database while removing site specific information (e.g., cross streets, identification number).

### **7.2 Import/Export of Timing Plans in Synchro File Format**

The system shall allow the user to import and export timing plans to Synchro 6.0 or the most current version at the time the equipment is purchased.

### **7.3 System Detector Data**

The system shall be able to download and store system detector data for off-line analysis. It shall store all data up to a user-specified time, overwriting older data.

## **8 Status Monitoring**

The system shall monitor all field devices and log activity such as:

- Communication errors
- Controller failure
- Flash condition
- Local and system detector status
- Cabinet door open
- Conflict monitor status
- Pedestrian actuation
- Conflicting local controller and system data
- Local preemption
- Local manual control

### **8.1 Status Displays**

The system shall provide real-time status displays, refreshed once per second, with detailed information on the following:

- Controller status (e.g., mode, green phase(s), ring status)
- Coordination status
- Preemption status
- Time base status
- Detector status
- Malfunction Management Unit (MMU) status (for TS-2 Type 1 cabinets)
- Group status

### **8.2 Alarms/Paging**

The system shall be configurable to page numbers at user-defined alarm conditions. The system shall allow the user to configure which number(s) are paged for different alarm conditions. The system shall be configurable to page different numbers at different times of day and day of the week. The system shall support distribution to at least 50 different paging numbers, or provide an email-to-paging interface.

## **9 Reporting**

### **9.1 *Predefined Reports***

The system shall produce a variety of predefined reports to help users manage system performance. Reports shall include a high level of detail and be professional in appearance in order to not require substantial formatting before being distributed to stakeholders. Predefined reports shall include, at a minimum, for either intersections or control groups:

- Measures of effectiveness
- Intersection detector volumes
- System detector volume and occupancy
- Communication faults
- Detector faults
- Local alarms
- MMU faults
- Group reports
- Group traffic-responsive plan changes
- Traffic-responsive system detector parameters and threshold comparisons

### **9.2 *Custom Reports***

The system shall allow users to define custom reports from any database entry either from scratch or based on a predefined report.

### **9.3 *Event Log***

An event log shall record system activity by date and time. It shall be viewable, sortable, filterable and printable.

## **10 Local Intersection Functional Requirements**

This section describes local intersection requirements, which are based on the Technology Review portion of the feasibility study. The Newport News traffic signal system may have some combination of intersections with:

- NEMA TS-1 cabinets (re-use existing) and NEMA TS-2 Type 2 controllers (new)
- NEMA TS-2 cabinets (new) and NEMA TS-2 Type 1 controllers (new)

All existing cabinets are TS-1. The majority, if not all, will be upgraded to TS-2, with the possible exception of a number of pole-mounted cabinets in the downtown and southeast community. The functional requirements listed below apply to all controllers.

## **Attachment B – High-Level System Functional Requirements**

Controllers shall be fully actuated. They shall be fully compatible with the central software and allow block upload and download of all timing plan parameters. They shall meet the minimum specifications described below.

### **10.1 Hardware**

- Shall meet NEMA TS-2 standards for traffic controllers.
- Shall have a front panel multi-line alphanumeric backlit display to show all operational parameters and states.
- Shall have an alphanumeric keypad to allow the controller to be programmed without requiring a laptop.
- Shall store all timing and control parameters in flash memory. Settings shall not be lost during power outages.
- Surge protection shall be provided for all hardware.

### **10.2 Communications**

- The software shall be updatable from a computer or laptop via serial or Ethernet connections.
- Built-in 10-Base T Ethernet and Infrared ports.
- Shall be able to receive time broadcasts from the central system software or a Network Time Protocol (NTP) server to update internal clocks.

### **10.3 Traffic Control Features**

- 16 Vehicle Phases
- 16 Pedestrian Phases
- 4 Timing Rings
- 16 Overlaps
- 64 Detectors
- 16 System Detectors, each with up to 10 different traffic response thresholds
- 120 coordination plans, each with its own cycle length, offset and split

### **10.4 Time-Base Control**

- 200 Events
- 99 Day Programs
- 10 Week Programs
- 36 Exception Day Programs that can override normal day programs

### **10.5 Preemption/Priority**

- 6 Preemption Routines
- 6 Priority Routines

### **10.6 Logs**

- Local Alarm Log
- Communications Fault Log
- Detector Fault Log
- System Detector Log

## **Attachment B – High-Level System Functional Requirements**

- Measures of Effectiveness (MOE) Log
- Detector Volume Count Log
- Cycle MOE Log
- Malfunction Management Unit (MMU) Fault Log (for NEMA TS-2 cabinets)

### ***10.7 Diagnostics & Status Displays***

- Monitor Compatibility Diagnostics
- Monitor Field Status Diagnostics
- Cycling Diagnostics
- Detector Diagnostics
- Port Message and Communication Status Displays
- Hardware I/O Status Display
- MMU Status Display

## **11 Communications**

### ***11.1 Communications with On-Street Equipment***

The system shall communicate with all on-street equipment at a minimum of once-per-minute to monitor status. Should communication between the central system and a controller fail, the controller shall revert to its local TBC settings.

### ***11.2 Media***

The system shall support Ethernet communications with field devices over fiber optic cable or twisted pair copper wire.