CITY OF PETALUMA

POST OFFICE BOX 61
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ADDENDUM NO. 1

Traffic Signal Timing Improvements
City Project No. C16102038

August 2019, 2019

This Addendum No. 1 modifies the RFP as shown on the attachment in track changes.

Jeff Stutsman, P.E.,
Senior Civil Engineer

Public Works & Utilities Department

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August 19, 2019

~~August 8, 2019~~August 19, 2019

Re: Addendum #1
~~-~~REQUEST FOR PROPOSAL (RFP) FOR PROCUREMENT OF ADVANCED TRAFFIC MANAGEMENT SYSTEM (ATMS), SERVICES AND SUPPORT

1. INTRODUCTION

The City of Petaluma's Department of Public Works & Utilities is requesting a Proposal is for the procurement of an advanced traffic management system (ATMS), capable of monitoring and synchronizing traffic signals in the City of Petaluma, including performance monitoring and adaptive control capabilities~~.~~

The City looks forward to receiving well-thought-out proposals from consultants/vendors who specialize in Traffic Management Systems.

At the end of the evaluation, submittals will be ranked according to point scores in Attachment A. A Purchase Order may be issued to the product vendor with the highest total points, at the City's discretion.

2. SCHEDULE, LOCATION, CONTACT

The City would like to set the following schedule for Proposal submittal:

Issuance of Proposal	August 8, 2019
Deadline for questions:	August 26, 2019
Deadline for submittal:	August 29, 2019
Vendor Interviews	September 2019
Award of Contract:	October of 2019

Submit Proposals (Electronically Only) to:
Jeff Stutsman, PE
Senior Civil Engineer
Jstutsman@cityofpetaluma.org where they will be logged and time stamped

For questions regarding this RFP, please direct to:
Jeff Stutsman
Jstutsman@cityofpetaluma.org
707-776-3673

3. BACKGROUND

The City of Petaluma has 51 intersections not including 11 Caltrans owned intersection and 1 County owned intersection within the City Limits. The 51 intersection communicate back to public work via 900 mHz broadband radios. The City currently utilizes McCain's QuicNet Pro software for its Advanced Traffic Management System. The City is looking to update its current software to a more advanced software that can manage the growing needs of the City. The procurement of the central traffic management system is part of a larger vision to synchronize the traffic signals and improve reliability. Ultimately, the City desires to move away from the existing radios and utilize fiber interconnect and higher broadband radios to connect all 51 intersection to bring back video data. The City is interested in adaptive control capabilities of the software but there wont be implementing on any corridors with this project.

4. PROCUREMENT PROCESS

The procurement process is based on the following criteria to fully evaluate your products:

- ATMS Features
- System ~~Demonstration~~Presentation
- References
- Cost

Please refer to Attachment A for the required project specifications.

4.1 ATMS Features

The City is looking for an ATMS with performance monitoring and adaptive capabilities. A verification of this criterion will be based on staff evaluations and product demonstrations. The attached summary table "ATMS Feature Summary" shall be filled out and submitted with the proposal. Features that are labeled "Partial" shall be described in the Explanation column, or noted in a separate document.

ATMS Feature Summary			
Section	**Requirements**	**Meet Req (Y/N/Partial)**	**Explanation**
A3.1	**Traffic Management Functions**		
A3.1.1	Minimum Required System Performance		
A3.1.2	Communications Standards and Interfaces		
A3.1.3	Displays and System Functionality		
A3.1.4	System Wide Map Displays		
A3.1.5	Device Lists		
A3.1.6	Groups		
A3.1.7	Signal Control Source		

