CITY OF SAN ANTONIO

PURCHASING AND CONTRACT SERVICES DEPARTMENT

REQUEST FOR COMPETITIVE SEALED PROPOSAL
("RFCSP 08-022")

for

Advanced Transportation Management System (ATMS)

Issued: Monday, February 4, 2008
Proposals Due: Tuesday, March 4, 2008, 2:00 p.m.

TABLE OF CONTENTS

Attachment 7	Signature Page	201
Attachment 8	Proposal Checklist	202

I. BACKGROUND

The City of San Antonio intends to construct an Advanced Transportation Management System (ATMS). The objective of this initial ATMS deployment is to provide the infrastructure and components necessary to improve traffic operations, minimize congestion, and improve maintenance response times. The system will provide advanced features which will permit an operations or maintenance technician the ability to monitor real-time operations remotely, identify malfunctions, and implement traffic signal timing plans on-command and by time-of-day, or other means, as deemed necessary.

The deployment of the initial 275 Model 2070L controllers and associated software system shall be completed by August 31, 2008. A detailed deployment schedule is highlighted in this document.

This document identifies the requirements for a Competitive Sealed Proposal for Contractors interested in providing the services and ATMS described herein. Respondents to this Request for Competitive Sealed Proposal (RFCSP) will demonstrate an understanding of the work to be performed and indicate their approach to performing said work. This document includes functional specifications that define both required and desired system and local controller features. Desired features or optional features will be accepted based on technical approach, resulting benefit, and cost.

Respondents are encouraged to show creativity and ingenuity in how they will approach the project and achieve the functional requirements, specifications, and desired functions described herein.

II. SCOPE OF SERVICES

The Contractor shall furnish, install, integrate, test, and/or make operational all hardware and software necessary for a fully functional and operational distributed traffic control system for multiple locations. This hardware and software consists, but is not limited to the Central System Software site license for up to 2000 intersections; the associated computer servers, workstations, mobile maintenance units, printers, and network interface; 275 Model 2070L traffic signal controllers; local traffic signal controller firmware/software site license for up to 2000 intersections; 275 conflict monitors; 25 traffic signal controller assembly cabinets; and system support equipment. The Technical Specifications for the above listed items are detailed in this

document. The Contractor will participate in the field installation of up to 30 Model 2070L controllers and conflict monitors and five Type 332 cabinets. The Price Proposal shall contain all items for which payment will be made and shall prevail. A detailed scope of work is shown in Section 2.0 of this RFCSP.

The Contractor shall furnish, install, integrate, and/or test all hardware and software necessary for the full integration into the CITY's communications network. This integration work will be considered subsidiary to the various bid items. The Contractor shall work and coordinate with the City of San Antonio Public Works Department, Information Technology Services Department, and the Texas Department of Transportation.

Up to an additional 1000 Model 2070L controllers and conflict monitors might be procured under this contract.

III. EXPANSION OF SCOPE OF SERVICES

A. IMPLEMENTATION OF THE ATMS

1.0 The Project

As stated in the previous Section, the City will procure central system software, Model 2070L controllers and conflict monitors, controller hardware, and controller firmware. The combination of the central software, communication system, controller and firmware are considered to be the City's Advanced Transportation Management System, or ATMS. This Section of the RFCSP identifies how this will be done, the role of the Contractor / System Integrator, the City, and a conceptual scope of work.

1.1 Controllers and Conflict Monitors

The City anticipates replacing all of the existing Type 170 controllers citywide over the next four (4) years. There are approximately 1,250 controllers in operation today within the City of San Antonio's operation and control. This project is for the replacement of the initial 250 controllers and conflict monitors in existing cabinets. It is the intent of the City to perform the change-out of the existing controllers and conflict monitors with the new controllers and monitors. However, the bid tabulation sheet requests an option cost for the contractor to perform this change-out.

The change-out of controllers will require the conversion of the firmware database configuration data from what it is now to what is required with the new firmware. The conversion of the database will be performed by others. The new timing data will be downloaded by others into the new controller at the City's Signal shop. The controller will be bench tested in a test control cabinet by others. The Contractor will be requested to provide input into a test methodology that will be conducted to ensure that each controller is ready for implementation in the field.

The City desires that controller change-outs be conducted for an entire group of signals (subsystem of signals). There could be a few as 10, or as many as 30 per week. The City will provide City forces for this controller change-out. As stated before, the Contractor can provide an option price for conducting the controller change-out work.

This contract will procure 275 Model 2070L controllers and 275 conflict monitors (Model 2010). The City is requesting unit bid prices for additional controllers and conflict monitors up to the balance of units (1,000) that could potentially be procured under this contract if desired by the City. The City will evaluate the performance of the hardware (the Model 2070L and conflict monitor) from the specific manufacture and determine whether or not to procure additional units. Unit quality, manufacture support of product, vendor support, and distributor support will be taken into consideration for future unit purchases. Please see discussion below regarding firmware installation onto the Model 2070L controllers.

Of the 275 controllers and conflict monitors, 250 units will be deployed in the field by August 31, 2008. The 250 controllers and conflict monitors shall meet the schedule below. The balance of 25 controllers and conflict monitors are considered spares. The contractor shall provide a production and delivery schedule to accomplish this work.

Required Delivery Schedule of the controllers are as follows:

By end of second week following NTP	15 units
Each week thereafter	25 units

1.2 Control Cabinet

The City is requesting unit bid prices for the purchase up to 25 traffic signal controller cabinets (Type 332). The bid price is for the supply (not installation, only delivery) of controller cabinet as per the Specifications contained in Exhibit A, Section 3, and does not include the controller or conflict monitor. The exact quantity of control cabinets to be procured under this contract is contingent upon need..

1.3 Controller Firmware

The City is requesting a site license for use of the firmware on Model 2070L controllers operated and maintained by the City of San Antonio. The total number of installations will not exceed 2,500.

The City requires that the controllers be delivered with the correct version of the firmware installed.

The controller firmware shall meet the minimum requirements as identified in Section 2 of this RFCSP to be considered.

1.4 Central System Software

The Central System Software (CSS) will be installed on rack-mounted servers that will be located at City of San Antonio office space located at TransGuide, or at a location designated by the City. The hardware required to support the CSS has been identified in Section 2.1.7 and in Exhibit A, Section 5.

The Central System Software can be installed on-site or off-site and then delivered to TransGuide, or a location designated by the city, for final integration.

There will be four (4) permanent workstations (desktop PCs) at TransGuide. There will be one (1) additional workstation at the Signal Shop. There will be twenty (20) mobile maintenance units. The System Integrator will be required to install and/or upgrade as necessary the Central System Management Software onto all of these permanent and mobile units at either TransGuide or the Signal Shop.

The CSS shall use I.P. communications over Ethernet to all controllers in the field. The communication system will be designed and implemented by the City. See Section 2.4 of the RFCSP for additional information regarding the communication system. See Section 2.6 for the discussion on demarcation points.

As stated above the System Integrator is not responsible for the communication system design. The System Integrator should include in their bid sufficient staff time to review pertinent design documents by the City and their (System Integrator) testing of the communication system to their satisfaction. The City will make available to the System Integrator the communication system end-to-end for the purposes of their testing. The System Integrator should assume that one end of the network will be in the cabinet at a specific port on an Ethernet switch; the other end will be in TransGuide or the Signal Shop at a port of an Ethernet switch. Both referenced switches will be conveniently accessible. The System Integrator will be provided copies of any and all test results conducted by the City as part of their implementation and internal testing. The System Integrator may submit to the City a core set of test procedures that they believe would provide the communication system reliable for the purpose of supporting the needs of the Central System Management Software. This said submittal should be supplied only after the selection process is completed.

The City will be responsible for providing network connectivity between all workstations and system servers. The City will provide a network cable to the workstation or mobile maintenance unit.

1.5 Test Equipment

The Contractor shall provide five (5) Controller Interface Device testers. See Section 5.0 in the Exhibit A for technical specifications. The Respondent to the RFCSP is only required to deliver the units to the City's Traffic Signal Shop.

1.6 Traffic Management Center

The City will be constructing a Traffic Management Center. As part of this effort, the City will design, procure, and install the furniture and hardware to support their TMC needs. For the purpose of this RFCSP, the Respondent shall assume that a desk (permanent or temporary) will be provided for the purpose of supporting the above referenced workstations.

1.7 Hardware Procurement

The contractor/system integrator shall be responsible for procuring the equipment identified in the Price Schedule.

2.0 ROLE OF THE CONTRACTOR

The City will contract with a single firm that will serve as the prime contractor. The prime contractor will be responsible for the total project, including system software installation and all deliverables. The contractor may also serve as the System Integrator for software delivered on this project. This RFCSP may use these two terms interchangeably. The term Contractor is used in reference to the firm that the legal contract is executed with. The term Respondent is used to identify the firm responding to this RFCSP, and after the selection process is complete the successful Respondent becomes the Contractor.

The Contractor shall, when issues are identified with the hardware, software, or services provided with this contract, be able to provide the required service response as described in the conceptual scope of work found in the RFCSP and pertinent sections of Exhibit A.

The Contractor will work with city staff, subcontractors, private industry, and public utilities as necessary to provide services and equipment needed to implement this project.

During the integration phase of this project, the Contractor shall be solely responsible for coordinating the activities between its own personnel, city staff, and the services or equipment supplied by the subcontractor(s). The Contractor shall also be solely responsible for resolving any conflicts that arise between its subcontractors.

The Contractor shall be responsible for the following tasks:

- Development of System Requirements Document (Draft and Final)
- Schedule Adherence
- Procurement and delivery of hardware and software

- Installation of local controller firmware into Model 2070 controllers (if not performed at factory)
- System Integration
- Development of system graphics
- Acceptance testing, including development of acceptance test plans
- Training
- Documentation
- Support and Warranty Services
- Timely Response and Resolution of Technical Issues
- Project Review Meetings

City Responsibilities:

The City of San Antonio shall be responsible for the following activities in conjunction with this project:

- Timely Review and Comment on all submittals by the Contractor/System Integrator
- Development of Final System Requirements document based on final contract negotiations
- Timely Responses to all Contractor/System Integrator inquiries.
- Design and construction of new communications network
- Conversion of existing timing plans to new local controller software format
- Field Installation of the 2070 controllers (if not performed by contractor)
- Witness all acceptance testing

3.0 PROPOSED SYSTEM OVERVIEW

The City of San Antonio ATMS will provide improved management, monitoring capabilities and operation of the City's thoroughfare (roadways) system. The ATMS will take advantage of advances in system hardware and software, communication technologies and advanced traffic management strategies.

As a general statement, the City of San Antonio ATMS shall provide the following capabilities:

- Monitor and control local intersection operation
- Provide two-way communications between system users and field controllers
- Report real-time information
- Receive, transmit, and display data
- Store and report traffic data
- Allow upload and download of controller databases
- Allow multiple means of accessing system information
- Accommodate multiple security levels
- Graphically display traffic information
- Provide traffic engineering analysis tools
- Provide notification of field device malfunctions
- Be easily expandable

The above list is for general information purposes and should not be considered as requirements. See Exhibit A for a detailed list of specific system requirements.

4.0 COMMUNICATIONS NETWORK

The City's IT Department (ITSD) is currently constructing the communication system that will support this project. The existing communication infrastructure is fiber optic with some wireless bridges that collectively forms a ring topology. The built out communication infrastructure will be a switched topology.

The communication infrastructure will be a shared resource with other City agency departments in the future. The City IT Department will segment off the data traffic for this project onto its own virtual local area network (VLAN).

The first 9 intersections are operational now in the downtown area along Commerce. The diagram on the following page depicts the 9 intersections and the communication devices used.

For the purpose of this Proposal, the Respondent shall assume the following:

- All communication infrastructure will be provided by the City.
- From the communication link between the backbone and the controller will be Ethernet.
- The City shall make available their deployment schedule.
- The communication system shall be based on I.P. network addressing over Fast Ethernet.
- The City will provide IP addressing
- The Ethernet switch used in the signal control cabinet will be a Cisco 2955
- At the intersection control cabinet, the minimum committed information data rate will be 5 MB with no more than a 1,000 ms latency.
- The network will be 100 MB in full duplex.

If any of the above bullets points are not followed by the City, the City shall notify the Contractor immediately to discuss possible impact. If the impact has no reasonable mitigation or workaround, the controllers impacted will not be included in any acceptance testing.

If issues arise during the time span of this project that prevent communication between the central and field equipment, the contractor will not be responsible for the communication infrastructure. In this case, the Ethernet port on the Layer 3 network switch shall be one demarcation point, the other demarcation point is the Ethernet port on the Cisco 2955 switch in the controller cabinet.

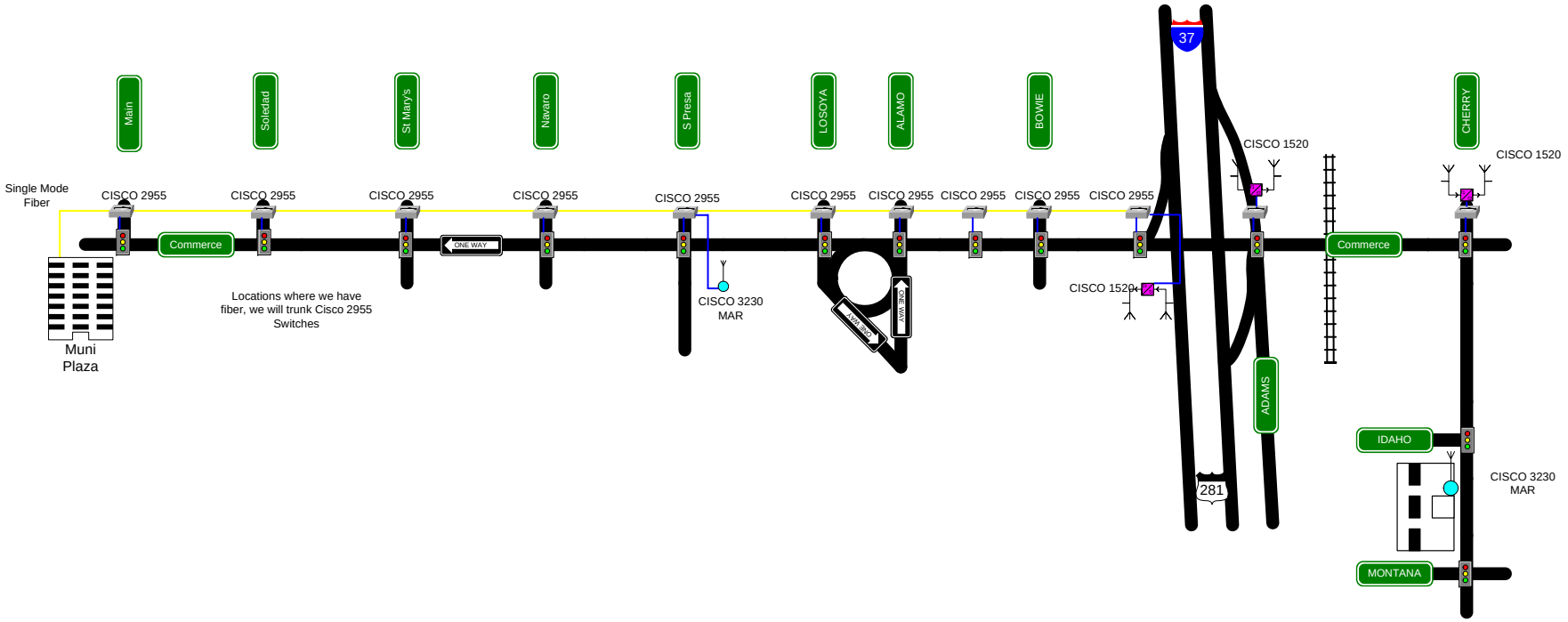


Figure 1. Communication to Field Controllers in Downtown

5.0 Communication with Local Controller

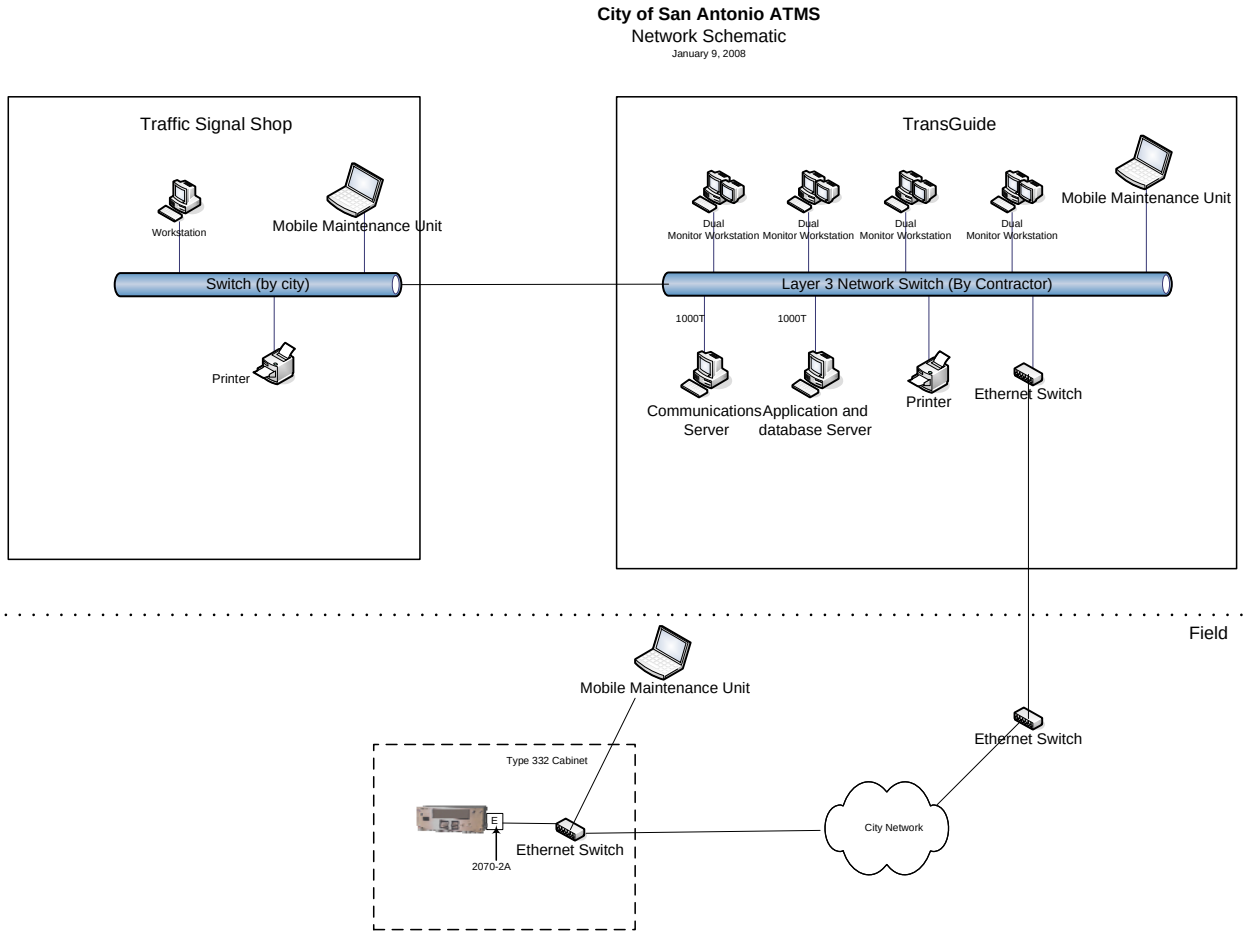
The communications system has been designed by San Antonio ITSD. Latency may exist; however, using Layer 2 switches and allowing routing that has no more than 5 activations between the field and central was a rule assumed in the design. Latency shall be less than that required to guaranty a 1-second polling to all masters and from all masters to all slaves resulting in less than 2 seconds total delay between any field device and its appearance in the database and monitors. The Contractor shall use IP devices and appropriate ports and cables to eliminate latency effects on the display and operation of the system controller and devices.

For routine polling options this may be adequate, but for some other monitoring purposes it is highly problematic. This is especially true when displaying maps of traffic signal networks which are supposed to show signal indications in real time. It is also somewhat problematic when monitoring individual intersections, although perhaps less so. When displaying the phase status, detector status, alarm status, etc. for a specific intersection, the central software should poll that intersection using event-based reporting (or sometimes called exception based polling). When monitoring an individual intersection it is acceptable to temporarily reduce the rate at which routine polling occurs for other devices on the same communications channel.

Transmission delays and timing issues are also likely to come into play with regard to uploading and downloading data from actuated signal controllers. The developer of the central software must take into account the transmission delays as described above when writing code for upload and download request processing. It may also take longer for the device to respond to these commands than to respond to routine polling requests and this must be accounted for as well.

6.0 Planned Network Schematic

The City of San Antonio will build out the ATMS network as described above. The diagram below illustrates that network at the traffic operation center, the signal shop, and field devices.



7.0 RESOLUTION OF HARDWARE AND SOFTWARE ISSUES

With any project, unforeseen issues may arise which require special attention from the contractor in order to be resolved swiftly and successfully. It is also the intent of this section to describe the procedure for correcting test failures.

The term “issue” refers to an undesirable or illogical incident or event regarding the operation of a traffic signal or the traffic management system employing software or hardware provided as part of this contract. It shall, of course, refer to events which can not be attributed to data entry errors or hardware faults (unless said hardware is supplied as part of this contract). It may also refer to operational characteristics of software or hardware provided as part of this contract which contradict the intent of the specifications, or which produce illogical operation of a traffic signal, and/or which produce a public hazard.

Some examples of the type of issues referred to here can be drawn from the actual experiences of various agencies occurring during the deployment of new traffic control systems:

- System fails to update clocks at intersections where night flash is used (and only at locations where night flash is used).

- Calls are placed on all phases every time clocks are updated by the central software (even when all detectors are working, no recalls are placed on said phases, and no vehicles are present).
- Even when disconnected from communications system, data in controller intermittently becomes corrupted, resulting in erratic operation of traffic signal.
- Signal skips yellows when entering or leaving emergency preemption.
- Signal will not exit night flash directly to main street green, even though programming calls for this to occur.
- Signal controller units which have operated for many months without incident suddenly begin to ignore their time-of-day schedules and operate the same timing plan at all times, and will only stop doing so when they are reinitialized and reprogrammed.

These examples are not intended to describe the full range of possible issues covered here, but to serve as illustrations of the types of situations in which the steps outlined in this section may be invoked.

When an issue first arises, staff will attempt to ascertain if a data entry error is the cause by consulting the user documentation. If this is determined to be the case, staff will make any necessary corrections before involving the Contractor. If staff is unable to identify any data entry errors, the steps outlined below may be initiated. Initiation may occur at any time in the deployment process, regardless of whether or not a testing phase is in progress.

If staff has determined that the issue is causing a public hazard, staff may opt to call an immediate halt to any further deployment of controller units and may also suspend delivery of and payment for any undelivered goods until the issue is resolved. Once it has been determined that no obvious data entry errors are causing the observed incident, the City will notify the Contractor's project leader of the problem via email. The email will describe what was observed and the means that have been used to try to solve the problem. At this point the City expects the following sequence of events to be initiated:

1. The project leader will, within one business day, acknowledge receiving the City's message by email. Contained in the acknowledgement will be a summary, in the project leader's own words, of his or her understanding of the issue. He or she may at this time suggest possible remedies for the problem, which staff may implement. If no suggestions are made, project leader should state what the Contractor's project team plans to do about the problem.

2. If necessary, staff will respond with clarification of the issue. Staff will then, to the best of their ability and as quickly as possible, implement the Contractor's remedies as stated above. Once implemented, staff will contact the Contractor either by email or telephone to inform them of the results.

3. If the remedy did not produce the desired result, the Contractor shall have up to two business days to propose another remedy.

4. Steps two and three may be executed up to a total of three times.

5. If after three attempts at using the Contractor's proposed remedies the problem is still not resolved, the City may require the Contractor to set up a test bed at the Contractor's facility. The test bed shall include a controller, cabinet, and software identical to those used by the City as well as any communications device required for the location(s) in question. The Contractor shall then attempt to duplicate the problem and discover a remedy. The

Contractor shall have up to ten business days to find a remedy once the City has notified them of the need for a test bed.

6. If the implementation of a test bed fails to resolve the issue, and/or the Contractor disputes that a particular issue exists as described by staff, the City may require that the Contractor send one or more representatives to the City of San Antonio in order to view the situation first hand. City staff will work closely with Contractor's representatives to resolve issues and will provide whatever information we have available. Once the City notifies the Contractor that a visit is needed, such visit is required within five (5) business days. During the visit, City staff and Contractor's representatives shall reach a consensus regarding the cause of the issues and their resolution.

7. If the Contractor asserts that particular problem is caused by hardware, software, communications problems, power supply problems, or any other causes which conveniently absolve his or her hardware or software from fault, the burden for proving this assertion shall fall upon the Contractor. Contractor shall be required to obtain and present proof during the visit required in step 6.

8. Once the test bed is complete or twenty business days after step one is performed, whichever comes first, City staff shall have the option to call a halt to any further deliveries or payments regarding this project if they are dissatisfied with contractor's handling of any issues identified. Please note that an exception may be made in the event of a public hazard. In the event of a public hazard, staff may call a halt immediately.

If an issue is resolved for a period of time, and then arises again, the steps shall be modified. The modification is that steps two and three shall only occur once.

8.0 ANTICIPATED SCOPE OF WORK

It will be the responsibility of the Respondent to identify a Technical Approach that will successfully execute the implementation of the ATMS (not including the communication system, but working with it). The scope of work identified below is anticipated. The Respondent is not required to adopt this scope of work verbatim. The Respondent shall identify in the Technical Approach their proposed work plan or scope of work.

Task 1 – Project Oversight

The Contractor shall provide a Project Manager who will act as the principal Contractor contact for CITY and other involved agencies and organizations. The designated Project Manager will be responsible for the completion of activities associated with the performance of this project. The Contractor's Project Manager will communicate directly with the CITY's Project Manager or their designee.

Task 1.1 – Project Management

The Contractor shall arrange and manage whatever resources are necessary to complete the Project in accordance with the agreement between the CITY and the Contractor.

Task 1.2 – Project Administration

The Contractor's Project Manager shall participate in Bi-monthly (every other week) on-site project management meetings with the CITY Project Manager and others. Three work days prior to each meeting, the Contractor's Project Manager shall provide a written (e-mail okay) Project status report that describes significant work performed since the previous report, the state of completion of each task, the status of each system component when relevant including results of internal testing and other software progress metrics, describes outstanding issues and significant potential problems that are impacting or may impact the Project, identifies prior issues and problems that have been resolved, and provides an updated summary Project time schedule. The frequency of the meetings can be reduced to once per month after the project is underway and key issues are resolved. The point that this transition occurs will be determined by the City's Project Manager.

Task 1.3 – Project Changes

When the Contractor and CITY agree that a change in the scope of work is needed, the Contractor shall provide supporting material and prepare proposed scope of work wording, cost estimates, and time schedules as requested as part of negotiation of a work amendment.

Task 2 – Provide Software/Hardware Specifications

The Contract shall provide procure the stated hardware. The Contractor shall provide the City with the specifications of the units purchased. The Contractor will provide the City two days to respond if there are any exceptions. The Contractor shall coordinate with the City on the delivery address.

Task 3 – Systems Requirement Documentation

The Contractor will provide two draft versions of the Systems Requirement Document (SRD). The SRD will state the final functionality to be provided by the System Supplier for the central software and local controller firmware under this project after negotiations. The City will review and provide comments and finalize the document.

Task 4 – Approval of Communication Network Design

The Contractor shall be provided the design documents relating the system communication system. The Contractor shall provide a written response identifying any issues that will prevent acceptable operation of the central system management software and the field controllers. Upon the Contractor's written request, the City shall supply a set of communications components for their internal testing.

Task 5 – Install Central Software

This task is all-inclusive of the necessary work activities to make the central system software fully operational to support the functionality identified in Exhibit A, Section 4. This task also includes the work activities required to procure, configure, and make operational the hardware identified in Exhibit A, Section 5.

Task 6- Acceptance Test Plan

This task is for the development of an Acceptance Test Plan for the project. Because the City will procure COTS software and firmware, rigorous testing is not anticipated. The Contractor should prepare a test plan that will demonstrate that the requirements identified in the Systems Requirement Document have been provided to the City. Exhibit B provides a detailed discussion on the anticipated testing to be

performed for this project. It is acceptable to incorporate the demonstration of the functionality as part of training modules provided that the final installed system is used and there is no risk to impacting 'live' intersections in the field. The City will provide up to two review comments before the final plan is accepted.

Task 7 – Execution of the Test Plan

This task is the execution of the acceptance test plan developed in Task 6 above.

Task 8 – Development of Graphics

This task is for the development of the graphics required for this project. For the purpose of this RFCSP, the Contractor should assume the following graphics as required for delivery:

- One (1) Citywide map (based on the City's GIS)
- Ten (10) subarea maps
- Twenty (20) Intersection maps

Intersection details to be provided to the contractor by the city. Contractor should assume a maximum of two (2) review comments.

Task 9 – Install Hardware

This is an optional task for providing the labor and materials related to the installation of 250 controllers and conflict monitor cards in to existing field cabinets.

Task 10 – Training

There are many training modules required in this project. The Contract will provide the training as identified in Exhibit A.

Task 11 – Documentation

There are many documents to be provided in this project. The Contractor will provide the documents as identified in Exhibit A.

Task 12 – On-Call Support

This CITY may request the Contractor to provide services that are outside of the contract. An example work effort is providing more graphics than originally requested. Other tasks might include field installation support, controller testing (database testing), installation of time clocks in cabinets, or similar work. The Contractor should identify in their Technical Approach staff categories and billing rates.

IV. PROJECTED RFCSP DATES AND DEADLINES

Following is a list of projected dates with respect to this RFCSP:

RFCSP Solicitation Issued	February 4, 2008
Pre-Submittal Conference	February 11, 2008
Deadline for Questions	February 14, 2008
Proposals Due	March 4, 2008
Save the Date (Demonstrations & Presentations)	March 13-14, 2008

V. TERM OF CONTRACT

The anticipated term of the proposed contract will begin upon award by San Antonio City Council and terminate upon at the conclusion of the Warranty Period established in this RFCSP.

The City reserves the right to extend support and maintenance, to include all parts and labor as originally installed and, to include any additional components added to the system by the selected Respondent at the City's request, for four (4) years after the expiration of the Warranty Period, with an option to extend for an additional four (4)-year period, for a total of eight (8) years.

VI. CERTIFICATIONS

Respondent warrants and certifies that Respondent and any other person designated to provide services hereunder has the requisite training, license and/or certification to provide said services, and meets all competence standards promulgated by all other authoritative bodies, as applicable to the services provided herein.

VII. INTELLECTUAL PROPERTY

If selected, Respondent agrees to abide by the following regarding intellectual property rights:

Respondent shall pay all royalties and licensing fees. Respondent shall hold the City harmless and indemnify the City from the payment of any royalties, damages, losses or expenses including attorney's fees for suits, claims or otherwise, growing out of infringement or alleged infringement of copyrights, patents, materials and methods used in the project. It shall defend all suits for infringement of any Intellectual Property rights. Further, if Respondent has reason to believe that the design, service, process or product specified is an infringement of an Intellectual Property right, it shall promptly give such information to the City.

> Upon receipt of notification that a third party claims that the program(s), hardware or both the program(s) and the hardware infringe upon any United States patent or copyright, Respondent will immediately:

Either:

a. obtain, at Respondent‘s sole expense, the necessary license(s) or rights that would allow the City to continue using the programs, hardware, or both the programs and hardware, as the case may be, or,

b. alter the programs, hardware, or both the programs and hardware so that the alleged infringement is eliminated, and

c. reimburse the City for any expenses incurred by the City to implement emergency backup measures if the City is prevented from using the programs, hardware, or both the programs and hardware while the dispute is pending.

Respondent further agrees to:

a. assume the defense of any claim, suit, or proceeding brought against the City for infringement of any United States patent or copyright arising from the use and/or sale of the equipment or software under this Agreement,

b. assume the expense of such defense, including costs of investigations, reasonable attorneys’ fees, expert witness fees, damages, and any other litigation-related expenses, and indemnify the City against any monetary damages and/or costs awarded in such suit;

Provided that:

- Respondent is given sole and exclusive control of all negotiations relative to the settlement thereof, but that Respondent agrees to consult with the City Attorney of the City during such defense or negotiations and make good faith effort to avoid any position adverse to the interest of the City,
- that the Software or the equipment is used by the City in the form, state, or condition as delivered by Respondent or as modified without the permission of Respondent, so long as such modification is not the source of the infringement claim,
- that the liability claimed shall not have arisen out of the City’s negligent act or omission, and
- that the City promptly provide Respondent with written notice within 15 days following the formal assertion of any claim with respect to which the City asserts that Respondent assumes responsibility under this section.

VIII. INTELLECTUAL PROPERTY INFRINGEMENT

The successful vendor agrees to indemnify and hold Client’s affiliates, public officials, officers, directors, employees, attorneys, agents and clients harmless from and against any and all claims, costs, damages, losses, liabilities and expenses (including attorneys' fees and costs) arising out of or in connection with a claim alleging that the services provided or material used in development of the website infringes the Intellectual Property rights of a third party, including but not limited to Patents, Copyrights, Trademarks, Service Mark and Trade Secrets.

IX. ESCROW

Software Escrow Agreement: If software is included in the Respondent's response, the Respondent will provide, at its own expense, an escrow agreement whereby the Respondent will make available to the City all program source codes for the software in the event of noncompliance, including but not limited to bankruptcy, product failure, product discontinuance and product support discontinuance.

X. PERFORMANCE AND PAYMENT BONDS

If selected, Respondent shall provide a performance and a payment bond, each of which shall be in a form acceptable to the City, executed by a corporate surety acceptable to City who is licensed pursuant to the Texas Insurance Code and listed on the United States Department of the Treasury's Listing of Approved Sureties (Dept Circular 570) in the full amount of the contract price as estimated by the City. Each bond must have attached thereto a Power of Attorney as evidence of the authority of the person executing the bond to bind the surety. Each bond must clearly and prominently display on the bond or on an attachment to the bond: (1) the name, mailing address, physical address, and telephone number, including the area code, of the surety company to which any notice of claim should be sent; or (2) the toll-free telephone number maintained by the Texas Department of Insurance under Article 1.35D, Insurance Code, and a statement that the address of the surety company to which any notice of claim should be sent may be obtained from the Texas Department of Insurance by calling the toll-free telephone number. The performance bond shall be made payable to the City of San Antonio, Texas. The payment bond shall be provided as security for all persons supplying labor and material in the performance of the contract.

The Performance and Payment Bonds must be executed and delivered to City prior to commencement of work under the contract awarded pursuant to this RFCSP.

XI. PROPOSAL REQUIREMENTS

Respondent's Proposal shall include the following items in the following sequence:

A. PROPOSAL: Prepare and submit your Proposal as required in this RFCSP. Reference XIV.

B. RESPONDENT QUESTIONNAIRE: Complete and submit the Respondent Questionnaire.

C. DISCRETIONARY CONTRACTS DISCLOSURE: Complete, sign and submit the Discretionary Contracts Disclosure Form.

D. LITIGATION DISCLOSURE: Complete and submit the Litigation Disclosure Form. If Respondent is proposing as a team or joint venture, then all persons or entities who will be parties to the contract (if awarded) shall complete and return this form with the proposal.

E. SMALL BUSINESS ECONOMIC DEVELOPMENT ADVOCACY FORM: Complete, sign and submit the Good Faith Effort Plan form.

F. PRICING SCHEDULE: Complete and submit the Pricing Schedule.

G. PROOF OF INSURABILITY: Obtain and submit a letter from Respondent's insurance provider stating provider's commitment to insure the Respondent for the types of coverage and at the levels specified in this RFCSP if awarded a contract in response to this RFCSP. Respondent shall also submit a copy of their current insurance certificate.

H. SIGNATURE PAGE: Complete, sign and submit the Signature Page. The Signature Page must be signed by a person, or persons, authorized to bind the entity, or entities, submitting the proposal.

I. PROPOSAL CHECKLIST: Complete and submit the Proposal Checklist.

Respondent is expected to examine this RFCSP carefully, understand the terms and conditions for providing the services listed herein and respond completely. FAILURE TO COMPLETE AND PROVIDE ANY OF THESE DOCUMENTS MAY RESULT IN THE RESPONDENT'S PROPOSAL BEING DEEMED NON-RESPONSIVE AND THEREFORE DISQUALIFIED FROM CONSIDERATION.

XII. ADDENDUMS TO RFCSP

Addendums regarding this RFCSP will be posted on the City's website at http://www.sanantonio.gov. It is Respondent's responsibility to review this site and ascertain whether any addendums have been made prior to submission of a proposal. A Respondent who does not have access to the Internet, must notify City in accordance with Section XVI, Restrictions on Communication, that Respondent wishes to receive copies of addendums to this RFCSP by mail.

No oral statement of any person shall modify or otherwise change or affect the terms, conditions or specifications stated in the RFCSP, and changes to the RFCSP – if any – shall be made by addendum only.

The only avenue for making changes to this RFCSP is a published Addendum. Addendums are posted to the City's website and to http://www.demandstar.com/. If there is a conflict between anything contained on the City's website, Demandstar, and/or the signed and issued Addendum, then the Addendum will control.

XIII. SUBMISSION OF PROPOSALS

A. Respondent shall submit one (1) original, signed in ink and thirteen (13) copies of the Proposal, in a sealed package, clearly marked on the front: "PRCS RFCSP". All Proposals

must be received in the City Clerk's Office no later than 2:00 p.m. central time, Tuesday, March 4, 2008 at the address below. Proposals submitted prior to the above time and date may be modified provided such modifications are sealed and received by the City Clerk's Office prior to the time and date set for submission of proposals. Any Proposal or modification received after this time shall not be considered.

Mailing Address:
City Clerk's Office
Attn: RFCSP #08-003, PRCS
P.O. Box 839966,
San Antonio, Texas 78283-3966

Physical Address:
City Clerk's Office
Attn: RFCSP #08-003, PRCS
100 Military Plaza
2nd Floor, City Hall
San Antonio, Texas 78205.

Proposals sent by facsimile or email will not be accepted.

B. Proposal Format: Each proposal shall be typewritten and submitted on 8 ½" x 11" white paper inside a three ring binder. The use of recycled paper is encouraged. Unnecessarily elaborate brochures, artwork, bindings, visual aides, expensive paper or other materials beyond that sufficient to present a complete and effective submission are not required. Font size shall be no less than 12-point type. All pages shall be numbered and printed one-sided. Margins shall be no less than 1" around the perimeter of each page. Electronic files, websites, or URLs shall not be included as part of the proposal; compact disks and/or computer disks submitted as part of the proposal shall not be considered. Each proposal must include the sections and attachments in the sequence listed in the RFCSP Section VI, Proposal Requirements, and each section and attachment must be indexed and divided by tabs and indexed in a Table of Contents page. Failure to meet the above conditions may result in disqualification of the proposal.

C. Respondents who submit responses to this RFCSP shall correctly reveal, disclose, and state the true and correct name of the individual, proprietorship, corporation, and /or partnership (clearly identifying the responsible general partner and all other partners who would be associated with the contract, if any). No nicknames, abbreviations (unless part of the legal title), shortened or short-hand, or local "handles" will be accepted in lieu of the full, true and correct legal name of the entity. These names shall comport exactly with the corporate and franchise records of the Texas Secretary of State and Texas Comptroller of Public Accounts. Individuals and proprietorships, if operating under other than an individual name, shall match with exact Assumed Name filings. Corporate Respondents and limited liability company Respondents shall include the 11-digit Comptroller's Taxpayer Number in their proposal's Respondent Questionnaire.

If an entity is found to have incorrectly or incompletely stated its name or failed to fully reveal its identity on the Signature Page of its proposal, the Director of the City Purchasing & Contract Services Department shall have the discretion, at any point in the contracting process, to suspend consideration of the proposal.

D. All provisions in Respondent's proposal, including any estimated or projected costs, shall remain valid for one hundred twenty (120) days following the deadline date for submissions or, if a proposal is accepted, throughout the entire term of the contract.

E. All proposals become the property of the City upon receipt and will not be returned. Any information deemed to be confidential by Respondent should be clearly noted on the page(s) where confidential information is contained; however, the City cannot guarantee that it will not be compelled to disclose all or part of any public record under the Texas Public Information Act, since information deemed to be confidential by Respondent may not be considered confidential under Texas law, or pursuant to a Court order.

F. Any cost or expense incurred by the Respondent that is associated with the preparation of the Proposal, the pre-submittal conference, if any, or during any phase of the selection process, shall be borne solely by Respondent.

XIV. PROPOSAL CONTENT AND ORGANIZATION

The intent of this request for proposal (RFCSP) is to determine which responders are best able, in terms of their team and their proposed solution, to perform the scope of work in a timely manner given the ATMS system requirements and the project schedule.

Proposals should be limited to specific discussion of the elements outlined in this RFCSP. Responders are encouraged to avoid submissions that are long winded, poorly organized or in which important information is obscured by unnecessary material. Short, succinct, and clear submittals are less likely to be marked down due to uncertainty as to meaning or misinterpretation. The evaluation panel will assume the most unfavorable interpretation when information is unclear, ambiguous, or missing.

Respondent's proposal shall include the following items in the following sequence: Attachment 1 has bee designated as the proper place to submit Respondent's Proposal.

A. Transmittal Letter:

The transmittal letter should include the name, title, address, phone number, and original signature of an individual with authority to negotiate on behalf of and to contractually bind the responder firm, and who may be contacted during the period of proposal evaluation. Only one transmittal letter need be prepared to accompany all copies of the technical and cost proposals, though a copy may be bound with each copy of the proposal if desired.

B. Table of Contents

A listing of the major sections in the proposal and the associated page numbers.

C. Introduction

In this section, the responder should demonstrate an understanding of the project and provide a brief overview of their team, the team qualifications, and the proposed solution.

D. Technical Approach

The Technical Approach should include:

1) A complete description of the proposed solution and integration approach, including what existing software will be used, what software will be developed, how it will be integrated, how unknowns will be addressed, any assumptions made, the attributes of the solution and approach that minimize the risk of failure to meet the project requirements or failure to meet the time schedule, and the attributes of the solution that will facilitate future expansion and enhancement of the project.

2) A work plan that describes the work tasks and subtasks to be undertaken, the deliverables for each task and subtask, and what team members will be responsible for each element of the work.

3) A project time schedule that provides the proposed time of delivery and time of acceptance (for deliverables subject to acceptance testing) of each deliverable identified in the work plan.

4) A cost breakdown, showing the price of each deliverable identified in the work plan, and subtotals and totals as appropriate. Proposals that offer functionality and features beyond the requirements will also be considered.

E. Description of Central Traffic Management System Software

The Proposal should include the following information:

1) Description of the Central Traffic Management System Software including product history, number of deployed systems, and number of local controller software packages that the system has worked with.

2) Compliance to Functional Requirements – The Proposal shall provide a detailed description of how the central software meets the functional requirements contained in the RFCSP. For each functional requirement, the Proposal shall include the requirement (as stated in the RFCSP) and how the software meets the requirement. Where a deviation f rom the requirement, is proposed, explain the extent and nature of any partial or full deviation and proposed alternative solution. Any ambiguity or lack of information in this regard will be interpreted to the responder’s detriment.

Where appropriate, the Proposal may include screen shots of the System's GUI and/or a description of key stokes required to meet the requirement.

3) Contact information for prior or current customers to which the evaluation panel can speak to gain an assessment of their experience with previous deployments of the proposed solution or portions thereof. A minimum of three successful deployments shall be identified, with at least one deployment consisting of at least 500 controllers

4) Other Information – The Proposal may include descriptions of any other features provided by the proposed Central Traffic Management System Software.

F. Description of the Local Controller Software

The Proposal shall include the following information related to the local controller software:

1) Description of the Local Controller Software including product history, deployment locations, number of intersections currently being operated using the proposed software, and list of different manufacturer's 2070 controllers that the product has been deployed on.

2) Compliance to Functional Requirements - The Proposal shall provide a detailed description of how the Local Controller Software meets the functional requirements contained in the RFCSP. For each functional requirement, the Proposal shall include the requirement (as stated in the RFCSP) and how the software meets the requirement. Where appropriate, the Proposal may include screen shots of of a controller's front panel or database editor screen shot to illustrate key stokes required to meet the requirement..

3) Other Information. The Proposal may include a description of any other features provided by the proposed Local Controller Software.

G. Software Quality Assurance/Quality Control

All Respondents should include a description of their Quality Assurance/Quality Control Program used in their software development and implementation process.

H. Software Testing

The Proposal should describe the Respondent's software testing plans for new software releases.

I. Acceptance Testing Procedures

The Proposal shall detail the Respondents acceptance testing procedures and its approach to the Acceptance Testing procedures described in this RFCSP.

J. Software Upgrades

The Proposal should state if the Respondent will comply with the software upgrades requirements contained in the RFCSP.

K. Software License

The Proposal should provide a statement from the Respondent stating the licensing terms and conditions for CITY use. This is for the local controller firmware and the central system software. State here any other required software that will need to be purchased by the CITY. Any costing information included in this section shall be included in the final cost to the CITY stated in the final price.

L. Required Hardware

The Proposal shall provide detailed information for all of the hardware, and equipment that is required such that the proposed ATMS is operational. This section should include a description of the network, computer hardware and peripherals. The Respondent should identify the Make, model and technical specifications of the equipment. Cut sheets or other product information should also be provided. A schematic diagram of the hardware configuration shall also be provided.

M. Team Members and Their Qualifications

The proposals must state the full name and role of each firm participating on the Respondent's team, and clearly indicate which firm is the prime. Describe the relevant qualifications and experience of each firm, and of key personnel involved from each firm. Indicate the project manager and their experience in managing similar projects.

Include a letter from each Subcontractor committing to their role on the team.

Proposals must describe the nature and outcome of projects previously conducted by the Respondent which are similar to the work described within the RFCSP. Descriptions should include client contact names, address, phone numbers, descriptions of the type of work performed, approximate dates on which the work was completed, and any key team members who were involved. Two to three similar qualifications and references should be provided for each subcontractor.

N. Optional Information

Proposals may include other material that may assist in evaluating the Proposal. Examples include excerpts from User's manuals, product specifications, and testimonials. Such material should be kept separate from the Technical Approach, with references there as needed. References to on-line materials are also appropriate.

O. Price Proposal

P. Other Required Information

Proposals must include the following additional materials:

1) A written statement of any requested changes to the standard agreement attached hereto as Exhibit A or conditions contained in this RFCSP that will become part of

the agreement. Proposed agreement wording changes not disclosed in this way will not be considered during contract negotiations. The number and nature of requested changes will be considered in evaluating proposals, as it pertains to the anticipated difficulty of negotiating an agreement and the impact on CITY if requested changes are accepted. It is recognized that some clauses in the standard agreement, including those related to payment and ownership, are in conflict with other elements of this RFCSP and will need to change.

Respondent is expected to examine this RFCSP carefully, understand the terms and conditions for providing the hardware, software, and services herein and respond completely. FAILURE TO COMPLETE AND PROVIDE ANY OF THE ABOVE ITEMS MAY RESULT IN THE RESPONDENT'S PROPOSAL BEING DEEMED NON-RESPONSIVE AND THEREFOR DISQUALIFIED FROM CONSIDERATION.

The evaluation panel will also consider the value of functionality that goes beyond the stated requirements, though there is no assurance that any such offer will be judged to be of significant value. On the other hand, a proposed solution that seems too good to be true in terms of its claims may be judged as unrealistic unless supporting information clearly explains how it can be provided within a reasonable time schedule and with a low risk of failure. Also, the selected integrator's payment for services and materials will be contingent on acceptance testing of all requirements they claim to meet, including any that go beyond the currently defined system requirements. The system requirements that a respondent claims to meet will be documented during the contractor selection process, including "best and final offers" if necessary, and will become part of the Contractor agreement.

Responders are free to propose a work plan that does not mirror the tasks in the Scope of Work above, as long as all aspects of the work are covered. The proposed work plan of the selected responder will be incorporated in the agreement between CITY and the Contractor.

XV. PRE-SUBMITTAL CONFERENCE

On Monday, February 11, 2008, a Pre-Submittal Conference will be held in the Training Room at the TranGuide Building – First Floor, 3500 NW Loop 410, San Antonio, Texas 78229. The Pre-Submittal Conference will run from 9:00 a.m. until 12:00 p.m.

Respondents are encouraged to prepare and submit their questions in writing three (3) calendar days in advance of the Pre-Submittal Conference in order to expedite the proceedings. City's responses to questions received by this due date may be distributed at the Pre-Submittal Conference and posted on the City's website at http://www.sanantonio.gov/rfp/. Attendance at the Pre-Submittal Conference is non-mandatory. Email questions to david.benites@sanantonio.gov.

Any oral responses provided by City staff at the Pre-Submittal Conference shall be preliminary. A written summary of the Pre-Submittal Conference shall contain official responses, if any. Any oral response given at the Pre-Submittal Conference that is not confirmed in the written summary of the Pre-Submittal Conference or by a subsequent addendum shall not be official or binding on

the City. Only written responses shall be official and all other forms of communication with any officer, employee or agent of the City shall not be binding on the City.

XVI. RESTRICTIONS ON COMMUNICATION

A. Respondents are prohibited from communicating with elected City officials and their staff regarding the RFCSP or Proposals from the time the RFCSP has been released until the contract is posted as a City Council agenda item. Respondents are prohibited from communicating with City employees from the time the RFCSP has been released until the contract is awarded. These restrictions extend to "thank you" letters, phone calls, emails and any contact that results in the direct or indirect discussion of the RFCSP and/or Proposal submitted by Respondents. Violation of this provision by Respondent and/or their agent may lead to disqualification of Respondent's proposal from consideration. Exceptions to the restrictions on communication with City employees include:

1. Respondents may ask verbal questions concerning this RFCSP at the Pre-Submittal Conference.

2. Respondents may submit written questions concerning this RFCSP to the Staff Contact Person listed below 4:30 p.m., local time, on Thursday, February 14, 2008. Questions received after the stated deadline will not be answered. It is suggested that all questions be sent by certified mail, return receipt requested, to:

   David Benites, Senior Procurement Specialist
   City of San Antonio, Purchasing and Contract Services Department
   506 Dolorosa Street, Suite 175
   San Antonio, TX 78205

   However, electronic submissions by e-mail will also be accepted at david.benites@sanantonio.gov. Email TIME-STAMP must be prior to deadline date & time.

3. Respondents and/or their agents are encouraged to contact the Small Business Outreach Office of the Economic Development Department for assistance or clarification with issues specifically related to the City's Small Business Economic Development Advocacy Program policy and/or completion of the Good Faith Effort Plan form. The point of contact is Ms. Grace Luna. Ms. Luna may be reached by telephone at (210) 207-3900 or by e-mail at grace.luna@sanantonio.gov. Respondents and/or their agents may contact Ms. Luna at any time prior to the due date for submission of proposals. Contacting her or her office regarding this RFCSP after the proposal due date is not permitted.

4. Respondents may provide responses to questions asked of them by the Staff Contact Person named above in A-2 after responses are received and opened. During interviews, if any, verbal questions and explanations will be permitted.

B. The City reserves the right to contact any Respondent for clarification after responses are opened and/or to further negotiate with any Respondent if such is deemed desirable by City.

C. City Code Article VII, Section 2-309 provides that any person acting as a legal signatory for a proposed contractual relationship that applies for a "high profile" discretionary contract, as defined by the City of San Antonio Contracting Policy and Process Manual, may not make a political contribution to any councilmember or candidate at any time from the time the person submits the response to the solicitation until 30 calendar days following the contract award. Any legal signatory for a proposed high-risk contract must be identified within the response to this solicitation, if the identity of the signatory will be different from the individual submitting the response.

If the legal signatory entering into the contract has made such a contribution, the City may not award the contract to that contributor or to that contributor's business entity. Any contract awarded in violation of this provision shall be voidable at the discretion of the City Council.

The City has identified this solicitation as "high profile".

XVII. PRESENTATIONS

Subsequent to the City's preliminary review and evaluation of the submitted Proposals, the City may, but is not required to, invite one or more Respondents to make presentations, give demonstrations and/or be interviewed by the City. For those Respondents who are invited, attendance will be mandatory. Therefore, Respondents are encouraged to "save the date" for the presentations and interviews which are anticipated to be held on Thursday, March 13, 2008. Respondents who are selected to participate in the presentation and interview process will be informed regarding the location, date, and time. This date is subject to change at the City's discretion.

XVIII. EVALUATION CRITERIA

The City will conduct a comprehensive, fair and impartial evaluation of all Proposals received in response to this RFCSP. The City will appoint a selection committee to perform the evaluation. Each Proposal will be analyzed to determine overall responsiveness and qualifications under the RFCSP. Criteria to be evaluated will include the items listed below. The selection committee may select all, some or none of the Respondents for interviews. If the City elects to conduct interviews, Respondents may be interviewed and re-scored based upon these same criteria. The City may also request additional information from Respondents at any time prior to final approval of a selected Respondent. Final approval of a selected Respondent is subject to the action of the San Antonio City Council. The Evaluation Criteria are:

A. Experience, Background, Qualifications (15 %)

B. Proposed Solution and Schedule (50 %).

C. Pricing (15 %)

D. Small Business Economic Development Advocacy Program (SBEDA) (20%):

1. A maximum of ten percentage (10%) points for Local Business Enterprises (LBEs).

   Prime contractors who have a local branch office will receive six percent (6%) of the selection points.

   Non-local prime contractors can receive points for subcontracting with local businesses proportional to the amount of work performed by those local subcontractors (i.e. – 50% to local = 5 points).

2. A maximum of five percentage (5%) points for companies designated as Historically Underutilized Enterprises (HUEs).

   Prime contractors who subcontract with HUEs can receive points proportional to amount of work performed by those HUEs (i.e. – 50% to HUEs = 2.5 points).

   S/MBEs and/or S/WBEs must be certified by the South Central Texas Regional Certification Agency or approved by the Director of Economic Development or designee to be considered a HUE.

3. A maximum of five percentage (5%) points for Prime Contractor compliance with the Small Business Economic Development Advocacy (SBEDA) policy:

   a. One percent (1%) for submission/approval of the Good Faith Effort Plan.
   b. One percent (1%) for meeting/exceeding the MBE goal.
   c. One percent (1%) for meeting/exceeding the WBE goal.
   d. One percent (1%) for meeting/exceeding the AABE goal.
   e. One percent (1%) for meeting/exceeding the SBE goal.

XIX. AWARD OF CONTRACT AND RESERVATION OF RIGHTS

A. City reserves the right to award one or no contract(s) in response to this RFCSP.

B. The Contract, if awarded, will be awarded to the Respondent(s) whose Proposal(s) is deemed most advantageous to City, as determined by the selection committee, upon approval of the City Council.

C. City may accept any Proposal in whole or in part. If subsequent negotiations are conducted, they shall not constitute a rejection or alternate RFCSP on the part of City. However, final selection of a Respondent is subject to City Council approval.

D. City reserves the right to accept one or reject any or all proposals received in response to this RFCSP, and to waive informalities and irregularities in the proposals received. City also reserves the right to terminate this RFCSP, and reissue a subsequent solicitation, and/or remedy technical errors in the RFCSP process.

E. The City reserves the right to pursue Best and Final Offers (BAFO) and may choose to do so with a short list of Respondent(s) based on initial proposal scoring. Only selected Respondents meeting the standards determined by the City may submit a Best and Final Offer. In the event that Best and Final Offers are requested, the City will notify qualified Respondents in writing. All responses to the request for Best and Final Offer will be submitted in writing. The City will not consider any BAFO not submitted in writing

E. City will require the selected Respondent(s) to execute a contract with the City, prior to City Council award. No work shall commence until City signs the contract document(s) and Respondent(s) provides the necessary evidence of insurance and performance bond as required in this RFCSP and the Contract. Contract documents are not binding on City until approved by the City Attorney. In the event the parties cannot negotiate and execute a contract within the time specified, City reserves the right to terminate negotiations with the selected Respondent and commence negotiations with another Respondent.

F. This RFCSP does not commit City to enter into a Contract, award any services related to this RFCSP, nor does it obligate City to pay any costs incurred in preparation or submission of a proposal or in anticipation of a contract.

G. If selected, Respondent will be required to comply with the Insurance and Indemnity Requirements established herein.

H. The successful Respondent must be able to formally invoice the City for services rendered, incorporating the SAP-generated contract and purchase order numbers which shall be provided by the City.

I. Conflicts of Interest. Respondent acknowledges that it is informed that the Charter of the City and its Ethics Code prohibit a City officer or employee, as those terms are defined in the

Ethics Code, from having a financial interest in any contract with City or any City agency such as City-owned utilities. An officer or employee has a "prohibited financial interest" in a contract with City or in the sale to City of land materials, supplies or service, if any of the following individual(s) or entities is a party to the contract or sale: the City officer or employee; his parent; child or spouse; a business entity in which he or his parent, child or spouse owns ten percent (10%) or more of the voting stock or shares of the business entity, or ten percent (10%) or more of the fair market value of the business entity; or a business entity in which any individual or entity above listed is a subcontractor on a City contract, a partner or a parent or subsidiary business entity.

Respondent is required to warrant and certify that it, its officers, employees and agents are neither officials nor employees of the City, as defined in Section 2-43 of the City's Ethics Code. (Discretionary Contracts Disclosure – Attachment 2)

J. Independent Contractor. Respondent agrees and understands that, if selected, it and all persons designated by it to provide services in connection with a contract, is (are) and shall be deemed to be an independent contractor(s), responsible for its (their) respective acts or omissions, and that City shall in no way be responsible for Respondent's actions, and that none of the parties hereto will have authority to bind the others or to hold out to third parties, that it has such authority.

K. Effective January 1, 2006, Chapter 176 of the Texas Local Government Code requires that persons, or their agents, who seek to contract for the sale or purchase of property, goods, or services with the City, shall file a completed conflict of interest questionnaire with the City Clerk not later than the 7th business day after the date that the person: (1) begins contract discussions or negotiations with the City; or (2) submits to the City an application, response to a request for proposals or bids, correspondence, or another writing related to a potential agreement with the City. The conflict of interest questionnaire form is available from the Texas Ethics Commission at www.ethics.state.tx.us <http://www.ethics.state.tx.us>. Completed conflict of interest questionnaires may be mailed or delivered by hand to the Office of the City Clerk. If mailing a completed conflict of interest questionnaire, mail to: Office of the City Clerk, P.O. Box 839966, San Antonio, TX 78283-3966. If delivering a completed conflict of interest questionnaire, deliver to: Office of the City Clerk, City Hall, 2nd floor, 100 Military Plaza, San Antonio, TX 78205

XX. TECHNICAL SECTION

ADVANCED TRAFFIC MANAGEMENT SYSTEM (ATMS)

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DEFINITIONS AND ACRONYMS

The following terms and acronyms are used in this bid procurement document:

Term	Meaning
Advanced Transportation Management System	The ATMS is the project plus the communication infrastructure
ATMS	Advanced Transportation Management System
Central system software	The software installed at TransGuide used to monitor and control field devices. The word phrase "central system" means the same thing.
CSS	Central System Software.
City	The City of San Antonio
Controller	Model 2070L hardware
Controller firmware	Also referred to in the industry as controller software. This is the software that is installed on to the Model 2070L controller.
Contractor	The successful bidder selected by the City to perform the work. The Contractor is responsible for the total project.
Firms	Companies that respond to the RFCSP
Install	The act of placing hardware into a cabinet. The act of installing software complete with configuration.
CSS	Central system software
Real-time	Second-by-second
Respondent	The company or firm that responds to the RFCSP
RFCSP	Request for Competitive Sealed Proposals
supplier	The manufacture or distributor that will supply hardware, firmware, or software to the Contractor.
The Project	The project consists of traffic signal controllers, conflict monitors, controller firmware, central system software, and central hardware.

The following acronyms may appear in the documents:

ACS	Adaptive Control System
ASC	Actuated Signal Controller
ATC	Advanced Traffic Controller
ATMS	Advanced Transportation Management System
BER	Bit Error Ratio
BIU	Bus Interface Unit
BPS	Bits Per Second
COTS	Commercial off the Shelf
CPU	Central Processing Unit
CTS	Clear To Send
DHCP	Dynamic Host Configuration Protocol
DOW	Day of Week
DVD	Digital Video Disk
EEPROM	Electronically Erasable Programmable
FCC	Federal Communications Commission
FSK	Frequency Shift Keying
GB	Gigabyte
GIS	Geographic Information System
GFI	Ground Fault Interrupter
GUI	Graphic Use Interface
IEEE	Institute of Electrical and Electronic Engineers
IP	Internet Protocol
ITS	Intelligent Transportation Systems
Kbps	Kilobits per second
LAN	Local Area Network
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LOS	Level of Service
MB	Megabyte
Mbps	Megabits per second
MMU	Malfunction Management Unit
MOE	Measure of Effectiveness
MTBF	Mean Time Between Failures
MUTCD	Manual on Uniform Traffic Control Devices
NEMA	National Electrical Manufacturing Association
NTCIP	National Transportation Communications for ITS Protocol
OER	Octet Encoding Rules
OTR	Optical Transceiver
PCB	Printed Circuit Boards
PCI	Peripheral Component Interconnect
PICS	Protocol Implementation Conformant Statement
PMPP	Point to Point Multi-Point Protocol

PPP	Point to Point Protocol
QPL	Qualified Product List
RAM	Random Access Memory
RFP	Request for Proposal
ROM	Read Only Memory
RTS	Request To Send
SMFO	Single Mode Fiber Optic
SMI	Signal Maintenance Incorporated
STMF	Simple Transportation Management Framework
STMP	Simple Transportation Management Protocol
SVGA	Super Video Graphics Array
TBC	Time Based Control
TEES	Transportation Electrical Equipment Specifications
TMC	Traffic Management Center
TMS	Traffic Management System
TOC	Traffic Operations Center
TOD	Time of Day
TOD/DOW	Time of Day/Day of Week
TWP	Twisted Wire Pair
U.L.	Underwriter Laboratories
VAC	Volt Alternating Current
VGA	Video Graphics Array

EXHIBIT A

TABLE OF CONTENTS

1.0 Specification for Traffic Signal Controller and Conflict Monitor

1.1 Description

This specification covers the traffic controllers to be procured for installation into existing (and potentially some new) Type 332 or similar style traffic control cabinets. The Contractor shall deliver 275 Model 2070L controllers, with the specified modules defined herein. The Contractor shall supply operating system software, drivers and descriptors, initialization software, and the validation suite as required herein. Traffic controller firmware will be installed onto the controller at the factory. The specification for controller firmware is identified in Exhibit A, Section 3.

This specification covers the following:

- Traffic signal controller hardware
- Cabinet Conflict Monitor

1.2 General Requirements

1. Prospective vendors must prove beyond any doubt to the City Purchasing Manager that they are duly qualified, capable, bondable, etc. to fulfill and abide by the specifications herein listed.
2. No officer or employee of the City shall have a financial interest, direct or indirect, in any contract with the City, or shall benefit financially, directly or indirectly, in the sale to the City of any materials, supplies or services, except on behalf of the City as an officer or employee. This prohibition extends to the CPS Energy, San Antonio Water System, and all City boards and commissions other than those which are purely advisory. In this instance a City employee is defined as any employee of the City who is required to file a financial involvement report pursuant to the City's ethics ordinance.
3. The City shall reject bids offered by unauthorized sources. Authorized sources are the vendors themselves and the certified resellers of the vendors equipment. The vendors are limited to those who can provide proof of this relationship with one of the following:
    - Econonlite
    - McCain/BiTran
    - Naztec
    - Siemens

4. The potential bidder shall also provide proof of having provided/installed more than 500 2070L controllers to public agencies over the last 3 years. The name, address and phone number shall be given and the City notifies vendors that calls will be made to verify the quality of the installation. Only satisfied customers will be counted toward the required number of installations.
5. When a Contractor cannot abide by terms and conditions in fulfilling the contract, Contractor must supply services or supplies from other sources at the contract price. If Contractor delays in the above, the City reserves the right to purchase on the open market and charge Contractor the difference between contract price and the purchase price.

4. All prices to be quoted f.o.b., City of San Antonio facility, freight prepaid. Allowances for special freight charges will be acceptable only when expedited delivery is requested and approved by the City of San Antonio.
5. The equipment supplied under these specifications from any manufacturer shall not be construed as endorsement of this equipment by the City of San Antonio.

6. The vendor shall, at the option of the City, supply the City with a standard production model for evaluation by the City prior to approval.

7. Such requested sample unit shall be provided within two weeks of the request from the City. The vendor shall arrange to have the unit transported back to the original sender at no expense to the City.

8. All equipment required for proper operation of the control equipment, must be provided.

9. The vendor supplying controller units and Type 332 cabinets shall provide the following test equipment and services, upon request:

    a) Two complete sets of card extenders for all printed circuit boards which attach to the controller by means of an edge connector, including CPU boards, I/O boards, Model 400 modem, program module, power supply boards, etc., for the controller unit, and all plug-in cards in the cabinet including detectors, isolators, and conflict monitor.

    b) One program module shall be supplied with diagnostic software to test controller, cabinet and conflict monitor. Diagnostic software shall be capable of interfacing with a serial terminal or microcomputer running an ANSI-standard terminal emulation software.

    c) All necessary wrap-around cables, interface cables, and jumpers to perform diagnostic testing of controller and all internal boards, including serial connection from controller to external serial device.

1.3 Warranty

The Model 2070L Controller Equipment shall have a full warranty due to manufacture defects, including parts and labor for a minimum of twenty-four (24) months from the date of installation or thirty-six (36) months from date of delivery whichever comes sooner. Identification of manufacturer defects shall be as determined by the City of San Antonio. The Contractor shall submit three (3) copies of all warranty certificates with the first delivery of each component. All other equipment shall be warranted for a period of twenty-four (24) months from date of installation.

The Contractor shall bear all expenses connected with the return of any material that any agency deems necessary to return for adjustment during the warranty period. The City of San Antonio, or its agent,

reserves the right to withhold payments that may be due, should it be discovered that material does not meet the specifications and/or claims of the Contractor.

The City of San Antonio will determine the manufacturer's responsibility for any controller unit assembly failure, if failure occurs within the warranty period. The City of San Antonio, or its agent, will contact the manufacturer with instructions on the pick up and delivery of defective controller assembly components.

The vendor will bear all expenses connected with the return of any equipment which the City deems necessary to have returned to the factory for repair during the warranty period.

1.4 Training

The vendor shall provide forty hours of training by factory technicians in troubleshooting and repair, theory of operation, and diagnostic testing. Operational and maintenance training shall be provided to designated personnel. This training shall be provided through practical demonstrations, seminars and other related technical procedures. The training shall include, but not be limited to the following:

- "Hands-on" operation for each type of equipment.
- Explanation of all system commands, their function and usage.
- Required preventive maintenance procedures.
- Servicing procedures.
- Equipment "troubleshooting" or problem identification procedures.

Upon purchase of 8 or more controllers and conflict monitors, the Contractor shall provide on-site demonstration of the installation procedure for the retrofit of a 303, 332, 336, 337 and 357 cabinet. The cabinet and contents shall perform the existing functions as existed prior to the installation as well as the functions required at the location chosen by the City and available in the 2070 software [by others]. The Contractor shall provide all cables, connections, labor and test tools associated with this demonstration.

Training shall take place at a mutually agreed upon date, and for purposes of the proposal, the Responder can assume approximately four weeks following delivery of the controllers to the the Traffic Operations Facility at 223 S. Cherry Street in San Antonio, Texas. Training shall be scheduled at least one month in advance with the Traffic Signal Engineer (210) 733-4574.

1.5 Model 2070L Hardware Requirements

1.6.1. Compliance with Standards

The Model 2070L controller shall comply with the Transportation Electrical Equipment Specifications (TEES), dated 2002, including Errata 1 (2003) and Errata 2 (2004) and Errata through 2006. The Model 2070L shall be delivered with the following options:

- 2070-1B Central Processing Unit (CPU) module.
- 2070-2A Field Input/Output (I/O) module (C1 and C11 connectors).
- 2070-3B front panel (8 line display).
- 2070-4B (3.5 Amp) power supply.

The model 2070L controller shall come equipped with 8MB of DRAM and 8 MB of Flash memory as per TEES specifications.

1.6.2. Controller Unit Delivery

The Contractor shall deliver 15 controller units and 15 conflict monitors by the 15th day following receipt of the Notice to Proceed, and 25 controller units and 25 conflict monitors every week thereafter up to the maximum quantity of 275.

The Contractor can furnish units at a faster delivery rate than specified.

The Contractor is requested to provide an option cost for controller and conflict monitor hardware storage. The storage facility shall be environmentally equal to the manufacture's storage facility requirements, which means the units shall be protected from heat, cold, water, and theft. The storage facility shall be located within the San Antonio city limits. The Contractor shall assume a maximum of 500 controllers and 500 conflict monitors. The cost shall be calculated as a monthly cost to the City. A minimum number of months may be required of the city, if so, the Contractor shall identify the terms.

1.6.3. Deployment of Traffic Signal Controller Units

This section only applies to the case where the Contractor will provide the services to install the hardware. This is an optional bid item.

The controller units and conflict monitors will be tested by City staff. Following acceptance of the unit for field deployment, the intersection database will be downloaded to the controller and tested by City staff. Upon acceptance by the City that the unit and database are ready for field installation, the controller units will be placed in an area accessible to the Contractor. The City will develop a check list for each controller. The check list will identify, as a minimum, the following: intersection name, ID number, IP address of controller, date of controller test, date of database test, staff conducting test, and issues identified and resolved. The City will coordinate with the Contractor to identify when the total number of units needed to replace an entire subsystem is ready for field deployment.

The contractor shall replace all controller units within a single subsystem in an expeditious manner. The contractor shall coordinate with the City as a city staff person must be present during the deployment. The Contractor shall develop a standard check list for all work activities completed by the Contractor at each intersection. This check list shall include such items as: date of installation, technicians performing the work, field tests performed, and any issues that should be addressed by the City. The Contractor shall install the first ten (10) controllers and cabinets at which point the city will provide a detailed inspection of work performed on all units. Any adjustments in quality of workmanship or process will be made at that time. If changes in workmanship are made, the contractor will be responsible for making the necessary changes to the ten (10) units previously completed, plus carrying out the future work in the manner directed by the City.

The Contractor is responsible for traffic control.

The Contractor should anticipate that there will be some intersections whereby there is an incompatibility between the database and the cabinet operation such that the intersection immediately goes to flash upon turn-on with the new controller and conflict monitor. The Contractor should apply due diligence in rectifying the problem in the field with reasonable effort applied. There should be an expectation that an immediate solution is not identified and will require a future re-visit to the intersection. The Contractor should build into his cost a maximum of 50 intersections where this is the case.

Acceptance of the work conducted by the Contractor shall be by the City. The work will be considered as complete once the traffic signal has been in operation with the new equipment for three days.

After the controller units have been installed by the Contractor, City staff will notify the contractor of any issues as they arise. City staff will attempt to resolve issues by telephone whenever possible. If issues can not be resolved by means of telephone conversation, the City may request that the contractor send a representative to assist.

The Contractor is requested to provide a lump sum bid price for the deployment of 50 controller and conflict monitors, at which the city may authorize the contractor's services for up to 5 units, or 250 units (controllers and conflict monitors). The City may authorize none, 50, 100, 150, 200, or 250 units.

1.6.4. Mobile Maintenance Unit

Firmware updates and local access/control shall be accomplished by using a Mobile Maintenance unit connected to the Model 2070L Controller Unit's EIA 232 port. The Contractor shall supply a cable, approximately ten (10) feet in length, to facilitate the connection of the upload/download unit with the Model 2070L Controller Unit.

There is a desire by the City to perform controller uploads and download via a wireless interface. However, it is not a requirement.

The mobile maintenance unit will be a notebook size field portable computer and shall be supplied with a carrying case of sufficient size to protect the mobile management unit and related peripherals, adapters, cables, manuals, and etc. See Section 5 of Exhibit A for the mobile maintenance unit specifications.

1.6.5. Quality Control and Documentation

1.6.5.1. Quality Control

The Contractor shall, within fifteen (15) days from the date of Notice to Proceed, supply quality control procedures and test report formats as required by the TEES.

The Contractor shall comply with all testing, quality control, and reporting procedures specified in the TEES.

1.6.5.2. Documentation

The Contractor shall supply one (1) complete user manuals for each controller unit delivered as part of this procurement.

Each manual shall include, as a minimum, the following sections:

1. Table of Contents
2. Glossary
3. Manufacturer Contact Information
    a. Address
    b. Telephone Number
    c. Fax Number
    d. General Email Address

4. General Description
5. General Characteristics
6. Installation
7. Adjustments
8. Theory of Operation
    a. Systems Description (include block diagram).
    b. Detailed Description of Circuit Operation.
9. Maintenance
    a. Preventive Maintenance.
    b. Trouble Analysis.
    c. Trouble Shooting Sequence Chart.
    d. deleted.
    e. Voltage Measurements.
    f. Alignment Procedures.
10. Parts List (include circuit and board designation, part type and class, power rating, component manufacturer, mechanical part manufacturer, data specification sheets for special design components and original manufacturer's part number).
11. Electrical Interconnection Details & Drawings.
12. Schematic and Logic Diagram
13. Assembly Drawings and a pictorial diagram showing physical locations and identification of each component or part.
14. The date, serial numbers, model numbers and revision numbers of equipment covered by the manuals shall be printed on the front cover of the manuals.

1.7 Conflict Monitor Specifications

The Contractor shall supply a conflict monitor that conforms to the TEES specification for the Model 2070L controller. The conflict monitor shall be EDI, Model 2018 KCLiP, or approved equivalent. The Contractor shall supply fifteen (15) CMU Data Key Programming Tool (datakey programming device).

2.0 Specification for Local Controller Firmware

2.1 Overview

The Local Controller Firmware functional requirements described herein will be used on the Model 2070L controller hardware being purchased under this contract. The selected System Integrator is responsible for providing a complete, workable, and fully functional firmware product that meets or exceeds the minimum acceptable requirements described in this section.

2.2 Off-the-Shelf Firmware

The City desires to implement firmware on the Model 2070L controller that current exists, or “Off the Shelf Software” (COTS). The Contract shall review the specifications below thoroughly. The Contractor shall identify any discrepancies. The supplied firmware shall meet the intent of the requirement, meaning that it is acceptable for the firmware to perform differently than described herein provided the end result is achieved without any workaround procedure.

Functionality that is currently not available, but shall be made available to the City at no cost at a time to be determined in the future shall be explicitly identified as “No Cost”. Functionality that will require additional development for a cost to the City shall also be identified as “Optional.”

2.3 Database Editor

The local controller firmware shall be provided with a tool to be used to edit the controller's signal timing data, configuration, and administration parameters.

2.4 Compatibility with Local Controller Hardware

The firmware described in this requirement document shall be designed for proper and fully functional operation when installed on a Model 2070L controller.

Respondents should address in their proposal any compatibility issues and concerns, with the cabinet discussed herein, that may arise from the use of the proposed local controller firmware within the context of these environments.

Respondents shall identify incompatibilities with installing the local controller firmware onto a "standard" Model 2070 controller. This discussion should be limited to the controllers identified in Section 1.2 of Exhibit A, Section 1.

Before final payment is made to the Contractor for the local controller firmware license, the Contractor shall be required to perform a demonstration test at the City's Traffic Signal Shop of the complete installation of the firmware onto the four manufacture's controller hardware identified in Section 1.2 of Exhibit A. The City will supply the controller hardware.

2.5 Compatibility with Central System Software

The Local Controller Firmware must be compatible with the proposed Central Software. For purposes of this RFCSP compatible is defined as "all objects supported in the Central management software shall also be supported in the Local Controller Software".

2.6 Communication Protocol

The communication protocol between the central system software and the controller firmware shall support, at a minimum, the stated functionality in Exhibit A, Sections 2 and 4. The City requires that the local intersection control firmware furnished with this project shall be compliant with NTCIP 1202- Object Definitions for Actuated Traffic Signal Controller Units, Conformance Level 2. The software shall be based on NTCIP 1202 v02.19. A listing of the required data elements is reproduced below in Exhibit 2.1, along with NTCIP references. Exhibit 2.2 shows the minimum project requirements for data element ranges. If a range is not specified for a specific element, the applicable NEMA TS2 -2003 v.02.06, Traffic Control Assemblies with NTCIP Requirements, standard shall apply. It is understood that upload and download will be accomplished using vendor specific extensions (native blocks).

In the case that the Contractor must use vendor specific object definitions, the MIB must be published including full definitions of each object and such document shall be made available to the City as part of the project.

Exhibit 2.1: NTCIP 1202 Conformance Groups and Data Elements required by the City of San Antonio

Conformance Group/Data Element	Reference
Configuration	**NTCIP 1201**
Database Management	**NTCIP 1201**
Time Management	**NTCIP 1201**
Timebase Event Schedule	**NTCIP 1201**
Report	**NTCIP 1201**
STMP	**NTCIP 1201**
PMPP	**NTCIP 1201**
Phase	NTCIP 1202
maxPhases	NTCIP 1202
phaseTable	NTCIP 1202
phaseNumber	NTCIP 1202
phaseWalk	NTCIP 1202
phasePedestrianClear	NTCIP 1202
phaseMinimumGreen	NTCIP 1202
phasePassage	NTCIP 1202
phaseMaximum1	NTCIP 1202
phaseMaximum2	NTCIP 1202
phaseYellowChage	NTCIP 1202
phaseRedClear	NTCIP 1202
phaseRedRevert	NTCIP 1202
phaseAddedInitial	NTCIP 1202
phaseMaximumInitial	NTCIP 1202
phaseTimeBeforeReduction	NTCIP 1202
phaseCarsBeforeReduction	NTCIP 1202
phaseTimeToReduce	NTCIP 1202
phaseReduceBy	NTCIP 1202
phaseMinimumGap	NTCIP 1202
phaseDynamicMaxLimit	NTCIP 1202
phaseDynamicMaxStep	NTCIP 1202
phaseStartup	NTCIP 1202
phaseOptions	NTCIP 1202
phaseRing	NTCIP 1202
phaseConcurrency	NTCIP 1202
maxPhaseGroups	NTCIP 1202
phaseStatusGroupTable	NTCIP 1202
phaseStatusGroupNumber	NTCIP 1202
phaseStatusGroupReds	NTCIP 1202
phaseStatusGroupYellows	NTCIP 1202
phaseStatusGroupGreens	NTCIP 1202
phaseStatusGroupDontWalks	NTCIP 1202
phaseStatusGroupPedClears	NTCIP 1202
phaseStatusGroupWalks	NTCIP 1202
phaseStatusGroupVehCalls	NTCIP 1202
phaseStatusGroupPedCalls	NTCIP 1202
phaseStatusGroupPhaseOns	NTCIP 1202
phaseStatusGroupPhaseNexts	NTCIP 1202
phaseControlGroupTable	NTCIP 1202
phaseControlGroupNumber	NTCIP 1202
phaseControlGroupPhaseOmit	NTCIP 1202
phaseControlGroupPedOmit	NTCIP 1202
phaseControlGroupHold	NTCIP 1202
phaseControlGroupForceOff	NTCIP 1202
phaseControlGroupVehCall	NTCIP 1202
phaseControlGroupPedCal	NTCIP 1202

Exhibit 2.1: (continued) NTCIP 1202 Conformance Groups and Data Elements required by the City of San Antonio

Conformance Group/Data Element	Reference
Detector	NTCIP 1202
maxVehicleDetectors	NTCIP 1202
vehicleDetectorTable	NTCIP 1202
vehicleDetectorNumber	NTCIP 1202
vehicleDetectorOptions	NTCIP 1202
vehicleDetectorCallPhase	NTCIP 1202
vehicleDetectorSwitchPhase	NTCIP 1202
vehicleDetectorDelay	NTCIP 1202
vehicleDetectorExtend	NTCIP 1202
vehicleDetectorQueueLimit	NTCIP 1202
vehicleDetectorNoActivity	NTCIP 1202
vehicleDetectorMaxPresence	NTCIP 1202
vehicleDetectorErraticCounts	NTCIP 1202
vehicleDetectorFailTime	NTCIP 1202
vehicleDetectorAlarms	NTCIP 1202
vehicleDetectorReportedAlarms	NTCIP 1202
vehicleDetectorReset	NTCIP 1202
maxVehicleDetectorStatusGroups	NTCIP 1202
vehicleDetectorStatusGroupTable	NTCIP 1202
vehicleDetectorStatusGroupNumber	NTCIP 1202
vehicleDetectorStatusGroupActive	NTCIP 1202
vehicleDetectorStatusGroupAlarms	NTCIP 1202
maxPedestrianDetectors	NTCIP 1202
pedestrianDetectorTable	NTCIP 1202
pedestrianDetectorNumber	NTCIP 1202
pedestrianDetectorCallPhase	NTCIP 1202
pedestrianDetectorNoActivity	NTCIP 1202
pedestrianDetectorMaxPresence	NTCIP 1202
pedestrianDetectorErraticCounts	NTCIP 1202
pedestrianDetectorAlarms	NTCIP 1202
Volume Occupancy Report	NTCIP 1202
volumeOccupancySequence	NTCIP 1202
volumeOccupancyPeriod	NTCIP 1202
activeVolumeOccupancyDetectors	NTCIP 1202
volumeOccupancyTable	NTCIP 1202
detectorVolume	NTCIP 1202
detectorOccupancy	NTCIP 1202
Unit	NTCIP 1202
unitStartUpFlash	NTCIP 1202
unitAutoPedestrianClear	NTCIP 1202
unitBackupTime	NTCIP 1202
unitRedRevert	NTCIP 1202
unitControlStatus	NTCIP 1202
unitFlashStatus	NTCIP 1202
unitAlarmStatus2	NTCIP 1202
unitAlarmStatus1	NTCIP 1202
shortAlarmStatus	NTCIP 1202
unitControl	NTCIP 1202
maxAlarmGroups	NTCIP 1202
alarmGroupTable	NTCIP 1202
alarmGroupNumber	NTCIP 1202
alarmGroupState	NTCIP 1202
Special Function	NTCIP 1202
maxSpecialFunctionOutputs	NTCIP 1202
specialFunctionOutputTable	NTCIP 1202
specialFunctionOutputNumber	NTCIP 1202
specialFunctionOutputState	NTCIP 1202

Exhibit 2.1: (continued) NTCIP Conformance Groups and Data Elements required by the City of San Antonio

Conformance Group/Data Element	Reference
Coordination	NTCIP 1202
coordOperationalMode	NTCIP 1202
coordCorrectionMode	NTCIP 1202
coordMaximumMode	NTCIP 1202
coordForceMode	NTCIP 1202
maxPatterns	NTCIP 1202
patternTableType	NTCIP 1202
patternTable	NTCIP 1202
patternNumber	NTCIP 1202
patternCycleTime	NTCIP 1202
patternOffsetTime	NTCIP 1202
patternSplitNumber	NTCIP 1202
patternSequenceNumber	NTCIP 1202
maxSplits	NTCIP 1202
splitTable	NTCIP 1202
splitNumber	NTCIP 1202
splitPhase	NTCIP 1202
splitTime	NTCIP 1202
splitMode	NTCIP 1202
splitCoordPhase	NTCIP 1202
coordPatternStatus	NTCIP 1202
localFreeStatus	NTCIP 1202
coordCycleStatus	NTCIP 1202
coordSyncStatus	NTCIP 1202
systemPatternControl	NTCIP 1202
systemSyncControl	NTCIP 1202
Time Base	NTCIP 1202
Time Management Conformance Group	NTCIP 1202
timebasePatternSync	NTCIP 1202
maxTimebaseAscActions	NTCIP 1202
timebaseAscActionTable	NTCIP 1202
timebaseAscActionNumber	NTCIP 1202
timebaseAscActionPattern	NTCIP 1202
timebaseAscActionAuxillaryFunction	NTCIP 1202
timebaseAscActionSpecialFunction	NTCIP 1202
timebaseAscActionStatus	NTCIP 1202
Preempt	NTCIP 1202
maxpreempts	NTCIP 1202
preemptTable	NTCIP 1202
preemptNumber	NTCIP 1202
preemptControl	NTCIP 1202
preemptLink	NTCIP 1202
preemptDelay	NTCIP 1202
preemptMinimumDuration	NTCIP 1202
preemptMinimumGreen	NTCIP 1202
preemptMinimumWalk	NTCIP 1202
preemptEnterPedClear	NTCIP 1202
preemptTrackGreen	NTCIP 1202
preemptDwellGreen	NTCIP 1202
preemptMaximumPresence	NTCIP 1202
preemptTrackPhase	NTCIP 1202
preemptDwellPhase	NTCIP 1202
preemptDwellPed	NTCIP 1202
preemptExitPhase	NTCIP 1202
preemptState	NTCIP 1202
preemptControlTable	NTCIP 1202
preemptControlNumber	NTCIP 1202
preemptControlState	NTCIP 1202

Exhibit 2.1: (continued) NTCIP Conformance Groups and Data Elements required by the City of San Antonio

Conformance Group/Data Element	Reference
Ring	NTCIP 1202
maxRings	NTCIP 1202
maxSequences	NTCIP 1202
sequenceTable	NTCIP 1202
sequenceNumber	NTCIP 1202
sequenceRingNumber	NTCIP 1202
sequenceData	NTCIP 1202
maxRingControlGroups	NTCIP 1202
ringControlGroupTable	NTCIP 1202
ringControlGroupNumber	NTCIP 1202
ringControlGroupStopTime	NTCIP 1202
ringControlGroupForceOff	NTCIP 1202
ringControlGroupMax2	NTCIP 1202
ringControlGroupMaxInhibit	NTCIP 1202
ringControlGroupPedRecycle	NTCIP 1202
ringControlGroupRedRest	NTCIP 1202
ringControlGroupOmitRedClear	NTCIP 1202
Channel	NTCIP 1202
maxChannels	NTCIP 1202
channelTable	NTCIP 1202
channelNumber	NTCIP 1202
channelControlSource	NTCIP 1202
channelControlType	NTCIP 1202
channelFlash	NTCIP 1202
channelDim	NTCIP 1202
maxChannelStatusGroups	NTCIP 1202
channelStatusGroupTable	NTCIP 1202
channelStatusGroupNumber	NTCIP 1202
channelStatusGroupReds	NTCIP 1202
channelStatusGroupYellows	NTCIP 1202
channelStatusGroupGreens	NTCIP 1202
Overlap	NTCIP 1202
maxOverlaps	NTCIP 1202
overlapTable	NTCIP 1202
OverlapNumber	NTCIP 1202
OverlapType	NTCIP 1202
overlapIncludedPhases	NTCIP 1202
overlapModifierPhases	NTCIP 1202
overlapTrailGreen	NTCIP 1202
overlapTrailYellow	NTCIP 1202
overlapTrailRed	NTCIP 1202
maxOverlapStatusGroups	NTCIP 1202
overlapStatusGroupTable	NTCIP 1202
overlapStatusGroupNumber	NTCIP 1202
overlapStatusGroupReds	NTCIP 1202
overlapStatusGroupYellows	NTCIP 1202
overlapStatusGroupGreens	NTCIP 1202

Exhibit 2.2: Data Element Range Values for Actuated Traffic Signal Controller Units Required by the City of San Antonio

Data Element	Minimum Project Requirements
NTCIP 1201- Global Object Definitions	
moduleType	Value 3
dBCreateTransaction dBErrorType	All Values All Values
globalDaylightSaving	Values 2 and 3
maxTimeBaseScheduleEntries maxDayPlans maxDayEvents	32 20 16
maxEventLogConfigs eventConfigMode eventConfigAction maxEventLogSize MaxEventClasses	50 Values 2 thru 5 Values 2 and 3 255 7
maxGroupAddress	2
NTCIP 1202- Actuated Traffic Signal Controller Units	
maxPhases phaseStartup phaseOptions maxPhaseGroups	16 Values 2 thru 6 All Values 2
maxVehicleDetectors vehicleDetectorOptions maxPedestrianDetectors vehicleDetectorAlarms pedestrianDetectorAlarms	64 All Values 8 Values 0 thru 4 Values 0 thru 4
unitAutoPedestrianClear unitControlStatus unitFlashStatus unitAlarmStatus2 unitAlarmStatus1 shortAlarmStatus unitControl maxAlarmGroups	All Values All Values All Values All Values All Values All Values All Values 1
maxSpecialFunctionOutputs	8
coordCorrectionMode coordMaximumMode coordForceMode maxPatterns patternTableType maxSplits splitMode localFreeStatus	Values 2 thru 4 Values 2 thru 4 Values 2 and 3 27 2 24 Values 2 thru 7 Values 2 thru 11
maxTimebaseAscActions	48
maxPreempts preemptControl preemptState	8 All Values Values 2 thru 9
maxRings maxSequences	4 16
maxChannels channelControlType channelFlash channelDim maxChannelStatusGroups	16 Values 2 thru 4 Values, 0, 2, 4, 6, 8, 10, 12 and 14 Values 0 thru 15 2
maxOverlaps overlapType maxOverlapStatusGroups	16 Values 2 and 3 2

The Vendor of the Controller Firmware shall provide a statement in the proposal that identifies how upload and download of the objects identified above is accomplished.

The vendor of the Central System Software shall provide a statement in the proposal that identifies which, if any, objects identified in Exhibit 2.1 are not used for anything.

2.7.1 Warranty

The vendor of the local controller firmware shall warranty the firmware for a period of one (1) year against all bugs and defects.

2.7.2 Upgrades

The vendor will provide firmware upgrades to the City for no additional cost for a period of five years following the completion of the initial warranty period. Each upgrade will include changes and new functionality, and bug fixes. Each upgrade will be accompanied by a readme file describing the changes in the firmware, and new users' manuals, when appropriate. The readme files shall identify what bugs have been addressed and what new features have been added or changed.

2.8 Training

The Contractor or Supplier shall provide training to the city staff on the use of the local controller firmware. The training should be broken down into the following modules:

- Basic Firmware Instruction
- Advance Firmware Instruction
- Post Implementation Instruction

The Basic and Advanced instruction will come sooner in the project, with the Post Implementation Training occurring towards the end of the controller deployment schedule.

The Contractor will provide training for 40 staff. To accomplish this task, it is anticipated that the training will be instructed in four (4) sessions with approximately ten (10) staff member in each training session. This means that each module will be instructed four (4) times each.

The Contractor shall identify the appropriate agenda for each module.

2.9 Documentation

The Contractor shall provide ten (10) hard copies of the firmware User documentation. The documentation shall address, as a minimum, the following: a) installation procedures, b) necessary cables or software applications required, c) default setup parameters, and d) definitions of all menus and configuration terms.

2.10 Site License

The City requests a bid price for a site license use of the firmware, as discussed in Section 2 of the RFCSP.

2.11 Minimum Functional Requirements

The following table (Exhibit 2.3) identifies the minimum level of functional requirements for the Local Controller Firmware. Information regarding the intended operation as it applies to certain functionality may be found in Exhibit C. Exhibit C also identifies optional functionality that the responder may want to include as added-value functionality. There is no requirement to supply firmware that goes beyond the minimum functional requirements.