ATMS Feature Summary			
Section	**Requirements**	**Meet Req (Y/N/Partial)**	**Explanation**
A3.1.8	Time-Space Diagram		
A3.1.9	Traffic Controller Timing Editor		
A3.1.10	Real-time Status Display for Individual Intersections		
A3.1.11	Event Notifications		
A3.1.12	Failure Notification		
A3.1.13	Central Scheduler		
A3.1.14	Security		
A3.1.15	Preemption and Priority		
A3.2	**Modes of Operation**		
A3.2.1	Time of Day Schedule		
A3.2.2	Pedestrians		
A3.2.2	Non-Adaptive Situations		
A3.2.4	System Responsiveness		
A3.2.5	Complex Coordination and Controller Features		
A3.2.6	Monitoring and Control		
A3.2.7	Traffic Responsive Operations		
A3.2.8	Traffic Adaptive Operations		
A3.2.8.1	Network Characteristics		
A3.2.8.2	Cycle Length Optimization		
A3.2.8.3	Phase Split Optimization		
A3.2.8.4	Offset Optimization		
A3.2.8.5	Benefit Requirements for Adaptive		
A3.3	**Access and Security**		
A3.3.1	User Access		
A3.4	**Event Logs and Reports**		
A3.4.1	System Event Logs		
A3.4.2	Performance Reporting		
A3.4.2.1	Volume Occupancy Speed Reports		
A3.4.2.2	Split Measures of Effectiveness		
A3.4.2.3	Turning Count Movement Report		
A3.4.2.4	Peak Hour Volume Report		
A3.5	**System Integration and Training**		
A3.6	**System Demonstration**		

5. SUBMITTAL REQUIREMENTS

A. Proposal Format

Proposals should be structured as outlined below. Proposals not following this format may be deemed non-responsive and eliminated from further consideration.

Proposals are to include:

- A cover letter, signed by an individual authorized to negotiate on behalf of the firm and must be binding for a term of 90 days from date of submittal to the City.

- An introduction, conveying a clear and concise understanding of project scope, understandings and objectives. Project tasks shall also be stated and described as well as how they relate to achieving the project scope

- The proposal shall specifically indicate what products the consultant intends to utilize in undertaking each phase of work and how such work will be incorporated in the final deliverable. The descriptions shall be in sufficient detail to permit evaluation of the relative merits of the analysis and procedures.

- The identification of each proposed subcontractor (if any), if any, its tasks, schedule, costs, etc, shall be included. The form and content of all subcontractor provided products shall be described in detail. Subcontracts must also meet all requirements requested of the selected Consultant and be approved by the City.

- A project schedule shall indicate the logical breakdown of project tasks and completion deadlines. It should be designed to provide time for staff input. The Consultant should specify all scheduled meetings with staff. The schedule shall indicate all milestones, the critical path necessary for the project, and the anticipated completion timeframe upon notice to proceed.

- Consultants are requested to submit Proposal Costs in a "menu" formant to permit item by item cost identification. The costs shall be presented in a format that allows identification of total costs for the overall project. The budget should contain all cost assumptions including the number of hours for each team member, hourly billing rates, estimated costs of other items (travel, printing, etc.), subtotal of fees by task and a grand total (labor and direct costs) to complete the scope of work. If costs are based on a fixed number of meetings, cost of additional meetings should be itemized. The cost for preparation of the deliverables shall be separately identified. The proposed costs shall be submitted in a separate sealed envelope identified as such.

- Related experience and references – the material submitted in the response to the Request for Qualifications will be reviewed in conjunction with the review of the proposals and need not be provided again, unless updated information is available.

B. Award of Contract

A purchase order will be issued with the selected firm.

C. Proposal Submittal

Proposals shall be submitted electronically via email to Jstutsman@cityofpetaluma.org where they will be logged and time stamped. Proposals should be addressed to:

Jeff Stutsman, PE
Senior Civil Engineer

Proposals must be received no later than August 29, 2019 at 5:00 p.m.

The City reserves the right to reject all proposals if deemed unsuitable. Late or incomplete submittals will not be considered, and the City reserves the right to determine the completeness of proposals. The City is not responsible for the costs of preparing or delivering the proposals.