Exhibit 2.3 Minimum Requirements for Local Controller Firmware

Requirement No.	Requirement	Comments
General Requirements		
1	The Local Controller firmware shall operate on any Advanced Transportation Controller Model 2070L manufactured to comply with the Transportation Electrical Equipment Specifications (TEES), dated 2002, including Errata 1 (2003, and Errata 2 (2004) and Errata through 2006.	
2	The Local Controller firmware shall be configurable to operate in the following cabinets:	
2.1	Type 332, 303, 337, 336S	
3	The Local Controller firmware shall be compatible with the Central Management Software as defined below.	
3.1	The Local Controller firmware shall allow database uploads and downloads from the Central Management System.	
3.2	The Local Controller firmware shall accept commands from the Central Management System	
4	The Local Controller firmware shall be capable of controlling multiple intersections from the same 2070 controller	
5	The Local Intersection Software shall operate under the OS-9 real-time operating system from Micro-systems Corporation	
Functional Requirements		
6	The Local Controller firmware shall provide at least 16 phases	
7	The Local Controller firmware shall provide at least 4 concurrently timing rings	
9	The Local Controller firmware shall be capable of storing a minimum of 27 individual timing plans	
10	The Local Controller firmware shall provide the following per phase features	
10.1	Minimum Green time ranging from 1-255 seconds in 1 second increments	
10.2	Passage time ranging from 0-25.5 seconds in 0.1 second increments	
10.3	Maximum Green 1 time ranging from 1-255 seconds in 1 second increments	
10.4	Maximum Green 2 time ranging from 1-255 seconds in 1 second increments	
10.5	Yellow Change time ranging from 3-25.5 seconds in 0.1 second increments	
10.6	Red Clearance time ranging from 0- 25.5 seconds in 0.1 second increments	

Requirement No.	Requirement	Comments
10.7	Pedestrian Walk 1 time ranging from 0-255 seconds in 1 second increments	
10.8	Pedestrian Walk 2 time ranging from 0-255 seconds in 1 second increments	
10.9	Pedestrian Clearance time ranging from 0-255 seconds in 1 second increments	
10.10	Added Initial time ranging from 0-25.5 seconds in 0.1 second increments	
10.11	Time to Reduce time ranging from 1-255 seconds in 1 second increments	
10.12	Time Before Reduction ranging from 1-255 seconds in 1 second increments	
10.13	Minimum Gap time ranging from 0-25.5 seconds in 0.1 second increments	
11	The Local Controller firmware shall permit exclusive pedestrian service	
12	Phase Selection Points – The phase next to be served shall be determined at the end of the Green interval of the terminating phase, except that if the decision cannot be made at the end of the Green interval it shall not be made until after the end of the vehicle change and clearance intervals	
13	Provision for Storing a Demand – The Local Controller firmware shall support the following provisions for storing a demand:	
13.1	The storing of a call for vehicle service on each vehicle phase when that phase is not displaying a Green indication.	
13.2	The storing of a call for pedestrian service on phases equipped with pedestrian time setting, when that phase is not displaying a Walk indication	
14	Placement of Maximum Recall – The Local Controller firmware shall allow, via program entry, the ability to place a call on a phase such that the Green interval shall be extended to the Maximum Green Time.	
15	Placement of Minimum Recall – The Local Controller firmware shall allow, via program entry, the ability to place a recurring demand for vehicle service on any phase when that phase is not in Green interval.	
16	Placement of Pedestrian Recall – The Local Controller firmware shall allow, via program entry, the ability to place a recurring pedestrian call which shall function in the same manner as an external pedestrian call, except that it shall not recycle the pedestrian service until a conflicting phase is serviced	
17	Placement of Call at Phase Termination – The Local Controller firmware shall place a call on a terminating phase when the terminating phase has remaining time in the Passage Time.	

Requirement No.	Requirement	Comments
18	Conditional Service – The Local Controller firmware shall provide conditional service phase selection, via program entry.	
19	The Local Controller firmware shall provide the following inputs, via program input, to each phase:	
19.1	Hold – The hold input shall retain the Green indication on the selected phase.	
19.1.1	Hold on a nonactuated phase	
19.1.2	Hold on an actuated phase	
19.2	Phase Omit - The Phase Omit input shall cause the omission of a phase	
19.3	Pedestrian Omit – The Pedestrian Omit input shall inhibit the selection of a phase due to a pedestrian call on that phase and to prohibit the servicing of a pedestrian call on that phase.	
20	The Local Controller firmware shall provide, via program entry, the following outputs:	
20.1	Load Switch Drivers for Vehicle Phase – This output shall provide a Green, Yellow, and Red output for each vehicle phase.	
20.2	Load Switch Drivers for Pedestrian Phase – This output shall provide a Walk, Pedestrian Clearance, and Don't Walk output for each pedestrian movement.	
20.3	Check – This output shall indicate phase or vehicle phase status	
20.4	Phase On – This output indicates phase status	
20.5	Phase Next – This output indicates the next committed phase.	
21	The Local Controller firmware shall provide the following inputs on a per ring basis:	
21.1	Force Off in actuated mode terminates the Green timing of the active phase	
21.2	Force Off in nonactuated mode terminates the Walk Hold of the active phase	
21.3	Red Rest requires rest in Red of all phases in the timing ring	
21.3.1	Registration of a serviceable conflicting call shall result in immediate advance for Red Rest to Green on the demanding phase	
21.4	Inhibit Maximum Termination – disables the maximum termination functions of all phases in the selected timing ring.	
21.4.1	Inhibit Maximum Termination does not inhibit timing of maximum green	
21.5	Omit Red Clearance – Omits the Red Clearance interval timings	

Requirement No.	Requirement	Comments
21.6	Pedestrian Recycle – This input controls the recycling of pedestrian movements based on the operating mode	
21.6.1	In actuated mode, the pedestrian movement shall be recycled if the pedestrian recycle input is active on the phase, a serviceable pedestrian call exists, and the hold input is active.	
21.6.2	In non-actuated mode, the pedestrian movement is recycled if the pedestrian recycle input is active on the phase, the phase has reached State D, the Pedestrian Omit is not active, and a serviceable conflicting call does not exist.	
21.7	Maximum II Selection – Allows the selection of the maximum II time on all phases in the selected ring	
22	The Local Controller firmware shall provide the following outputs on a per ring basis:	
22.1	The active phase is in its Green interval and operating in Actuated Mode	
22.1.1	Minimum Timing – When timing in the Initial, Walk, or Pedestrian Clearance portions of the Green interval	
22.1.2	Extension Timing – When timing that portion of the Green interval following the completion of the minimum timings	
22.1.3	Maximum timing – When timing that portion of the Green interval following the completion of the minimum timings, when not timing an extension and the maximum Green is timing	
22.1.4	Green Rest – When timing that portion of the Green interval when the minimum timings are complete, Passage Timer is timed out and the Maximum Green timer is either timed out or has not started	
22.2	The active phase is in its Green interval and operating in nonactuated Mode	
22.2.1	Walk Timing – When timing in the Walk portion of the Green interval	
22.2.2	Walk Hold – When the output is active, Walk timing is complete and the Hold input is active	
22.2.3	Pedestrian Clearance Timing – When timing the Pedestrian Clearance interval or the remaining portion of the Minimum Green	
22.2.4	Green Rest – When the timing of the Pedestrian and Minimum Green are complete	
22.3	The Active Phase is not in its Green interval	
22.3.1	Yellow Change – When timing the Yellow Change	
22.3.2	Red Clearance – When timing the Red Clearance	

Requirement No.	Requirement	Comments
22.3.3	Red Rest – When timing is complete and a Red indication is displayed	
23	The Local Controller firmware shall provide the following features on a Per Unit basis:	
23.1	Initialization - Initialization shall occur after either of the following conditions:	
23.1.1	Restoration of power after a defined power interruption	
23.1.2	Activation of an External Start input	
23.1.3	The Local Controller firmware shall provide a program entry for initialization to allow define initialization start-up at the beginning of the Green, Yellow, or Red interval of any phase or nonconflicting phase pair	
23.2	Simultaneous Gap Out shall allow the user to insure that defined phases which will terminate, must simultaneously reach a point of being committed to terminate before Green timing termination shall begin.	
23.2.1	Simultaneous Gap Out shall be enabled/disabled via program entry	
23.3	Dual Entry provides that one phase in each ring must be in service, subject to compatibility, al all times	
23.3.1	Dual Entry shall be selectable via program entry in the ring to be active	
23.4	Alternate Sequence – The Local Controller firmware shall provide fifteen alternatives to the standard sequence	
23.4.1.	The alternate sequences shall provide every combination of lead-lag operation for an eight phase Dual Ring configuration.	
23.4.2	The Alternate sequence shall be user definable	
23.4.3	The Alternative Sequence shall be selectable by Timing Plan	
23.5	Red Revert – The Local Controller firmware shall provide a minimum red indication ranging from 2-6 seconds following the Yellow Change interval and prior to the next display of Green on the same phase.	
23.6	The Local Controller firmware shall provide indications to facilitate the determination of the operation. The indications shall include the following	
23.6.1	Phase or phases in service	
23.6.2	Phases or phases next to be services	
23.6.3	Presence of a vehicle call	

Requirement No.	Requirement	Comments
23.5.4	Presence of a pedestrian call	
23.7	Deleted	
23.8	The Local Controller firmware shall provide indications to indicate the status of each active phase in the ring. These indications shall include the following:	
23.8.1	Initial	
23.8.2	Extension	
23.8.3	Yellow change	
23.8.4	Red Clearance	
23.8.5	Walk	
23.8.6	Pedestrian Clearance	
23.8.7	Green termination through Gap-out	
23.8.8	Green termination through Maximum time-out	
23.8.9	Green termination through Force-off	
23.8.10	Rest State	
23.9	The Local Controller firmware shall be capable of supporting a minimum of 64 vehicle detectors inputs per intersection.	
23.9.1	The Local Controller firmware shall support speed, occupancy, and presence detection	
23.9.2	Each vehicle detector inputs shall be assignable to any one phase, via program entry	
23.9.3	Each detector input shall be capable of being delayed , via program entry from 0-255 seconds in one second increments	
23.9.4	Each detector input shall be capable of being extended from the point of termination be program entry from 0-25.5 seconds in increments to 0.1 seconds.	
23.9.5	Each detector input shall be capable of being switched to another phase when the assigned phase is Yellow or Red and the program entered phase is Green.	
23.9.6	A minimum of eight Vehicle Detectors shall be assignable to a system detector function, via program entry	
23.10	The Local Controller firmware shall provide a minimum of 8 pedestrian detector inputs.	
24	The Local Controller firmware shall provide internally generated Overlaps	

Requirement No.	Requirement	Comments
24.1	The Local Controller firmware shall provide up to 16 overlaps	
24.2	The Overlaps shall be capable of providing pedestrian service directly, timing walk and pedestrian clearance intervals	
24.3	Each Overlap shall have its own timing parameters	
24.4	Each overlap output shall be configurable to display any of the three output colors.	
24.5	Each overlap output shall be configurable to be dark	
25	The Local Controller firmware shall provide a minimum of 8 special functions	
25.1	Each special function shall be controllable from the Central System	
25.2	Each special function shall be controllable from the local time-of-day schedule	
25.3	Each special function shall be controllable for the special function inputs	
25.4	Each special function shall be programmable per plan and pattern	
26	The Local Controller firmware shall be capable of providing coordinated operation.	
27	The Local Controller firmware shall provide a minimum of 8 unique pre-emption inputs per intersection.	
27.1	Each Pre-emption input shall be programmable to have equal or higher priority.	
27.1.1	Equal priority preempts shall be served on a first called, first served basis	
27.1.2	Higher priority preempts shall override a lower priority preempt	
27.2	The Local Controller firmware shall provide a maximum preemption timed interval, user settable in one minute increments between zero and 25 minutes.	
27.3	The Local Controller shall provide user selectable entry and exit phases for each unique preempt input	
27.4	At the Conclusion of any preempt call, the Local Controller firmware shall provide an exit transition timing and signal display to a programmed return-to-normal condition.	
27.5	All preempts inputs shall have priority over Automatic Flash.	
27.6	The Local Controller firmware shall provide indications to identify the status of preempt operation. These indications shall include the following:	
27.6.1	Preempt Call	

Requirement No.	Requirement	Comments
27.6.2	Preempt in Control	
27.6.3	Preempt Interval	
27.6.4	Preempt Interval Counter	
28	The Local Controller firmware shall be capable of providing internal Time Base Control, via program entry	
29	The Local Controller firmware shall be capable of being set to manually operate in timing plan, via program entry	
30	The Local Controller firmware shall be capable of operating in Free Mode	
31	The Local Controller firmware shall allow Start-up Flash Operation	
31.1	The duration of start-up flash shall be programmable for 0-255 seconds in one second increments	
32	The Local Controller firmware shall provide Automatic Flash Operation	
32.1	The Entry phases to Automatic Flash shall be selectable, via program entry	
32.2	The Exit phases from Automatic Flash shall be selectable, via program entry	
32.3	When exiting Automatic Flash, calls shall be placed on all vehicle and pedestrian movements	
33	The Local Controller firmware shall allow data to be entered on the front panel keypad	
34	The Local Controller firmware shall allow data to be entered from a mobile maintenance unit via a Port 2 Interface.	
35	The Local Controller firmware shall support of backing-up the parameter database.	
Insert36	The Local Controller firmware shall support transit signal priority using menu selectable programming. See in Exhibit C, or approved alternative.	
37	The Local Controller firmware shall support Flashing Yellow operation for left turn protective/permissive operation.	
38	The Local Controller firmware shall support Dallas Phasing and the Arlington Phasing as described in Exhibit C.	
39	The Local Controller firmware shall be capable for providing fully actuated and fixed time diamond interchange operation	
40	The Local Controller firmware shall support the following diamond interchange operations	
40.1	Figure 3 - Three Phase (Lag-Lag)	
40.2	Figure 6 – Three Phase Variation (Lead-Lag)	

Requirement No.	Requirement	Comments
40.3	Figure 7 – Three Phase Variation (Lag-Lead)	
40.4	Figure 4 – Four Phase w/ Overlaps (TTI Phasing)	
40.5	Three Level Diamond Four Phase with Four Overlaps	
41	The Local Controller firmware shall be capable of operating Changeable Lane Assignment Signs (CLAS). This functionality can be direct, or by means of making active specific controller outputs.	
41.1	The operation of the CLAS shall be assignable by Time-of-Day	
41.2	CLAS operation shall include clearance intervals to allow safe change from one assignment to another	
41.3	CLAS shall have continuous on/off control from the local controller software	
42	The Local Controller firmware shall be capable of operating active “No Right Turn” or “No Left Turn” signs at railroad crossings	
43	The Local Controller firmware shall allow programming of Uneven Double Cycling	
44	Users shall be capable of setting date and time settings in the Local Controller Software.	
44.1	The Local Controller firmware shall be capable of automatically adjusting for Daylight Savings Time using programmed month/week.	
45	The Local Controller firmware shall allow selection of timing plans on a time-of-day/day-of-week basis	
45.1	The Local Controller firmware shall allow up to 40 weekly time-of-day schedules	
46	The Local Controller firmware shall be capable of scheduling fixed holidays	
47	The Local Controller firmware shall be capable of scheduling floating holidays.	
47.1	The floating holiday (or other special event) can be scheduled to run for continuous multiple days.	
48	The Local Controller firmware shall provide Automatic Detector Diagnostics for the following conditions	
48.1	Max Presence	
48.2	No Activity	
48.3	Erratic Output	
48.4	Failed Communications	
49	The Local Controller firmware shall provide controller logs containing the following minimum information	

Requirement No.	Requirement	Comments
49.1	Critical Response Frame Errors	
49.2	Non-critical Response Frame Errors	
49.3	Detector Errors	
49.5	Local Flash Faults	
49.6	Preempt	
49.7	Power On/Off	
Communications		
50	The Local Controller firmware shall be capable of communicating using TCP/IP Ethernet Standard Protocol	
50.1	The Local Controller shall allow the following Ethernet Settings:	
50.1.1	IP Address	
50.1.2	Subnet Mask	
50.1.3	Broadcast Address	
50.1.4	DHCP enable	
50.2	The Local Controller firmware shall allow remote ping to verify communication in an IP network.	
51	The Local Controller Software shall be capable of communicating using serial communication	
51.1	The Local Controller firmware shall allow serial communication through all four serial ports available on the 2070 controller	

2.12 Transition Logic

The Contractor or supplier shall provide a brief discussion of their transition logic. Identify how the controller transitions from preempt to a plan, and visa versa.

3.0 SPECIFICATION FOR TYPE 332 CABINET

SECTION 3.0 – 332 CABINET CONTENTS FOR A FULL REPLACEMENT

Each cabinet assembly shall include, as a minimum, the following items:

- All labeling shall be either silk screen or phenolic/engraved.
- 18-in fluorescent light in the top front of the cabinet
- 18-in fluorescent light in the top rear of the cabinet
- PDA and 24VDC cabinet power supply combined into one unit
- Service panel #1
- Model 200 Switchpacks
- Model 242 2-Channel Isolators
  - Flasher Units
  - Load Switches
  - Cabinet Mounted Interconnect Center (CMIC) – CMIC shall be a Corning Cable Systems model C-MIC-12 or equivalent
  - One fiber optic splice tray
  - One single mode SC connector module with 6 connectors in each panel

3.1 Delivery of Cabinets

The Type 332 cabinets shall be delivered to the City of San Antonio Traffic Signal Shop.

3.2 Cabinet Wiring Methods

A Ground Fault Circuit Interruption (GFCI) duplex receptacle shall be mounted and wired in the lower right sidewall of the cabinet. An additional duplex receptacle shall be mounted and wired in the upper left side of the cabinet. These receptacles shall be wired on the load side of the 15-Amp auxiliary equipment circuit breaker.

All exposed AC wiring points shall be covered with a clear non-conductive plastic cover to prevent accidental contact, except for wiring at terminal strips.

Each cabinet shall be delivered with wiring diagrams, instructional manuals, and a parts list including part numbers.

3.3 Auxiliary Devices

3.3.1 - Load Switches

Load switches shall be solid state.

Signal load switches shall have a minimum rating of 10 amperes at 120 VAC for an incandescent lamp load.

The full complement of load switches shall be supplied with each cabinet to allow for maximum phase utilization for which the cabinet is designed.

3.3.2 - Flashers

The flasher shall be solid state.

Flashing of field circuits for the purpose of intersection flash shall be accomplished by a separate flasher.

The flasher shall be rated at 15 amperes, double pole with a nominal flash rate of 60 FPM.

3.33 - Flash Transfer Relays

The full complement of relays shall be supplied with each cabinet to allow for maximum phase utilization for which the cabinet is designed.

3.3.4 - Loop Detector Units

Four 2-channel loop detector units shall be supplied with each 2-phase cabinet supplied. Sixteen (16) 2-channel loop detector units shall be supplied with each 8-phase cabinet supplied.

3.3.5 - Cabinet Power Supply

One 24VDC cabinet power supply shall be supplied with each cabinet assembly.

SECTION 3.4 – DETECTORS

A. GENERAL:

The detector unit shall be a Model 222 Loop Detector Sensor Unit. The sensor unit shall produce an output signal when a vehicle passes over or remains over wire loops embedded in the roadway. The method of detection shall be based upon a design that renders the output signal when a metallic mass (vehicle) enters the detection zone causing a change of 0.02% minimum decrease in inductance of the circuit measured at the input terminals of the sensor unit. The detector zone shall include all configurations listed herein.

1. An open loop shall cause the sensor unit channel to output a signal.

2. Each sensor unit channel shall be capable of detecting all types of licensed motor vehicles when connected to the loop configurations and lead-in requirements listed herein.

3. The sensor unit shall comply with all performance requirements when connected to an inductance (loop plus lead-in) from 50 to 700 microhenries with a Q-parameter as low as 5 at the sensor unit operating frequency.

4. Loop inputs to each channel shall be transformer isolated.

5. Each individual channel shall have a minimum of 3 switch-selectable operating frequencies.

6. The sensor unit channel tuning circuits shall be automatic and shall be so designed that drift, caused by environmental changes, or changes in applied power shall not cause an actuation.

B. MODE SELECTION REQUIREMENTS:

Each sensor unit channel shall have Pulse and Presence selectable modes.

1. Pulse Mode:

In the pulse mode, each new vehicle presence within the detection zone shall initiate a sensor unit channel output pulse of 125 (± 25) ms in duration.

Should a vehicle remain in a portion of the detection zone for a period in excess of 2 seconds, the sensor unit shall channel shall automatically "tune out" the presence of said vehicle. The sensor unit channel shall then be capable of detecting other vehicles entering the same detection zone. The recovery time between the first vehicle pulse and channel capability to detect another vehicle shall be 3 seconds maximum.

2. Presence Mode:

In the presence mode, the sensor unit channel shall recover to normal sensitivity within 1 second after termination of vehicle presence in the detection zone regardless of the duration of the presence.

The channel sensitivity settings shall be provided that detect the presence of a vehicle in the detection zone for a specified time period and inductance change(s). The conditions are as follows:

	Minimum Time Duration (min.)	Detector Input Inductance Change
Setting 1	3	0.02% or more
	10	0.60% or more
Setting 2 (OCC)	4	1.00% or more

C. SENSITIVITY:

1. Each Sensor Unit channel shall be equipped with a front panel selectable sensitivity setting(s) in presence and pulse modes to accomplish the following under the operational and environmental requirements of these specifications.

2. Each sensor unit channel shall respond to an inductance change of 0.02% while connected to the following City of San Antonio loop configurations:

   i) Single 6x6 loop (4 turns, #14 wire duct, 1 inch [25 mm] minimum depth into street), with a 250 feet [76 m] lead-in cable.

   ii) Single 6x6 loop (4 turns, #14 wire duct, 1 inch [25 mm] minimum depth into street), with a 800 feet (244 m] lead-in cable.

   iii) Three 6x6 loops (4 turns, #14 wire duct, 1 inch [25 mm] minimum depth into street) connected in series, with a 250 feet [76 m] lead-in cable.

   iv) Three 6x6 loops (4 turns, #14 wire duct, 1 inch [25 mm] minimum depth into street) connected in series, with a 800 feet [244 m] lead-in cable.

   v) Single 6x50 monopole loop (2 turns, #14 wire duct, 1" [25 mm] minimum depth into street), with a 250 feet [76 m] lead-in cable.

3. Each sensor unit channel shall respond while in Setting 2 (OCC) to a nominal change in inductance between 0.15% to 0.4% while connected to the above loop configurations. This setting shall not respond to an inductance change of less than 0.1%.

4. The sensor unit channel shall not detect vehicles, moving or stopped, at distances of 3 feet [1 m] or more from any loop perimeter, in all configurations listed above.

5. All sensitivity settings shall not differ more than 40% from the nominal value chosen.

6. There shall be a minimum of 7 selectable sensitivity settings including specified sensitivity settings.

D. RESPONSE TIME:

Response time of the sensor unit channel for the OCC setting shall be less than 20 ms. That is, for any decreased inductive change which exceeds its sensitivity threshold, the channel shall output a ground true logic level within 20 ms. When such change is removed, the output shall become an open circuit within 20 minutes.

The sensor unit channels shall begin normal operation within 2 seconds after the application of power or after a reset signal of 15 microseconds.

E. LIGHTNING PROTECTION:

1. Lightning protection shall be installed within the sensor unit.

2. The protection shall enable the sensor unit to withstand the discharge of a 10 microfarad capacitor charged to ± 1000 volts directly across the sensor unit input pins with no loop load present.

3. The protection shall enable the sensor unit to withstand the discharge of a 10 microfarad capacitor charged to ± 2000 volts directly across wither sensor unit input inductance pins or from either side of the sensor unit input inductance pins to equipment ground. The sensor unit input pins shall have a dummy resistive load attached equal to 5.0 ohms.

F. TRACKING:

1. Tracking Rate: The sensor unit shall be capable of compensating or tracking for an environmental change up to 0.001% change in inductance per second.

2. Tracking Range: The sensor unit shall be capable of normal operation as the input inductance is changed ± 5.0% from the quiescent tuning point regardless of the internal circuit drift.

3. The sensor unit shall be capable of normal operation as the input resistance is changed ±0.5% from the quiescent tuning point regardless of the internal circuit drift.

G. ENVIRONMENTAL INTEGRITY:

The operation of the sensor shall not be affected by changes in the inductance and/or capacitance of the loop caused by environmental changes with the rate of temperature change not exceeding 1 °C per three minutes. The opening or closing of the controller cabinet door with a temperature differential of up to 18 °C between the inside and outside air shall not affect the proper operation of the sensor unit.

SECTION 3.5 – ISOLATORS:

A. DC Isolators shall be Model 242 and shall meet FHWA-IP-78-16 specifications chapter 7. See Section VI L for quantities to be supplied with particular cabinets.

B. AC Isolators shall be Model 252, supplied as specified in Section VI L, and placed in input file slot I11, with marker strip labeled "DOOR ALARM" in each Type 332 and 336 cabinet.

SECTION 3.6 - LOAD SWITCHES:

Load switch can be Type 200 in accordance with the specification of FHWA-IP-78-l6.

SECTION 3.7 - CONTROLLER CABINETS:

This specification defines the cabinets to be used with the Model 2070L controller units. This specification uses the Caltrans TEES requirements for controller cabinets.

Details of alternative designs must be submitted to the Traffic Signal Engineer for approval prior to fabrication.

A. GENERAL CABINET CONSTRUCTION:

1. All cabinets shall be rainproof. The cabinet top shall be "crowned" or slanted to prevent standing water.

2. The cabinet and doors shall be fabricated of 0.125-inch [3 mm] minimum thickness aluminum. All exterior seams for cabinet and doors shall be continuously welded. All exterior welds shall be smooth. All edges shall be filed to a radius of 0.03125 inch [0.794 mm] minimum.

3. Cabinets shall conform to the requirements of ASTM Designation: B 209 for 5052-H32 aluminum sheet.

4. Welding shall be done by the gas metal arc (Mig) or gas tungsten arc (Tig) process using bare aluminum welding electrodes. Electrodes shall conform to the requirements of the American Welding Society (AWS) A5.10 for ER5356 aluminum alloy bare welding electrodes.

5. Procedures, welders and welding operators for welding on aluminum shall be qualified in accordance with the requirements of AWS B3.0, "Welding Procedure and Performance Qualification," and to the practices recommended in AWS C5.6.

6. The surfaces of each aluminum cabinet shall be the original cast-like finish or fabricated finish. Any variations of finish shall be preapproved in writing by the City. Each cabinet shall be equipped with an electric fan with ball or roller bearings and a capacity of at least 100 cubic feet [3 cubic meters] of free air delivery per minute.

7. The fan shall be mounted within the cabinet and vented out between the top of the cabinet and the front door.

8. The fan shall be thermostatically controlled and shall be manually adjustable to turn on between 33 °C and 65 °C with a differential of not more than 6 °C between automatic turn on and turn off. The cabinet fan circuit shall be protected at 125 percent of the ampacity of the fan motor.

9. Intake (including filter) and exhaust areas shall pass a minimum of 60 cubic feet [2 cubic meters] of air per minute.

10. Each cabinet shall be provided with louvered vents in the front door with a removable pleated disposable air filter. The filter shall cover the vents and shall be held firmly in place with bottom and side brackets and a spring-loaded upper clamp.

11. The bottom filter bracket shall be formed into a waterproof sump with drain holes to the outside. The louvered vents shall be designed and constructed such that a stream of water from a pressure head, such as a Rainbird sprinkler or other type sprinkler, will not enter the cabinet.

12. All cabinets shall have a police panel. The police door shall provide access to the "Auto-Flash" and "Signals Off" switches. Police Access shall be limited to these two switches. The police panel door shall be equipped with a lock keyed for a master police key.

13. One key shall be furnished with each cabinet for the police lock. Each police key shall have a shaft at least 1.75 inches [44mm] in length.

14. Type 332 cabinets shall have single front and rear doors, each equipped with a lock. When each door is closed and latched, the door shall be locked. The latching handles shall have provision for padlocking in the closed position. The operating handle shall be stainless steel with a 7.5-inch [191 mm] handle and a minimum 0.50 inch [13 mm] stainless steel shank. The cabinet door frame shall be double flanged out on all four sides and shall be provided with strikers to hold tension on and form a firm seal between door gasketing and cabinet door frame.

15. The flange width shall be a minimum of one inch [25 mm], measured from front edge to flange to cabinet outside surface.

16. Each cabinet will be supplied with locks keyed alike to the standard Corbin #2 core combination. Two keys shall be supplied with each cabinet.

17. The locks shall have rectangular, spring-loaded bolts. The bolts shall have a 0.281-inch [7 mm] throw and shall be 0.75 inch [19 mm] wide by 0.375 inch (9 mm] thick (dimension tolerance is +0.035 inch [0.89 mm]). The locks shall be left hand on the front door and right hand on the rear door. Keys shall be removable in the locked position only. Locks shall be rigidly mounted with two stainless steel machine.

18. All load switches shall be solid-state switches and shall turn on and off within plus or minus 5 degrees of the zero voltage point of the AC sinusoidal line. In the locked position, the throw shall extend a minimum of 0.25 (+ 0.03) inch [6 mm (+0.76 mm)]. The front portion of the lock shall neither be recessed nor shall it extend more than 0.1875 inch [5 mm] from the face of the door. The locks shall be mounted on the door in such a position that the tumblers are in the upper quadrant.

19. The latching mechanism shall be a three-point draw roller type. The center catch and pushrods shall be plated. Pushrods shall be turned edgewise at the outward supports and cross section shall be 0.25 inch [6 mm] by 0.75 inch [19 mm], minimum.

20. Supports shall be 0.105 inch [3 mm] steel, minimum. Rollers shall have a minimum diameter of 0.875 inch [22 mm] and shall be equipped with ball bearings and nylon wheels. The center catch shall be fabricated of 0.1875-inch [5 mm] plated steel, minimum.

21. Each door shall be equipped with two bolt hinges, minimum 3.5 inches [89 mm] long. Each hinge shall have a fixed pin. All doors shall be provided with catches to hold the door open at

both 90 degrees and 180 degrees, plus or minus ten degrees. The catches shall be 0.375 inch [10 mm] diameter minimum, plated steel rods. Door latches, in latched position, shall not come in contact with cabinet surface or flange lip. The catches shall be capable of holding the door open at 90 degrees in a 60 MPH [96.54 kph] wind at an angle perpendicular to the plane of the door.

22. On all cabinets, door hinge pins and bolts shall be made of stainless steel. Door hinges shall be made of aluminum. The hinges shall be bolted to the cabinet and may be welded to the door. The hinge pins and bolts shall be covered by the door edge and shall not be accessible when door is closed. Hinge pins will be welded at each end to form a cap and welds filed or ground smooth.

23. Type 332 cabinets shall be provided with two lifting eyes to be used when placing the cabinet on the foundation. Each eye attached to the cabinet shall have a minimum diameter of 0.75 inch [19 mm] and shall be capable of supporting the cabinet.

24. Gasketing shall be provided on all door openings and shall be dust-tight. Gaskets shall be 0.25 inch [6 mm] minimum thickness closed cell neoprene and shall be permanently bonded to the metal. The mating surface of the gasketing shall be covered with a silicone lubricant to prevent sticking to the mating surface.

B. POWER SUPPLY:

1. A power supply shall be provided in the cabinet for all equipment installed in the cabinet except the 170 Controller unit, the Model 210 Monitor and the Models 242 Isolators.

2. All Power Supply Assemblies (PDA) for 8-phase cabinets shall meet Caltrans' Traffic Signal Control Equipment Specifications for PDA #2, dated January 1989 or latest revision.

3. The power supply shall be ferro-resonant design having no active components and shall conform to the following requirements:

   a. Line Regulation: Two percent from 95 to 135 VAC at 60 Hz, plus an additional 1.6 percent for each additional one percent frequency change.

   b. Load Regulation: Five percent from one ampere to five amperes with a maximum temperature rise of 30°C above ambient.

   c. Design Voltage: +24 (+0.5) VDC at full load and 30°C with 115 VAC input line after 0.5 hour warm-up.

   d. Full Load Current: Five amperes, minimum.

   e. Ripple Noise: Two volts peak-to-peak and 500 millivolts rms at full load.

   f. Line Voltage: 95 to 135 VAC.

   g. Efficiency: 60 percent, minimum.

   h. Minimum Voltage: 22.8 VDC.

4. The power supply front panel shall include:

a. All fuses or circuit breakers.

b. Pilot lamp.

c. Test points or meter for monitoring output voltage.

d. The power supply, including terminals, shall be protected to prevent accidental contact with energized parts.

e. Wiring for 120 VAC power input to power supply shall be terminated on terminal strips. AC plugs will not be acceptable.

f. The power supply cage and transformer shall be securely braced with nylon strapping to minimize damage in transit.

C. FLASH TRANSFER RELAY:

1. The Flash Relays shall conform to the requirements of these specifications.

2. A leakage resistor, which will permit 3 to 8 volts to be applied to the relay coil, shall be installed across the terminals of each relay socket to overcome the residual magnetism.

3. The flash transfer relay shall transfer field outputs from switchpack output to flash control. Transfer of the flash transfer relay circuit to flash control shall not interrupt the operation of the controller unit.

4. The coils of the flash transfer relays shall be energized only when the signals are in flashing operation and the police panel "ON/OFF" switch is in the "ON" position.

D. EQUIPMENT REMOVAL:

The following equipment shall be completely removable from the cabinet without removing any other equipment and using only a screwdriver:

a. Power Supply

b. Power Distribution Assembly

c. Input File

d. Output File

E. MISCELLANEOUS:

1. All fuses, circuit breakers, switches, (except police panel switches and fan fuse) and indicators shall be readily visible and accessible when the front door is open.

2. All equipment in the cabinet shall be clearly and permanently labeled. The marker strips shall be made of a material that can be easily and legibly written on using a pencil or ball-point pen. Marker strips shall be located immediately below the item they are to identify and must be clearly visible with the items installed. Glossy marker strips are not acceptable because ink tends to

bubble and smear. Resistor/Capacitor transient suppression shall be provided at the relay socket (across relay coils) and in the fan circuit.

F. CABINET WIRING DIAGRAM:

1. One set of nonfading (comparable to Xerox 2080) readable cabinet wiring diagrams shall be supplied with each cabinet. The diagram shall be nonproprietary. They shall identify all circuits in such a manner as to be readily interpreted. The cabinet drawing shall show the component layout in an elevation view as viewed from the rear of the cabinet with the left and right cabinet walls shown in their relative positions. The diagrams shall be placed in a heavy duty side opening clear plastic pouch and attached to the front cabinet door. The pouch shall be of such design and material that it provides adequate storage and access to the wiring diagram, and shall be constructed of a material which will not react with or stick to xerographic plastic toners used in copy machines.

2. Detailed equipment layout scale drawings and wiring diagrams of all equipment installed in the cabinet shall be submitted to the Traffic Engineer for approval prior to production. Review by the City does not lessen the contractor's responsibility to meet the specifications.

G. CABINET LIGHT:

1. Each cabinet shall be equipped with a fluorescent lighting fixture mounted inside the top front of the cabinet. The fixture shall have an 8 watt lamp AT5-CW, operated from a normal power factor, U.L. listed ballast. The lamp shall be shaded to diffuse the light. A door switch shall be installed to turn the cabinet light on when the front door is opened. The door switch shall be on a separate circuit by itself, and used only to turn on the light and operate the door alarm.

2. On the Type 332 and 336 cabinets, additional wiring shall be provided from the load (normally open) side of the light switch to Input File location I11D, run AC- to Input File location I11E, and C1-80 shall be wired to IUF for the door alarm circuit.

H. CONDUCTORS:

1. Conductors used in cabinet wiring shall terminate with properly sized spring-spade type terminals or shall be soldered to a through-panel solder lug on the rear side of the terminal block. All crimp-style connectors shall be applied with a power tool which prevents opening of the handles until the crimp is completed.

2. Conductors in the controller cabinet between the service terminals and the signal bus breakers including the chassis ground conductor to Power Distribution Assembly shall be No. 8, or larger.

3. All conductors used in controller cabinet wiring shall be No. 22, or larger, with a minimum of 19 copper strands. Conductors shall conform to Military Specification: MIL-W-16878D, Type B or better. The insulation shall have a minimum thickness of 10 mils and shall be nylon jacketed polyvinyl chloride except that Conductors No. 14 and larger may have Type THHN insulation, and shall be stranded with a minimum of seven copper strands.

4. All conductors, except those which can be readily traced, shall be labeled. Labels attached to each of the conductors shall identify the destination of the other end of the conductor.

5. All conductors used in controller cabinet wiring shall conform to the following color-code requirements:

a. The grounded conductors of AC circuits shall be identified by a continuous white or gray color.

b. The equipment grounding conductors shall be identified by a solid green color or by a continuous green color with one or more yellow stripes.

c. The DC logic ground conductors shall be identified by a solid white color with a colored (except green) stripe.

d. The ungrounded conductors shall be identified by any color not specified above.

6. All cabinet wiring harnesses shall be neat, firm and routed to minimize crosstalk and electrical interference. Printed circuit motherboards may be used to eliminate or reduce cabinet wiring on the input files, only.

   a. Wiring containing AC shall be routed and bundled separately or shielded separately from all logic voltage control circuits.

   b. Cabling shall be routed to prevent conductors from being in contact with metal edges. All conductors, terminals or parts, which could be hazardous to maintenance personnel, shall be protected with suitable insulating material.

7. Within the cabinet wiring, the DC logic ground and equipment ground shall be electrically isolated from the AC grounded conductor and each other by 500 megohms when tested at 250 VDC, with the power line surge protector disconnected.

8. Conductors from Connector C to the input file shall be of sufficient length to allow any conductor to be connected to any detector output terminal (Positions S, F, W). The AC- copper terminal bus shall not be grounded to the cabinet or connected to the logic ground and shall provide a minimum of 10 terminals for connection to field conductors. Nylon screws with a minimum diameter of 0.25 inches [6 mm] shall be used for securing the bus to the service panel.

9. An equipment grounding (earth ground) bus shall be provided in each cabinet. The bus shall be copper and grounded to the cabinet.

10. The output common of the cabinet power supply shall be connected to the DC logic ground bus using a No. 14, or larger, stranded copper wire.

11. The DC ground bus shall be located on the input panel.

12. A No. 8, or larger, copper conductor shall be connected between equipment ground bus and rack rails.

13. Terminals for the signal wires shall be fitted with 90 degree lugs for #14 AWG wire. Lugs shall be the type that the end of the field wire slips into and is held in place with a compression screw on the wire. (Blackburn #L35 or equivalent)

14. Each loop detector lead-in, from the field terminals in the cabinet to the sensor unit rack connector shall be a cable UL Type 2092 or better. The stranded tinned copper drain wire shall

be connected to a terminal on the input file terminal block. This input terminal shall be connected to the equipment grounding bus through a single conductor.

15. Each cabinet shall be provided with one harness, terminated at one end with standard C-2 connector plugs, at the other end to a terminal strip, and four feet in length. The harness for the C-2 connector shall contain conductors for the AUDIO IN and AUDIO OUT pairs. Harness shall be terminated at a terminal strip placed near the bottom of the cabinet, and each AUDIO IN and AUDIO OUT position on the terminal strip shall be protected with an EDCO Model SRA-642C (18 VAC) or approved equal. Harness conductors shall be clearly labeled at the terminal strip.

I. SURGE PROTECTION:

1. All cabinets shall be provided with an EDCO Model # SHA-1210 or approved equal. Cabinet shall be wired so filtered AC+ shall be supplied to the 170 unit receptacles (2) and conflict monitor only.

2. Surge protection shall be provided for all cabinet power.

3. All signal output lines shall be protected by a MOV installed at the field wiring terminal block inside the swing down back panel so as to not interfere with the field wiring, between the terminal and earth ground. The MOV shall be Type V150LA20.

J. HEAVY DUTY RELAYS:

This specification defines the Model 430 heavy duty relays to be used with the Model 2070L controller unit.

This specification replaces chapter 17 of Federal Highway Administration Publication FHWA-IP-78-16, Type 170 Traffic Signal Controller System:

1. Heavy duty relays shall be the electromechanical type and shall be designed for continuous duty at 95 to 135 VAC.

2. Each relay shall mate with the eight-pin Jones-type socket as shown on the plans and shall be enclosed in a removable, clear plastic cover.

3. The manufacturer's name and part number, and electrical rating, shall be provided on the cover. They shall be permanent, durable and readily visible when the relay is mounted in its socket.

4. Each relay shall be provided with double-pole, double-throw contacts. Contact points shall be of fine silver, silver alloy or superior alternative material. Contact points and contact arms shall be capable of switching at 20 amperes tungsten load per contact, and 120 VAC once every two seconds with a 50 percent duty cycle, for at least 250,000 operations, without contact welding or excessive burning, pitting or cavitation.

5. The relay coil shall have a power consumption of 10 volt-amperes or less.

6. Each relay shall withstand a potential of 1,500 volts at 60 hertz between insulated parts, and between current carrying parts and non-current carrying parts.

7. Each relay shall have a one-cycle surge rating of 175 amperes RMS.

K. SUPPLY QUANTITY:

All cabinets shall be supplied with all necessary equipment for proper operation, including the plug-in items listed in the following table, in all cases, regardless of the intended operation.

CABINET TYPE	303	332	336
Load Switches	6	12	12
DC Isolators	2	3	3
Detectors	4	16	8
Conflict Monitors	1	2	2
AC Isolators	1	1	1

L. OUTPUT FILES:

1. There shall be eight capacitive dummy loads mounted to a terminal block on the rear of the swing-down back panel. One side of each dummy load shall be tied to AC-. Four of the dummy loads shall be connected at the factory to the center (yellow) output of the load switches assigned to ped signals for Phases 2, 4, 6, and 8.

2. The P20 connector and cable assembly for monitoring the red outputs of all load switches shall be provided and mounted to the swing-down back panel, for future use.

3. Auxiliary output files shall be provided in each Type 332 cabinet. Auxiliary output files shall be supplied in Type 336 cabinets if specified (adequate rack length shall be provided in all 336 cabinets for an aux file in case the City retrofits one at a later date). The file shall accommodate six load switches and two flash relays. The file shall be connected via a cable to the C6 connector on the rear of the standard 12-position output file. Four dummy capacitive loads shall be provided on a terminal block for selective jumping to the outputs of the load switches. The red and yellow signal circuits of switch packs 13, 14, 16, and 17 shall be available at a Molex type 1375 receptacle which shall intermate with a Molex type 1375 plug to allow flash programming. A plug connector, with programming jumpers, shall be furnished for each circuit to allow red or yellow flash programming. Plugs shall be readily accessible without the removal of any other equipment. Plug pins shall be crimped and soldered.

SECTION 3.8 – TYPE 332 CABINET

A. RACK ASSEMBLY:

1. A standard EIA 19-inch [483 mm] rack cage shall be installed inside the cabinet for mounting the controller unit, input file power supply, output file and power distribution assembly. The EIA rack portion of the cage shall consist of two pairs of 53-inch [1346 mm] minimum usable, continuous, adjustable equipment mounting angles of 0.1345 inch [3 mm] nominal thickness plated steel tapped with 10-32 threads with EIA universal spacing. The angles shall comply with Standard EIA RS-310-B and shall be supported top and bottom by welded support angles to form a cage. Clearance between rails for mounting assemblies must be 17.75 inches [451 mm].

2. Two plated supporting angles extending from the front to the back rails shall be supplied to support the controller unit. The angles shall be designed to support a minimum of 50 pounds [22.7 kilogram] each. The horizontal side of each angle shall be mounted 17.5 inches [445 mm] from the top of the rack and shall be adjustable vertically.

3. The cabinet shall have supporting angles (railing) on either side level with the bottom edge of the door opening to provide horizontal support for the cage. The cage shall be vertically attached to each side of the cabinet at four points, two at the top and two at the bottom of the rails.

4. A minimum of 10.5 inches [267 mm] of EIA rack height and 20 inches [508 mm] of depth (18 inches [457 mm] behind and two inches [50 mm] in front of the mounting ears) shall be provided for the Model 2070L controller unit.

5. A 2-inch [50 mm] tall drawer shall be rack-mounted in each Type 332 cabinet. The drawer shall be provided with a hinged top cover and shall be capable of supporting 50 pounds [22.68 kg] in the extended position.

B. INPUT FILE:

1. The input file shall utilize 5.25 inches [133 mm] of rack height. The input file shall intermate with and support 14 two-channel inputs.

2. The input file shall provide card guides (top and bottom) and a 22-pin single-readout, edge connector centered vertically for each detector. The input file shall allow air circulation through the top and bottom.

3. Pins D, E, F, J, K, L, and W on each edge connector slot shall be terminated on their associated terminal block mounted on the rear of their input file. Pins F and W for each slot shall terminate on the terminal blocks mounted on the rear of the input file and will connect to the proper controller unit inputs in the Connector C1S wiring harness. Common grounding of output emitters will be permitted and common grounding conductor brought out to TB15, Terminal 4 (CTR DC GND).

4. The edge connectors shall be double-sided connectors with the numbered side of each pin shorted to its respective lettered side internally.

5. The card guide shall begin 1.0 (+0.5) inch [25 mm +12 mm] back from the front face of the file.

6. The input file shall be provided with marker strips to identify isolators and detectors in the file as described in Section VI E.

C. POWER DISTRIBUTION ASSEMBLY SUITABLE TO 2070L MEETING TEES REQUIREMENTS:

1. The power distribution assembly shall be furnished and mounted on the EIA 19-inch [483 mm] rack utilizing no more than seven inches [178 mm] of rack height. All equipment shall be readily accessible for ease of replacement. The depth of the assembly shall not exceed 10 inches [254 mm] from the front cabinet rails including terminal blocks.

2. The following equipment shall be provided with the power distribution assembly:

   a. 2 - Equipment duplex receptacles (one on the front panel, and another on the back panel readily accessible from back door)

   b. 1 - Controller unit duplex receptacle

c. 1 - Main circuit breaker

d. 1 - Six-pole single bus circuit breaker

e. 1 - Two-pole flash bus circuit breaker

f. 1 - Equipment circuit breaker

g. 1 - Mercury Contactor

h. 1 - Auto/Flash Switch

i. 1 - Flash Relay and socket

j. 2 - Flasher Unit sockets

k. 2 - Model 204 Flasher Units

l. 1 - Flash Indicator light

m. Terminal Blocks

3. The main circuit breaker shall be rated for 50 amperes at 120 VAC. The circuit breakers for the equipment receptacles and signal bus shall be rated for 15 amperes at 120 VAC. The flash bus circuit shall be rated for 20 amperes at 120 VAC. Rating of breakers shall be shown on face of breaker or handle. Breaker function shall be labeled below breakers on front panel.

4. Equipment Receptacles shall be NEMA 5-15R duplex type. The Equipment Receptacles shall have ground-fault circuit interruption as defined in the National Electrical Code. Circuit interruption shall occur on six milliamperes of ground-fault current and shall not occur on less than four milliamperes of ground-fault current.

5. An "Auto/Flash" switch shall be provided which, when placed in "Flash" position (down), shall energize the Mercury Contactor (MC) Coil. When the switch is placed in the "Auto" position (up) the switch packs shall control the signal indications. The switch shall be a single-pole single-throw toggle switch rated for 15 amperes at 120 VAC.

6. A lamp labeled "Flash Operation" shall be provided on the front panel of the assembly. The lamp shall be driven by the Flasher Unit Output through Transfer Relay Circuit No. 1.

7. The Controller Unit Receptacle shall be a hospital grade NEMA 5-15R mounted on the back panel of the assembly. AC+ to the 170 unit receptacle shall be from the filtered outputs of the SHA-1210 surge protector.

8. Terminal Blocks shall be provided and mounted on the back panel of the assembly. The blocks shall be of type specified for signal field wire terminal blocks. All conductors from the power distribution assembly routed to the cabinet wiring shall be connected to the terminal block on the common side, except for the AC power conductor between the service terminal block and main circuit breaker.

9. All internal conductors terminating at the blocks shall be connected to the other side of the blocks. Terminal position assignments shall be as shown on Plan Sheet No. SA170-4, Model 332 T1 and T2 Terminal Block Assignment Detail, modified as follows:

   "Add two No. 14 conductors between the back equipment duplex receptacle and the PDA Terminal Blocks (AC+ to T1, Terminal 10; AC- to T2 Terminal 1.)"

10. The Flash Relays shall conform to the provisions for "Heavy Duty Relays, Model 430."

11. A leakage resistor, which will permit three to eight volts to be applied to the relay coil, shall be installed across the terminals of each relay socket to overcome the residual magnetism.

D. OUTPUT FILE:

1. Card guides shall be provided to support the switch packs and the monitor unit.

2. The output file shall utilize 10.5 inches [267 mm] of rack height and shall be supplied with 12 Model 200 Switch Packs. Four Model 430 Flash Transfer Relays and one Model 210 Monitor Unit shall be furnished with each output file. The depth of the assembly including terminal blocks and relays shall not exceed 14.5 inches [368 mm] from the front cabinet rails.

3. The output file shall be provided with marker strips to identify switch packs when mounted in the file, as specified in Section VI.

4. Switch pack connectors, monitor unit connectors, flash transfer relay sockets and flash programming connectors shall be accessible from the back of the output file without the use of tools.

5. Three field wire terminal blocks shall be mounted vertically on the back of the assembly. The terminal blocks shall be the 12-terminal type.

6. The controller unit outputs to the output file shall be connected through Connector C4.

7. The red and yellow signal circuits of all switch packs assigned to vehicle signals for phases 1 through 8 shall be available at a Molex Type 1375 Receptacle which shall intermate with a Molex Type 1375 plug to allow flash programming. A plug connector, with programming jumpers, shall be furnished for each circuit to allow red or yellow flash programming. Connectors shall be readily accessible without the removal of any other equipment. Plug pins shall be crimped and soldered.

8. The monitor connector shall be rigidly supported printed circuit board edge connector, having two rows of 28/56 independent double readout bifurcated contacts on 0.156 inch [4 mm] centers. The connector shall terminate with the Model 210 Monitor Unit.

9. It shall be possible to remove the monitoring device without causing the intersection to go into flashing operation. The cabinet shall be wired so that with front cabinet door closed and with the monitor unit removed, the intersection shall go into flashing operation. The cabinet shall contain a conspicuous warning against operation with the monitor unit removed.

10. The monitor unit connector shall be wired in accordance with the pin assignment shown on the plans.

E. SIDE PANELS:

1. Two panels shall be provided and mounted on the EIA rack parallel to the cabinet sides.

2. In viewing from the back door, the left side panel shall be designated as the "Input Panel" and the right side panel shall be designated as the "Service Panel".

3. All input field terminal blocks for detector field cables and other input conductors, except service conductors, shall be mounted on the "input panel". The "input panel" shall be wired per CALTRANS's August 1983 specification.

F. TERMINAL BLOCKS:

1. Terminal blocks shall be provided for terminating field conductors. They shall be readily accessible through the cabinet rear door and shall be rated for 20 amperes at 600 volts RMS, minimum.

2. The terminal blocks for detector field conductors, auxiliary field wires and control wires shall be the barrier type and shall be provided with 8-32 by 5/16 inch [8 mm] minimum nickel plated brass binder head screws and nickel plated brass inserts.

3. The terminal blocks for field wires to the signal indications, power distribution assembly and the required unused position shall be the barrier type and shall be provided with 10-32 by 5/16 inch [8 mm] nickel plated brass binder head screws and nickel plated brass inserts.

4. The terminal blocks for the input file and power supply shall be the barrier type and shall be provided with 8-32 by 5/16 inch [8 mm] nickel plated brass binder head screws and nickel plated brass inserts.

5. The terminals of the power line service terminal block shall be labeled "L1" and "AC-", and shall be covered with a clear insulating material to prevent inadvertent contact. Terminating lugs large enough to accommodate No. 2 conductors shall be furnished for the service terminal block. The terminal block shall be rated for 50 amperes at 600 volts, minimum.

G. CONNECTORS:

1. Connector C1P shall contain 104 pin contacts and shall intermate with connector C1S mounted on the controller unit chassis. Corner guide pins for connector C1P shall be stainless steel and shall be 0.097 inches [2 mm] in length. Corner guide socket assemblies shall be stainless steel and shall be 0.625 inches [16 mm] in length.

2. Connector C4 shall contain 37 contacts and shall be the circular plastic type with quick connect/disconnect capability and thread assist, positive detent coupling. The Plug Connector C4P shall be mounted on the output file.

3. Connector C5 shall contain 24 contacts and shall be the circular plastic type with quick connect/disconnect capability and thread assist, positive detent coupling. The Plug Connector C5P shall be mounted on the input file.

4. Connector blocks for Connector C1 pin and socket connectors shall be constructed of diallylphathalate or better. Contacts shall be secured in the blocks with springs of stainless steel.

SECTION 3.9 – TESTING AND CERTIFICATION

3.9 TESTING

Testing shall consist of three phases: factory acceptance testing, operational and performance testing, and final acceptance testing. An independent testing laboratory will perform the factory acceptance testing on all signal cabinets as described herein.

Prior to beginning factory acceptance testing, the Contractor shall provide all submittals, certifications, and reports necessary to determine that the equipment to be tested will meet specifications.

3.9.1 Factory Acceptance

The signal system equipment shall be tested prior to shipping to demonstrate conformance with all applicable requirements. The Contractor shall not perform factory acceptance testing until all certifications and submittals are approved by the City. All traffic signal controllers and cabinets shall be tested by Signal Maintenance Incorporated (SMI) at 3395 Viso Court, Santa Clara, CA 95050, or approved alternate. Testing shall include visual inspection, NEMA TS2 environmental testing, electrical testing and testing of all required controller assembly functions. A Contractor representative shall be present at all tests. Each controller assembly shall be tested continuously under signal load for a minimum of 21 days.

If a unit fails its factory acceptance test, the conditions shall be corrected or the unit replaced and the test shall be repeated until the 21 days of continuous, satisfactory operation is obtained. When the testing has been completed, the Contractor is responsible for pick up and delivery to the job site and installation. The Contractor will pay for all delivery, pick-up and testing by SMI. The Contractor will pay SMI using contract funds. The Contractor shall furnish a letter from SMI stating compliance with applicable requirements upon completion of the factory acceptance testing.

In addition, each unit of communications equipment including Ethernet switches, serial concentrator and modems shall be successfully pre-tested in accordance with a formal factory functional test procedure. The manufacturer's quality assurance organization shall have validated testing and shall supply a Certificate of Compliance with each unit shipped. No communications equipment shall be installed without having Certificate of Compliance by testing.

The City reserves the right to conduct at its own expense any testing or inspections deemed necessary to ensure that the equipment conforms to applicable requirements.

3.9.2 Operational and Performance Testing

The Contractor shall create a detailed test plan that clearly indicates the requirement(s) covered by each test case. The operational test shall include both stand-alone tests for each system component and system-level tests. The operational test shall be deemed complete when each

component has passed a stand-alone test and the entire signal system (software and hardware) are demonstrated to meet all requirements defined in these Proposed System Specifications when all components are working together as an integrated system. It will be the responsibility of the Contractor to prepare detailed test procedures (as described later in this Section) and to procure all of the equipment necessary to perform the test.

Performance testing shall include criteria outlined below. The proposal must address at least these performance items:

- Time to upload the entire controller database on a 19.2 kbps channel
- Time to download the entire controller database on a 19.2 kbps channel
- Average time between recommended workstation application restarts (how often does the application need to be shutdown and restarted)
- Average time between recommended workstation reboots
- Average time between recommended server application restarts
- Average time between recommended server reboots
- Average time for workstation application to fully initialize
- Average time for all server applications to fully initialize
- Monitoring of intersection phase status;
- Monitoring of intersection alarm status;
- Monitoring of intersection preemption status;
- Monitoring of intersection communication status;
- Monitoring of intersection coordination status (in step, in transition, etc.); and
- Testing of any modifications or extensions to local and/or central software.

The Contractor shall provide a test procedure and test data forms to the City for approval at least 45 calendar days before the operational test is to begin. The Contractor must also provide a requirement matrix that clearly maps each requirement to a specific test case(s). Performance testing must be included in the test cases and must be consistent with the values submitted in the proposal. The City will review the test procedures and matrix and return them with comments or approval to the Contractor within 30 calendar days after receipt. The test procedure proposed by the Contractor shall be comprehensive, and in sufficient detail to allow the Engineer to determine whether or not the system provided fully complies with the system requirements included in these Proposed System Specifications. If the City deems the test procedure to be unacceptable, the Contractor shall revise the procedure according to the City's comments without additional cost to the City.

As a minimum the test procedures shall include the following:

- A step-by-step outline of the test sequence to be followed, showing a test of every system requirement.
- A description of the expected operation, output and test results.
- An estimation of the test duration proposed test schedule.
- A data form to be used to record all data and quantitative results obtained during the tests.
- A description of any special equipment, setup, manpower, or conditions required for the test.

The operational test shall be conducted in front of the City and the City's Consultant. The City shall review the test results for conformance with the system requirements specified in these Specifications. The City shall score each of test case on a pass/fail basis. The Contractor shall provide all necessary assistance to ensure completion of this test. The Contractor shall fix any problems encountered and add any omissions discovered during this test period without additional cost to the City. If any of the equipment is rejected for failure to comply with the requirements of these Specifications, the Contractor shall be responsible for all of the costs involved in re-testing the equipment after it has been rejected. Deductions to cover the costs of such re-testing will be made from any monies due or which may become due to the Contractor.

3.9.3 Final Acceptance Testing

The final acceptance test will verify that the entire system, with the changes and additions made during the operational testing in place, functions properly and in accordance with these requirements. The final acceptance test shall not be completed until all items conform to the requirements and training has been completed as approved by the City. The Contractor shall perform and document all necessary testing.

The formal start of the final acceptance test or "burn-in" period shall be documented by the Contractor and approved by the City. The final acceptance test will include the completion of a 90-day period, by the end of which the entire integrated system operates without failure. A failure is defined as failing any of the test cases defined in the operational test procedure referred to herein.

In the event of a failure during the burn-in acceptance-testing period, the Contractor shall repair the equipment as necessary within five (5) working days of the time of notification by the City and the final acceptance test must be restarted at zero hours. If the failure is a signal system emergency, a qualified representative from the software and hardware manufacturer shall respond within two hours of notification as required in the maintenance agreement described herein. Signal system emergencies are defined as a condition related to the malfunctioning of the signal hardware or software that impedes normal operation of the signal timing plans, such as going into flash. The Contractor shall be responsible for all of the cost involved in the repair of the equipment, including re-testing if necessary.

The manufacturer shall provide certification that the units supplied under these specifications are not units rejected by some other municipality or state.

SECTION 3.10 – DOCUMENTATION

A. CONTROLLER UNIT:

Manuals documenting the programming, operation and maintenance of the unit shall be provided. The documentation shall also include schematic drawings and pin assignment charts for maintenance purposes. Three (3) complete documentation sets per order shall be furnished.

B. CABINET ASSEMBLY WIRING DIAGRAM:

Each and every complete Cabinet Assembly Cabinet shall be provided with one set of nonfading readable cabinet wiring diagrams as specified in Section VI-F of this specification.

OTHER EQUIPMENT:

1. Documentation is also required for each auxiliary piece of equipment. The documentation shall be sufficient for operation and maintenance of the equipment to the satisfaction of the City of San Antonio. All documentation shall be prepared in a clear, concise manner with appropriate illustrations, tables, and cut-away drawings, and voltage/wave form reference pictures. Equipment requiring this documentation shall include, but not be limited to the following:

    a. Power Supply Assembly

    b. Power Supply, 24V

    c. Load Switch

    d. Flasher

    e. Model 222 Loop Detector

    f. Model 242 DC Isolator

    g. Model 252 AC Isolator

    h. Flash Transfer Relays

2. The documentation shall be adequately bound for protection and to prevent loss of pages.

3. The documentation material shall include, but not be limited to, the following:

    a. General description,

    b. Complete installation and set-up procedures,

    c. Complete and accurate schematic diagrams.

    d. Complete performance specifications (functional, electrical, mechanical and environmental) on the units.

    e. Complete and detailed system operations manuals.

    f. Theory of operation,

    g. Voltage and wave form descriptions,

    h. Complete maintenance and trouble shooting procedures,

    i. Schematic diagrams of circuits and IC boards, which are in sufficient detail to enable City of San Antonio traffic signal operations personnel to trace signals at the component level,

    j. Pictorial layout of IC board components,

k. Parts list including: Name of OEM, description, reference symbol, part number and location,

l. Software (hard bound copy of all diagnostic, and test software documentation shall be required, even if provided on magnetic media).

m. Complete parts list including names of vendors for parts not identified by universal part numbers such as JEDEC, RETMA, or EIA.

4. Two (2) complete auxiliary equipment documentation sets per order shall be furnished.

4.0 CENTRAL SYSTEM SOFTWARE

1.2. Overview

The primary purpose of the ATMS Central System Software (CSS) will be to provide real-time two-way traffic signal communications, monitoring capability in graphical and text formats, general operational configuration, and database management for local intersections.

The ATMS Central Software shall enable the system hardware and firmware described in Sections 1 and 2 of Exhibit A to function and operate in accordance with the functional requirements described herein. The use of commercial off-the-shelf (COTS) software or existing packages is desired. It is expected that the selected System Integrator has a complete and fully functional "off-the-shelf" ATMS Central Software Package capable of meeting the minimum requirements specified in this Request for Proposal. It is understood that such an "off-the-shelf" package may not be fully compliant with all the requirements stated herein at the onset. For the purposes of this procurement, "off-the-shelf" is defined as having functional and operational software install, operational and accepted in a minimum of 3 systems in the United States. These systems must have been installed within the last three years or be operating with the latest version of the proposed ATMS Central Software.

The ATMS Central Software shall provide full system capabilities to both Operator and Remote (i.e. laptops) workstations when connected to the ATMS LAN at any location. The Software shall also provide secure access to the system via the Internet using various connection speeds.

1.3. Distributed control and Centralized Monitoring

The central software shall provide distributed control and centralized monitoring:

- Control shall be provided by the local intersection controllers.
- The central system shall be able to command the operation of a particular timing plan to a specific controller or group of controllers, but the timing plan itself shall be stored within and executed by the local controller.
- The central system shall provide polled monitoring of all controllers and other connected field devices at highest rate feasible with current communications bandwidth, communications channel loading and transmission delay time.
- On both central system work stations and on notebook computers connected directly to individual controllers, the software shall be capable managing controller inputs and monitoring controller outputs and displaying this information in an easy-to-read graphical user interface. When monitoring a single intersection, this display shall be updated at least once per second.

4.3 Training

Training is an important element of the project. It will be conducted at the City by the System supplier. There are six modules that are anticipated. The content of each module listed below is provide to describe the general level of detail and the Supplier will be allowed the change the content with the approval of the City.

The System Supplier shall provide the following training modules:

4.3.1 Executive

The executive training module is a high-level training session intended for senior management staff. This training module should be approximately one hour in duration. The topic of the training will be directed by City staff. For the purpose of responding to this RFCSP, the Responder should assume that this session is similar to a system demonstration.

4.3.2 System Introduction

This module is meant as the first formal training to city staff. There could be up to ten (10) staff attending this session. The following topics should be covered:

- User login, User rights,
- Assignment of controllers to groups
- Entity numbering
- Setting up controllers for IP communication
- Assign plan implementation w/in groups to TOD schedule
- Manual mode command, command to flash, priority of commands.
- Communication protocols supported
- Communication status
- Intersection status
- Graphical User Interface, maps, intersection graphics.
- How to create intersection graphics
- Scheduling: free, flash, Special Functions,
- Holiday Schedules

4.3.3 Intermediate Training

This module is meant as the first formal training to city staff. There could be upto ten (10) staff attending this session. The following topics should be covered:

- System configuration
- System logging and events
- Status monitoring
- Signal control operation (TOD, Manual, etc)
- Signal controller parameters editing and upload/download
- Alarms and e-mail notification.
- System detector data collection

- Archiving VOS data
- View/manage VOS reports
- System startup and shutdown
- Customize buttons

4.3.4 Advanced Training (System Administrator)

This module is meant as the first formal training to city staff. There could be upto five (5) staff attending this session. The following topics should be covered:

- System configuration
- System installation
- Application Services
- Database Issues
- Time Clock
- Remote Access
- Troubleshooting
- Data backup and restoration
- Custom report generation
- System maintenance
- Creation and management of user rights, create user groups

4.4 Warranty

The Contractor shall provide a one (1) year warranty for the central system software. The warranty shall cover all defects and bugs. The warrant shall begin from the date of final system acceptance.

4.5 Maintenance

The Contractor shall supply a maintenance agreement for the support of the central system software. The maintenance agreement shall start when the one-year warranty period has expired.

The maintenance agreement shall provide telephone support during normal business hours.

The maintenance agreement shall provide a minimum of one (1) software upgrade per year. The upgrade shall include versions that address software defects, bugs and new features. The upgrade shall be performed on-site by the Contractor. The City's project manager and the system's System Administrator will be present at the time of the on-site upgrade.

The maintenance agreement shall be for an initial three (3) years, with two, one-year options, upto a maximum of five years total.

The City will provide the Contractor a secure access point into the central system software via Citrix or a virtual private network (VPN) connection. The Contractor should state if other means of access is preferred or required. The City will administer all access privileges.

4.6 Documentation

The Contractor shall deliver the following documentation:

Central Control Software – Five copies of the central system software documentation will be provided and will include the following components: User Manual. Two copies are required for the System Administrator documentation, if separate. An electronic file of these two documents shall be provided to the City on a CD-ROM, labeled appropriately. The electronic file must be updated to the current and most complete version before final acceptance of the system.

Project Configuration – One copy of network and device configuration, which will comprise of the following information:

- Network schematics
- Device ID numbers
- Port assignments
- Baud rates
- Channel assignments
- IP addresses
- Cable labels

Manufacturer-Provided Manuals – The contractor will deliver one set of contractor-purchased manufacturer-provided equipment manuals.

Database object definitions - This document will describe and/or define the objects in the SQL database.

4.7 Minimum Functional Requirements

This section provides a description of the minimum functional requirements of the ATMS Central Software.

Requirement No.	Requirement	Comments
General Requirements		
1	The Central System Management Software (CSS) shall provide a single interface between the traffic signal controllers in the field and the users of the system.	**ARCH**
2	Software Architecture	**ARCH**
2.1	The CSS shall allow enhancement to individual modules without impacting other modules	**ARCH**
2.2	The CSS shall allow new modules to be installed without impacting other modules	**ARCH**
3	Installation of the CSS shall be from Storage Media.	**ARCH**
3.1	Installation of the CSS shall be through an automated routine.	**ARCH**

Requirement No.	Requirement	Comments
4	The installation process of the client and server components of the CSS shall be thoroughly documented. This includes the installation of all 3rd party tools.	**ARCH**
5	The CSS shall be capable of communicating with the following minimum number of field devices	**ARCH**
5.1	2,000 Signalized Intersections	**ARCH**
5.2	15,000 System Detectors	**ARCH**
6	The CSS shall support the grouping of field devices into a minimum of 250 groups.	**ARCH**
	SUPPORT LOCAL CONTROLLERS	
7	The CSS shall be fully compatible with the Local Controller Firmware	**CONTR**
8	The CSS shall be capable of the Upload/Download of databases	**CONTR**
8.1	Upload/download shall transfer the key programmable database to/from the selected intersection controller	**CONTR**
8.2	The CSS shall not upload/download controller parameters, such as cabinet configuration data.	**CONTR**
8.3	Upload/download shall be verified by block checksum and word parity	**CONTR**
8.3.1	Non-verified data shall cause termination of the upload/download with no data transfer taking place.	**CONTR**
9	Upload and download actions from central shall not cause the controller to go off-line.	**CONTR**
10	Following an upload, the operator shall be able to perform a database comparison and graphically view and differences between the field and central data.	**CONTR**
11	The System Operator shall be able to upload data from the field and store it in the central database	**CONTR**
11.1	The System Operator shall be able to upload and download individual controller database pages.	**CONTR**
11.2	The System operator shall be able to export timing data to an Excel compatible format.	**CONTR**
11.3	The system operator shall be able to import timing data from an Excel compatible format.	**CONTR**
12	The CSS shall support check-in, check-out of the controller database so that multiple users can access the data, but only one user has edit and save permissions.	**CONTR**
12.1	The administrator shall have over-ride privileges.	**CONTR**
13	The CSS shall provide a means to store the entire controller database configuration data by date.	**CONTR**
13.1	The database shall include a field for user notes.	**CONTR**

Requirement No.	Requirement	Comments
13.2	The controller data shall be stored in the database so that it can be retrieved and implemented as the current data.	**CONTR**
13.3	The user shall be able to compare the current (active) file with a user-selectable historical file.	**CONTR**
	TRAFFIC CONTROL	**TCL**
14	The CSS shall provide mode control on the following basis:	**TCL**
14.1	Intersection	**TCL**
14.2	Section	**TCL**
14.3	Zone	**TCL**
14.4	System-Wide	**TCL**
15	The CSS shall provide the operator-selectable control modes for system control.	**TCL**
15.1	The CSS shall provide the following control modes:	**TCL**
15.2	Manual Control - The operator shall be able to manually override the plan that the system, zone, section, or intersection is currently running	**TCL**
15.2.1	The Operator shall be able to initiate and release manual control manually, via the user interface	**TCL**
15.2.2	The Operator shall be able to schedule the initiation and termination of Manual Control	**TCL**
15.3	Free – The Controller, section, zone or system shall operate without coordination.	**TCL**
15.4	Flash – The CSS shall command the controller, section , zone, or system to flash	**TCL**
15.5	Time-of-Day/Day-of-Week	**TCL**
15.5.1	Deleted	
15.5.2	All controllers shall return to their Time-of-Day plan if the traffic responsive plan is not implemented	**TCL**
15.5.3	The traffic responsive sampling period shall be user definable from one to fifteen minutes	**TCL**
16	The CSS shall be able to schedule system commands, including the following:	**TCL**
16.1	Go to Flash	**TCL**
16.2	Go to Free	**TCL**
16.3	Run off local schedule	**TCL**
16.4	Run a pattern	**TCL**

Requirement No.	Requirement	Comments
16.5	Deleted	
16.6	Turn special function on	**TCL**
16.7	Turn special function off	**TCL**
16.8	Turn on transit signal priority	**TCL**
16.9	Turn off transit signal priority	**TCL**
16.10	The scheduler shall include multiple time-of-day/day-of-week (TOD/DOW) schedules	**TCL**
16.10.1	TOD/DOW schedules shall have one minute resolution	**TCL**
16.11	System Operators shall be able to schedule system commands one year in advance	**TCL**
16.12	All Operator commands shall have priority over scheduled entries in the scheduler.	**TCL**
16.13	The Scheduler shall be able to schedule and execute multiple commands for the same defined time	**TCL**
16.14	The Scheduling capability shall include permanent and temporary schedules	**TCL**
17	The CSS shall include a permanent schedule that defines fixed and floating holidays	**TCL**
17.1	It shall be possible to override TOD/DOW plans with Holiday/Exception day plans	**TCL**
18	The CSS shall support a multi-terminal, multi-user interface to the system.	**ACCESS**
18.1	The CSS shall allow access to multiple levels of the system simultaneously	**ACCESS**
18.2	Operator access privileges shall be controlled on an object level, or by creating user groups which possess functional capabilities.	**ACCESS**
18.3	Operator access privileges shall be defined by the System Administrator	**ACCESS**
19	The CSS shall support at least 25 concurrent users	**ACCESS**
20	System Users shall be able to access the system through the following means:	**ACCESS**
20.1	Direct Connection to the ATMS LAN	**ACCESS**
20.2	Direct Connection to the ATMS Communications Network through any field level Ethernet Switch	**ACCESS**
20.3	Connection to the System through the Internet using Windows Remote Desktop	**ACCESS**
20.4	Third Party Access from outside the City shall be provided using VPN software client using the CSS client software or through a browser window	**ACCESS**
21	The CSS shall include a security system to prevent unauthorized access to and/or manipulation of the	**ACCESS**

Requirement No.	Requirement	Comments
	ATMS.	
21.1	System security shall apply to menu and functions accessible through the GUI.	**ACCESS**
21.2	System security shall be ensured through the use of a unique user identification number and password.	**ACCESS**
21.3	Passwords shall be changeable by the user	**ACCESS**
21.4	The System Administrator shall be able to define time limits for User passwords	**ACCESS**
21.5	All passwords shall be fully encrypted	**ACCESS**
21.6	Access privileges shall be defined by the System Administrator	**ACCESS**
21.7	Access privileges shall be defined at the user group level.	**ACCESS**
21.8	The start-up procedure shall establish the privileges, object-menu options, windows, and tools available to the User.	**ACCESS**
21.8.1	Any system function not available to a User shall either be grayed out or not shown	**ACCESS**
	ALARMS	**ALARMS**
22	The CSS shall be capable of providing alarms to System Operators	**ALARMS**
22.1	The CSS shall monitor intersection devices, detectors, and communication channels for errors.	**ALARMS**
22.2	The CSS have user selectable alarms based off any event generated in the controller. The Contractor shall identify all of the alarms/alerts that are supported by the controller and central software	**ALARMS**
22.3	Alarms shall be transmitted to each TOC and active system operators	**ALARMS**
22.4	Alarms shall be capable of being acknowledged from any authorized user	**ALARMS**
22.5	All alarms and acknowledgements shall be logged	**ALARMS**
22.6	The CSS shall allow the System Administrator to configure the recipients of alarm notification.	**ALARMS**
22.6.1	The System Administrator shall be able to configure the method of notification	**ALARMS**
22.6.2	The System Administrator shall be able to configure the recipients of alarms by TOD/DOW	**ALARMS**
22.6.3	The System Administrator shall be able to establish alarm notification by group members	**ALARMS**
22.7	The CSS shall provide at least the following alerts	**ALARMS**
22.7.1	Conflict Flash	**ALARMS**

Requirement No.	Requirement	Comments
22.7.2	Local Flash	**ALARMS**
22.7.3	Commanded Flash	**ALARMS**
22.7.4	Preempt	**ALARMS**
22.7.5	Local Free	**ALARMS**
22.7.6	Preemptors	**ALARMS**
22.7.7	Controller Keyboard Press	**ALARMS**
23	The CSS shall be capable of sending alarms through alphanumeric message pages and/or email messages to the designated system operators	**ALARMS**
23.1	The CSS shall be capable of allowing manual pages or emails to system operators	**ALARMS**
23.2	The CSS shall be capable of automatically sending pages or emails	**ALARMS**
23.3	All pages and email shall be logged	**ALARMS**
23.4	The System Administrator shall be able to configure recipients of pages/emails	**ALARMS**
23.4.1	Recipients shall be configurable by alarm	**ALARMS**
23.5	Recipients shall be configurable by TOD/DOW or Week of Year	**ALARMS**
23.6	The System Administrator shall be able to configure the events that will trigger a page and/or email	**ALARMS**
23.7	The CSS shall be capable of sending multiple pages/emails within a few seconds of each other.	**ALARMS**
23.8	Pages/emails shall be activated within 60 seconds of the event.	**ALARMS**
	DATABASE	
24	The CSS shall utilize a commercially available ODBC-compliant relational database software application.	**DBASE**
25	The central database shall be an SQL Compliant database. The City has a preferences toward SQL Server 2005. Alternatives will be considered.	**DBASE**
26	The database application shall be integrated with the ATMS CSS.	**DBASE**
27	The database application shall be used to store all data used by the CSS.	**DBASE**
28	The database application shall support the editing, copying and deleting of data.	**DBASE**
29	Historical data shall be archived out of the database daily once a user- configurable amount of time (cleanout time) has passed.	**DBASE**

Requirement No.	Requirement	Comments
30	The cleanout time should be configurable by individual table	**DBASE**
31	The System shall be capable of daily archiving of dynamic data onto a backup medium such as magnetic tape, external disk drive, or DVD. Dynamic data will include the following: Event Log (includes alerts) Event Acknowledgement System Detector Link History User Activity Log	**DBASE**
32	All system configuration changes shall be achievable without restarting the system	**DBASE**
33	The System Integrator or Vendor of the CSS shall provide documentation that describes the data in the database when codes are used in lieu of English words. This documentation can be hardcopy or an electric file that is readable by the owner.	**DBASE**
34	System Operators shall be able to back-up the database using, for example Veritas, or other backup utility application.	**DBASE**
	LOGS	
35	The CSS shall maintain logs of system events	**LOGS**
35.1	System logs shall be accessible from any workstation	**LOGS**
35.2	System Operators shall be capable of defining specific events and/or time periods for viewing or report generation.	**LOGS**
35.3	The CSS shall include a Traffic System Log	**LOGS**
35.3.`	The CSS shall log traffic-related events	**LOGS**
35.3.1	events shall be listed in chronological sequence.	**LOGS**
35.3.2	The system administrator shall have the ability to automatically store all event log data to specific tables within the relational database.	**LOGS**
35.3.2.1	. The system administrator shall have the ability to store the event log data to a media storage device.	**LOGS**
35.3.2.2	The system administrator shall have the ability to delete the log data at the end of a 24-hour time period.	**LOGS**
35.4	The CSS shall log operator/approved users who are currently logged into the system.	**LOGS**

Requirement No.	Requirement	Comments
35.4.1	The CSS shall log the users name and the time the user logs in and out the system.	**LOGS**
	REPORTING	**RPT**
36	The CSS shall include standard reports	**RPT**
36.1	Standard reports shall be obtainable from a menu of report names	**RPT**
36.2	Standard reports shall be obtainable from any operator workstation	**RPT**
36.3	Standard reports shall be displayed on the workstation monitor	**RPT**
36.4	Standard reports shall be printable	**RPT**
36.5	It shall be possible to save any standard report to a file	**RPT**
36.6	The CSS shall include the following standard reports	**RPT**
36.6.1	System Status	**RPT**
36.6.1.1	The System Status Report shall include possible status conditions	**RPT**
36.6.2	Intersection Operation	**RPT**
36.6.2.1	The Intersection Operation Report shall present the real-time intersection operation	**RPT**
37	The CSS shall have the capability of generating custom reports using Crystal reports or other 3rd party COTS	**RPT**
37.1	Custom reports shall be definable by any system operator	**RPT**
37.2	Custom reports shall be definable from any operator workstation	**RPT**
37.3	System Operators shall be able to define report format and content	**RPT**
37.4	Custom reports shall be printable to any network printer	**RPT**
37.5	Custom Reports shall be savable to the standard reports list	**RPT**
	GRAPHICAL USER INTERFACE	**GUI**
38	The CSS shall include an Object Library that contains dynamic icon objects for system control and monitoring devices.	**GUI**
38.1	Dynamic objects shall include the following objects as a minimum:	**GUI**
38.1.1	Traffic Signals	**GUI**
38.1.2	Links	**GUI**

Requirement No.	Requirement	Comments
38.2	The Dynamic objects shall be placed on the GUI using an included graphical editor.	**GUI**
38.3	Dynamic objects shall be directly linkable to system database	**GUI**
38.4	Dynamic objects shall be placed on the GUI without requires software programming or recompilation.	**GUI**
39	The CSS shall include a graphical user interface (GUI)	**GUI**
39.1	Operators shall access the system through the GUI	**GUI**
39.2	The GUI shall provide access to monitoring and control options from a single point.	**GUI**
39.3	The GUI shall provide hot keys for commonly used functions	**GUI**
39.4	The GUI shall provide right-click menu options for links to commonly used functions	**GUI**
39.5	The GUI shall include the following features	**GUI**
39.5.1	Pop-up multiple object and windows	**GUI**
39.5.2	Menu icons and controls	**GUI**
39.5.3	Dialog boxes	**GUI**
39.5.4	Push button and other active commands	**GUI**
39.5.5	Visual and audio alarms	**GUI**
39.5.6	Use of object characteristics such as color, highlighting and flashing	**GUI**
39.6	The Operator shall be able to open several windows at one time	**GUI**
39.6.1	Windows shall overlap on the screen	**GUI**
39.6.2	The Operator shall be able to interact with only one window at a time	**GUI**
39.6.3	The Operator shall be able to easily switch from one window to another	**GUI**
39.6.4	The Operator shall be able to move windows around on the screen	**GUI**
39.6.5	The Operator shall be able to change the size of CSS windows	**GUI**
39.6.6	The Operator shall be able to minimize CSS windows	**GUI**
40	The CSS shall include graphical displays for displaying and accessing system information	**GUI**
40.1	All commands for manipulating the graphical displays shall be available directly from the Operator Workstation	**GUI**

Requirement No.	Requirement	Comments
40.2	Multiple traffic condition views shall be supported simultaneously on the operator workstation	**GUI**
40.3	Traffic Condition graphics shall contain multiple levels of background images	**GUI**
40.4	Operators shall and able to access system functions using the graphical display system	**GUI**
41	The CSS shall include graphic displays for the display of real-time system information	**GUI**
41.1	The Operator shall be able to display the real-time graphics on the workstation and/or system monitor	**GUI**
41.2	Real-time graphics displays shall be available at the system, area, section, and intersection levels	**GUI**
41.3	The CSS shall support the City's ESRI GIS system map.	**GUI**
41.3.1	The System Map shall display dynamic objects that represent the ATMS field devices	**GUI**
41.3.2	Selection of any particular dynamic icon on the system map shall display a more detailed status window	**GUI**
41.3.3	The System Map shall provide interactive mechanisms for editing and modifying dynamic graphic screens that are linked to the system dynamic elements	**GUI**
41.3.4	The System Map shall allow system operators to select the following specific system status information for viewing	**GUI**
41.3.4.1	Communications Status	**GUI**
41.3.4.2	Main Street Green	**GUI**
41.3.4.3	Preemption Status	**GUI**
41.3.4.4	Link Volumes	**GUI**
41.3.4.5	Coordination Status	**GUI**
41.3.4.6	Signals on Flash	**GUI**
41.3.4.7		**GUI**
41.3.5	The System Operator shall have zoom and scrolling capabilities within the System Map	**GUI**
41.3.6	The System Map shall include the following minimal information:	**GUI**
41.3.6.1	Major Streets	**GUI**
41.3.6.2	Street Names	**GUI**
41.3.6.3	Freeways	**GUI**

Requirement No.	Requirement	Comments
41.3.6.4	Rail Lines	**GUI**
41.3.6.5	Major Landmarks	**GUI**
41.3.6.6	Traffic Signal Controllers	**GUI**
41.3.6.7	CCTV Cameras (future)	**GUI**
41.3.6.8	Dynamic Message Signs (future)	**GUI**
41.4	The CSS shall support aerial photography for use as the main map as well as the intersection graphics	**GUI**
41.5	The CSS shall include area maps which cover a specific area of the City	**GUI**
41.5.1	The CSS shall support an unlimited number of Area Maps	**GUI**
41.5.2	The Area Maps shall include all the information and features of the System Map, plus the following information	**GUI**
41.5.2.1	Minor Streets	**GUI**
41.5.2.2	Individual Signal Phase Status	**GUI**
41.5.3	Information displayed on the Area Map shall be definable by the Operator	**GUI**
41.6	The CSS shall provide individual intersection displays	**GUI**
41.6.1	Intersection Displays shall be accessed from a drop-down list or by double clicking on the intersection icon on the System or Area map at any zoom level	**GUI**
41.6.2	Specific intersections can be located using a search tool	**GUI**
41.6.2.1	The search tool shall use intersection 6-digit numeric identification number.	**GUI**
41.6.2.2	The search tool shall use street name as the search entity	**GUI**
41.6.2.3	The user shall be able to search for intersections within a particular grouping	**GUI**
41.6.2	Multiple intersection display windows shall be displayable simultaneously	**GUI**
41.6.3	The Operator shall be able to minimize and maximize the detailed intersection display	**GUI**
41.6.4	The Intersection Display shall include the following information	**GUI**
41.6.4.1	Street Names	**GUI**
41.6.4.2	Current Timing Plan in Use	**GUI**

Requirement No.	Requirement	Comments
41.6.4.3	Vehicle and pedestrian Displays	**GUI**
41.6.4.4	Current Communication Status	**GUI**
41.6.4.5	Control Mode	**GUI**
41.6.4.6	Vehicle calls per phase	**GUI**
41.6.4.7	Pedestrian calls per phase	**GUI**
41.6.4.8	System detector actuation	**GUI**
41.6.4.9	Special functions	**GUI**
41.6.4.10	Detector actuations (inputs)	**GUI**
41.6.4.11	Local and Master Clock, if used	**GUI**
41.6.4.12	Preempt status	**GUI**
41.6.4.13	Overlap Information	**GUI**
41.6.4.14	Lane control state	**GUI**
41.6.5	Phase timers shall count upward	**GUI**
41.6.6	Cycle Counters shall count up to a value equal to the length of the current cycle	**GUI**
41.6.7	The CSS shall indicate the interval that each active phase is currently in	**GUI**
41.7	The CSS shall refresh information of the graphics displays as frequently as the data is being returned from the field devices.	**GUI**
42	The CSS shall support system and local detectors	**DET**
42.1	The Detectors shall be capable of being used for vehicle detection, traffic counting, and traffic-responsive operation.	**DET**
42.2	The CSS shall process and maintain detector count and occupancy data on a continuous basis.	**DET**
42.3	The CSS shall support the following types of detector data types:	**DET**
42.3.1	Volume	**DET**
42.3.2	Occupancy	**DET**
42.4	The CSS shall be capable of automatically logging detector data in the database	**DET**
42.4.1	The System Operator shall be able to enable/disable the recording of detector data	**DET**

Requirement No.	Requirement	Comments
42.4.2	The Detector data shall be archived periodically	**DET**
42.4.3	The parameters for management and storage of the detector data shall be configurable by the System Operator	**DET**
42.5	The CSS shall continuously monitor detector data from the field for proper operation	**DET**
42.5.1	The System shall report when detectors are experiencing constant calls for user-set time period, if reported by the controller.	**DET**
42.5.1.1	The System shall report when detectors experiencing no calls for user-set time period, if reported by the controller.	**DET**
42.5.1.2	The System shall report when detectors experiencing excessive calls for user-set threshold, if reported by the controller.	**DET**
	TIME	**TIME**
43	The CSS shall interface to time acquisition equipment and automatically synchronize the System's central time clock	**TIME**
43.1	The frequency of the central time clock synchronization shall be user selectable	**TIME**
43.2	The CSS shall synchronize all system servers and workstations.	**TIME**
43.2.1	The CSS shall be capable of downloading system time to each field device.	**TIME**
43.2.2	The Frequency of time updates shall be operator-selectable from once-per-day to once-per-hour.	**TIME**
43.2.3	The CSS shall transmit a clock update in conjunction with the command for the implementation of a different timing plan	**TIME**
44	The CSS shall be capable of assigning field devices to hierarchal levels of control sections.	**SETUP**
44.1	The CSS shall provide a minimum of three hierarchal levels	**SETUP**
44.2	Field devices shall be assignable to any of the control section levels	**SETUP**
44.3	Control section levels shall include the following:	**SETUP**
44.3.1	Corridor/Section	**SETUP**
44.3.1	Area	**SETUP**
44.3.1	System-Wide	**SETUP**
44.3	The CSS shall support the ability to move a device from one control section to another control section by time of day.	**SETUP**

Requirement No.	Requirement	Comments
44.4	The CSS shall support a minimum of 250 control sections	**SETUP**
44.5	The CSS shall be capable of transmitting any command to all devices within a control section	**SETUP**
45	The CSS shall provide static and dynamic green band displays.	**TSD**
45.1	System Operators shall be able to select real-time or timings stored in the database for the green band display	**TSD**
45.2	System Operators shall be able to select the intersection or intersections to be displayed	**TSD**
46	The CSS shall provide all communications between the system servers and the field devices.	**COMM**
46.1	The CSS shall provide a message communications scheme that ranks messages to field devices on a priority level basis.	**COMM**
46.2	User-initiated messages shall have higher priority over polling messages	**COMM**
46.2.1	The Communications scheme shall allow dropping of real-time monitoring to help facilitate the quickest completion of higher priority messages	**COMM**
46.2.2	The CSS shall also prioritize communications to field devices based on the present use of the system	**COMM**
46.2.3	The CSS shall be capable of communicating with field devices over a variety of communication technologies and mediums.	**COMM**
46.3	The system administrator shall have the ability to configure the polling timeout in milliseconds for each device.	**COMM**
46.4	The Communications type shall be selectable as part of setup by the System Operator	**COMM**
47	The CSS shall implement any communication type without degradation of system monitoring capabilities	**COMM**
47.1	The CSS shall support the following communications technologies	**COMM**
47.2	RS-232	**COMM**
47.3	IP	**COMM**
48	The CSS shall monitor communications between the system servers and field devices	**COMM**
48.1	The CSS shall fail individual components when operator-selectable thresholds are exceeded	**COMM**
48.2	The Operator-selectable parameters shall be unique to the type of communications technology being use	**COMM**

Requirement No.	Requirement	Comments
48.3	If communications fails, the CSS shall display a heads-up alarm to the system operator	**COMM**
48.3.1	The CSS shall log all communication failures	**COMM**
48.3.2	The CSS shall continue to attempt to reestablish communications with the failed component for a operator-definable amount of time.	**COMM**
48.3.3	If communications is re-established within the selected time period, the component shall be considered operational	**COMM**
48.3.4	If communications is re-established, the CSS shall log the event and clear the alarm	**COMM**
48.3.4.1	The System Operator shall be able to enable/disable communications monitoring through the GUI.	**COMM**
49	The CSS shall be capable of providing event based polling (also called exception based reporting) of all field devices	**POLLING**
49.1	Event based polling shall not cause the device to be deemed off-line if extended period of time elapses without an event taking place. The CSS shall maintain a heartbeat, or similar, to the controller to satisfy this requirement.	**POLLING**
50	Remote laptops connected directly to the local intersection controller shall be able to access and modify the local controller database without accessing the Central System.	**LAPTOP**
50.1	Remote laptops connected directly to the local intersection controllers shall be able to upload/download timing parameters and set time and date on the controller	**LAPTOP**
50.2	The Remote laptops shall synchronize their database with the Central database upon next connection to the LAN.	**LAPTOP**
51	The CSS shall be capable of comparing programmed phase timing to real-time phase returns	**COMP**
51.1	The comparison of programmed and real-time phase data shall be displayed on the operator workstation.	**COMP**
52	The CSS shall be capable of monitoring actual split times by phase.	**SPLIT MON**
53	The CSS shall display the percentage of time that the phase reaches it maximum value	**SPLIT MON**
54	The CSS shall display the percentage of time that the phase terminates following the completion of the minimum time	**SPLIT MON**
55	The CSS shall have the ability to export the split monitor report to an Excel compatible file.	**SPLIT MON**

Requirement No.	Requirement	Comments
56	The CSS shall provide a means of uploading and downloading timing information for data analysis and timing development	**SYNCHO**
56.1	The CSS shall export traffic volume data	**SYNCHO**
56.2	The CSS shall export to a Synchro compatible file the signal phase sequence data.	**SYNCHO**
56.3	The CSS shall export to a Synchro compatible file the signal phase duration data.	**SYNCHO**
56.4	The CSS shall export the geo-reference data as used in the GIS coordinate system that is consistent with the Synchro intersection location referencing system.	**SYNCHO**
56.5	The CSS shall import signal phase duration data and offset data.	**SYNCHO**
56.6	Synchro 7 shall be supported	**SYNCHO**
57	The CSS shall be capable of monitoring and controlling a lane control sign system.	**LANE**
57.1	Red "X" shall depict lane closed	**LANE**
57.2	Green Arrow shall depict lane open.	**LANE**
57.3	Middle/center turn lane depicts two-way turn lane.	**LANE**
57.4	The CSS shall be able to transition between lane control assignment safely.	**LANE**
57.5	The CSS shall provide monitoring and management of the local field device controller.	**LANE**
57.5.1	The CSS shall monitor for lane control sign status using graphical or tabular display.	**LANE**
57.5.2	The CSS shall manage the lane control sign by implementing pre-defined plans.	**LANE**

4.8 Desired Functionality

In addition to the Minimum Functionality identified above, the City desires the following functionality:

- Support for Dynamic Message Signs. This would include a communications interface using the NTCIP protocol, and a message management system
- Support for Closed Circuit Television Cameras (CCTV). This additional functionality would include the camera control system. The control system would include pan, zoon, tilt, iris, pre-sets. The camera protocol must include Cohu, but others may be considered.
- Measures of Effectiveness. The city desires some specific level of metrics that could be generated for a particular intersection or corridor using standard data objects from the field controller. The vendor is open to identify what MOE's their system currently supports.
- Time Space Diagram. This functionality would provide the City the ability to generate Time Space Diagrams using data from the database or 'real-time' data. There should be the ability to store pre-defined routes for later use. There should be an ability to print.