Questions regarding this Request for Proposal should be submitted in writing to Jeff Stutsman at Jstutsman@cityofpetaluma.org. The closing date for receipt of written questions is August 26, 2019 at 5:00 p.m. All questions and responses will be posted as an addendum to the RFP on the City's website.

Attachment A: Standard Specifications

Sincerely,

Jeff Stutsman, P.E.
Senior Civil Engineer

ADDENDUM #1 (8/19/2019)
ATTACHMENT A

Traffic Signal Timing Improvements C16102038

A1: LOCATION

Location of work is within the City of Petaluma.

1. The Traffic Management System will be located at a 202 North McDowell Boulevard

This project consists of selecting and procuring Advanced Traffic Management System (ATMS) software, procurement and installation of appurtenant equipment, connection and integration of the software and hardware in the Traffic Management Center. The Traffic Signal System shall be a complete and fully functional system that is fully integrated with the systems that comprise the Traffic Management Center. The ATMS shall be connected and communicating with all the intersections and field equipment that have communication.

A2: EXISTING CONDITIONS

The City of Petaluma is located in Sonoma County along the US-101 corridor The City currently operates and maintains 51 signalized intersections controlled by Model 170E which are housed in in Caltrans-style Type 332 cabinets. The remainder are Model 170E controller units running McCain ~~200SA, 200CA or 233~~233 and 233MC1 software. There are an additional 11 signalized intersections at Caltrans intersections, owned and operated by Caltrans and 1 intersection owned and operated by the County of Sonoma, which are not part of the project.

The City currently has Opticom GPS for transit signal priority at 34 intersections. The City currently does have emergency vehicle preemption GTT Opticom implemented at 51 intersection (many are non-operable) and the city has 2 intersection with railroad preemption. The current pre-empt operation must be accommodated in the new ATMS, at a minimum, in the form of system capability to report times, directions, and input duration when pre-empt inputs are received and traffic signal response information.

Communications infrastructure is currently limited to 900MHz radio at all 51 intersections. The City is exploring option to deploy fiber through various city projects, developments and other outside resources. The only existing interconnect in the City is along Sonoma Mountain parkway between Corona Road to Rainier Avenue. Eventually this will utilized for fiber installation.

The City is currently upgrading detection through out town to replace loop detection with video which includes Iteris and older Trafficon and other systems. Video detection is being updated as loops fail, upcoming City construction projects and development projects.

Relevant information about City facilities is summarized as follows:

- Public Works and Utilities is located at 202 North McDowell Boulevard. This building may be utilized for the traffic management center. The City is currently extending Fiber to all the City owned buildings
- The Current ATMS and server is located at 555 North McDowell Boulevard (Transit Facility)
- The space to be dedicated for the system may be as small as 8’ x 10’.

A3: SCOPE OF WORK

Project Summary:

The selected vendor shall furnish and install the following:

- An Advanced Traffic Management System (ATMS) to be housed at 202 North McDowell Boulevard , capable of managing up to 55 signalized intersections.

A3.1: SPECIFICATIONS FOR ATMS

This specification sets forth minimum requirements for a TCP/IP based client/server application providing multi-user access to traffic signal and related field devices as part of an overall Advanced Traffic Management System (ATMS). A detailed communications system interfacing the ATMS with the field devices is not provided in this specification, except for a description of existing equipment. However, the ATMS shall be capable of supporting both asynchronous and Ethernet based data communications that comply with current NTCIP specifications.

The primary field devices supported by this specification shall include traffic signal controllers that comply with Caltrans TEES 170E based controllers, 2070, and 2070N specifications. The ATMS shall support the functional requirements of these devices incorporated into the system.