- Alert Prioritization. This functionality provides the ability to define specific users as priority recipients with secondary users being alerted if only the top priority user did not respond within some user-programmable time period.
- Real-time I/O display. This functionality would provide the ability for the user to view an intersection graphic that would show dynamic icons representing the Inputs and Outputs of the controller.
- External Call placement. This functionality would allow the system operator to place vehicle, pedestrian, and preemption calls to a controller using the Central System Software. The controller firmware will be required to support external placement of calls.
- TxDOT Center-to-Center Support. This functionality is supporting the current TxDOT Center-to-Center standard for sharing data between centers. As a minimum, the functionality provided shall meet the functionality specified in the Center-to-Center Communications Status Interface Control Document C2C-SICD-3.1.2 as published by TxDOT (2004). The C2C data shall be network-based using Transmission Control Protocol/Internet Protocol (TCP/IP) connectivity, the Hypertext Transfer Protocol (HTTP), and XML data format based and shall be consistent with TMDD 2.1 (and NTCIP 2306) and the emerging TMDD 3.0 (and NTCIP 2306). The Contractor is requested to respond as to how their system can provide the data objects listed below using the stated defined interface control document.
    - Network Data:
        - network identifier
        - network name
        - number of links in the network
        - number of nodes in the network
        - list of link data
        - list of node data
        - network identifier
    - Traffic Signal Status Data:
        - traffic signal identifier
        - traffic signal name
        - traffic signal location (lat/long)
        - traffic signal status
        - traffic signal planned maintenance
        - traffic signal plan
        - traffic signal plan description
        - traffic signal plan expiration
        - traffic signal state
        - traffic signal failure status
        - traffic signal preemption
    - Traffic Conditions Data:
        - network data
        - link identifier
        - data type
        - data type description
        - delay
        - travel time
        - volume
        - speed
        - density
        - occupancy

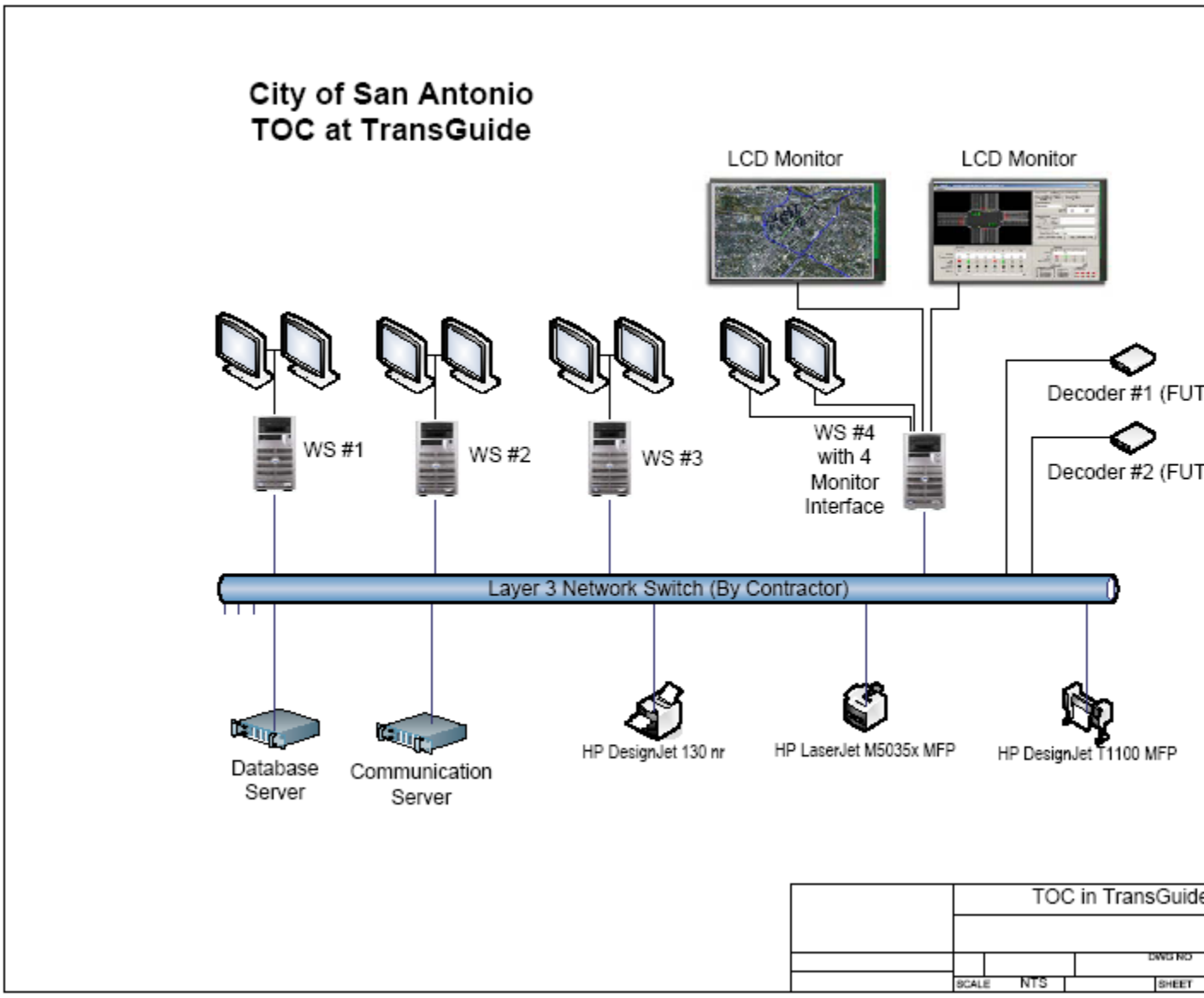
5.0 Specification for central hardware

5.1 Description

The Contractor shall furnish and install at a location designated by the City the following equipment:

- One (1) 19-inch EIA rack
- One (1) Layer 3 routing switch
  - Storage unit of one (1) terabyte minimum
  - DVD read/write/burner or HD DVD
  - Ports to support all applications contained herein
- One (1) fiber termination assembly (furnished by City but configured by Contractor)
- One (1) UPS
- Two (2) server with traffic application installed
  - Operating system
  - Licenses for six (6) workstations at various locations
  - Distributed software platform for multi-user applications
- Five (5) operator workstations
- Twenty (20) mobile maintenance units in the form of laptop computers
- Two (2) 40-inch minimum LCD video displays
- Three (3) color printers with cartridges
- Five (5) Controller Interface Devices

The equipment identified above will be constructed in the traffic operation center room located at TransGuide as shown in the diagram on the next page. The system shall be configured as shown in the diagram below. The system rack (EIA rack) is not shown for simplicity reasons.



5.2 General

The Contractor shall create an inventory of the workstation computer assembly and verify the shipment. When the shipment is verified complete, the Contractor shall setup and install the workstation computer at the location indicated in plans. The Contractor may purchase manufacturer installation and testing service from the factory. The Contractor shall connect the workstation to service power and the workstation LAN.

The Contractor shall insure that operating system and all applications delivered as part of the operating system are updated with the current service pack, all security patches and all other patches recommended by Microsoft Update.

5.3 EIA Rack

The EIA rack shall meet the following requirements:

The black EIA rack shall be 24” wide, 36” deep, and 72” high. It shall be a four post unit with front and back secured doors that are smoked.

The EIA rack shall include one shelf, a power strip, and a ventilation fan.

The components placed in the rack shall be directed by the City’s project manager.

5.4 Layer 3 Routing Switch

The Layer 3 Routing Switch shall conform to the following requirements:

This specification describes the functional, performance, environmental, submittal, training, documentation, and warranty requirements, as well as the method of measurement and basis of payment. The city only supports network equipment manufactured by Cisco. Other products meeting the minimum specifications may be used if accepted by ITSD.

General. All equipment and materials covered by referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when so requested by the Engineer. All materials furnished, assembled, or installed covered by reference specification shall be new.

Industry Specifications and Standards. The following industry specifications apply to the Layer 3 Switch. Latest issues of these industry specifications apply unless otherwise noted.

a. FCC Rules and Regulations, Vol. II, Part 15 for Class A Equipment
b. UL 60950
c. IEEE 802.3 CSMA/CD (ISO/IEC 8802-3), 802.3i (ISO/IEC 8802-3), 802.3u (ISO/IEC 8802-3), 802.3z, 802.3ab, 802.1Q & 802.1p, 802.1D, 802.1s, 802.1w, 802.3x, 802.1X , 802.1Q, 802.1P, 802.3X, & 802.1W
d. RFC 1123, 2236, 1493, 951, 2131, 1058, 1723, 1389, 1213, 1253, 1583, 2178, 1850, 2178, 2338, 2362, 1757, 1643, 1112, 1587, 2787, 2030, 2138, 2474, 2475, 2597, & 2598
e. TS-1, Section 2
f. IEC 61850-3
g. MIL-HDBK-217F-2

Routing Switch. The Routing Switch shall:

a. Support full redundancy features in its hardware-switching platform
b. Have a passive backplane
c. Have a chassis with a minimum of ten (4) slots suitable for mounting in a 19-inch rack
d. Have a minimum of one (1) Gigabit-Ethernet GBIC interface modules
e. Have a minimum of two (2) SMFO GBIC interfaces
f. Have a minimum of one (1) Fast-Ethernet copper interface module with a minimum of thirty-two (32) 10/100 BaseT ports
g. Have a minimum of one Switch-Fabric modules
h. Have an ASIC-based wire speed routing architecture
i. Be non-blocking and switch traffic at wire-speed operation

CPU/Switch Fabric Architecture. The CPU/Switch Fabric Architecture shall perform system configuration for High-Availability mode (Redundancy). This architecture shall support the following:

a. Minimum forwarding rate of 48Mpps
b. Packet switching rate greater or equal to 48,000,000 64-byte packets per second
c. Minimum Switching Fabric rate of 32Gbps
d. Support Dual-Active Load-Sharing or fully redundant Switch Fabric modules
e. Minimum of four (4) I/O slots in High-Availability mode
f. Allow the total number of ports to operate without over subscription

GIGABIT-Ethernet GBIC Interface Module. Each module shall have a minimum of eight (8) GBIC 1000Base ports.

GBIC. The GBIC shall:

a. Allow for hot swapping failed component
b. Operate as its own switched port
c. Operate over SMFO and MMFO media
d. Support detecting and shutting down one-way link failures, using the FEFI or Auto-Negotiation method
e. Support signaling up to a distance of:
    1. 275m for MMFO
    2. 70km for SMFO
f. Utilize fiber connectors (Fiber connectors shall be available as SC, LC, or MTRJ)

Fast-Ethernet Copper Interface Module. Each Fast-Ethernet Copper Interface Module shall have a minimum of thirty-two (32) Fast-Ethernet copper interfaces.

Each Fast-Ethernet Copper Interface shall:

a. Operate as its own switched port
b. Operate at 10/100Mbps at 10/100Base-T
c. Auto-Negotiate up to Full-Duplex operation
d. Support Cat5 cabling media up to 100m
e. Utilize RJ-45 Connector

Power Supply. Power Supply shall:

a. Operate from 120 VAC 60HZ input power
b. Be hot swappable
c. Support load sharing

Environmental. The Routing Switch shall conform to performance specification as stated herein when operated in the following environment:

a. Temperature: 0ºC to +40ºC
b. Humidity: 5 to 95 percent relative humidity, non-condensing

Physical. The Routing Switch shall not exceed a height of 23 RMU. The weight shall not exceed 400 lbs.

Mounting Options. The Routing Switch shall be mountable in a 19" Rack Assembly.

Mean Time Between Failures (MTBF). The Routing Switch shall have a minimum MTBF of 25,000 hours. The MTBF shall be calculated in accordance with the methods described in Mil-Std HDBK 217F for a temperature of 55ºC for ground benign.

Labeling and Markings. All connectors, indicators, and replaceable components shall be permanently marked and traceable to the supplied documentation, including schematics and parts list. The external markings shall include the product function name, model number, serial number, and manufacturer's name.

Protocols. The Routing Switch shall support and provide the following minimum protocols:

a. Wire-speed Packet Filtering capabilities for Layers 2 through 4
b. Flow-control (IEEE 802.1x)
c. STP (IEEE 802.1s)
d. Link aggregation (IEEE 802.3ad)
e. VLAN (IEEE 802.1Q)
f. Broadcast and Multicast rate limiting
g. Standards-based Multicast routing protocols
    1. DVMRP
    2. PIM-SM
    3. PIM-DM
    4. IGMP (Version 1 & 2)
    5. IGMP Multicast Router Discovery
    6. Minimum of 512 Multicast Groups
    7. Providing management of video streaming
h. VRRP (IETF RFC2338)
i. OSPF Protocol
j. OSPF MD5 Cryptographic Authentication
k. OSPF NSSA
l. IP routing based on Port-based and MAC-based VLANs
m. UDP Broadcast Forwarding
n. Supernet Address Configuration

o. RARP
p. IP Prefix Flow Filters
q. Router Interface
r. Flushing Routing Tables
s. ECMP
t. Port-mirroring
u. High-Availability mode operation. (The Routing Switch shall be able to recover from a failed Switch Fabric module within 1-minute boot-up operation, and within 2-minute route-table recovery.)

QoS. The Routing Switch shall support QoS methods and de-queuing techniques as follows:

a. IEEE 802.1p
b. Diff-Serv
c. IEEE 802.1p to Diff-Serv re-marking
d. Prioritize the traffic through the switching architecture, so as to allow traffic to be managed across a minimum of eight (8) service queues (Hardware)
e. Strict and Weighted-Round-Robin or Weighted Fair de-queuing
f. Layer 2 through Layer 4 filtering

Management. The Routing Switch shall support the following Management features:

a. NTP (RFC 1305) and SNTP
b. CLI, Telnet, Web-base, and SNMP management
c. FLASH configuration and operating storage
d. Storing multiple configuration files and operating software images on running FLASH storage areas
e. TFTP or FTP
f. Minimum of four levels of RMON (Alarm, Events, Statistics, and History)
g. Feature to “turn on or off” additional software/hardware feature sets without rebooting (i.e., enabling OSPF, disabling DVMRP, etc)
h. ACLs or filtering for network control and security at wire-speed

Security. The Routing Switch shall support the following security features:

a. RADIUS
b. Secure Shell version 2 (SSH2)

Installation. The Contractor shall install the Layer 3 switch in the 19-inch rack.

Testing. Prior to acceptance of any Routing Switch, the following tests shall be performed:

Stand-Alone Acceptance Test (SAT). Using the Engineer approved Vendor-supplied test procedures, the Engineer will perform SAT in a test area provided by the Engineer. A vendor representative shall be present during the SAT. The Vendor will be provided with a schedule of test, including time and place.

The SAT will be performed as follows:

a. The Routing Switch will be assembled and connected to power in a stand-alone configuration
b. The Routing Switch will be powered up and allowed to initialize, boot and run self-diagnostic tests as defined in the Engineer-approved test procedure
c. After the Routing Switch has started and initialized, any additional test procedures will be executed
d. After the test procedures have been executed, the Routing Switch will be allowed to run, uninterrupted, for a burn-in period of 72 hours.
e. At the end of the burn-in period, the unit will be restarted and configuration verified

Operational Test. After successful completion of the SAT, the Engineer will configure and connect the Routing Switch to the city test network. The following tests will be performed by the Engineer:

System Integrity: A Comprehensive diagnostics will be performed to verify system integrity

10/100Base-T Interfaces: The Routing Switch will be configured with default VLAN 0 and assigned an IP address. Connect a 10/100Base-T link (Link A) with a host to the first 10/10Base-T I/O port. For the second port to the last 10/100Base-T port the following will be performed:
Connect a second 10/100Base-T link (Link B) with host to the port
Verify the port's activity and link lights
Ping host to host and verify the connection

100FX Interfaces: For first port to the last 100FX port, the following will be performed:
Connect a 100FX link (Link C) with host to the port
Verify the port's activity and link lights
Ping host to host and verify connection

1000Base Interfaces: For first 1000Base port to the last 1000Base port the following will be performed:
Connect a 1000Base MMFO link (Link D) with host to the port
Verify the port's activity and link lights
Ping host to host and verify the connection

While connected to the network, the Routing Switch shall not, in any way, compromise the function or functions of any other connected network device(s).

Additionally, the Contractor shall also demonstrate full compliance to all requirements stated herein and any additional manufacturer stated functionalities not stated in this specification.

Upon completion of all tests, the Contractor will be notified of Operational Routing Switch acceptance or failure. If the unit fails the test, the Contractor shall replace the unit at no additional cost to the project and the test procedure shall be restarted. If repeated / chronic failures continue to occur during a one month window, the Engineer will reject the equipment and the Contractor will be given 30 days to submit an alternate unit (model), meeting all required specifications.

MATERIAL REQUIREMENTS

FCC Rules and Regulations, Vol. II, Part 15 for Class A Equipment	Electromagnetic Compatibility and Susceptibility (Product electromagnetic compatibility is required)
UL 60950	Safety Requirements for IT Equipment (Applicable to equipment safety)
IEEE 802.3 CSMA/CD (ISO/IEC 8802-3)	Layer 1 conformance: Ethernet
IEEE 802.3i (ISO/IEC 8802-3)	Layer 1 conformance: 10BaseT
IEEE 802.3u (ISO/IEC 8802-3)	Layer 1 conformance: 100BaseT
IEEE 802.3z	Layer 1 conformance: Gigabit Ethernet 1000Base SX and LX
IEEE 802.3ab	Layer 1 conformance: Gigabit Ethernet 1000BaseT 4 pair Cat5 UTP
IEEE 802.1Q & 802.1p	Layer 1 conformance: VLAN tagging & Prioritization
IEEE 802.1D	Layer 1 conformance: MAC bridges/Spanning Tree Protocol
IEEE 802.1s	Multiple Spanning Trees
IEEE 802.1w	Rapid Reconfiguration of Spanning Tree
IEEE 802.3x	Layer 1 conformance: Flow Control
IEEE 802.1X	Layer 1 conformance: EAPOL
MIL-HDBK-217F-2	Military Handbook for “Reliability Prediction of Electronic Equipment”, Notice 2
RFC 1123	Layer 2 conformance: IGMPv1 for snooping
RFC 2236	Layer 2 conformance: IGMPv2 for snooping
RFC 1493	Layer 2 conformance: Bridge MIB
RFC 951	Layer 3 & 4 conformance: BootP
RFC 2131	Layer 3 & 4 conformance: Dynamic Host Control Protocol: DHCP
RFC 1058	Layer 3 & 4 conformance: RIP version 1
RFC 1723	Layer 3 & 4 conformance: RIP version 2
RFC 1389	Layer 3 & 4 conformance: RIP 2 Management Information Base
IEC 61850-3	Communications Networks and Systems in Substations (Applicable to EMI immunity, Section 5.7 applies)
RFC 1213	Layer 3 & 4 conformance: TCP/IP Management Information Base
RFC 1253	Layer 3 & 4 conformance: OSPF
RFC 1583	Layer 3 & 4 conformance: OSPFv2
RFC 2178	Layer 3 & 4 conformance: OSPF v2
RFC 1850	Layer 3 & 4 conformance: OSPF Management Information Base
RFC 2178	Layer 3 & 4 conformance: OSPF MD5 cryptographic authentication
RFC 2338	Layer 3 & 4 conformance: VRRP: Virtual Redundancy Router Protocol
RFC 2362	PIM-SM
RFC 1757	RMON 4 groups
RFC 1643	Ethernet MIB

RFC 1112	IGMPv1
RFC 1587	OSPF NSSA
RFC 2787	VRRP MIB
RFC 2030	SNTPv4
RFC 2138	RADIUS authentication
RFC 2474 & 2475	Layer 3 & 4 conformance: DiffServ
RFC 2597 & 2598	DiffServ Per Hop Behavior

5.5 Servers and Peripheral Devices

The Contractor shall furnish and install a minimum of 2 servers to run the CSS. It is anticipated that one server will be dedicated to the database, and the other focused on field communication. The City standard, as shown in Exhibit D, is Dell 2950 servers, running Windows Server 2003, configured for RAID 5 with a minimum of 2GB of RAM. The total disk storage should be at least 36GB on the communication server and at least 72GB on the database server. It is expected that the each of these servers will cost approximately $6,000.

A KVM, associated cables and flat panel monitor shall be furnished and installed in the rack. It is expected that this equipment will cost approximately $3,000.

5.6 UPS

The Contractor shall provide an Uninterruptable Power Supply (UPS). The UPS shall meet the following specifications:

- Rack Mounted (as identified in section 5.3 of this document)
- Output power capacity of 1600 watts / 2200 VA
- Nominal Output voltage of 120V
- Nominal Input voltage of 120V
- Backup time at half load of 24 minutes
- Backup time at full load of 6 minutes

5.7 Workstation

The Operator workstation computer shall meet the city standards identified in Computing Resources for Tier 3 found in Exhibit D, and also meet the following minimum requirements:

The operator workstation computer shall be purchased as an assembly from an established manufacturer. The City ITSD currently deploys units from Dell.

The computer shall be housed in a case. The system board shall be Quad-Core Intel Xeon 3.16 GHz with a 1333 MHz front side bus, 2 6MB L2 cache, and 2 GB of double data rate SDRAM. The computer shall be internally equipped with a 200 GB SATA hard drive, 2 hard disk drives, IDE 16X Dual DVD/CD-RW or HD drive, audio adaptor, 10/100 BaseT network interface, four USB ports, and a modem interface.

The computer shall be provisioned with nvidia quadro graphics adaptor plug-in card with 250 MB GDDR3 video memory and support for DVI. It shall include a standard ASCII keyboard, optical wheel mouse, and speakers. The computer and speakers shall require nor more than 900 watts.

There shall be dual monitors which are 21-inch LCD flat screen with DVI interface. Contrast ratio shall exceed 1000:1 and brightness 250 cd/m3. Operating system shall be Windows XP Professional.

5.8 Mobile Maintenance Unit

The Mobile Maintenance unit shall meet the City standards identified in the Computing Resources for Tier 3 found in Exhibit D, and also meet the following minimum requirements:

- Windows XP Professional operating system
- Intel® Core™ 2 Duo T7250 (2.0GHz/800Mhz FSB/2MB cache)
- 15.4 inch Wide Screen XGA LCD Display
- 2GB Shared Dual Channel DDR2 SDRAM at 667MHz, 2 DIMM
- 256MB NVIDIA® GeForce™ 8600M GT
- 85 WHr 9-cell Lithium Ion Primary Battery
- Intel® PRO/Wireless 3945 802.11a/g Wi-Fi Mini Card
- Microsoft Office 2007 Basic
- 8X CD/DVD+RW Read and Burn CD and DVD
- Dell Wireless 355 Bluetooth Internal (2.0 + Enhanced Data Rate), WinXP
- Docking station (Port replicator)
- Carrying case

The units shall be supplied with all standard cables and an extra battery pack.

5.9 LCD Video Displays

Two (2) 40-inch (min.) LCD displays shall be supplied that meets the following requirements:

Size: 40 " Diagonal
Display: Color 16.7 M Colors
Optimum resolution 1360 x 768
Input Signal: Terminated RGB Analog, DVI (Digital Visual Interface) Compliant Digital RGB. Separate H/V sync, Composite sync, SOG, TTL level , positive or negative. Signal Cable: 15pin to 15pin D-sub cable, Detachable DVI-D to DVI-D connector Signal Connectors: D-sub, BNC, DVI-D, YPbPr, S-VHS, VCR LAN Connection Terminal USB Connection Terminal

The specifications above match a Samsung 400PXN. Other units may be supplied if equivalent, and approved by the Engineer. The LCD displays shall be provided with two (2)DVI cables of a length of at least 23 feet. These two cables will be needed for the video card described below.

The Two (2) LCD displays shall be mounted in a fixed position on a designated wall sturdy enough to support the weight of the two display units. The mounting hardware shall provide some degree of vertical tilt.

5.10 Color Printers

The Contractor shall supply three (3) printers.

- HP LaserJet M5035x MFP
- HP DesignJet T1100 MFP
- HP DesignJet 130 nr

The Contractor shall furnish and install the printers in the area designated by the City's Project Manager. The Contractor will supply all necessary cables and network peripherals to make the units operational. Each printer will be network capable. The City will supply the IP address and the contractor will provide all configuration and setup. The Contractor will supply one extra complete set of ink cartridges for each printer. The City will provide the network jack at the location where the printers will be installed. The Contractor will configure each of the five workstations with appropriate software drivers to support the printers intended operation.

5.11 Controller Tester

The Contractor shall provide five (5) Controller Interface Device testers. This device is the McCain CIDII, or equivalent.

EXHIBIT B
Acceptance Testing

Overview

As stated in the proposed scope of work, and in Sections 2 and 4 of Exhibit A, the City will be selecting a commercially off the shelf, or COTS, application. As such, the selected system will have been previously installed and integrated into multiple previous sites. The City will verify past performance by contacting each of the references provided by the Contractor. The project acceptance process will acknowledge the software as COTS and as such a rigorous acceptance testing process is not anticipated. The acceptance testing process will demonstrate to the City that the Contractor has provided the materials or software applications as promised and advertised in their proposal, demonstration, and final negotiations. The acceptance testing will tie closely to the systems requirement document (SRD) that will be developed by the Contractor as part of the project. The Contractor should use existing test plans to the extent possible. However, the existing test plan should be tailored to this project. The process below is provided as a guide to the level of detail anticipated.

Important Note

The City reserves the right to require a much more stringent process of acceptance testing if there is evidence that supplied software (controller firmware or central software) does not perform as advertised.

Testing Process

There are five basic stages and/or components of anticipated acceptance testing, which are as follows:

- Hardware (controllers)
- Controller Firmware
- Cabinet
- Central System Software
- System Administrator Aspects
- Complete System

Hardware Testing

Hardware consists of the Model 2070L controller. The hardware supplied shall comply with TEES standards. The controllers will undergo a thorough testing at the signal shop by City forces before implementation into the field. If the controller hardware fails at any time following delivery and while under warranty, the controller will be sent back to the Contractor at the Contractor's expense as per the requirements set forth in Section 1 of Exhibit A.

Controller Firmware

The controller firmware shall comply with the minimum functionality as stated in Section 2 of Exhibit A and as amended in any way during final negotiations. The contractor will perform a test of the controller firmware that demonstrates the functionality identified in the Systems Requirement Document (SRC).

The firmware acceptance testing should include of the following components:

Basic Test – this will be conducted at the signal shop in the presence of the City's Project Manager and signal shop superintendent. This test will be a demonstration of the firmware's basic functionality. The Contractor should be prepared to demonstrate the functionality identified in the SRD. Detailed test cases are not required at this stage. It is anticipated that the staff in the Signal Shop will have thoroughly tested the basic functionality and features of the firmware to their satisfaction and thus a detailed test is not anticipated.

It is acceptable for the Contractor to use the training venue as an opportunity to introduce some of the features and functionality of the firmware as identified in the SRD. It is not acceptable for the training to serve as the acceptance testing or to merely focus on the SRD. The training shall focus on training the signal shop staff on the effective and practical use of the firmware that is consistent with their daily operations.

It is the Contractor's responsibility to identify in advance when and how testing for required functionality is being conducted and the test results afterwards.

The Contractor should build into the project cost sufficient time for a qualified representative (an instructor) to be onsite at the Signal Shop at least one day a week for four weeks. During this time, the instructor will provide technical assistance in the use and deployment of the firmware. This time should be used to demonstrate features identified in the SRD but not implemented by the City to date. For example, uneven double cycling can be demonstrated with a previously prepared controller database, or how to implement the flashing yellow arrow display for protected permitted left turn control.

It will be the City's responsibility to provide the Contractor/instructor with instruction to what should be demonstrated in the following week. The Contractor/instructor will have approximately one week to prepare for the following instruction time with the city staff.

Testing for NTCIP

The Contractor will need to prove that the firmware and central software support NTCIP 1201 and 1202. One possible way that removes any bias out of the process is to use a third party tester, such as Device Tester, or the NTCIP exerciser. If previous test results using either of these service providers are available, it is acceptable to provide the results without having to re-perform the testing. The test results should reflect conformance to Exhibit 2.1 and 2.2 in Exhibit A, Section 2.

Regardless of whether a Contractor has its software tested by an independent laboratory, the Contractor shall perform tests on its own to prove that these tests shall be valid for the protocol stack recommended in the proposal to be compatible with the City's communications network. The results of this these tests for NTCIP 1202 Conformance Level 2 shall be placed in the format of the conformance statement (PICS) in section A.2 of that document. As shown in this document, this table contains columns with the following headings:

NTCIP 1202 Clause
Object Name
Object Type
Object Status
Object Support
Allowed Values
Supported Values

In addition to these columns, the contractor shall include a column headed by the phrase "Conformance Test Result". For each object listed in this statement, contractor shall fill out each column for each object as shown in NTCIP 1202. In the column headed "Conformance Test Result", the contractor shall indicate the results of the test for each item. The results shall be expressed in one of the following phrases:

Pass
Pass with exceptions
Fail

After the table, the contractor shall specify what the exceptions are for the items that passed with exceptions. Contractor shall also specify and explain why any failures occurred. Any items omitted from the PICS will be assumed to have failed the test.

Near the end of the conformity statement, the contractor shall state that these test results are accurate and truthful. The project manager and his/her supervisor shall then sign this statement in the presence of a notary public. Said notary shall then seal the document as appropriate.

Cabinet Testing

There are no additional tests beyond the testing identified in Section 3 of Exhibit A.

Central System Software

The testing of the central system software should include a process by which each of the functionality items in the SRD can be demonstrated. The Contractor should allow for additional time in testing the central software because of the detailed nature of the software.

The testing for the central software should be performed in three stages, once upon initial system installation (call it the basic test), once in the middle of the project, and a final system test.

Basic Testing

The basic system test should focus on the functionality in the Systems Requirement Document. This test shall be conducted immediately following the installation and configuration of the software at the Traffic Management Center and the traffic signal maintenance shop. The Central Software Acceptance Test shall test functionality from all workstations at the TMC and the traffic signal maintenance shop. The Central System Software Acceptance Test shall test all requirements of the following central system functions while the central system is connected to a test controller in the TMC and to at least 10 controllers located in the field:

- Database;
- System administration;
- Command;
- Reporting;
- Time Sync;
- Communication; and
- Others as defined in the System Requirements Document.

Please note that subsequent upgrades of the Central System software will require testing of new functionality and regression testing. If the central system is upgraded in order to accommodate new MIB extensions, said extensions shall be tested during the mid-project acceptance test, described below.

Mid-Project Testing

The purpose of this test is to verify the ability of the local controller software to communicate with the central system after approximately fifty units have been deployed and at least one communications channel has been fully loaded. It shall also be designed to test any modifications or extensions to the software and firmware, both local and central. This test shall not be complete until these modifications have been made and tested successfully. At a minimum, this test shall include:

- Ability to Upload and download controller databases;
- Monitoring of intersection phase status;
- Monitoring of intersection alarm status;
- Monitoring of intersection preemption status;
- Monitoring of intersection communication status;

- Monitoring of intersection coordination status (in step, in transition, etc.); and
- Testing of any modifications or extensions to local and/or central software.

The test plan should also include retesting of functionality of controllers to verify that no functionality has been lost due to communications loading or any other unforeseen reasons.

Final System Testing

The Final System Integration test will be the final test prior to City acceptance. This Test will be conducted after all equipment has been installed and final software upgrades (if required) are installed and configured. The Final System Integration Test shall test all system requirements.

System Administrator Testing

There are many processes that will be conducted by the system administrator as part of the central system software; for example, backing up the database. These processes will be demonstrated in the system administrator training provided as part of the software delivery.

This testing is the full demonstration that the system provides the functionality in the SRD. The City's designated System Administrator, project manager, and ITSD will provide input into the acceptance the system as it relates to duties performed by the System Administrator.

Complete System

Each of the stages identified above are at the component or isolated system level. This test demonstrates that the system performs as advertised when communicating to all 250 controllers. This test should build upon previous tests.

EXHIBIT C
Explanation Of Functions And Features Of Expected Software

If the description in this section conflicts with other parts of the RFCSP, only the non-conflicting elements will prevail. This Exhibit explains terminology used in the RFCSP.

1.0 CENTRAL SYSTEM MANAGEMENT SOFTWARE

The City is procuring a central software system including local traffic control software, Type 2070L traffic signal controllers, Central System Software, detector system software, other auxiliary system software, and other ancillary hardware to form a comprehensive traffic-management system.

The primary goals of the central system software shall be to provide the City with real-time traffic signal communications feedback monitoring (in graphical and text formats), general operational configuration and database management for all interconnected intersections and/or intelligent communications devices. The server(s) shall use Microsoft Windows™ operating system and shall operate in true 32-bit operational mode.

The system shall provide a fully operational traffic signal coordination and management system capable of coordinating and/or monitoring local intersection controllers running local intersection control firmware compatible with 2070L controllers and existing cabinets.

The central software shall be modular in design and be capable of accepting (without changes to the basic system modules) additional functional modules. The following modules are desired:

- System Detector Station Software;
- Monitoring of Controller Access;
- Automated Timing and Progression Plan Development and Implementation;
- Citizen Request and Complaint Tracking;
- Equipment Inventory Tracking;
- Synchro™ plus Sim Traffic™ Version 6 and 7;
- Synchro™ plus Sim Traffic™ Interface;

All software purchased, if any, under this contract shall include at least four (4) copies of the software's documentation, unless stated otherwise. For Synchro plus Sim Traffic™, Passer V and Transyt-7F, two copies of the documentation for each software application will be sufficient.

The central system integrates all software modules into a unified and comprehensive traffic control system. The software must use object-oriented, knowledge-based techniques to monitor and control ITS devices including signal system software.

No sole-source devices or hardware components shall be permitted in the central system and associated hardware in the TMC; all critical components shall be available from at least two sources. The system shall be built around commercially available, off-the-shelf personal computer hardware and software. The system shall also allow the City to upgrade the performance as the PC industry advances.

1.1 DELETED

1.2 SYSTEM SIZING REQUIREMENTS

The server must be designed to communicate with intelligent local intersection controllers, detector count stations, weather stations, etc. (hereinafter referred to collectively as "Devices") on a real-time basis. The capabilities the server PC shall provide:

- Support of up to 20,000 Devices (signals, detector count stations, CCTV, and DMS units).
- Support for 15,000 system detectors.
- The capability of dividing the traffic network into a minimum of 250 control sections. Intersections and detectors shall be dynamically/online-assignable to any section. It shall be possible to have intersections and detectors assigned to different sections for different times of the day, either by operator command or the TOD/DOW command scheduler.
- Real-time feedback (e.g. all status is processed and returned to the server system at one second intervals when monitoring specific devices).
- A historical log of all real-time events that occur.

1.3 Deleted

1.4 GEOGRAPHIC AND FUNCTIONAL EXPANSION

The system is to be designed to provide for expandability, both geographical and functional. The system must provide for the easy addition of intersections, system detectors, and other field elements.

1.5 SOFTWARE INSTALLATION

The installation of the software from storage media shall be completely automated. From the operating system command line, no more than two typed commands should be required to fully install all software. Once the software is installed, configuration screens shall allow the system administrator to set distinct operating features of the system.

1.6 DATABASE GENERATION AND MAINTENANCE

The data server shall be responsible for maintaining all of the databases that implement the user interface and system operations. The database format shall support SQL and shall allow the database files and indexes to be accessed by third-party utilities. There shall be no significant limitations on the size of the databases or database record fields.

Data-entry formats shall be designed for easy data preparation by the operators. All tables in the database shall be printable in the proper format for use by the traffic engineers and maintenance technicians in the field. Software shall also provide a means to export data tables to spreadsheet programs in comma-separated variable format (csv) and as text files. All columns and rows shall be clearly labeled using terms consistent with those used in the central software, local controller software, documentation, and training materials. In order to alleviate repetitive data entry, the system shall allow the operator to copy data tables for use with other devices.

Database generation of traffic control operations shall include safeguards to preclude dangerous or undesirable intersection operation. These safeguards shall, as a minimum, include range checking, and coordinated timing plan diagnostics for each pattern/split combination.

At a minimum, timing plan diagnostics shall check for the following:

- Split times which violate minimum phase lengths (minimum green + yellow + all red);
- Split times which violate pedestrian times (walk + flashing don't walk + yellow + all red);
- Split times which do not add up to cycle length; and
- Split times which cause barriers to not be aligned.

The diagnostics shall check for split time violations which occur during short way correction mode as well as those which occur during the programmed cycle length for a given coordination pattern. Checking for splits which violate pedestrian times shall not prevent the use of vehicular splits which are less than the pedestrian times, as explained in section 2.6.5.

When errors occur, the results shall be displayed clearly and concisely with information sufficient for timely correction by the operator.

The central system shall also provide a means of recording device-specific text information. The City wishes to have a simple way of documenting explanations of why changes were made to the programming of a particular traffic signal, for example. One way this could be accomplished is by providing a menu item which opens a text editor, permits the user to document changes, and save them to a text file specific to the traffic signal controller in question.

Similarly, the City also wishes to have a means to produce graphics files, associated with specific devices, in jpeg or Windows™ bitmap format for the purpose of documenting unusual phasing assignments, etc.

1.7 DATABASE RECOVERY

The Server software shall provide all the necessary utility operations for backing up, restoring, and repairing the databases digital discs DVD. There shall be only one operational set of the database files. This set shall reside on the data Server and shall be shared rather than copied by the workstations (except possibly for notebook computers). This approach shall ensure database consistency and integrity among multiple users.

If the contractor's system configuration calls for the notebook computers to hold copies of the database, a means shall be provided to enforce regular updating by the user. The system administrator (and only the system administrator) shall have the means to decide how long a database may be considered valid. This period of time should be adjustable to a period of time of one week or less to a period of time as long as thirty days. The administrator shall have the authority to disable this feature if desired.

No less than forty-eight hours before the expiration of a database's validity (or the first time the user attempts to access the database when the remaining valid time is less than forty-eight hours), the software shall display a warning message to the user. This message shall be contained in a modal dialog box (e.g. one that must be acknowledged by the user) before operations can resume. This message shall be displayed every time the user attempts to access the database until it is updated from the central system.

If the deadline for updating passes and the database has still not been updated, the system shall display a message alerting the system operator that the update has not been performed.

It shall be possible to update the database via dial-up or VPN connection to the server.

1.8 PERIODIC UPLOAD AND ARCHIVING OF FIELD DATABASES

The system shall perform periodic and operator scheduled upload of all field databases and compare such field databases with the central database, which shall be considered to be the master database.

In the event that a change is made to controller settings through the keypad or by means of a portable computer, controller should automatically upload any and all changes to the data server in the TMC. After uploading, this change will be logged and stored in the appropriate tables in the database.

This upload shall occur without operator intervention, and shall occur not more than thirty minutes after the last change was made. It shall be possible for this feature to be deactivated at the system operator's discretion. Operator may also choose to upload and compare databases manually, if desired.

In order to maintain a permanent record of every change made to the operation of a traffic signal or other field device, the management system shall create an archive file every time one or more changes are made to the settings. When requested, the management software shall display a list of all archived files. Next to each file on the list shall appear the date and time on which each archive file was created. These archives shall be easily accessible, viewable, and printable in the

same format that current data would use. When viewed on a monitor or printed on paper, archived file shall show the date and time at which the archive file was created (as opposed to the date on which it was displayed or printed).

1.9 CORRECTION OF DATABASE DISCREPANCIES

Whenever a discrepancy is discovered between a field database and the central database, the software shall initiate one of two actions as defined by the operator:

- Automatically download the central database, overwriting the local controller; or
- Alert the operator of a discrepancy.

When comparing field and central database parameters, the software shall highlight the discrepancies between the two data sets. The operator shall have the option of saving the uploaded field database or downloading the central database, or any part thereof, to the field.

1.10 SYSTEM STARTUP AND SHUTDOWN

The ability of the system components to interact with each other shall not be governed by a structured start-up order. That is, if a component fails to operate or is powered down, the remainder of the system will not have to be shut down and restarted to re-establish a working system. The unaffected components will simply wait for the missing component to be returned to the system. When returned, all components will automatically revert to normal operations.

The system must be designed such that it will not need to be shut down. Hardware that is removed from active duty by power-down or cable-disconnect shall be reported by other components of the system to be non-responsive. When such equipment is powered up or reconnected, the system will respond by recognizing the return to normalcy and resume regular operations without operator interaction.

1.11 MULTI-USER ACCESS

The system software must support a multi-terminal, multi-user interface and allow access to multiple levels of the system simultaneously. The software package must support at least eight (8) external workstations simultaneously.

1.12 SYSTEM SECURITY

A dialog box shall be provided for the system administrator to set up a database of users and their privileges. Check boxes shall be shown for each defined area of system access, with separate entries for view and modify privileges. Several default sets shall be available, including such categories as "system administrator", "maintenance", and "traffic engineer". The software shall allow access to multiple levels of the system simultaneously.

The software shall establish and maintain a security system to prevent unauthorized access to the system. This shall apply to executable files as well as text files and database files. System security shall be ensured through the use of user-ID numbers (social security numbers or any other unique identifying number), user-changeable passwords, and user specific view and modify privilege categories. The user shall be required to enter his or her user ID, while accessing the system by means of a work station or a remote terminal through a dial-up connection. User ID shall also be required to gain direct access to a traffic signal controller, regardless of whether it is through the controller's keyboard or a portable computer connected directly to the controller. All significant operations performed by the user or occurring while the user is logged in shall be recorded in the Server's event log and shall be tagged with the user's ID, creating a system activity audit trail. All passwords shall be fully encrypted to help guard against outside "hacker" invasion. Successful completion of the log-in shall result in execution of a session start-up procedure.

The start-up procedure shall establish the privileges, object-menu options, windows, and tools an operator may utilize. Any functions to which an operator does not have access shall either not be shown or shall be grayed out. This will allow the operator to easily determine to which functions he has access. The system administrator must also be capable of setting an automated log-out for inactivity of a workstation.

1.13 REMOTE ACCESS

The software of the remote access computers should be the same version that is resident in the workstations. No scaled-down versions are acceptable. Each remote computer shall have all graphics files resident. All other database items shall reside only on the system server. Such software shall be capable of performing all operator-allowed command and monitoring functions available to operators within the TMC.

The software shall provide VPN security features designed to protect the system from unauthorized access by computer hackers capable of breaking sign-on password protection. The remote computers shall be able to monitor real-time operations of a minimum of six intersections simultaneously.

1.14 DIRECT-CONNECT ACCESS TO LOCAL CONTROLLERS

The portable computer software shall enable the portable computers to be connected directly to the type 2070L local intersection controller. Field technicians and engineers shall thereby have the ability to access and modify the local controller database without directly accessing the central software. This shall give the field technicians the ability to directly upload/download controller timing parameters and to set the time and date.

Field technicians shall also have remote access to the central system by means of a direct connection. This function shall allow the technician to:

- Download the current parameters for any controller to a controller or portable computer; and
- Upload newly established local controller parameters to the central system.
- Provide display of the status of all controller inputs and outputs.
- Provide the technician with the means of turning on any input as desired.

1.15 AUTOMATIC PAGING

The software shall have the capability of automatically sending alphanumeric messages to pagers. The Server shall store up to sixty-four phone numbers. The phone numbers shall be used to alert a personnel pager or pager group when an alarm condition or event occurs. Each phone number shall have the following programmable parameters:

- 16-byte pre-dial modem command string;
- 16-byte phone number;
- 16-byte text pager number/post-dial modem command string;
- Modem/pager descriptor;
- Pulse or touch-tone dialing;
- Maximum retries if phone calls are unsuccessful;
- Wait period between retries;
- Pager message acknowledge period; and
- Next phone number to use.

The primary phone number shall be any one of the sixty-four phone numbers. This phone number shall be changeable to another by time of day or workstation intervention. If a phone number is not specified by an alarm then the primary phone number is the first number used. If the phone calls are unsuccessful and the maximum retries have been exhausted, then the Server shall select the second phone number. If all of the calls using the second phone number are unsuccessful the Server selects a third phone number. This process continues according to how the user programmed all of the next phone number parameters until either a successful call is completed or no next phone number is specified.

1.16 SYNCHRONIZATION WITH UNIVERSAL TIME

The Server shall provide the time stamp and adjust the real-time clock for each local intersection controller on an operator-selectable schedule. In addition, the Server shall also be responsible for synchronizing its own internal clock and the workstation clocks using the world standard time sync received from a GPS, WWV receiver, or a time server provided by the City.

1.17 SYSTEM-WIDE CLOCK UPDATES

The system shall provide for the automatic downloading of clock updates to each field clock. The frequency of such updates shall be operator-programmable within a minimum range of once per day to once per hour. Additionally, unless the feature has been disabled by the operator, the system should transmit a clock update in conjunction with the command for implementation of a different timing plan.

1.18 VERIFICATION OF FIELD CLOCKS

The software should also upload, on a periodic basis selectable by the operator, the date/time from local controller and other field clock. If the controller time has drifted beyond an operator-defined amount, then:

- the system shall automatically download the true time to the controller; and,
- the system should report the clock drift to the operator; and,
- the event and action is logged to the event data base.

The frequency of this verification shall be set by the operator in the event scheduler.

1.19 ACCOMMODATION OF DAYLIGHT SAVINGS TIME, LEAP YEAR, ETC.

The software must have the ability to enable or disable daylight savings functions, handle leap years, and holidays and special events. All software must be capable of operating in the central time zone.

1.20 SIGNAL TIMING PLAN IMPLEMENTATION AND MONITORING

1.20.1 CONTROL SECTIONS

The central software must be capable of dividing the traffic network into a minimum of 250 sections.

- Intersections and detectors shall be dynamically/on-line assignable to any section.
- The number of intersections in a particular subsystem shall be programmable from a minimum of one to a maximum of the total number of intersections in the system.
- It shall be possible to have intersections/detectors assigned to different sections, for different times of the day, either by operator command or the TOD/DOW command scheduler.

- A dialog box shall be provided to define "control groups," which are groups of coordinated intersections. The parameters for a control group shall be the name and a user-defined text description of the control group. From the control group setup dialog the user shall also be able to run a particular timing plan for the entire control group and generate a report on the existing control groups in the system.

1.20.2 REMOTE ACCESS

The software must have the capability of providing access to the system for remote operators. The remote access capability includes workstations, mobile maintenance units and servers associated with the project which are physically connected to the LAN. All connected PCs, including those connected by dial-in, are capable of concurrent operation up to the number of seats required by the specifications.

1.20.3 LOCAL INTERSECTION CONTROL AND CONTROL MODES

Local traffic signal control functions shall be provided by the local controller firmware. The intersection controller shall determine the coordination cycle synchronization point from the current time-of-day. All offset, split, and transition timings shall be determined and implemented locally.

Under normal operation, intersection control shall follow the local controller TOD/DOW schedule. When the operator or central software determines that a different timing plan should be implemented, the system shall download the timing plan, if required, and command the intersection to that plan by sending the plan number to the controller. If communication is lost between the intersection and the central software, the intersection shall revert back to its original TOD/DOW schedule. The downloaded special plan shall not overwrite any plans that are used by the TOD/DOW schedule. The operator shall be able to select controller timing plan slots to be used as temporary locations and the remaining slots for TOD/DOW usage.

1.20.4 NUMBER OF TIMING PLANS

The system software shall provide for a number of timing plans equal to the value of the maxPatterns object for each intersection to be stored in the central database. The City anticipates up to 27 combinations of cycle length, offset and split to be used. At any one time, it shall be possible for all of the plans to be stored in the local controller's database and implemented upon command by the central system. Each timing plan shall include uniquely programmable values for cycle length and offset, a uniquely programmable phase sequence, and uniquely programmable split values.

The system shall handle special signal and/or timing plans to accommodate unusual traffic flow patterns during special events, parades, etc. These special event-timing plans will be included within the timing plans defined above.

1.20.5 PREEMPTION

The system software and local software shall recognize the occurrence of locally initiated preemption and thereby not erroneously diagnose a coordination failure because the local controller has been preempted.

1.20.6 INPUT AND OUTPUT STATUS

The system software shall accommodate the control and monitoring of the on/off status of all of the inputs and outputs to be implemented by the intelligent local controller. This monitoring and control shall be available both from the central system and from notebook computers connected directly to controllers. It shall be possible for an operator to turn any input on or off while being monitored from a workstation or portable computer, either remotely (e.g. from the TMC or signal shop) or by direct connection between computer and controller.

1.20.7 REMOTELY-REQUESTED DOWNLOAD OF LOCAL DATABASE

The maintenance technician shall have the ability, from the local controller, to affect a download of the local controller database from the central database without the need for an operator to be present at the TMC.

1.20.8 TIMING PLAN COMPLIANCE MONITORING

The system software must be able to be commanded from the event scheduler to monitor the real-time phase status of a traffic signal controller unit to ensure that its operation is within proper constraints of the timing plan that is in effect. The software shall use the central database timing parameters to check against the phase returns.

Through compliance monitoring, the error conditions, which shall be detected, include the following:

- The controller is not using the proper timing plan;
- The controller time clock is out of synchronization;
- The controller is not sequencing;
- The phase sequence is improper; and
- Phase time compliance.

The software shall automatically inhibit monitoring if real-time feedback is not being received from the controller. Pre-emption occurrences shall not be interpreted as an error condition.

1.21 CONTROL MODES

The traffic signal control software shall operate in a distributed mode, fully making use of the intelligence in the local intersection controllers. The intelligent local controllers shall be programmed with timing plans, time-of-day/day-of-week (TOD/DOW) schedules, and all other parameters required to operate the local intersection. All intersection controllers shall be monitored on a real-time basis by the software. Upon system startup, the system software shall establish communications with all intersection controllers and begin real-time monitoring. The software shall start to process both incoming data and operator requests. Any upload, download, or time/date requests shall take precedence over real-time monitoring. The central software shall be designed for unattended operation 24 hours per day, seven days a week, without requiring an operator to be logged into the system.

Upon system startup, the control mode shall always be local TOD/DOW. If the event scheduler is calling for traffic responsive mode at the time of system restart, the system shall transfer to traffic-responsive mode after an operator-selectable amount of time.

For commanding an intersection to a timing plan different than the TOD/DOW, either by manual override or through the traffic-responsive algorithm, the controller shall be commanded to the

appropriate plan. In the event that, while in software-commanded override, a controller does not receive a valid timing plan number from the central software within an operator-defined time frame, it shall revert back to its local TOD/DOW schedule. The central override shall be allowable on an intersection, section, or system-wide basis.

1.21.1 MANUAL CONTROL

The operator shall be able to manually override the plan that the system, section, or controller is operating. Manual selection of timing plans is of higher priority than all other modes of plan selection. The operator shall have two options for implementing manual override:

- set manual override and later release manual override via the GUI; or
- set manual override with a specified end time for termination.

When manual override is terminated, the controller shall revert to one of the other modes of operation based on its normally scheduled operation.

1.21.2 TIME-OF-DAY/DAY-OF-WEEK CONTROL

TOD/DOW mode shall be used for controlling traffic conditions that occur regularly. In this mode, each controller shall automatically select and implement traffic signal timing plans in accordance with the defined schedule, locally stored, on a TOD/DOW basis. TOD/DOW plans shall be downloadable from the central software to the controller in the field. The number of timing plans available in the central software shall be a minimum of twenty-seven (27).

In order to download a timing plan to a controller, the operator shall select the plan from the central database and the controller memory slot where the plan will reside. The user interface shall allow the operator to choose timing plans for all available memory slots at once. This shall enable the operator to initiate one download per controller to download all timing plans and time-of-day events.

1.21.3 TRAFFIC-RESPONSIVE CONTROL

In the traffic-responsive mode of operation, the central system shall select the timing plan that is best suited to the existing traffic conditions as measured by the system detectors and analyzed by the central system’s traffic-responsive process. Volumes and occupancies of system detectors assigned to inbound, outbound, and side street traffic are scaled and monitored by the algorithm. Volume thresholds are set for three bands (three sets of plans), and three traffic flow compensation thresholds are set for each band. The algorithm implements plans one through nine according to the current band and compensation. Inbound, outbound, and side street occupancy thresholds are also set. The algorithm implements plans ten through seventeen when monitored occupancies exceed the set thresholds.

Once the traffic-responsive process has selected the appropriate timing plan, the plan number shall be commanded to the intersections on a continuous basis until the traffic-responsive process recognizes, based on sufficient change in traffic conditions, the need to command a different timing plan. All of the algorithms' plan changes are to be logged and accessed by the workstation for review at a later time.

Should communications be lost to one or more intersections in a section operating in Traffic-Responsive mode, for an operator-defined time frame, the whole section will drop back to its local TOD/DOW schedule.

1.21.4 FREE OPERATION/REMOTE FLASH MODE

In the free mode (when not operating according to a schedule), controllers shall run without coordination. To initiate Manual on Uniform Traffic Control Devices (MUTCD) flashing operation, the controller shall be commanded to flash from the central system.

1.22 EVENT SCHEDULER

1.22.1 GENERAL

The event scheduler dialog shall allow the user to configure the server's internal scheduler to perform specific actions based on time and date. Events must be scheduled to occur on any combination of the day of the week, a particular date, or whether the day is a (user-definable) holiday. The start time and stop time shall be able to be specified. The target of the operation shall be the complete traffic control network, a particular communications channel, a control group, a specific Device, or an internal operation such as a system backup or time synchronization.

The Server shall support up to one thousand (1,000) programmable time of year (TOY) events and up to one thousand (1,000) programmable time of day/day of week (TOD/DOW) events. Each event can be configured to implement a plan or execute a function.
The external device-oriented operations shall include:

1. Run a specific local controller coordination plan;
2. Enable the local controller to run in "free" mode;
3. Enable/disable responsive operation;
4. Override the current responsive plan;
5. Make a local controller active or inactive;
6. Place local controller in "flash" mode;
7. Place local controller in "off-line" mode;
8. Generate an alarm report;
9. Clear a specific log;
10. Broadcast real-time to a group of Devices or all Devices.

All external events shall support an individual Device, a specific control group, or the entire system.

The available internally oriented operations shall include:

1. Turn paging on or off;
2. Synchronize the workstation and Device real-time clocks;
3. Fetch the failure log from the Server.
4. Automatically log out an inactive user.
5. Perform a database backup on the Server.
6. Check to see if the system is running on uninterruptible power supply (UPS); and
7. Close all the currently open database files and update the disk archive.

The user shall also be able to edit the holiday list and generate an event report from this dialog box.

1.22.2 TEMPORARY AND PERMANENT COMMANDS

Commands entered into the event scheduler shall be of two types, permanent and temporary. Permanent commands shall be performed every time the matching of time parameters occurs. Temporary commands shall be performed once and then be deleted from the scheduler database. The operator shall be able to enter the following permanent and temporary command times as a minimum.

Permanent commands:
- Every day basis (i.e., every day of the year);
- Every week basis (i.e., on a given day or days of every week);
- Every time span basis (i.e., every hour);
- Every weekday (i.e., given weekday from Monday through Friday); and
- Every weekend (i.e., given weekend day such as Saturday or Sunday).

Temporary commands:
- Specific date basis (e.g. December 25, 2002);
- Specific time basis (e.g. at 2:00 PM or 1400 hours); and
- Specific date/time basis (e.g. on 4/15/98 at 11:00 AM).

Events must be programmed with a start time, stop time and event action. They shall also be programmable to be reoccurring (occurring every hour/day/year) or single shot (occurring only once unless reprogrammed).

1.23 GRAPHICAL USER INTERFACE

1.23.1 OVERVIEW

The system's graphical user interface (GUI) software shall provide the operator with a graphical operating environment of the type commonly found on today's desktop computers. The GUI

shall be easy to use while providing a fast and efficient way to control and monitor the signal system in real time. The GUI shall allow the operator to intuitively select objects on the screen by point-and-click manipulation with the mouse, thereby minimizing typing and the need to memorize lengthy commands. The GUI shall incorporate the following:

- Pop-up multiple display objects and windows;
- Menu icons and controls;
- Dialog boxes;
- Push button and other active commands;
- Visual and audio alarms; and
- Use of object characteristics such as colors, highlighting, and flashing to alert operators of status changes.

Any workstation shall be able to display the status of the signals at an intersection or multiple intersections using a graphical display that shows the approximate layout of the intersection with colored signal heads. The workstation shall also provide a zone (group of related intersections) display, where a number of Devices can be observed (in real-time) in relation to each other.

All controller functions shall be accessible and editable by means of menus. All menu items shall be labeled in plain English. Likewise, all elements in data tables and displays shall also be clearly labeled in English according to function, phase, timing plan number, etc.

It shall also be possible to select an intersection from a list. It shall be possible to display the list of all intersections in the order of their identification number, or display the intersection list organized by communication channel. These lists shall be printable, if desired.

1.23.4 PAN/ZOOM REQUIREMENTS

The dynamic mapping provided shall incorporate full pan/zoom capability. The operator shall be able to set up both dynamic and static informational layers that are displayed at different view scale levels. By setting up the view scale range and appropriately enabled/disabled layers, the operator shall be able to control which layers display at the different view scales. For example, at the citywide scale level the operator might enable roadway centerlines (static information) as well as a communication status indication (dynamic information) for each intersection controller across the city. When zooming in to a group of intersections (i.e. changing the view scale), the roadway centerlines would be disabled from view and the roadway curb lines would be enabled (become visible), with, perhaps, all phases of the intersections in the displayed group.

1.23.5 REFRESH RATES

All real-time dynamic data that is to be displayed on a graphic map shall be refreshed as frequently as the feedback data is being returned from the field equipment. If feedback data is not received from the field because of higher priority communication, a message shall be displayed to the operator.

All graphic displays shall be designed and developed in such a way as to ensure near instantaneous redraw of the graphic display. The draw time for the largest map (system-wide) shall not take longer than two (2) seconds. All other displays shall not take longer than one (1) second.

1.24 REPORTING AND LOGGING CAPABILITIES

1.24.1 GENERAL

A flexible report generator shall be included in the workstation. All reports shall have the capability to be directed to any combination of output devices such as the monitor, an ASCII text file, or the printer. Where applicable, the report shall apply to the entire traffic control network, or everything related to a server, a particular server channel, a control group, a local intersection, a detector count station, or a configuration table archive set.

1.24.2.TYPES OF REPORTS AVAILABLE

As a minimum, the following displays/reports shall be available. All information shall be in human-readable form. In other words there shall be no list of "trouble codes" to memorize. All intersections shall be identified by the names of the intersecting streets.

- System Status. This display is an overview of the present condition of all devices in the traffic system including intersection controllers, detectors, communication channels, and other categories of devices. The conditions shall include all possible status conditions (e.g. on-line, failed, etc.) and modes (e.g. TOD/DOW, On Flash, etc.) as described in this specification.

  At the discretion of the operator, it may be displayed as a list, or displayed as a map with colors or symbols used to indicate the status of each device. Regardless of how this data is displayed, it should update continuously without operator intervention.

- Real-time Monitor. This display/report will show the request and reply to and from a single intersection. It shall display the command being sent to an intersection along with the feedback data received back from the intersection. The display shall be continuous until timed out by upward limit. Upward limit shall be operator-changeable to any value between five and sixty minutes. The data shall be displayed in an easily understood format, and shall be updated once per second. The data displayed shall not be displayed in hex format.

- Communication Statistics. This display/report shows the communications throughput. The display shall include number of communication attempts, number of successes, number of failures, and percentage of successful communications per intersection, per channel, and per system.

- Intersection Operation. This display/report shows the detailed intersection operation in real-time mode. This display shall be available on an intersection basis only. When operating in this mode, polling shall occur at a minimum rate of once per second.

- Detailed Intersection Failure Status. This display/report displays the failure information for all failed intersections. This information shall include as a minimum: intersection location, reason for failure, and time of failure.

- Detailed Detector Failure Status. This display/report displays the failure information for all failed detectors. This information shall include as a minimum: detector location, reason for failure, and time of failure.

- Detailed Channel Failure Status. This display/report displays the failure information for all failed channels. This information shall include as a minimum: channel address, associated intersections, reason for failure, and time of failure.

- Emergency Preemption Monitor. This report should display the time, duration and direction for all preemption calls at intersections in the system. System shall also alert operator when the number of preemption calls at an intersection exceed an operator-selectable threshold per unit time.

1.24.3 REPORT OUTPUT REQUIREMENT

Reports and displays may be output to the central system operator station monitors or any network printer. Remote computers may also request reports and displays, whether LAN-connected or dial-in.

1.24.4 TRAFFIC SYSTEM LOG

The central software shall log, in order of occurrence, all traffic-related messages with date, time of day, and location. The log shall include:

- Operational events (including occurrences of local preemption);
- Traffic device failures/repairs;
- Communication failures/repairs;
- Traffic data transfer messages;
- Manual override changes; and
- Operator log-on and log-off.

Unless printing has been suppressed by the operator, log messages shall be automatically output to a designated printer. The operator shall be able to filter which messages are logged to the printer or shall be able to suppress all log output to a printer. An on-line file of all log messages shall also be maintained with all messages logged to the on-line file.

1.24.5 LOG OF CURRENT OPERATORS

The system software shall maintain a continuous record of the operators who are currently logged onto the system. The system shall add to this log any operator who logs onto the system and, upon log-off, shall delete the name of that operator from this log.

1.24.6 OPERATING SYSTEM LOG

The operating system log records all central system related events that occur in order of occurrence. As a minimum, it shall include the following:

- Internal system errors;
- System hardware failures;
- System network errors; and
- Software fatal errors.

Log messages shall be automatically output to a designated file or files.

1.24.7 INTERSECTION MEASURES OF EFFECTIVENESS

The system software shall collect and store data on intersection measures of efficiency (MOEs). Intersection feedback shall be stored on a per-phase basis. The intersection MOEs which are to be stored include, but are not to be limited to, the following:

- Percent of green time used versus split;
- Percent of detector calls (relative to a threshold value);
- Number of times the phase reaches maximum green or is forced off prior to gap-out; and
- Number of pedestrian calls.

The system software shall automatically record intersection data in its database, and periodically archive the data onto removable optical media. Up to four weeks of intersection data for each intersection shall be stored on the system database by the database program. If bad data or no data is received from the intersection, the data will be tagged as questionable or not available in the database.

In case of failure during a database write process, the database program shall not leave a partially written block. Any missing blocks are tagged as unavailable. The operator shall have the capability to enable or disable data collection on an individual intersection basis.

The time increment between writing of data to the optical disk drive and start time shall be operator-selectable with defaults of 24 hours and midnight, respectively. Data shall be automatically compressed when written to the removable optical media. When the removable optical media does not have enough storage space left for a full time interval of intersection data, the system shall notify the operator that a new storage disk is required.
Intersection data shall be retrievable from the removable optical media for use with the relational database and traffic modeling packages. Upon retrieval, the intersection data from the optical disk shall be automatically expanded from the compressed format.

1.24.8 UPLOAD REPORTS FROM AUXILIARY DEVICES

The detectors, and Opticom™ units used by the City may be connected to terminal emulation software (e.g. Procomm™) and a report displayed on the computer screen. The City desires that the central software provide the capability of uploading this data from the controller and

displaying it on work stations. Note that if the City chooses this option, contractor shall be responsible for providing all cables needed to connect the auxiliary devices with the proper ports on the traffic signal controller.

1.25 FAILURE MONITORING

Communications and controller hardware monitoring shall cause the system to fail individual components when operator-definable error thresholds are exceeded. Upon failure, the software shall log the event and also display a visual alarm to the operator. The system software shall continue to attempt communication with the failed component. If the failed component communicates successfully for an operator-specified amount of time, the component shall be considered operational. This event also shall be logged, along with the clearing of the alarm for the failed component. The operator shall be able to disable any component in the system through the user interface. When disabled the software shall not communicate with the component.

1.25.1 AUTOMATIC DETECTION OF SYSTEM MALFUNCTIONS

A traffic signal system's effectiveness is primarily a function of the timing plan that it ultimately imposes on the street. This effectiveness is increased when adequate provision is made for the early detection and efficient diagnosis of component malfunctions. The System shall maintain an extensive list of alarms that shall be logged at the System PC and to other Device assigned by the operator including pagers or telephone.

1.25.2 SYSTEM FAILURE AND RECOVERY

The beginning and ending of the following system failures shall initiate paging of the appropriate personnel in addition to other reporting requirements detailed below.

- Power Failure Each lifeline and non-essential component of the master system and central communications apparatus is to be configured with automatic shutdown software which shall, upon switch-over to UPS, initially allow for up to one minute of blackout before non-essential components begin an automatic shutdown procedure. When power is restored, the system returns to duty.

- Non-fatal Failure If the software detects a non-fatal error within one or more of its processes, it shall alert the operator via an alarm and logs a message to the system log. The system shall continue to operate in a degraded state. The operator has final determination on what is considered a non-fatal failure.

- Fatal Failure If the system detects a fatal error within one or more of its processes, it shall alert the operator via an alarm and log a message to the system log. The system shall then attempt an orderly shutdown of the system.

1.26 DETECTOR SOFTWARE

1.26.1 GENERAL

The central software must be capable of using both system and local detectors for traffic counting, traffic-responsive operation, and computation of measures of effectiveness (MOEs). The software has to be capable of handling the maximum number of 64 detectors allowable per controller.

The system shall process and maintain detector count data and occupancy data on a continuous basis to be used for various traffic control strategies, reporting tasks, and other functions. Detector feedback shall be obtained in an operator-selectable time frame in five-minute increments.

1.26.2 DETECTOR DATA COLLECTION AND RETRIEVAL

The software shall automatically record detector data in a database, and periodically archive the data onto removable optical media. Raw detector data is to be stored in memory on a five-minute basis. Up to four weeks of five-minute detector data for each intersection must be able to be stored in the database. If bad data or no data is received from the detector loops during any or all of the five-minute time frames, the data shall be tagged as questionable or not available in the database. An operator-definable filter shall be used to set the thresholds regarding the usability of data.

Each five-minute block shall be date/time tagged. In case of failure during a database write process, the database program shall not leave a partially-written five-minute block. Any missing five-minute blocks shall be tagged as unavailable for that five-minute period. The operator shall have the ability to enable or disable the detector data collection function.

Every twenty-four hours, the five-minute detector data shall be automatically compressed and written onto removable optical media. Each 24-hour history block shall be date/time tagged. The data storage feature shall have the ability to append 24-hour detector data to the removable optical media, enabling full usage of the media. When the removable optical media does not have enough storage space left for a full 24-hour block, the system shall notify the operator that a new storage disk is required.

Detector data shall be retrievable from the removable optical media for use with the relational database or traffic modeling packages. Upon retrieval, the detector data shall be automatically expanded from the compressed format.

1.26.3 DETECTOR MONITORING

The detector feedback from the field shall be continuously monitored for proper operation. Detectors shall be classified as acceptable, marginal, disabled, and failed. Detector failures shall be reported to the system log and operator alarm.

The software shall have operator-selectable filters that define the thresholds that a detector must exceed to be considered failed. The filter values shall be selectable on a TOD basis. As a minimum, the following four failure types shall be diagnosed:

- Maximum Presence: if an active detector exhibits continuous detection for a program entered period (0-255 minutes in one minute increments);
- No Activity: if an active detector does not exhibit an actuation during a program period (0-255 minutes in one minute increments);
- Erratic Output: if an active detector exhibits excessive actuation (program entered maximum counts per minute 0-255 in increments of one); and
- Failed Communication: failed detectors shall not be available for traffic control strategies.

1.26.4 SYSTEM-WIDE DISPLAY

The Detector Module software shall be capable of displaying system detector (or link) icons at the area wide level. When the zoom level allows for the display of system detectors, the data shall be displayed instead of the corresponding link data. The operator shall be able to select the time interval to display the detector data. These data shall be displayable in either raw or smoothed form (operator-selectable). Reports and displays shall include:

Graphical representation of detector data including:

a. Counts/Speed/Occupancies over time;
b. Total counts;
c. Counts by time division (5, 10, 15, etc. minute intervals); and
d. Real-time acquisition.

Detector MOE Reports

a. Present volume versus historical volume;
b. Present occupancy versus historical occupancy;
c. Present speed versus historical speed; and
d. Present delay versus historical delay.

Printed reports by:

a. Count summaries;
b. Through and left turning movement counts;
c. Historical counts; and
d. Counts by lane, location, direction, placement, count station, etc.

1.27 MONITORING OF CONTROLLER ACCESS

Because field technicians have access to the intersection controllers, there is the opportunity for the local controller database to be changed without such change being commanded from the TMC. If the local intersection controller has the ability to report four (4) feedback bits (door open, portable computers connected, front panel accessed, and power out), the central system software shall automatically respond as follows:

- Door Open - Log that the door is open and when the door returns to a closed position.
- Door Open and either the portable computer is connected or the front panel is accessed - The system software shall log the event. After door closed signal is received, the software shall upload and compare the local controller's database with the central database, which shall be considered to be the master database. Any changes shall be uploaded, logged, and stored in the database.
- Power Out - Upon restoration of power, log that a power outage occurred and the time at which power was restored.

1.28 GENERATION AND DISPLAY OF TIME-SPACE DIAGRAMS

The system software shall enable the operator to generate time-space diagrams based on the timing stored in the central database and to display such time-space diagrams on-screen. The operator shall then be able to perform on-screen fine-tuning, using click and drag methods to adjust the offsets, with the resulting changes in the widths of the progression bands being displayed. The operator shall then be able to save to the database the resulting changes in offsets for that timing plan.

1.29 CITIZEN REQUESTS AND COMPLAINT TRACKING

Software for tracking of citizen requests and complaints should be included. The software package includes:

- On-line logging of citizen calls;
- Assignment and routing of requests/complaints to the appropriate Departments and individuals;
- Printing of work orders; and
- A full range of management reports.

1.30 Deleted

1.31 COMMUNICATIONS ANALYSIS MODULE

To more fully test the integrity of the data being sent from the central system, the analysis module should also be capable of displaying at least one type of data object table sent to it by the central system.

This object should be the contents of the phase table object, and all data elements contained therein, for all phases supported by the local and central software. Once downloaded, the module should display the data in the same format as the central software, in order to readily determine its accuracy and integrity.

1.32 ADDITIONAL OPTIONAL FEATURES

The central software module shall be an object-oriented knowledge based system operating with an intelligent graphical user interface. The module shall also include a management system with an intelligent knowledge base for decision making. The module shall be capable of integrating a variety of ITS features into a comprehensive unified system. In addition to central software and the specified auxiliary features, the central software module must be able to integrate:

- Variable Message Sign Control
- Pan-Tilt-Zoom (PTZ) and Fixed Closed Circuit Television (CCTV) video feeds and control
- Motorist Information Systems

2.0 INTERSECTION CONTROL SOFTWARE

2.1 REQUIRED DATA ELEMENTS AND DISPLAY FORMATS

All controller functions shall be accessible and editable by means of menus. All menu items shall be labeled in plain English. Likewise, all elements in data tables and displays shall be clearly labeled in English according to function, phase, timing plan number, etc. Hexadecimal numbers are not permitted in any display.

Where dynamic displays are used to indicate the duration or status of a controller phase, function or output (e.g. minimum green, maximum green, yellow, all red, local cycle counter, master cycle counter, etc.), they shall count upward, starting at zero. Cycle counters shall count up to a value equal to the length of the current cycle minus one, then return to zero and begin counting up again. Gap timers shall count downward, starting at the programmed or, when gap reduction is used, calculated gap time. Where NTCIP 1202 specifies that a parameter shall be programmable in increments of 0.1 seconds, then the controller display shall likewise display it in increments of 0.1 seconds. Otherwise, data shall be displayed in increments of one second.

Where phase status is displayed, the software must indicate in plain English (in other words, there shall be no codes to memorize) the interval that each active phase is in (e.g. minimum green, yellow, all red, etc.). This display must explicitly indicate whether maximum green one or maximum green two is in effect. If the software has more than one phase table, the active table must be indicated. As each phase is terminated, this display must show the reason for termination (e.g. gap termination, maximum green termination, or force-off by the coordinator).

Upon start up, software shall automatically go into time-of-day/day-of-week mode, and shall operate using the current timing plan called for in the time-of-day schedule. No intervention shall be required to get it to operate according to the schedule. If at any time the clock is updated, whether through the keyboard or by means of the central software or portable computer, and the new time corresponds to a different timing plan, the controller shall begin to operate the new timing plan automatically.

2.4 DEFAULT RING AND BARRIER CONFIGURATION

As in many cities, the vast majority of traffic signals in the City of San Antonio govern intersections with three or four approaches. Accordingly, the most common configuration in San

Antonio is the standard NEMA eight-phase, dual-ring configuration with even numbers assigned to through movements and odd numbers assigned to left-turn movements. Where one or more of the available phases is not needed, the unneeded phase(s) are not enabled.

To that end the City requires that any intersection control software supplied in response to this CSP default to the standard NEMA eight-phase dual-ring configuration as mentioned above. Approximately ten percent of the City's traffic signals are at diamond interchanges or intersections where one of the streets has a median wide enough to hold a number of vehicles (and therefore being geometrically equivalent to a diamond interchange).

The City of San Antonio has specified that the intersection control software have a minimum of sixteen phases. The City anticipates that the extra phases will be used for non-standard geometric configurations such as diamond intersections. Because the standard dual-ring configuration does not specify a default configuration for phases nine through sixteen, we will do so here.

The phases shown in concurrency groups one and two correspond to the standard NEMA dual-ring configuration. The phases shown in concurrency groups three and four contain phases nine through sixteen. The default programming shall have phases nine through sixteen in the disabled state (i.e. bit 0 in the phaseOptions object[1] for phases nine to sixteen shall default to 0). No phases shall be assigned to rings three and four in the default programming.

Exhibit 2.2 of Exhibit A, Section 2, lists the *minimum* requirements for this project and that some prospective contractors may propose more than sixteen phases. In the event that more than sixteen phases are proposed, phases numbered higher than sixteen shall by disabled as described for phases nine through sixteen above.

2.5 COORDINATED TIMING PLAN DIAGNOSTICS AND OFFSET REFERENCES

Local intersection control software should include safeguards to preclude dangerous or undesirable intersection operation. These safeguards shall, as a minimum, include range checking and coordinated timing plan diagnostics for each pattern/split combination.

If included, timing plan diagnostics shall check for the following:

- Split times which violate minimum phase lengths (minimum green + yellow + all red);
- Split times which violate pedestrian times (walk + flashing don't walk + yellow + all red);
- Split times which do not add up to cycle length; and
- Split times which cause barriers to not be aligned.

The diagnostics shall check for split time violations which occur during short-way correction mode as well as those which occur during the programmed cycle length for a given coordination

[1] NTCIP 1202, Sec. 2.2.2.21

pattern. Checking for splits which violate pedestrian times shall not prevent the use of vehicular splits which are less than the pedestrian times, as explained in section 5.6.5.

When errors occur, the results shall be displayed clearly and concisely with information sufficient for timely correction by the operator. If there are no errors, the controller shall service all serviceable phases and pedestrian movements with calls during every cycle. This shall occur regardless of whether or not the controller is in transition from one offset to another. The controller shall service every serviceable phase even while in transition from one phase sequence to another, and while leaving pre-emption.

With regard to offset references, it is a requirement of the City of San Antonio specifications that the offset be referenced (or be capable of being referenced) to the end of the green of the coordinated phase(s).

2.6 SPECIAL FUNCTIONAL REQUIREMENTS

The City of San Antonio uses a number of traffic signal operation techniques to optimize efficiency of traffic flow while promoting and maintaining safety. The City wishes to verify that the selected local intersection control software will be capable of providing the means to continue to use these techniques in the future. The only certain way to determine the ability of each prospective contractors' software to meet these needs is to require them to ascertain beforehand how their software will perform these operations and document this information in the proposal. **The techniques described herein should meet these functional requirements without interfering with more prosaic signal operation practices, such as night flash.**

A secondary purpose for requesting these special operational requirements is to give each prospective contractor to this project an opportunity to display how willing they are to provide customer assistance and support.

We are not necessarily asking for a copy of the prospective contractor's operating manual. We are simply asking that the applicant provide enough information so that one who is familiar with the fundamentals of the software may be able to program it to perform these special operations. At a minimum, the applicant must provide illustrations of the pertinent controller screens, and clear and concise explanation of how a given technique works. The responses to this section must be in paper form. References to internet web pages are allowed.

Each of these special operations is described in the following sections. There is a brief explanation of what each technique is designed to accomplish, which may be followed by an interval-by-interval explanation of the desired sequence of events.

2.6.1 PROTECTED-PERMITTED LEFT-TURN MOVEMENTS WITH LEAD-LAG PHASE SEQUENCING

This operation is also referred to by some agencies as “Arlington display” or “Arlington permissive lead-lag”. Modern traffic signal timing optimization applications, such as Synchro™, Passer II and Passer IV, allow traffic engineers to evaluate different phase sequence options in order to maximize the progressive flow of vehicles through a series of traffic signals. The City of San Antonio uses this technique at a number of locations.

It is desirable to use this technique with protected-permitted left-turn displays and to do so without creating the so-called “yellow trap” condition. This is accomplished by providing a five-section head specifically for each affected left-turn movement. The circular indications in these five-section heads are driven by overlaps, and the circular green and yellow indications are louvered to prevent motorists in adjacent through lanes from observing them. During the lagging left-turn movement, the circular indication in the left-turn head governing the leading left turn remains green. Motorists in this lane are therefore not given the false impression that the opposing through movement is terminating, thus avoiding the “yellow trap”.

The sequence is illustrated in exhibits B1 through B3, as explained below.

1. During the leading left-turn movement, the lagging left turn and the lagging through both have red indications.
2. The leading left turn turns yellow, the lagging left-turn and through movements still have red indications.
3. After the leading left turn terminates, both through movements receive green indications, and both left-turn movements have circular green indications.
4. The leading though movement turns yellow as it terminates, *but the left-turn head for the leading left turn retains the circular green.*
5. During the lagging left turn green, the leading left turn head continues to display a circular green.
6. The lagging left-turn arrow, the lagging through, and the circular indication for the leading left-turn head all turn yellow at the same time.

Phase Sequence	Φ 1	Φ 5	Φ 3	Φ 7
1	Lead	Lead	Lead	Lead
2	Lead	Lag	Lead	Lead
3	Lag	Lead	Lead	Lead
4	Lag	Lag	Lead	Lead
5	Lead	Lead	Lead	Lag
6	Lead	Lag	Lead	Lag
7	Lag	Lead	Lead	Lag
8	Lag	Lag	Lead	Lag
9	Lead	Lead	Lag	Lead
10	Lead	Lag	Lag	Lead
11	Lag	Lead	Lag	Lead
12	Lag	Lag	Lag	Lead
13	Lead	Lead	Lag	Lag
14	Lead	Lag	Lag	Lag
15	Lag	Lead	Lag	Lag
16	Lag	Lag	Lag	Lag

Table 1. The technique used to achieve protected-permitted lead-lag operation must work with all of the phase sequences shown above.

At this time the controller crosses the barrier to serve the remainder of the phases. Note that the numbers in the diagrams are given for illustrative purposes only; either phase 1 or phase 5 may lead. The phase sequence may also change when the time-of-day schedule activates a different sequence. Furthermore, the lead-lag operation may not be confined to one side of the barrier. It may be desirable to operate phases 3, 4, 7 and 8 in this fashion instead of, or in addition to, phases 1, 2, 5 and 6.

The key points are that the lagging left turn movement must receive a circular red during the leading left turn, both left turns must be permitted (have circular greens) during the dual-through phase, and the circular indication in both left-turn heads must remain green during the lagging left turn arrow, while a circular red is displayed to the leading through movement. Note that darkening the overlaps during any part of the signal cycle is *not* permitted.

Another possible phase sequence would be for both left-turn movements to lag, with one left turn beginning prior to the other. Both left turns must terminate at the same time in order to cross the barrier. Since one through movement will turn yellow before the other, there will be an interval during which one left turn will be green while the other is not. During this interval (and the through phase yellow), the circular indications in both left-turn heads shall continue to display greens, in order to prevent the yellow trap condition.

Each proposal shall show how the respective intersection control software will accomplish these objectives. The proposal shall consider a hypothetical intersection between two arterial streets.

At this intersection, all eight phases are assigned as shown in exhibits on the previous pages. Circular indications in the left-turn heads are assigned to overlaps.

All left-turn movements are protected and permitted. The intersection runs sixteen different timing plans during the course of a week, each with a different phase sequence. Once programmed, the controller must be able to run all sixteen sequences according to the key points above without modification of any hardware, software, or programming. The phase sequences are as shown in Table 1.

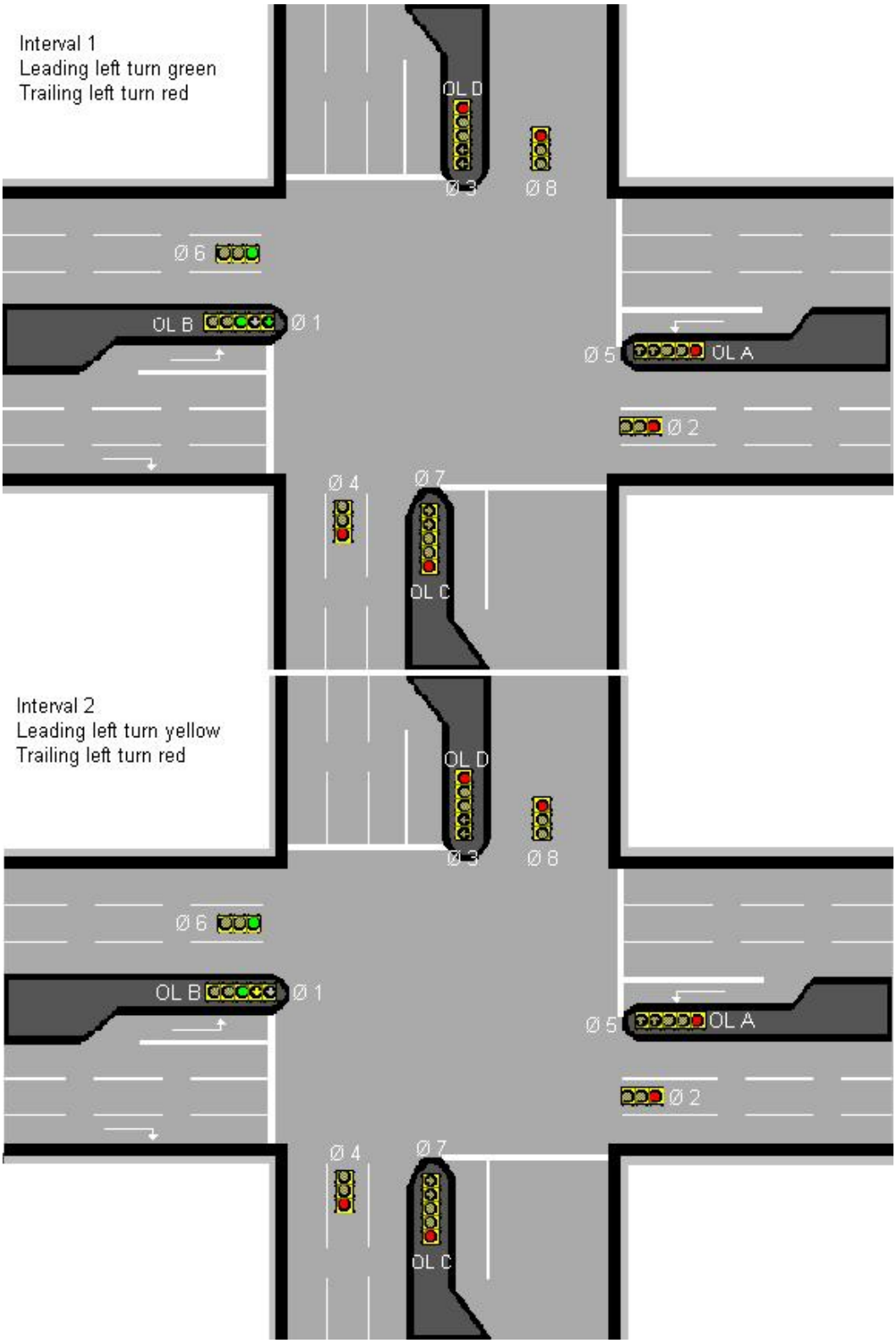


Exhibit B1: Protected-permitted lead-lag left turn operation.

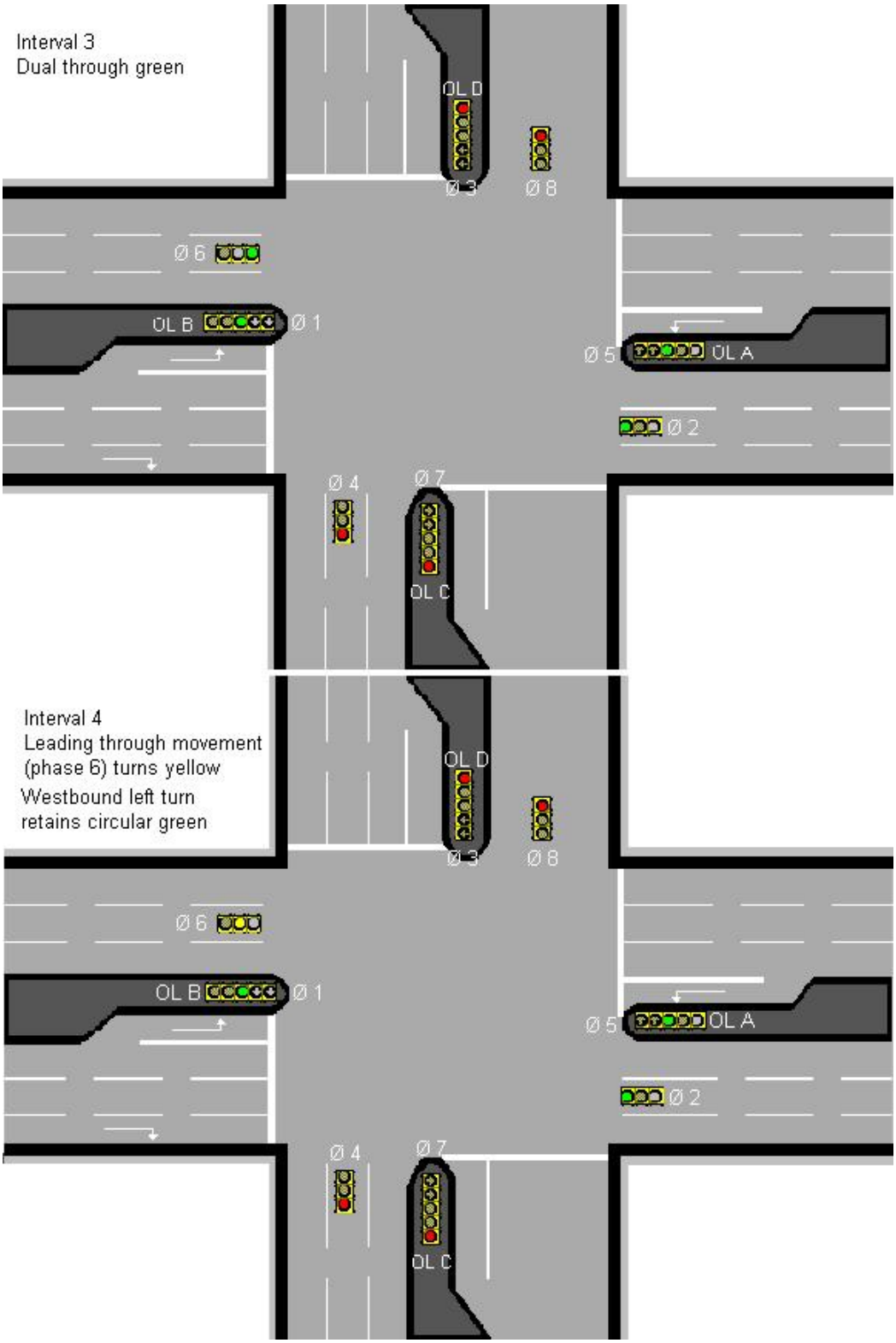


Exhibit B2: Protected-permitted lead-lag left turn operation (continued).

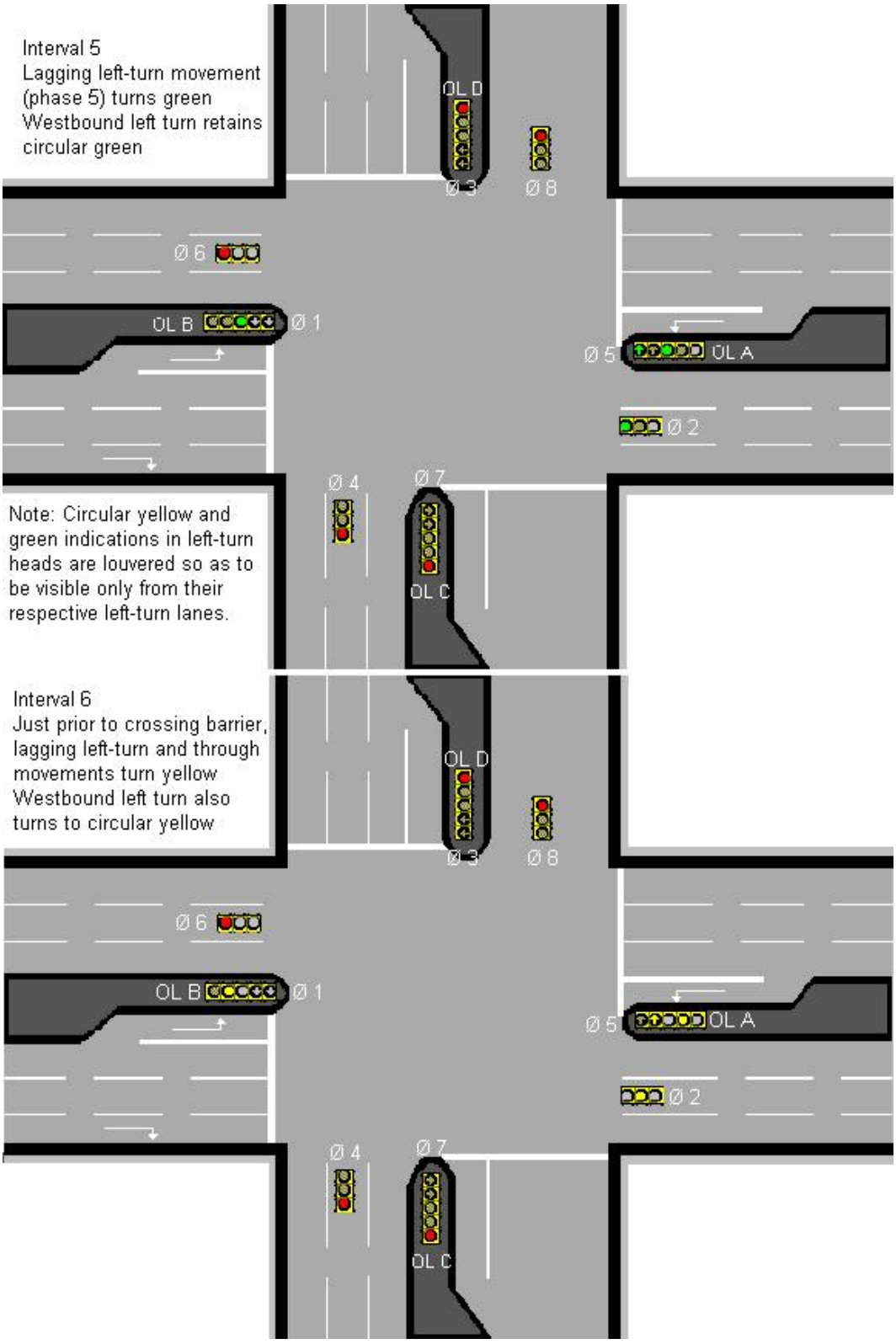


Exhibit B3: Protected-permitted lead-lag left turn operation (continued).

Applicants must submit documentation showing all programming required in their local intersection software needed to accomplish this. Documentation must include, at a minimum, included-phase overlap programming and modifier phases, if any. It must also show how the pattern and splits are programmed to implement the above phase sequences. Documentation shall include illustrations of every controller table pertinent to achieving this operation. It must also explain plain English how this technique works.

2.6.2 TWICE-PER-CYCLE LEFT TURNS

At some intersections left-turn movements may from time to time experience volumes large enough to cause queues to spill out into the adjacent through lanes. One technique the City uses to combat this challenge is twice-per-cycle left turns. By bringing up the left turn twice during the cycle, spillback into the adjacent through lanes is minimized.

The diagrams in exhibits B4 through B7 detail a possible implementation of twice per cycle left movements, as explained below.

1. During the first interval both left turn arrows are green at the same time.

2. During interval two, the left turn arrows terminate. If demand is heavier for one left turn than the other, one left turn may end before the other.

3. During interval 3 both eastbound and westbound left turn heads display circular green.

4. During interval 4, the eastbound movement terminates while the westbound remains green. Eastbound left turn retains a circular green indication in order to avoid the yellow trap.

5. In interval 5, the eastbound signal turns red, and the second left turn service for the westbound direction begins.

6. Eastbound left turn and westbound through go to circular yellow. Westbound left turn goes to yellow arrow.

At this time the controller crosses the barrier to serve the remainder of the phases. Note that the numbers in the diagrams are given for illustrative purposes only; either phase 1 or phase 5 may receive the second service. The twice per cycle left-turn operation may be in effect during certain parts of the day, while conventional once-per-cycle phasing may occur at others. Furthermore, the twice-per-cycle operation may not be confined to one side of the barrier; it may be desirable to operate phases 3, 4, 7 and 8 in this fashion as well.

Note that this technique is quite different from a conditional service. The second service of the left turn arrow is required whenever there is still demand for that left-turn movement at the point in the cycle at which its opposing through movement terminates.

Although the accompanying exhibits show a specific phase and overlap configuration, the left turn arrows need not necessarily be assigned directly to the left-turn phases. If required by the proposed technique, the left turn movements may be assigned to overlaps, provided that enough overlaps remain available in the intersection control software to drive the circular indications in the left-turn heads, and the number of load switches (channels) needed to operate the vehicular indications does not exceed twelve.

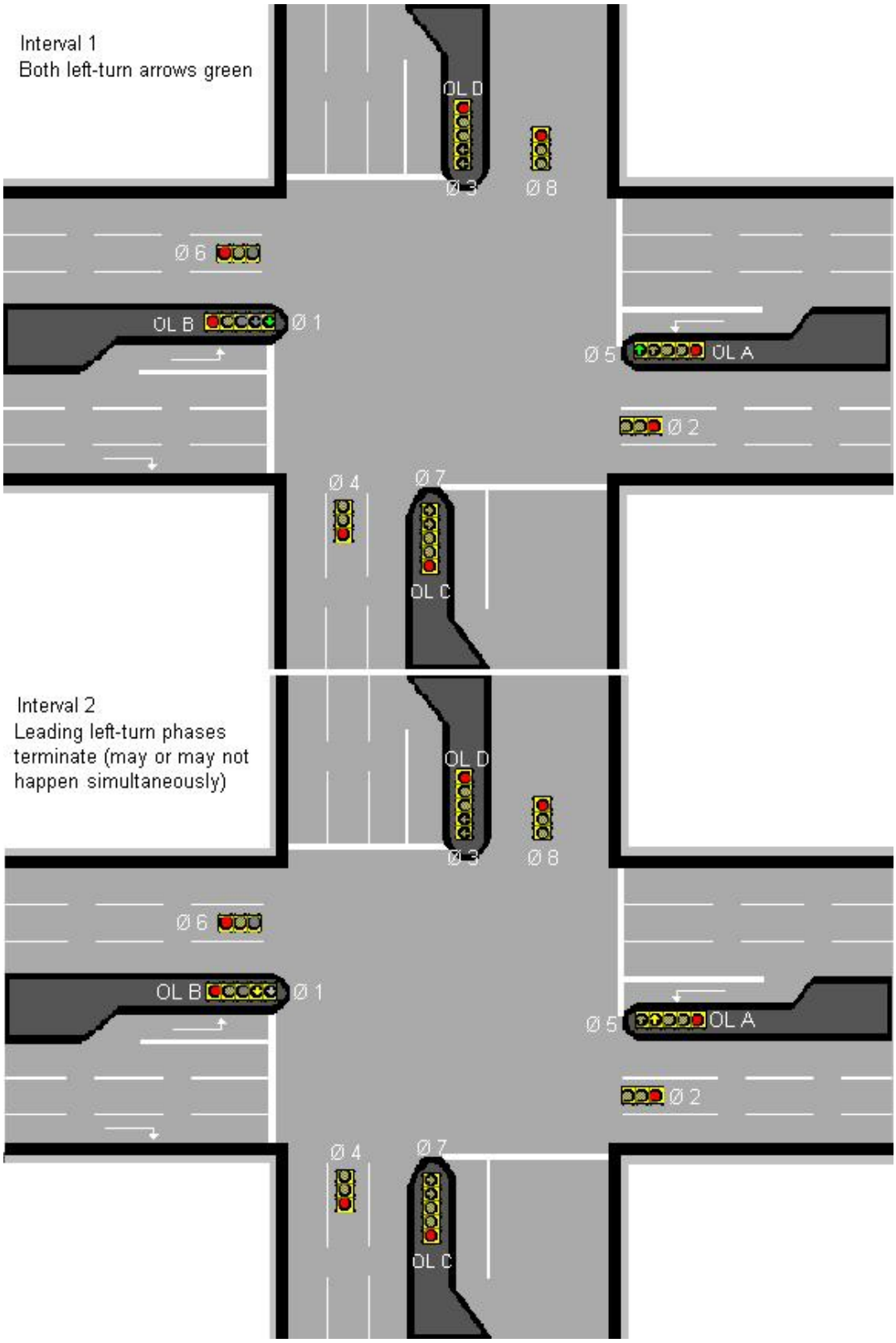


Exhibit B4: Twice per cycle left turn operation.

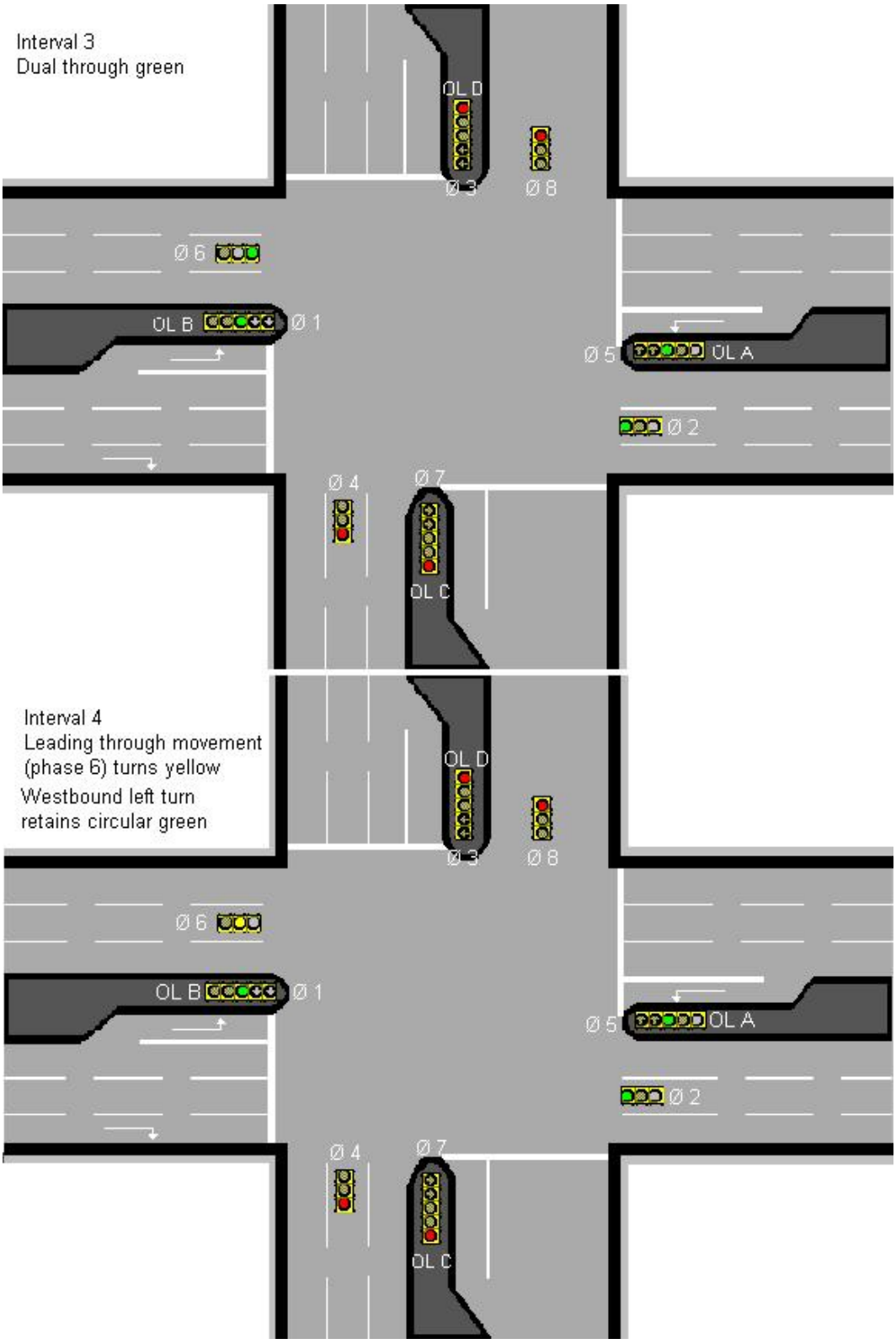


Exhibit B5: Twice per cycle left turn operation (continued)

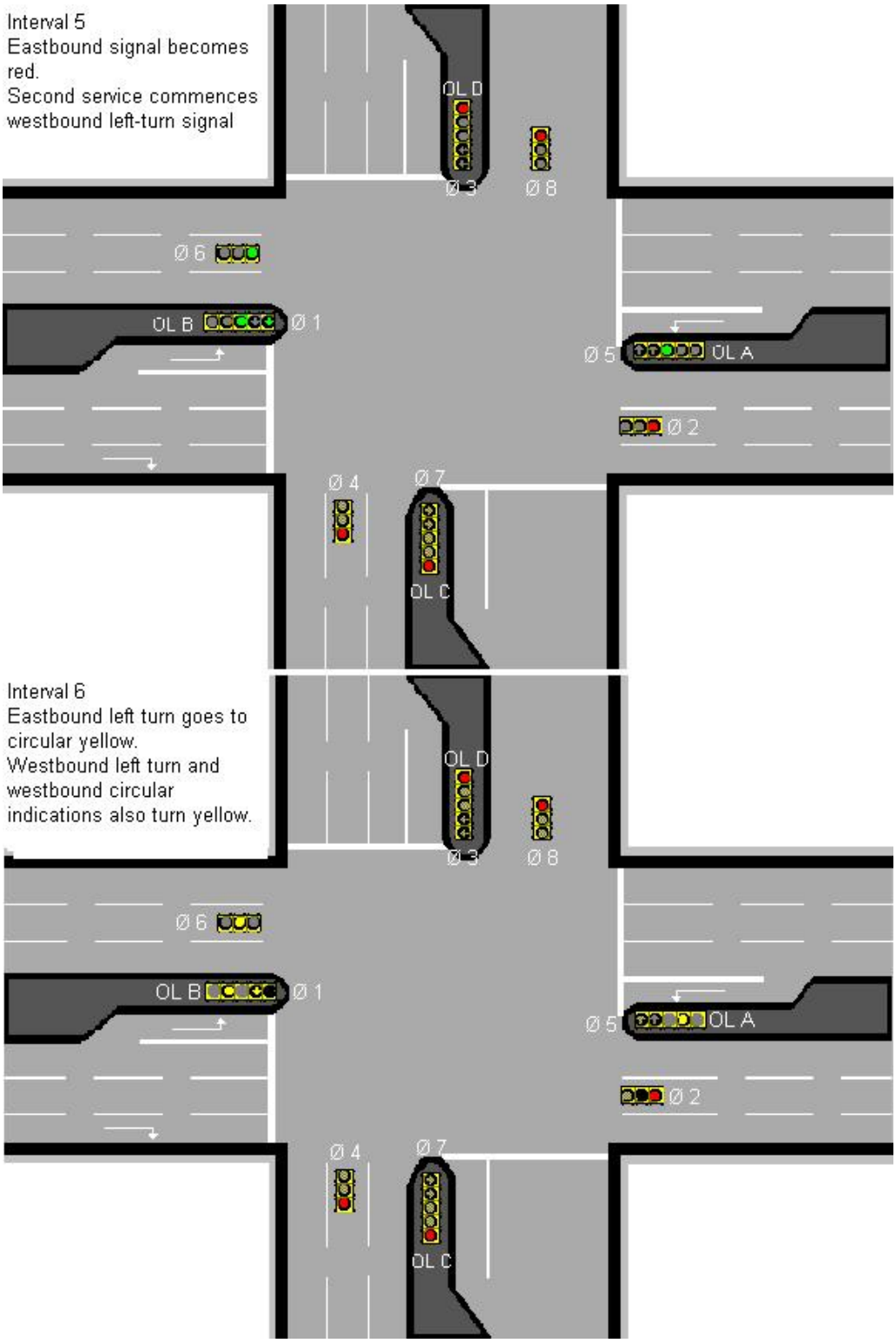


Exhibit B6: Twice per cycle left turn operation (continued).

Applicants must submit documentation showing all programming required in their local intersection software to accomplish twice-per-cycle left-turn operation. Applicants must also demonstrate that the proposed technique permits conventional once-per-cycle operation when

desired. Applicant must also ensure that the proposed technique permits the left-turn arrows to time independently. In other words, during the dual left-turn phase, one left turn arrow may terminate before the other, if desired. Documentation must include, at a minimum, overlap parent phase programming and modifier phases, if any. Documentation shall include pictures or screen shots of every controller table pertinent to achieving this operation. It must also explain in plain English how this technique works.

2.6.3 UNEVEN DOUBLE CYCLING AT INTERSECTIONS WITH MINOR STREETS

Consider a hypothetical intersection between a regional arterial roadway and a residential side street. The intersection is controlled by a signal with left-turn phases on the major roadway but not on the side street. On the side street left turns are permitted but not protected. During the afternoon peak period, this intersection is part of a coordinated network of traffic signals operating at a cycle length of 160 seconds.

Local residents complain that the side-street delays are excessive and demand that they be reduced. Field observations reveal that the signal's offset has been selected to provide two-way progressive flow, and that the volume in the northbound direction is approximately three times the volume in the southbound direction. The observations show that there is a significant gap between the passage of the northbound and southbound platoons. This gap is long enough to give a quick service to the side street, sufficient to clear the accumulated queue without interrupting progression. Staff members note that the green time needed by the southbound platoon is much shorter than the green time needed by the northbound platoon. In fact, an analysis shows that if they could give 85 seconds to the arterial street, 15 seconds to the side street, then go back to the arterial street for 45 seconds, and then return to the side street for another 15 second service, that they could reduce side-street delay while maintaining progression and staying within the 160-second cycle length.

Proposals for this project should show how this objective could be achieved with the contractor's intersection control software. It may be necessary to use more than eight phases, and to assign most or all of the load-switch channels to overlaps. Show detector assignments, phase assignments, ring configurations, concurrency groups, overlap included phases, coordination parameters and any other pertinent parameters. Please note that after a pedestrian call is placed, the pedestrian movement shall be served during the next side-street green. If the side-street green is assigned to an overlap, the pedestrian movement should be serviced regardless of which included phase is active. This shall occur regardless of whether or not there is a vehicular call on the side street.

2.6.4 DIAMOND INTERCHANGE OPERATION

Because the traffic signals are so closely spaced, operation at diamond interchanges mandates that the signals operate in flawless concert with one another. Intersections where one of the arterials has an unusually wide median can create situations that are schematically equivalent to diamond interchanges, and signals at these locations must also work in close concert with one

another. In the City of San Antonio, approximately one in ten traffic signals governs the operation of diamond interchanges or intersections with wide medians.

Because coordinated operation of traffic signals at diamond intersections is so critical, many agencies, including the City of San Antonio, operate both sides of the intersection with one controller. Doing so minimizes the possibility that the two signals will loose synchronization with one another, thus promoting both safety and efficiency.

A typical diamond interchange installation in the City of San Antonio uses overlaps to drive the on-street indications (see exhibit B7). The traffic signal heads facing each approach have a minimum of three sections, each with a circular red, yellow, and green. Each set of red, yellow and green indications is driven by its own load-switch channel and overlap. The sections containing left-turn arrows are also assigned to their own overlaps, each with a green and yellow arrow.
The controller operates using single ring, sequential phasing. (A quirk of the City's current intersection control software is that the phase sequence is 1,5,2,6,3,7,4,8 when operating in this mode. Applicants need not adhere to this phase sequence when developing their proposal.)

In most diamond interchanges in the City of San Antonio, detectors are located at the stop bar and also include set-back detectors.

A challenge presented by this scheme is its lack of flexibility. Note that the example in exhibit B7 presents an interchange programmed to operate in "four-phase" or "TTI phasing" mode. With the City's current software, once a traffic signal at a diamond interchange is wired for a particular phase sequence, it is not possible to change it. The City wishes to address this deficiency by acquiring software that has the flexibility to change phase sequences as desired.

Another challenge facing the City is providing efficient operation of the traffic signals when traffic volumes are very low, such as late night and early morning. At such times, there may be insufficient traffic volumes to require serving every approach during every cycle. It may be desirable to skip phases that do not have vehicle calls in order to avoid unnecessary delay.

One strategy to avoid unnecessary delay may be to program the controller to pass through a special clearance phase when it skips an uncalled approach. Consider the four-phase operation illustrated in exhibit B7 When traffic is moderate to heavy, calls are placed on all of the approaches and each approach is serviced one at a time in a clockwise fashion, as one might expect.

At times when traffic is light, there may not be enough demand to justify serving all approaches during every cycle. In a conventional eight-phase, four-leg intersection, the solution could be to simply skip the phases which lack calls in order to serve the phases with calls more quickly. At a diamond interchange, however, the situation is more complex.

It is our goal to avoid "trapping" vehicles between the service roads. For example, when a westbound vehicle has a green indication and crosses the northbound service road, it is desirable to get that vehicle through the intersection at the southbound service road without stopping.

As stated in the above example, let us assume that there is a westbound vehicle passing through the interchange. Suppose that there is no call for the northbound and eastbound directions, but that there is a call for the southbound direction. And suppose that we allow the controller to skip the northbound service road (phases 4 and 7 in exhibit B7) and the eastbound direction (phase 1). If the westbound vehicle passes through the intersection just as its signal (shown as overlap K in exhibit B7) turns yellow, the controller has already determined that it will next go to phase 5. Because overlap A is red during phase 5, it is likely that the westbound vehicle will receive a red at the southbound service road, thus "trapping" it between the service roads.

In order to avoid this situation with the current intersection control software, the City places minimum recalls on all phases at four-phase diamond interchanges. Accordingly, all approaches get at least a minimum service at any time of day or night, regardless of traffic demand. Although this technique is somewhat inefficient, it provides the only means by which trapping vehicles can be avoided at the time of this writing.

A more efficient operation could be achieved without trapping vehicles by programming the controller so it passes through an internal clearance stage when approaches are skipped. This concept is illustrated in exhibit B8. Note that the westbound direction is assigned to stage 1, the northbound service road to stages 2 and 3, the eastbound direction to stage 4, and the southbound service road to stages 5 and 6. Also note that there are now two paths between stage 1 and stage 5. One path passes through stages 2, 3 and 4. This is the path the controller would take when demand is moderate to high and all approaches are experiencing demand. This path does not pass through the internal clearance.

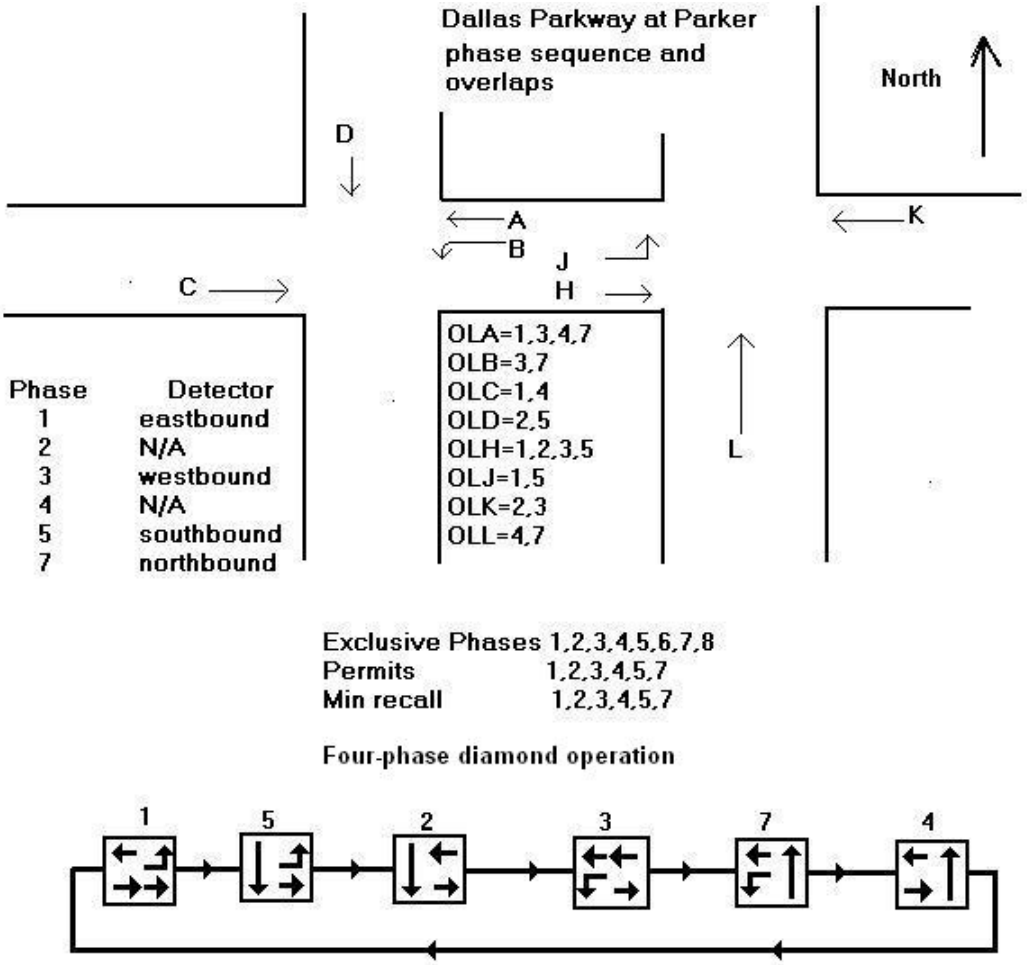


Exhibit B7: A typical four-phase diamond interchange implementation in the City of San Antonio.

The other path passes from stage 1 to stage 5 by way of the internal clearance. We can illustrate its use by again considering the scenario of a westbound vehicle passing through the intersection. As before, there is no call on the northbound service road or the eastbound approach, but there is a call on the southbound service road. As our vehicle crosses over the northbound service road, the westbound signal turns yellow. Seeing that there is no call on the northbound service road, the controller realizes that this direction need not be serviced.

Because there is no call on the eastbound approach the controller realizes that this direction will not be serviced either. But the controller logic also prevents it from going directly from stage 1 to stage 5. Instead, it passes through the internal clearance after leaving stage 1. By doing so it ensures that the westbound vehicle will be able pass all the way through the interchange without hindrance, yet permits the southbound vehicle to get a green indication without waiting for the signal to provide an unneeded service to the northbound service road and eastbound approach.

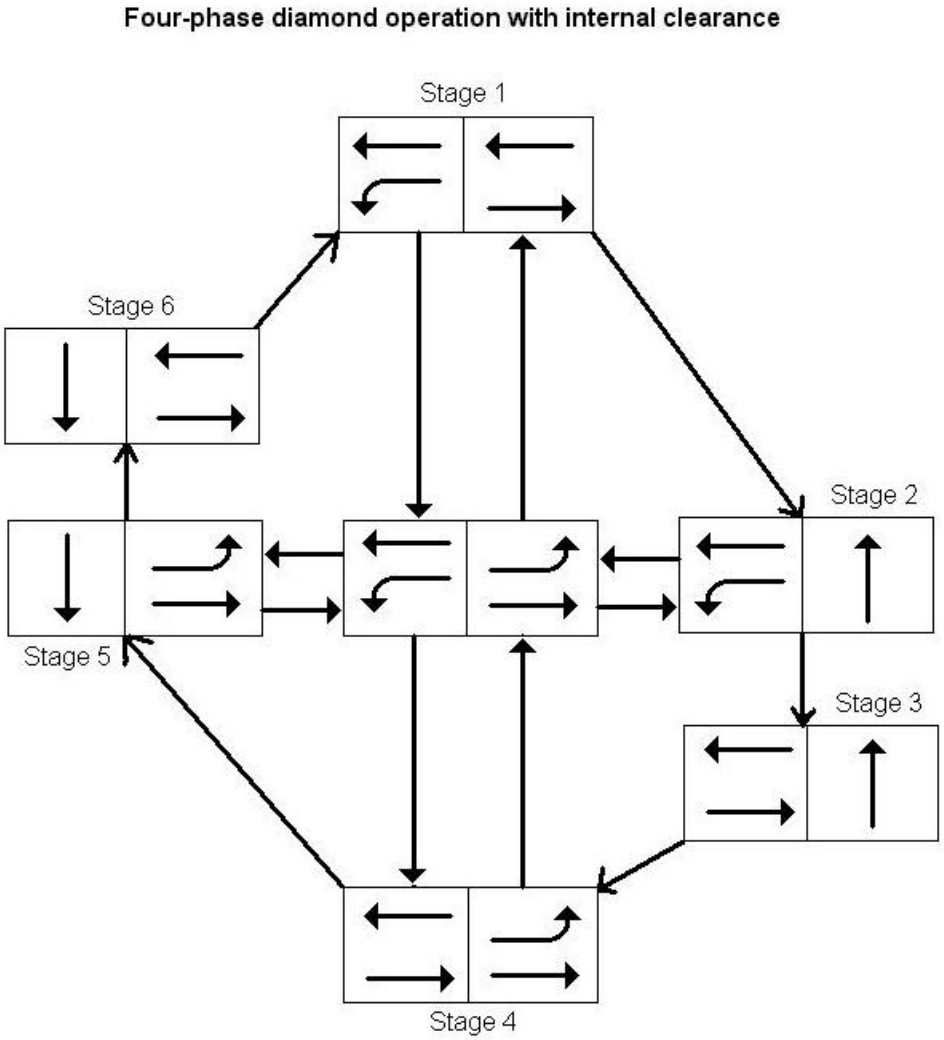


Exhibit B8: Illustration of the proposed internal clearance concept with four-phase diamond interchange operation.

The City desires that each applicant provide a complete description of the controller programming, including screen shots of the appropriate tables, any pertinent overlap programming, and a clear English language description of how the technique works. Applicant must demonstrate that this technique is compatible with both coordinated and fully actuated operation.

2.6.5 SERVICING PEDESTRIAN MOVEMENTS WHEN PEDESTRIAN TIME EXCEEDS SPLIT

In some cases it may be desirable to set the split times for a given phase to a value that is shorter than the sum of the WALK and FLASHING DON'T WALK intervals for the same phase. Some traffic signal controllers will not permit this condition and will respond to it by refusing to service the pedestrian movement. This control strategy therefore requires that the operator always makes the splits at least equal to the pedestrian times. This may prove very disruptive to traffic flow if a detector loop should happen to malfunction.

For this reason, the City desires to be able to set the splits for the phases to whatever value is most advantageous to the efficient flow of traffic, and have the signal service the pedestrian movements even if the pedestrian time exceeds the split. Possible methods for accomplishing this may be to temporarily stop the coordinator at the force off for the phase, or to extend the phase and deduct the needed time from the coordinated phase(s).

Please show how your software can be programmed to accomplish this and explain where the needed time comes from and what affect it has on the length of other phases as well as its effect on the coordination of the traffic signal.

2.6.6 LAGGING LEFT TURNS MUST BE ABLE TO TIME CONCURRENTLY WITH PEDESTRIAN INTERVALS OF LAGGING THROUGH MOVEMENT

As noted above, the City of San Antonio makes frequent use of lead-lag left turn operation in order to promote effective progression between traffic signals. This technique may be used with traffic signals operating at cycle lengths as short as seventy-five or eighty seconds. Many of the City's streets are broad boulevards requiring pedestrian clearance intervals as high as twenty seconds or more. At some major intersections operating at shorter cycle lengths, the length of time when both through movements are simultaneously green may be too short to service the pedestrian intervals before the local cycle counter reaches zero. (It is customary in the City of San Antonio to force off the leading through movement when the local cycle counter reaches zero.)

This means that the lagging through phase may still be counting down a pedestrian interval when the local cycle counter reaches zero. An unfortunate quirk of the City's current software is that, when this occurs, the coordinator will not allow the leading through phase to terminate until the lagging left-turn phase's pedestrian clearance interval has terminated. This delays the onset of the lagging left turn and all of the subsequent phases on the other side of the barrier. It also introduces an offset error which is at least equal to the time remaining in the pedestrian clearance interval when the local cycle counter reaches zero. The introduction of an offset error results in the traffic signal being temporarily out of step with adjacent traffic signals, followed of course by an undesirable transition period.

It should be stressed at this point that this occurs even when meticulous care is taken to ensure that the lagging through movement has sufficient time to properly service the pedestrian intervals. It appears that the City's current software is written in such a way that it simply will not allow the coordinator to begin a new cycle until the pedestrian intervals have terminated, even if the phase's split is long enough to service the pedestrian intervals.

Local intersection control software purchased as part of this project shall be required to permit the pedestrian interval(s) to continue into the next cycle when the subsequent phase in the other ring is compatible. This shall occur without adverse impact to coordination or the ability of the signal to service subsequent phases. In other words, subsequent phases shall not be shortened or skipped, and the offset shall be maintained. It shall have no impact on the ability of the intersection to service any pedestrian intervals.

Please give an example showing how an intersection can be programmed to meet these requirements with your firm's software.

2.7 DESIRED EXTENSIONS TO THE MANAGEMENT INFORMATION BASE

The City of San Antonio desires several features not included in NTCIP 1202. If by chance these features are already included in the prospective contractor's software, please state so in the proposal. System operators shall be able to view, edit, monitor and store all data related to any extensions created as part of this project using the central software, including but not limited to those shown below. In other words, modifications made to the local controller software shall be reflected in the central software as well.

2.7.1 NON-SKIP PHASES

A non-skip phase bit mask should be provided in such manner that it is accessible and editable in both the local controller software and in the central software. If provided, it shall be selectable with any free or coordinated timing pattern. The phases so coded would then be called if the controller is in a phase preceding the coded phase and a call is present on a phase after the coded phase as defined in the phase sequence table[2].

For example, if phase 3 is coded as non skip, the controller could not leave phases 2 and 6 to service a call on phase 4 without servicing phase 3 first, even if that phase does not have a call. This is useful to eliminate the need to recall the inside left-turn phases at diamond interchanges running three-phase sequences, yet it ensures that the internal clearance phase is serviced prior to a green on the service roads. It is also useful to avoid trapping vehicles between closely spaced adjacent intersections.

2.7.2 ANTI-BACKUP PHASES

An anti-backup phase mask should be provided that allows coding to prevent the controller from "backing up" from through phases to left turn phases in the same compatibility group in the absence of calls in another concurrency group.

[2] NTCIP 1202, Sec. 2.8.3

2.7.3 EXTRA PHASE TABLES

The phase table object as defined in NTCIP 1202 is a table containing Actuated Controller Unit Phase Parameters. This table contains parameters such as minimum and maximum green times, yellow and all-red times, gap times, etc.

The current intersection control software used by the City has three phase tables, and the City wishes to purchase software which also supports three phase tables. Each table shall be selectable by entry in the time base schedule. It should also be possible to associate each table with a specific coordinated timing plan. The number of phases supported in each table shall be equal to the value of the maxPhases object, and each table shall support all of the parameters listed at the end of section 2.2.2 in NTCIP 1202. All parameters in all tables shall have value ranges that comply with NEMA TS2 1998 standards. If this feature is included, it shall be supported by the central software as well the local. The central software shall provide data tables for editing the extra phase data tables and those tables shall have a format identical to the first phase data table.

3.0 Preemption and Priority

3.1 Vehicle Preemption

The controller shall provide a minimum of 6 preemption sequences. Preemption capability shall be standard and shall not require additional modules or software.

The 6 preemptors shall be selectable as to priority one to another and any preempt to automatic flash.

Each preemptor shall provide a locking and non-locking memory feature for preemptor calls. If a preemptor is in the non-locking mode and a call is received and dropped during the delay time, the preemptor shall not be serviced.

Preemptor timing intervals shall be programmable from 0-255 in one second increments or 0-9.99 in one-tenth second increments, depending on function.

A programmable delay time interval shall be provided to inhibit the start of the preemption sequence. This time shall be programmable from 0-255 in one second increments. This interval shall begin timing upon receipt of a preemption call.

A programmable extend time shall be provided to stretch the call duration from the point of termination of the actuation. This time shall be programmable from 0-255 in one second increments.

A programmable duration time shall be provided to control the minimum time that a preemptor remains active. This time shall be programmable from 0-255 in one second increments.

A programmable maximum call time shall be provided to control the maximum time that a preemptor remains in control. This time shall be programmable from 0-255 in one second increments. The preemptor maximum call time interval shall be inhibited when set to zero.

Signal displays in effect at the beginning of a preemption sequence shall not be terminated unless the respective green/walk has been in effect for a minimum time. If the respective green/walk has been active for longer than the programmed minimum GREEN/WALK time, the controller unit shall immediately advance to the next interval. Minimum times shall be programmable for the GREEN/WALK interval on a per ring basis. This time shall be programmable from 0-255 in one second increments.

A phase shall advance to pedestrian clearance if it has timed the minimum GREEN/WALK interval at the beginning of a preemption sequence. The programmed preempt pedestrian clearance will then be timed. During preemption pedestrian signals shall be individually selectable as being a solid DON'T WALK, solid WALK, flashing WALK, OFF (blank), or cycling (dwell).

During preemption vehicle signals (phase and overlap) shall be individually selectable as being a solid Red, solid green, flashing Red, flashing Yellow, or cycling (dwell).

Exit phases shall be selectable to time after the preemption sequence has been completed. These shall serve as transition phases to return the controller to normal operation. It shall also be possible to place calls on selected phases upon exiting preemption.

Preemptor linking shall permit preemption sequences, where lower-priority preemptors may call the higher-priority preemptors upon termination of their preemption sequence.

3.2 Transit Priority

The controller shall provide a minimum of 4 programmable transit priority sequences. Transit priority capability shall be standard and shall not require additional modules or software in the controller.

The controller shall be compatible with 3M Opticom discriminator transit priority inputs. The controller shall collect and store transit priority signal ID and time stamp data from the 3M Opticom discriminator unit for TMC retrieval.

The controller shall implement one of the following three types of traffic signal priority actions depending upon the instant in time when the signal controller receives the commands, relative to the background cycle.

- **Early Green:** Priority is granted when a bus is approaching a red signal. The red signal is shortened to provide a green signal sooner than normal by shortening the opposing vehicle phases.

- **Green Extend:** Priority is granted when a bus is approaching a green signal that is about to terminate. The green signal is extended on a settable interval to allow the bus to pass through the intersection.

- **Free Hold:** Priority is used to hold a signal green on a settable interval to allow the bus to pass through the intersection during the non-coordinated (free) operation.

Under early green transit priority sequence, no vehicle or pedestrian phase may be skipped, and vehicle minimum green and pedestrian timing may not be shorten to serve the transit priority call.

Transit priority call delay time, green extension time, free hold time shall be programmable from a range of 0 to 255 seconds in second increments.

Time interval to serve consecutive transit priority for the same approach shall be programmable by a range of 0 to 30 minutes in minute increments. Transit priority may not be served twice by the same approach in consecutive cycles. Transit priority calls received not meeting the minimum time interval shall be logged but not served.

Transit priority shall be enabled or disabled by a programmable time-of-day (TOD) schedule.

Transit priority call shall be non-locking.

3.3 Time-Based Control & Non-Interconnected Coordination

The controller shall include time-based control. This capability shall be a standard feature and shall not require additional modules or software.

EXHIBIT D
City Of San Antonio ITSD Standards

Information Management

***S=*Standard* Product(s), P=*Preferred* Product(s), G=*Guidance* Info Only.**

If the Information Technology Standards & Guidelines does not address a specific technical area, the user should seek guidance from the Director, Information Technology.

Information Management: Section 5	**Policy or Product**	S/P/G *	**Remarks**
Relational Database Management Systems	Oracle 10.2.0 MS SQLServer2005 Oracle 10.2.0 MS SQLServer2005	P S G	Enterprise and large-scale systems with high capacity, complex design and/or high volume transactional requirements Mid-scale systems with moderate capacity and/or transactional volume requirements
Database Access	SQL*Plus OCI-compliant client ODBC	S G G	
File Formats	IT guidance	G	Follow IT guidance for recommended file extensions

Information Management: Section 5	**Policy or Product**	S/P/G *	**Remarks**
Data Administration Implementation	IT guidance	G	IT is currently evaluating the use of tools in this area
Data Warehousing and Mining	Business Objects XI R2 SAP BI 7.0	S G	IT is currently implementing For SAP-based data
Messaging	IT guidance	G	
Presentation and Interface Standards • Application Standard Interfaces • Mobile Devices	IT guidance IT guidance	G G	.Net 1.1 or higher Web Services Follow IT guidance

Information Distribution

***S=*Standard* Product(s), P=*Preferred* Product(s), G=*Guidance* Information Only**

If the Information Technology Standards and Guidelines policy does not address a specific technical area, the user should seek guidance from the Director, Information Technology.

Information Distribution: Section 6	**Policy or Product**	S/P/G *	**Remarks**
E-Mail with Attachments • SMTP • IMAP • POP3 (all others)	MS Exchange with outbound SMTP Supported with “smartphones” BlackBerry Enterprise Server 4.0	S S S S	 See IT for guidance
File Transfer Service • HTTP • FTP	Follow IT guidance	G	

Applications

***S=*Standard* Product(s), P=*Preferred* Product(s), G=*Guidance* Information Only**

If the Information Technology Standards and Guidelines policy does not address a specific technical area, the user should seek guidance from the Director, Information Technology.

Applications: Section 7	**Policy or Product**	S/P/G *	**Remarks**
Enterprise Resource Planning	SAP 4.7e SAP ECC6 / NW 2004s	S P	Production implementation date was April 2004 . ECC6 upgrade planned for 2Q07. Core modules include: HR FI MM SD PS The application is accessible from any site or client VPN within the corporate network Current access methods include: client server run-time objects and Terminal Server. SAP Enterprise Portal implementation will be completed in a future scope of work.
Document Management	OpenText	S	
Cooperative Work Applications • Collaborative Processing • Workflow • External File Sharing	 MS Exchange 2003 MS SharePoint	 S G G	 See IT for guidance See IT for guidance
Content Management		G	See IT for guidance
Web Portal	Citrix MetaFrame Presentation Server	P	See IT for Guidance
Web Server	IIS 6.0		
Office Automation	MS Office XP MS Office 2003 MS Internet Explorer 6	S P S	Excludes MS Access See IT for guidance on “extensions”

Applications: Section 7	**Policy or Product**	S/P/G *	**Remarks**
	MS Outlook XP MS Outlook 2003 Acrobat Reader MS Project 2003 MS Visio 2003 Std.	S P S G G	
Web Development Tools	MS Visual Studio	S	See "HTML Publishing Policy" for guidance
Digital Signature	Pending	G	
Application Development Tools	MS Visual Studio	S	Follow IT guidance for configuration
Report Writers	Business Bojects XI R2	S P	Follow IT guidance for data integrity and access

Computing Resources

***S=*Standard* Product(s), P=*Preferred* Product(s), G=*Guidance* Information Only**

If the Information Technology Standards and Guidelines policy does not address a specific technical area, the user should seek guidance from the Director, Information Technology.

Computing Resources: Section 9	**Policy or Product**	S/P/G *	**Remarks**
Workstation • Tier 1 • Tier 2 • Tier 3	 Pentium P4 2.0GHZ Pentium P4 3.2GHZ	 S P G	In general, current IT standards provide a minimum baseline. IT will provision best value desktops that efficiently support the Refresh Policy. For specialized requirements seek IT guidance
Bus Standards	PCI	G	
Memory (RAM) Standards (EDO, SDRAM, DRAM) • Tier 1 • Tier 2 • Tier 3	 1GB 2GB 2GB	 S P G	In general, current IT standards provide a minimum baseline. IT will provision best value desktops that efficiently support the Refresh Policy. For specialized requirements seek IT guidance
Server Hardware Configuration	SUN UltraSPARC Intel Xeon AMD Opteron FC SAN	S S	
Workstation Operating Systems	Windows XP Professional SP2	S	

Computing Resources: Section 9	**Policy or Product**	S/P/G *	**Remarks**
Server Operating Systems • General File & Print Servers • Application Servers • Database Servers	 Windows Server 2003 EE Windows Server 2003 EE VMWare ESX I3 Solaris 10 Windows Server 2003 EE Solaris 10	 S S G S S S	 Follow IT guidance
Inter-Process Communication	Pending	G	
Configuration Management	Symantec GHOST Corporate Edition	S	
Data Backup & Recovery • Backup & Recovery Software	 Veritas NetBackup 6.5	 S	

EXHIBIT E

INSURANCE REQUIREMENTS

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If selected to provide the services described in this RFP, Respondent shall be required to comply with the insurance requirements set forth below:

INSURANCE

A) Prior to the commencement of any work under this Agreement, the selected Respondent shall furnish copies of all required endorsements and an original completed Certificate(s) of Insurance to the City's Purchasing & Contract Services Department, which shall be clearly labeled "Advanced Transportation Management System" in the Description of Operations block of the Certificate. The original Certificate(s) shall be completed by an agent and signed by a person authorized by that insurer to bind coverage on its behalf. The City will not accept Memorandum of Insurance or Binders as proof of insurance. The original certificate(s) or form must have the agent's original signature, including the signer's company affiliation, title and phone number, and be mailed, with copies of all applicable endorsements, directly from the insurer's authorized representative to the City. The City shall have no duty to pay or perform under this Agreement until such certificate and endorsements have been received and approved by the City's Purchasing & Contract Services Department. No officer or employee, other than the City's Risk Manager, shall have authority to waive this requirement.

B) The City reserves the right to review the insurance requirements of this Article during the effective period of this Agreement and any extension or renewal hereof and to modify insurance coverages and their limits when deemed necessary and prudent by City's Risk Manager based upon changes in statutory law, court decisions, or circumstances surrounding this Agreement. In no instance will City allow modification whereupon City may incur increased risk.

C) A Respondent's financial integrity is of interest to the City; therefore, subject to Respondent's right to maintain reasonable deductibles in such amounts as are approved by the City, Respondent shall obtain and maintain in full force and effect for the duration of this Agreement, and any extension hereof, at Respondent's sole expense, insurance coverage written on an occurrence basis, by companies authorized and admitted to do business in the State of Texas and with an A.M Best's rating of no less than A- (VII), in the following types and for an amount not less than the amount listed below:

TYPE	AMOUNTS
1. Workers' Compensation 2. Employers' Liability	Statutory $1,000,000/$1,000,000/$1,000,000
3. Commercial General Liability Insurance to include coverage for the following: a. Premises operations b. Independent Contractors c. Products/completed operations d. Personal Injury e. Contractual Liability *f. Environmental Impairment/ Impact – sufficiently broad to cover disposal liability. g. Broad form property damage, to include fire legal liability	For Bodily Injury and Property Damage of $2,000,000 per occurrence; $5,000,000 General Aggregate, or its equivalent in Umbrella or Excess Liability Coverage

4. Business Automobile Liability a. Owned/leased vehicles b. Non-owned vehicles c. Hired Vehicles	Combined Single Limit for Bodily Injury and Property Damage of $1,000,000 per occurrence
5. Professional Liability	$1,000,000 per claim to pay on behalf of the insured all sums which the insured shall become legally obligated to pay as damages by reason of any act, malpractice, error or omission in professional services.
* if applicable	

D) The City shall be entitled, upon request and without expense, to receive copies of the policies, declaration page and all endorsements thereto as they apply to the limits required by the City, and may require the deletion, revision, or modification of particular policy terms, conditions, limitations or exclusions (except where policy provisions are established by law or regulation binding upon either of the parties hereto or the underwriter of any such policies). Respondent shall be required to comply with any such requests and shall submit a copy of the replacement certificate of insurance to City at the address provided below within 10 days of the requested change. Respondent shall pay any costs incurred resulting from said changes.

City of San Antonio
Attn: Purchasing & Contract Services Department
P.O. Box 839966
San Antonio, Texas 78283-3966

E) Respondent agrees that with respect to the above required insurance, all insurance policies are to contain or be endorsed to contain the following provisions:

- Name the City, its officers, officials, employees, volunteers, and elected representatives as additional insureds by endorsement, as respects operations and activities of, or on behalf of, the named insured performed under contract with the City, with the exception of the workers' compensation and professional liability polices;

- Provide for an endorsement that the "other insurance" clause shall not apply to the City of San Antonio where the City is an additional insured shown on the policy;

- Workers' compensation and employers' liability policies will provide a waiver of subrogation in favor of the City.

- Provide thirty (30) calendar days advance written notice directly to City of any suspension, cancellation, non-renewal or material change in coverage, and not less than ten (10) calendar days advance notice for nonpayment of premium.

F) Within five (5) calendar days of a suspension, cancellation or non-renewal of coverage, Respondent shall provide a replacement Certificate of Insurance and applicable endorsements to City. City shall have the option to suspend Respondent's performance should there be a lapse in coverage at any time during this

contract. Failure to provide and to maintain the required insurance shall constitute a material breach of this Agreement.

G) In addition to any other remedies the City may have upon Respondent's failure to provide and maintain any insurance or policy endorsements to the extent and within the time herein required, the City shall have the right to order Respondent to stop work hereunder, and/or withhold any payment(s) which become due to Respondent hereunder until Respondent demonstrates compliance with the requirements hereof.

H) Nothing herein contained shall be construed as limiting in any way the extent to which Respondent may be held responsible for payments of damages to persons or property resulting from Respondent's or its subcontractors' performance of the work covered under this Agreement.

I)) It is agreed that Respondent's insurance shall be deemed primary and non-contributory with respect to any insurance or self insurance carried by the City of San Antonio for liability arising out of operations under this Agreement.

J) It is understood and agreed that the insurance required is in addition to and separate from any other obligation contained in this Agreement.

EXHIBIT F

INDEMNIFICATION REQUIREMENTS

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If selected to provide the services described in this RFP, Respondent shall be required to comply with the indemnification requirements set forth below:

INDEMNIFICATION REQUIREMENTS

RESPONDENT covenants and agrees to FULLY INDEMNIFY, DEFEND, and HOLD HARMLESS, the CITY and the elected officials, employees, officers, directors, volunteers and representatives of the CITY, individually or collectively, from and against any and all costs, claims, liens, damages, losses, expenses, fees, fines, penalties, proceedings, actions, demands, causes of action, liability and suits of any kind and nature, including but not limited to, personal or bodily injury, death and property damage, made upon the CITY directly or indirectly arising out of, resulting from or related to RESPONDENT's activities under this CONTRACT, including any acts or omissions of RESPONDENT, any agent, officer, director, representative, employee, consultant or subcontractor of RESPONDENT, and their respective officers, agents, employees, directors and representatives while in the exercise of performance of the rights or duties under this CONTRACT, all without however, waiving any governmental immunity available to the CITY under Texas Law and without waiving any defenses of the parties under Texas Law. IT IS FURTHER COVENANTED AND AGREED THAT SUCH INDEMNITY SHALL APPLY EVEN WHERE SUCH COSTS, CLAIMS, LIENS, DAMAGES, LOSSES, EXPENSES, FEES, FINES, PENALTIES, ACTIONS, DEMANDS, CAUSES OF ACTION, LIABILITY AND/OR SUITS ARISE IN ANY PART FROM THE NEGLIGENCE OF CITY, THE ELECTED OFFICIALS, EMPLOYEES, OFFICERS, DIRECTORS, VOLUNTEERS AND REPRESENTATIVES OF CITY, UNDER THIS CONTRACT.

It is the EXPRESS INTENT of the parties to this CONTRACT, that the INDEMNITY provided for in this section, is an INDEMNITY extended by RESPONDENT to INDEMNIFY, PROTECT and HOLD HARMLESS, the CITY from the consequences of the CITY'S OWN NEGLIGENCE, provided however, that the INDEMNITY provided for in this section SHALL APPLY only when the NEGLIGENT ACT of the City is a CONTRIBUTORY CAUSE of the resultant injury, death, or damage, and shall have no application when the negligent act of the City is the sole cause of the resultant injury, death, or damage. RESPONDENT further AGREES TO DEFEND, AT ITS OWN EXPENSE and ON BEHALF OF THE CITY AND IN THE NAME OF THE CITY, any claim or litigation brought against the CITY and its elected officials, employees, officers, directors, volunteers and representatives, in connection with any such injury, death, or damage for which this INDEMNITY shall apply, as set forth above.

The provisions of this INDEMNIFICATION are solely for the benefit of the parties hereto and not intended to create or grant any rights, contractual or otherwise, to any other person or entity.

RESPONDENT shall advise the CITY in writing within 24 hours of any claim or demand against the CITY or RESPONDENT known to RESPONDENT related to or arising out of RESPONDENT's activities under this contract, and shall see to the investigation and defense of such claim or demand at RESPONDENT's cost. The CITY shall have the right, at its option and at its own expense, to participate in such defense without relieving RESPONDENT of any of its obligations under this paragraph.

EXHIBIT G
PREVAILING WAGE RATES

(a) Definitions.

(1) Prevailing Wage Rate – that rate which has been determined by City to be the applicable prevailing wage rate, including the per diem rate and the rate for legal holiday and overtime pay, as set forth in Exhibit D-1, attached hereto and fully incorporated herein, for each category of worker.

(2) Worker - person employed by Contractor or a Subcontractor in the execution of this contract. A worker includes, but is not limited to, laborers and mechanics.

(b) Payment of Prevailing Wage Rate – the selected Contractor shall pay to its workers not less than the prevailing wage rate for that class of worker as described in said Exhibit D-1. Further, the selected Contractor shall stipulate in all contracts with subcontractors engaged by Contractor in furtherance of the execution of this contract that said subcontractors pay not less than the prevailing wage rate for its workers, and shall attach as an exhibit to said contracts a copy of Exhibit D-1.

(c) Penalty for Non-payment - A selected Contractor or Subcontractor who pays less than the prevailing wage rate to its workers, shall pay to City Sixty Dollars ($60.00) for each worker employed for each calendar day or part of the day that the worker is paid less than the wage rates stipulated in this contract. The selected Contractor shall stipulate in all contracts with subcontractors engaged by Contractor in furtherance of the execution of this contract that Subcontractor is subject to this $60.00 penalty if Subcontractor fails to pay said prevailing wage rates to its workers.

In accordance with Chapter 2258, TEX. GOV'T CODE, City shall be entitled to withhold payment from the selected Contractor under the contract to satisfy this penalty, even if the party incurring the penalty is a Subcontractor of Contractor. If City withholds payment from the selected Contractor as a result of a Subcontractor's violation, Contractor may withhold payment from said Subcontractor in accordance with said Chapter 2258. Further, release or disbursement of funds withheld as a penalty hereunder shall be governed by said Chapter 2258.

(d) Records – The selected Contractor and Subcontractor shall keep a record showing: (1) the name and occupation of each worker employed by the Contractor or Subcontractor; and (2) the actual per diem wages, including legal holiday and overtime wages, paid to each worker. These records shall be open at all reasonable hours to inspection by the officers and agents of City. The selected Contractor shall stipulate in all contracts with subcontractors engaged by Contractor in furtherance of the execution of this contract that Subcontractors must maintain and make available for inspection the records as described in this article.

(e) The selected Contractor shall submit certified payrolls directly to the City's Wage and Hour Office by mail or hand-delivery. Electronic transmissions are not acceptable.

Mailing Address for Payroll and Pertinent Documents:

City of San Antonio
Capital Improvements Management Department
Contract Services
Wage and Hour Compliance
P.O. Box 839966
San Antonio, Texas 78283-3966

Attention: Thomas Nixon

Physical Address for Payroll and Pertinent Documents:

City of San Antonio
Capital Improvements Management Department
Capital Programs Division
Wage and Hour Compliance
114 W. Commerce, 8th Floor
San Antonio, Texas 78283-3966

Attention: Thomas Nixon

EXHIBIT G-1

General Decision Number: TX070003 08/31/2007 TX3

Superseded General Decision Number: TX20030003

State: Texas

Construction Type: Building

County: Bexar County in Texas.

BUILDING CONSTRUCTION PROJECTS (does not include single family homes and apartments up to and including 4 stories). (Use current heavy & highway general wage determination for Paving & Utilities Incidental to Building Construction).

Modification Number	Publication Date
0	02/09/2007
1	05/11/2007
2	07/20/2007
3	08/31/2007

Effective Date 08/31/2007

ASBE0087-001 01/01/2006

	Rates	Fringes
Asbestos/Insulator Worker (Includes application of all insulating materials, protective coverings, coatings, and finishings to all types of mechanical systems.)	$ 19.67	6.37

BRTX0001-004 05/01/2007

	Rates	Fringes
BRICKLAYER	$ 23.50	1.50

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* ELEC0060-001 12/04/2006

	Rates	Fringes
Cable splicer	$ 21.85	7.60
ELECTRICIAN (Including pulling and installing cable through conduit for low voltage)	$ 21.60	7.60

ELEV0081-001 01/01/2005

	Rates	Fringes
Elevator Constructor		

```
     MECHANIC.....................$ 26.885        12.115+A

  FOOTNOTE;  A = UNDER 5 YEARS EMPLOYMENT, 6% BHR; OVER 5 YEARS
  EMPLOYMENT, 8% BHR. PAID HOLIDAYS : New Year's Day,
  Memorial Day, Independence Day, Labor Day, Thanksgiving
  Day, Friday after Thanksgiving Day and Christmas Day.
-----------------------------------------------------------------
 ENGI0450-001 04/01/1994

                                   Rates          Fringes

Power equipment operators:
     Cranes.......................$ 12.95             3.30
-----------------------------------------------------------------
* IRON0066-001 06/01/2007

                                   Rates          Fringes

IRONWORKER (Excluding metal
building erectors)
     Structural...................$ 17.40             5.00
-----------------------------------------------------------------
* MARB0002-001 07/01/2005

                                   Rates          Fringes

TILE SETTER.....................$ 18.50             6.10
-----------------------------------------------------------------
 PLUM0142-001 07/01/2005

                                   Rates          Fringes

Plumbers and Pipefitters
(Including HVAC WORK)...........$ 26.18             6.16
-----------------------------------------------------------------
* SFTX0669-001 01/01/2005

                                   Rates          Fringes

SPRINKLER FITTER (Fire
Sprinklers).....................$ 22.62            10.50
-----------------------------------------------------------------
 SHEE0067-001 04/01/2007

                                   Rates          Fringes

Sheet metal worker (Including
HVAC Duct Work).................$ 23.70             9.74
-----------------------------------------------------------------
*  SUTX1988-002 11/01/1988

                                   Rates          Fringes

Acoustical Ceiling Installer.....$ 12.26

CARPENTER (Excluding
Acoustical  Ceiling Installer
& Drywall Hanger)...............$ 10.64

CEMENT MASON/CONCRETE FINISHER...$ 11.46
```

DRYWALL HANGER.....$ 11.88

GLAZIER.....$ 10.78 1.40

IRONWORKER (Excluding Metal Building Assemblers)
Reinforcing.....$ 10.19 3.57

Laborers:
Mason Tenders.....$ 8.36 1.78
Mortar Mixers.....$ 8.99
PLASTERER'S TENDERS.....$ 8.68
Unskilled.....$ 7.06

LATHER.....$ 15.25

PAINTER (Excluding Tapers/Finishers).....$ 8.01

PLASTERER.....$ 15.25

Power equipment operators:
Front End Loader.....$ 7.36

Roofers:
Kettlemen.....$ 8.85
Roofers.....$ 8.14
Waterproofers.....$ 6.88

Sheet Metal Worker
Other Work.....$ 11.62

Taper/Finisher.....$ 7.99

TRUCK DRIVER.....$ 7.10

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

==========

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

In the listing above, the "SU" designation means that rates listed under the identifier do not reflect collectively bargained wage and fringe benefit rates. Other designations indicate unions whose rates have been determined to be prevailing.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can

be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

==========

END OF GENERAL DECISION

EXHIBIT G-2

General Decision Number: TX070043 02/09/2007 TX43

Superseded General Decision Number: TX20030043

State: Texas

Construction Types: Heavy and Highway

Counties: Bell, Bexar, Brazos, Comal, Coryell, Guadalupe, Hays, McLennan, Travis and Williamson Counties in Texas.

Heavy (excluding tunnels and dams) and Highway Construction Projects (does not include building structures in rest area projects). *NOT TO BE USED FOR WORK ON SEWAGE OR WATER TREATMENT PLANTS OR LIFT/PUMP STATIONS IN BELL, CORYELL, McLENNAN AND WILLIAMSON COUNTIES.

Modification Number	Publication Date
0	02/09/2007

Effective 02/09/2007

SUTX2005-001 01/03/2005

	Rates	Fringes
Air Tool Operator	$ 16.00	0.00
Asphalt Distributor Operator	$ 12.09	0.00
Asphalt paving machine operator	$ 11.82	0.00
Asphalt Raker	$ 9.96	0.00
Asphalt Shoveler	$ 10.56	0.00
Broom or Sweeper Operator	$ 9.74	0.00
Bulldozer operator	$ 11.04	0.00
Carpenter	$ 12.25	0.00
Concrete Finisher, Paving	$ 10.53	0.00
Concrete Finisher, Structures	$ 10.95	0.00
Concrete Paving Curbing Machine Operator	$ 14.00	0.00
Concrete Paving Finishing Machine Operator	$ 12.00	0.00
Concrete Rubber	$ 10.88	0.00
Crane, Clamshell, Backhoe, Derrick, Dragline, Shovel Operator	$ 13.66	0.00
Electrician	$ 24.11	0.00
Flagger	$ 9.49	0.00
Form Builder/Setter, Structures	$ 10.88	0.00
Form Setter, Paving & Curb	$ 9.89	0.00
Foundation Drill Operator, Truck Mounted	$ 15.00	0.00
Front End Loader Operator	$ 11.36	0.00
Laborer, common	$ 9.34	0.00
Laborer, Utility	$ 10.12	0.00
Mechanic	$ 14.74	0.00
Mixer operator, Concrete Paving	$ 15.25	0.00
Mixer operator	$ 10.83	0.00
Motor Grader Operator, Fine Grade	$ 15.26	0.00
Motor Grader Operator, Rough	$ 12.96	0.00
Oiler	$ 14.71	0.00
Painter, Structures	$ 11.00	0.00
Pavement Marking Machine Operator	$ 11.52	0.00
Pipelayer	$ 10.49	0.00
Planer Operator	$ 17.45	0.00
Reinforcing Steel Setter, Paving	$ 15.50	0.00
Reinforcing Steel Setter, Structure	$ 14.00	0.00
Roller Operator, Pneumatic, Self-Propelled	$ 9.34	0.00
Roller Operator, Steel Wheel, Flat Wheel/Tamping	$ 9.60	0.00
Roller Operator, Steel Wheel, Plant Mix Pavement	$ 10.24	0.00
Scraper Operator	$ 9.93	0.00
Servicer	$ 11.41	0.00
Sign Installer (PGM)	$ 14.85	0.00
Slip Form Machine Operator	$ 15.17	0.00
Spreader Box operator	$ 10.39	0.00
Structural Steel Worker	$ 13.41	0.00

Tractor operator, Crawler Type.	$ 11.10	0.00
Traveling Mixer Operator.....	$ 10.04	0.00
Trenching machine operator, Heavy.....	$ 14.22	0.00
Truck Driver Tandem Axle Semi-Trailer.....	$ 10.95	0.00
Truck driver, lowboy-Float.....	$ 15.30	0.00
Truck driver, Single Axle, Heavy.....	$ 11.88	0.00
Truck driver, Single Axle, Light.....	$ 9.98	0.00
Wagon Drill, Boring Machine, Post Hole Driller Operator.....	$ 14.65	0.00
Welder.....	$ 14.26	0.00
Work Zone Barricade Servicer...	$ 11.15	0.00

==========

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

In the listing above, the "SU" designation means that rates listed under the identifier do not reflect collectively bargained wage and fringe benefit rates. Other designations indicate unions whose rates have been determined to be prevailing.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

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On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor

200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

==========

END OF GENERAL DECISION

EXHIBIT H
WORKERS' COMPENSATION

(a) Definitions:

(1) Certificate of coverage ("certificate")- A copy of a certificate of insurance, a certificate of authority to self-insure issued by the Division, or a coverage agreement (DWC-81, DWC-82, DWC-83, or DWC-84), showing statutory workers' compensation insurance coverage for the person's or entity's employees providing services on a project, for the duration of the project.

(2) Duration of the project - includes the time from the beginning of the work on the project until the contractor's/person's work on the project has been completed and accepted by the City.

(3) Persons providing services on the project ("subcontractor" in §406.096) - includes all persons or entities performing all or part of the services the contractor has undertaken to perform on the project, regardless of whether that person contracted directly with the contractor and regardless of whether that person has employees. This includes, without limitation, independent contractors, subcontractors, leasing companies, motor carriers, owner-operators, employees of any such entity, or employees of any entity which furnishes persons to provide services on the project. "Services" include, without limitation, providing, hauling, or delivering equipment or materials, or providing labor, transportation, or other service related to a project. "Services" does not include activities unrelated to the project, such as food/beverage vendors, office supply deliveries, and delivery of portable toilets.

(b) The selected contractor shall provide coverage, based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements, which meets the statutory requirements of Texas Labor Code, Section 401.011(44) for all employees of the contractor providing services on the project, for the duration of the project.

(c) The selected contractor must provide a certificate of coverage to the City prior to being awarded the contract.

(d) If the coverage period shown on the contractor's current certificate of coverage ends during the duration of the project, the selected contractor must, prior to the end of the coverage period, file a new certificate of coverage with the City showing that coverage has been extended.

(e) The selected contractor shall obtain from each person providing services on a project, and provide to the City:

(1) a certificate of coverage, prior to that person beginning work on the project, so the City will have on file certificates of coverage showing coverage for all persons providing services on the project; and

(2) no later than seven days after receipt by the contractor, a new certificate of coverage showing extension of coverage, if the coverage period shown on the current certificate of coverage ends during the duration of the project.

(f) The selected contractor shall retain all required certificates of coverage for the duration of the project and for one year thereafter.

(g) The selected contractor shall notify the City in writing by certified mail or personal delivery, within 10 days after the contractor knew or should have known, of any change that materially affects the provision of coverage of any person providing services on the project.

(h) The selected contractor shall post on each project site a notice, in the text, form and manner prescribed by the Texas Workers' Compensation Division, informing all persons providing services on the project that they are required to be covered, and stating how a person may verify coverage and report lack of coverage.

(i) The selected contractor shall contractually require each person with whom it contracts to provide services on a project, to:

(1) provide coverage, based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements, which meets the statutory requirements of Texas Labor Code, Section 401.011(44) for all of its employees providing services on the project, for the duration of the project;

(2) provide to the contractor, prior to that person beginning work on the project, a certificate of coverage showing that coverage is being provided for all employees of the person providing services on the project, for the duration of the project;

(3) provide the contractor, prior to the end of the coverage period, a new certificate of coverage showing extension of coverage, if the coverage period shown on the current certificate of coverage ends during the duration of the project;

(4) obtain from each other person with whom it contracts, and provide to the contractor:

(i) a certificate of coverage, prior to the other person beginning work on the project; and

(ii) a new certificate of coverage showing extension of coverage, prior to the end of the coverage period, if the coverage period shown on the current certificate of coverage ends during the duration of the project;

(5) retain all required certificates of coverage on file for the duration of the project and for one year thereafter;

(6) notify the City in writing by certified mail or personal delivery, within 10 days after the person knew or should have known, of any change that materially affects the provision of coverage of any person providing services on the project; and

(7) contractually require each person with whom it contracts, to perform as required by paragraphs (1) - (7), with the certificates of coverage to be provided to the person for whom they are providing services.

(j) By signing the contract or providing or causing to be provided a certificate of coverage, the selected contractor is representing to the City that all employees of the contractor who will provide services on the project will be covered by workers' compensation coverage for the duration of the project, that the coverage will be based on proper reporting of classification codes and payroll amounts, and that all coverage agreements will be filed with the appropriate insurance carrier or, in the case of a self-insured, with the Division’s section of Self-Insurance Regulation. Providing false or misleading information may subject the contractor to administrative penalties, criminal penalties, civil penalties, or other civil actions.

(k) The selected contractor's failure to comply with any of these provisions is a breach of contract by the contractor which entitles the City to declare the contract void if the contractor does not remedy the breach within ten days after receipt of notice of breach from the City.

ATTACHMENT 1

This Page is reserved for Respondent's Proposal.

Reference XIV for details required.

ATTACHMENT 2

RESPONDENT QUESTIONNAIRE

PART A - GENERAL INFORMATION

1. **Respondent Information:** Provide the following information regarding the Respondent.
   (NOTE: Co-Respondents are two or more entities proposing as a team or joint venture with each signing the contract, if awarded. Sub-contractors are not Co-Respondents and should not be identified here. If this proposal includes Co-Respondents, provide the required information in this Item #1 for each Co-Respondent by copying and inserting an additional block(s) before Item #2.)

   Respondent Name: _____
   (NOTE: Give exact legal name as it will appear on the contract, if awarded.)

   Principal Address: _____

   City: _____ State: _____ Zip Code: _____

   Telephone No. _____ Fax No: _____

   Social Security Number or Federal Employer Identification Number: _____

   Texas Comptroller's Taxpayer Number, if applicable: _____
   (NOTE: This 11-digit number is sometimes referred to as the Comptroller's TIN or TID.)

   Business Structure: Check the box that indicates the business structure of the Respondent.

   ☐ Individual or Sole Proprietorship If checked, list Assumed Name, if any: _____
   ☐ Partnership
   ☐ Corporation If checked, check one: ☐ For-Profit ☐ Nonprofit
   Also, check one: ☐ Domestic ☐ Foreign
   ☐ Other If checked, list business structure: _____

   Printed Name of Contract Signatory: _____
   (NOTE: This RFCSP solicits proposals to provide services under a contract which has been identified as "High Profile". Therefore, Respondent must provide the name of person that will sign the contract for the Respondent, if awarded.)

2. **Contact Information:** List the one person who the City may contact concerning your proposal or setting dates for meetings.

   Name: _____

   Address: _____

   City: _____ State: _____ Zip Code: _____

   Telephone No. _____ Fax No: _____

   Email: _____

3. Does Respondent anticipate any mergers, transfer of organization ownership, management reorganization, or departure of key personnel within the next twelve (12) months?

   Yes ☐ No ☐

4. Is Respondent authorized and/or licensed to do business in Texas?

   Yes ☐ No ☐ If "Yes", list authorizations/licenses.

   _____

   _____

5. Where is the Respondent's corporate headquarters located? _____

6. **Local Operation:** Does the Respondent have an office located in San Antonio, Texas?

   Yes ☐ No ☐ If "Yes", respond to a and b below:

   a. How long has the Respondent conducted business from its San Antonio office?

      Years _____ Months_____

   b. State the number of full-time employees at the San Antonio office. _____

7. **County Operation:** If the Respondent does not have a San Antonio office, does the Respondent have an office located in Bexar County, Texas?

   Yes ☐ No ☐ If "Yes", respond to a and b below:

   a. How long has the Respondent conducted business from its Bexar County office?

      Years _____ Months_____

   b. State the number of full-time employees at the Bexar County office. _____

8. **Debarment/Suspension Information:** Has the Respondent or any of its principals been debarred or suspended from contracting with any public entity?

   Yes ☐ No ☐ If "Yes", identify the public entity and the name and current phone number of a representative of the public entity familiar with the debarment or suspension, and state the reason for or circumstances surrounding the debarment or suspension, including but not limited to the period of time for such debarment or suspension.

   _____

   _____

9. **Surety Information:** Has the Respondent ever had a bond or surety canceled or forfeited?

   Yes ☐ No ☐ If "Yes", state the name of the bonding company, date, amount of bond and reason for such cancellation or forfeiture.

   _____

   _____

10. **Bankruptcy Information:** Has the Respondent ever been declared bankrupt or filed for protection from creditors under state or federal proceedings?

    Yes ☐ No ☐ If "Yes", state the date, court, jurisdiction, cause number, amount of liabilities and amount of assets.

    _____

    _____

11. Provide any other names under which Respondent has operated within the last 10 years.

    _____

    _____

PART B - REFERENCES - Provide three (3) references. The references must be for projects Respondent has listed in response to Question #1 in Part C of this Respondent Questionnaire.

Reference No. 1:

Firm/Company Name:_____

Contact Name: _____ Title: _____

Address: _____

City:_____State:_____Zip Code:_____

Telephone No. _____Fax No: _____

Email: _____

Reference No. 2:

Firm/Company Name:_____

Contact Name: _____ Title: _____

Address: _____

City:_____State:_____Zip Code:_____

Telephone No. _____Fax No: _____

Email: _____

Reference No. 3:

Firm/Company Name:_____

Contact Name: _____ Title: _____

Address: _____

City:_____State:_____Zip Code:_____

Telephone No. _____Fax No: _____

Email: _____

PART C - EXPERIENCE, BACKGROUND, QUALIFICATIONS - Prepare and submit narrative responses to address the following items. If Respondent is proposing as a team or joint venture, provide the same information for each member of the team or joint venture.

1. Describe Respondent's experience relevant to the Scope of Services requested by this RFCSP. List and describe three relevant projects of similar size and scope performed over the past four years. Identify associated results or impacts of the project/work performed.

2. Indicate the number of years Respondent has been in the business of providing ATMS, respectively. Indicate if this is the Respondent's primary line of business. If not, state the Respondent's primary line of business.

3. List all ATMS projects that the Respondent has completed in the last four years.

4. List all ATMS projects that Respondent has in progress as of the proposal due date. For each project listed, give the target date of completion, and the contact name, phone number, and email address for the Authority or City.

5. Describe Respondent's specific experience with public entities clients, especially large municipalities or authorities. If Respondent has provided services for the City in the past, identify the name of the project and the department for which Respondent provided those services.

6. If Respondent is proposing as a team or joint venture or has included sub-contractors, describe the rationale for selecting the team and the extent to which the team, joint ventures and/or sub-contractors have worked together in the past.

7. Provide an organizational chart showing how the Respondent proposes to staff the project. For each position reflected on the organizational chart:

    - identify the number and professional qualifications (to include licenses, certifications, associations)
    - identify relevant experience on projects of similar size and scope
    - state the primary work assignment and the percentage of time to be devoted to the project.

8. Additional Information. Identify any other relevant information about the Respondent's qualifications.

ATTACHMENT 3
City of San Antonio Discretionary Contracts Disclosure

For use of this form, see Section 2-59 through 2-61 of the City Code (Ethics Code)
Attach additional sheets if space provided is not sufficient.

(1) Identify any individual or business entity[3] that is a **party** to the discretionary contract:

(2) Identify any individual or business entity which is a ***partner***, ***parent*** or ***subsidiary*** business entity, of any individual or business entity identified above in Box (1):
☐ **No partner, parent or subsidiary; *or***   **List partner, parent or subsidiary of each party to the contract and identify the corresponding party:**

(3) Identify any individual or business entity that would be a ***subcontractor*** on the discretionary contract.
☐ **No subcontractor(s); *or***   **List subcontractors:**

(4) Identify any ***lobbyist*** or ***public relations firm*** employed by any party to the discretionary contract for purposes related to seeking the discretionary contract.
☐ **No lobbyist or public relations firm employed; *or***   **List lobbyists or public relations firms:**

[3] A *business entity* means a sole proprietorship, partnership, firm, corporation, holding company, joint-stock company, receivership, trust, unincorporated association, or any other entity recognized by law. A sole proprietor should list the name of the individual and the d/b/a, if any.

(5) Political Contributions

List all political contributions totaling one hundred dollars ($100) or more within the past twenty-four (24) months made to any *current* or *former member* of City Council, any *candidate* for City Council, or to any *political action committee* that contributes to City Council elections, by any individual or business entity whose identity must be disclosed under Box (1), (2), (3) or (4) above, or by the officers, owners of any business entity listed in Box (1), (2) or (3):

☐ **No contributions made; If contributions made, list below:**

By Whom Made:	To Whom Made:	Amount:	Date of Contribution:

(6) Disclosures in Proposals

Any individual or business entity seeking a discretionary contract with the city must disclose any known facts which, reasonably understood, raise a question[4] as to whether any city official or employee would violate Section 2-43 of the City Code (Ethics Code), ("conflicts of interest") by participating in official action relating to the discretionary contract.

☐ **Party not aware of facts which would raise a "conflicts-of-interest" issue under Section 2-43 of the City Code; or**

Party aware of the following facts:

This form is required to be supplemented in the event there is any change in the information before the discretionary contract is the subject of council action, and no later than five (5) business days after any change about which information is required to be filed, whichever occurs first.

Signature:	Title: Company or D/B/A:	Date:

[4] For purposes of this rule, facts are "reasonably understood" to "raise a question" about the appropriateness of official action if a disinterested person would conclude that the facts, if true, require recusal or require careful consideration of whether or not recusal is required.

ATTACHMENT 4

LITIGATION DISCLOSURE

Failure to fully and truthfully disclose the information required by this Litigation Disclosure form may result in the disqualification of your proposal from consideration or termination of the contract, once awarded.

1. Have you or any member of your Firm or Team to be assigned to this engagement ever been indicted or convicted of a felony or misdemeanor greater than a Class C in the last five (5) years?

   Circle One YES NO

2. Have you or any member of your Firm or Team to be assigned to this engagement been terminated (for cause or otherwise) from any work being performed for the City or any other Federal, State or Local Government, or Private Entity?

   Circle One YES NO

3. Have you or any member of your Firm or Team to be assigned to this engagement been involved in any claim or litigation with the City or any other Federal, State or Local Government, or Private Entity during the last ten (10) years?

   Circle One YES NO

If you have answered "Yes" to any of the above questions, please indicate the name(s) of the person(s), the nature, and the status and/or outcome of the information, indictment, conviction, termination, claim or litigation, as applicable. Any such information should be provided on a separate page, attached to this form and submitted with your proposal.

ATTACHMENT 5

SMALL BUSINESS ECONOMIC DEVELOPMENT ADVOCACY (SBEDA) POLICY

1. Small Business Participation

Pursuant to Ordinance No. 2007-04-12-0396, it is the policy of the City of San Antonio to involve Small, Minority, Women and African-American Owned Business Enterprises (S/M/W/AABE) to the greatest extent feasible in the City's discretionary contracts. The intent and purpose of the policy is to ensure that S/M/W/AABE firms have the opportunity to compete for City contracts without discrimination on the basis of race, color, religion, national origin, age, sex or handicap. To accomplish the objectives of the Small Business policy, the City has established specific goals for local S/M/W/AABE participation in this contract.

2. **DEFINITIONS** related to the Small Business Program Provisions:

a. **Small Business Program:** the Small Business Economic Development Advocacy (SBEDA) Program governed by this ordinance and managed by the SMALL BUSINESS Program Office.

b. **Small Business Enterprises (SBE):** a corporation, partnership, sole proprietorship or other legal entity, for the purpose of making a profit, which is independently owned and operated and which meets the U.S. Small Business Administration (SBA) size standard for a small business. All firms meeting these thresholds will be considered an SBE.

c. **Local Business Enterprise (LBE):** a corporation, partnership, sole proprietorship, or other legal entity which is headquartered within Bexar County for at least one year. For a branch office of a non-headquartered business to qualify as an LBE, the branch office must be located in Bexar County for at least one year and employ a minimum of ten (10) residents of Bexar County for use at the local branch office.

d. **Minority Business Enterprise (MBE):** a sole proprietorship, partnership, or corporation owned, operated, and controlled by a minority group member(s) who has at least 51% ownership. The minority group member(s) must have operational and managerial control, interest in capital, expertise and earnings commensurate with the percentage of ownership and be legal residents or citizens of the United States or its territories. To qualify as an MBE, the enterprise shall be headquartered in Bexar County or the San Antonio Metropolitan Statistical Area (SAMSA) for any length of time, or shall be doing business in a locality or localities from which the City regularly solicits, or receives bids on or proposals for, City contracts within the MBES's category of contracting for at least one year.

e. **Woman Business Enterprise (WBE):** a sole proprietorship, partnership, or corporation owned, operated and controlled by women who have at least 51% ownership. The woman or women must have operational and managerial control, interest in capital, expertise and earnings commensurate with the percentage of ownership and be legal residents or citizens of the United States or its territories. To qualify as a WBE, the enterprise shall be headquartered in Bexar County or the SAMSA for any length of time or shall be doing business in a locality or localities from which the City regularly solicits or receives bids on or proposals for, City contracts within the WBE's category of contracting for at least one year.

f. **African-American Business Enterprise (AABE):** a sole proprietorship, partnership, or corporation owned, operated and controlled by an African-American group member(s) who has at least 51% ownership. The African-American group member(s) must have operational and managerial control,

interest in capital, expertise and earnings commensurate with the percentage of ownership and be legal residents or citizens of the United States or its territories. To qualify as an AABE, the enterprise shall be headquartered in Bexar County or the SAMSA for any length of time or shall be doing business in a locality or localities from which the City regularly solicits, or receives bids on or proposals for, City contracts within the AABE's category of contracting for at least on year.

3. Goals for Small Business Participation

The goals for the utilization and participation of SBE-MBE-WBE-AABE businesses on this contract are as follows:

MBE	**15%**
WBE	**10%**
AABE	**3%**
SBE	**50%**

Please note that a small business could be classified in multiple categories and thus their utilization could in theory be counted in each category of goals. For example, **Prime Contractor X** submits a proposal, which specifies that they intend to subcontract with Subcontractor A for 10% of the contract. Subcontractor A is certified by the City as an SBE and MBE (a male-owned Hispanic Business owner can be certified as an SBE and MBE). **Prime Contractor X** also intends to subcontract with Subcontractor B for 13% of the contract. Subcontractor B is certified by the City as SBE, MBE and a WBE (a female-owned Hispanic Business owner can be certified as SBE, MBE and WBE). In addition**, Prime Contractor X** also intends to subcontract 10% of the contract to Subcontractor C—a City-certified SBE, MBE and AABE (a male-owned African-American business owner can be certified as both a MBE and as an AABE Business). **Prime Contractor X** is also classified as a local SBE. **Prime Contractor X's** compliance with the Small Business goals under this scenario would be as follows:

	City's Small Business Goals	Prime Contractor X's Compliance
MBE	15%	33%
WBE	10%	13%
AABE	3%	10%
SBE	50%	100%

Under this scenario, the contractor would be in full compliance with the Small Business policy.

Another example regarding compliance with the policy is as follows: **Prime Contractor Y** submits a proposal, which specifies that they intend to partner through a joint-venture agreement with Company D. Company D is certified by the City as both an SBE and MBE (a male-owned Hispanic Business—certified as an SBE and MBE). As part of their joint-venture agreement, Company D will perform on 32.5% of the contract. **Prime Contractor Y** also intends to subcontract 13% of the contract with Subcontractor F. Subcontractor F is a City certified SBE/MBE/WBE and AABE business. **Prime Contractor Y** is also classified as a local SBE.

Prime Contractor Y compliance with the Small Business goals would be as follows:

	City's Small Business Goals	Prime Contractor Y's Compliance
MBE	15%	45.5%
WBE	10%	13%
AABE	3%	13%
SBE	50%	100%

Under this scenario, the contractor would be in full compliance with the Small Business policy.

4. Good Faith Effort Required

Proposals shall include a Good Faith Effort Plan (GFEP—ATTACHED). The GFEP shall include specific documentation to utilize local, small, MBE-WBE-AABE businesses in a percentage, which equals or exceeds the above goals. **Any proposal that does not include the GFEP form shall be declared non-responsive, and excluded from consideration.**

5. MBE-WBE-AABE Certification Required

Only companies certified as MBE, WBE or AABE through the South Central Texas Regional Certification Agency (SCTRCA), or as approved by the City of San Antonio Director of Economic Development, can be applied towards the contracting goals. Proof of certification must be submitted.

6. Small Business Program Information

Interested contractors/respondents are encouraged to contact the Small Business Outreach Office for information regarding the City's Small Business Program Policy in accordance with the City's Communication Policy outlined in the solicitation document. Please call (210) 207-3900 or FAX: (210) 207-3909.

GOOD FAITH EFFORT PLAN

NAME OF PROJECT: _____

BIDDER/RESPONDENT INFORMATION:

Name of Bidder/Respondent: _____

Address: _____

City: _____ State: _____ Zip Code: _____

Telephone: _____ E-mail Address:_____

Is your firm certified? ____ Yes _____ No (If yes, please submit Certification Certificate.)

1. List all subcontractors/suppliers that will be used for this contract. (Indicate all MBEs-WBEs-AABEs-SBEs. Use additional sheets as needed.)

NAME AND ADDRESS OF SUBCONTRACTOR'S/SUPPLIER'S COMPANY	CONTRACT AMOUNT	% LEVEL OF PARTICIPATION	MBE-WBE-AABE-SBE CERTIFICATION NUMBER

Only companies certified as an MBE, WBE, AABE or SBE by the City of San Antonio or its certifying organization can be applied toward the contracting goals. All MBE-WBE-AABE-SBE subcontractors or suppliers must submit a copy of their certification certificate through the Prime Contractor. Proof of certification must be attached to this form. If a business is not certified, please call the Small Business Program Office at (210) 207-3900 for information and details on how subcontractors and suppliers may obtain certification.

It is understood and agreed that, if awarded a contract by the City of San Antonio, the Contractor will not make additions, deletions, or substitutions to this certified list without consent of the Director of Economic Development and Director of the appropriate contracting department (through the submittal of the Request for Approval of Change to Original Affirmed List of Subcontractors/Suppliers form).

NOTE: If MBE-WBE-AABE-SBE contracting goals were met, skip to #9.

2. If MBE-WBE-AABE-SBE contracting goals were not achieved in a percentage that equals or exceeds the City's goals, please give explanation.

_____

_____

_____

3. List all MBE-WBE-AABE-SBE Listings or Directories utilized to solicit participation.

_____

_____

_____

4. List all contractor associations and other associations solicited for MBE-WBE-AABE-SBE referrals.

_____

_____

_____

5. Discuss all efforts aimed at utilizing MBE-WBE-AABE-SBE's.

_____

_____

_____

6. Indicate advertisement mediums used for soliciting bids from MBE-WBE-AABE-SBEs.

_____

_____

_____

7. List all MBE-WBE-AABE-SBE bids received but rejected. (Use additional sheets as needed.)

COMPANY NAME	MBE-WBE-AABE-SBE CERTIFICATION NUMBER	REASON FOR REJECTION

8. Please attach a copy of your company's MBE-WBE-AABE-SBE policy.

9. Name and phone number of person appointed to coordinate and administer the Good Faith Efforts of your company on this project.

_____

_____

10. This Good Faith Effort Plan is subject to the Economic Development Department's approval.

AFFIRMATION

I HEREBY AFFIRM THAT THE ABOVE INFORMATION IS TRUE AND COMPLETE TO THE BEST OF MY KNOWLEDGE AND BELIEF. I FURTHER UNDERSTAND AND AGREE THAT, IF AWARDED THE CONTRACT, THIS DOCUMENT SHALL BE ATTACHED THERETO AND BECOME A BINDING PART OF THE CONTRACT.

_____

SIGNATURE OF AUTHORIZED OFFICIAL

_____

TITLE OF OFFICIAL

_____

DATE PHONE

****

FOR CITY USE

Plan Reviewed By:_____

Recommendation: Approval_____ Denial_____

Action Taken: Approved_____ Denied_____

_____

DIRECTOR OF ECONOMIC DEVELOPMENT

ATTACHMENT 6

PRICE SCHEDULE

Item No.	Description	Unit	Quantity	Unit Price	Total Price
	SOFTWARE				
1	Local Controller Software Site License	L.S.	1		
2	ATMS Central Software	L.S.	1		
3	Additional Software mods & Lic.	TBD	1		
4	Other Required Software (list separately)	L.S.	1		
5	MS Windows 2003 Server	L.S.	1		
6	MS SQL Server	L.S.	1		
TOTAL SOFTWARE					
	CONTROLLERS				
7	Model 2070L	Each	275		
8	Conflict Monitors (2010)	Each	275		
TOTAL CONTROLLERS					
	HARDWARE				
9	Controller Interface Device Tester	Each	5		
10	Mobile Maintenance Unit	Each	20		
11	Operator Workstation	Each	5		
12	Printer (Color)	Each	3		
13	Database Server	Each	1		
14	Communications Server	Each	1		
15	UPS for Rack	Each	1		
16	Layer 3 Routing Switch	Each	1		
17	Video Display Unit (LED/LCD)(42")	Each	2		
18	Rack	Each	1		
TOTAL HARDWARE					
	SYSTEM INTEGRATION SERVICES				
19	Project Oversight (project management)	L.S.	1		
20	Provide software/hardware specifications	L.S.	1		
21	Systems Requirement Document	L.S.	1		
22	Approval of communication network design	L.S.	1		
23	Install central system software	L.S.	1		
24	Acceptance test plan (preliminary and final)	L.S.	1		
25	Execution of Acceptance Test Plan	L.S.	1		

26	Development of Graphics	L.S.	1		
27	Installation of Hardware	L.S.	1		
28	Training	L.S.	1		
29	Documentation	L.S.	1		
30	Maintenance	Year	1		
TOTAL SYSTEM INTEGRATION SERVICES					
	COST SUMMARY				
	Software				
	Hardware				
	System Integration Services				
TOTAL PRICE					
	OPTIONAL COSTS				
	Additional Model 2070L controllers (qty 1-250)	Each	250		
	Additional Model 2070L controllers (qty 250-500)	Each	250		
	Additional Model 2070L controllers (qty 501-750)	Each	250		
	Additional Model 2070L controllers (qty 751-1000)	Each	250		
	Additional Conflict Monitors (Model 2010)(qty 1-250)	Each	250		
	Additional Conflict Monitors (Model 2010)(qty 251-500)	Each	250		
	Additional Conflict Monitors (Model 2010)(qty 501-750)	Each	250		
	Additional Conflict Monitors (Model 2010)(qty 751-1000)	Each	250		
	Installation of Controller and Monitors (Per 50 Units)	Each	5		
	Cabinet Change-Outs	Each	5		
	On-Call Support	F.A.	TBD		
	Additional Storage of Controller Units	Each	250		
TOTAL OPTIONAL COSTS					

ATTACHMENT 7

SIGNATURE PAGE

The undersigned certifies that (s)he is authorized to submit this Proposal on behalf of the entity named below:

_____
Respondent Entity Name

Signature: _____

Printed Name: _____

Title: _____

(NOTE: If Proposal is submitted by Co-Respondents, an authorized signature from a representative of each Co-Respondent is required. Add additional signature blocks as required.)

_____
Co-Respondent Entity Name

Signature: _____

Printed Name: _____

Title: _____

By signature(s) above, Respondent(s) agrees to the following:

1. If Respondent is a corporation, Respondent will be required to provide a certified copy of the resolution evidencing authority to enter into the contract, if other than an officer will be signing the contract.
2. If awarded a contract in response to this RFCSP, Respondent will be able and willing to comply with the requirements set out Exhibit B, Exhibit C, Exhibit D, Exhibit D-1, and Exhibit E to the RFCSP.
3. If awarded a contract in response to this RFCSP, Respondent will be able and willing to comply with all representations made by Respondent in Respondent's Proposal and during Proposal process.
4. Respondent has fully and truthfully submitted a Litigation Disclosure form with the understanding that failure to disclose the required information may result in disqualification of proposal from consideration.
5. Respondent agrees to fully and truthfully submit a Respondent Questionnaire and understands that failure to fully disclose requested information may result in disqualification of proposal from consideration or termination of contract, once awarded.
6. To comply with the City's Ethics Code, particularly Section 2-61 that prohibits a person or entity seeking a City contract - or any other person acting on behalf of such a person or entity - from contacting City officials or their staff prior to the time such contract is posted as a City Council agenda item.

ATTACHMENT 8

PROPOSAL CHECKLIST

This checklist is to help the Respondent ensure that all required documents have been included in its proposal.

Tab in Proposal	Document	Check or Initial to Indicate Document is Attached To Proposal
	Table of Contents	
A	Respondent Proposal , Attachment 1	
B	Respondent Questionnaire, Attachment 2	
C	*Discretionary Contracts Disclosure, Attachment 3	
D	Litigation Disclosure , Attachment 4	
E	*Good Faith Effort Plan, Attachment 5	
F	Pricing Schedule, Attachment 6	
G	Proof of Insurability, Exhibit E 1. Insurance Certificate 2. Broker Letter	
H	*Signature Page, Attachment 7	
I	Proposal Checklist, Attachment 8	
	One (1) Original and Thirteen (13) Copies of the Proposal	

***Documents marked with an asterisk on this checklist require a signature. Be sure they are signed prior to submittal of proposal.**