A3.1.1: *Minimum Required System Performance:*

- System-wide, corridor, or user-specified grouping adaptive signal coordination
- Continuous central system monitoring of all controllers
    - As often as once-per-second
- Central system transmits and receives status data (once-per-second) to all local controllers
- Operational failure logging, indicating control and communications failures by date, times of occurrence and location of failure.
- Real-time status including phase status, mode of operation, and equipment status, displayed on system or laptop monitor.
- Historical status information including coordination status, cycle length by time-of-day, to be stored for a minimum of seven calendar days.
- System level status display with real-time information in graphic form using user-provided graphic maps, Bing or Google Maps for all intersections. Displays shall include main street phase status and real- time signal operation status.
- Intersection status displays with real-time information in both tabular and graphic form for operator selected intersections. Displays shall include vehicle and pedestrian signal phase status, flash status, local and master cycle timers, preempt on or off and the operational plan mode in effect.
- Automatic uploading and downloading of all controller timing data parameters to/from field controllers via the communications network

- Central-distributed topology that allows operation of free or time-of-day coordination at the controller level in case of communications failure.
- In the event of ATMS master failure, operation after restoration of proper function shall be time-of-day/day-of-week.
- Automatic reporting of user-specified failures and malfunction
- Controller data base management
- The system shall support the viewing of CCTV and Video detection video streams over RTSP.
- The system shall permit users to broadcast date/time to any number of signal controllers defined in the system.

A3.1.2: *Communication Standards and Interfaces*

NTCIP Communications for Actuated Signal Controllers

- The system shall support the use of dynamic objects via NTCIP 1103.
- The system shall support mandatory NCTIP 1201 objects.
- The system shall support mandatory and optional NTCIP 1202 objects.

Other proprietary communications to support existing equipment or messaging not supported by NTCIP.

NTCIP Communications for Center-to-Center Interfaces

- The system shall support center-to-center communication via NTCIP 2306 (TMDD).
- The system shall support center-to-center communications for ICMS applications.

Center-to-Center Communications for Connected Vehicle Applications.

- The system shall support a standard interface for connected vehicle applications/subscribers.
- The system shall support an interface to “Traffic Technology Services (TTS)”
- The system shall support an interface to “Connected Signals, Inc”
- The system shall support an interface to “LiveTrafficData, LLC”

A3.1.3: *Displays and System Functionality*

Graphical User Interface (GUI):

- The user interface shall be intuitive and provide a uniform and consistent scheme of buttons, menus, and forms.
- The user interface shall provide common operation elements such as dialog boxes, main menus, sub-context menus, reports, device summaries, and real-time status displays.
- The user interface shall provide controls for stacking, docking, un-docking, hiding, or splitting the window panes which can be easily organized on multiple monitors in an advanced traffic management center.
- The user interface shall provide a list of active alarms from each device.
    - The active alarms window shall automatically update as alarms are triggered and/or removed.

- The user interface shall prevent users from performing conflicting command actions.
  - The system shall prevent two users from performing concurrent signal timing modifications.
  - The system shall prevent two users from issuing concurrent phase, pedestrian, and/or preemption calls.
- The user interface shall permit authorized users to "unlock" control of commands from users.
- The user interface shall provide a means for labeling the following elements:
  - External Controller Alarms
  - Vehicle Detectors
  - Pedestrian Detectors
  - Overlaps
  - Phases

A3.1.4: *System Wide Map Displays*

- The system shall support the import of GIS map files for display of device inventory, location and status.
  - The system shall incorporate industry standard ESRI vector and/or image files.
  - The system shall permit users to define the map layers.
- The system shall support a Web-based system map for display of device inventory, location and status.
  - Users shall be able to change the background view of the Web-map to: Aerial, Physical, Shaded Relief, Road View, Terrain Base, or Topographic View.
  - Users shall be able to easily add devices to the Web-map by clicking on the location of the device within the map.
- The GIS and Web-based system maps shall support common GIS map navigation controls (i.e. panning, zooming, small/large scale hiding).
- The GIS and Web-based system maps shall provide a legend detailing status color indications.
- The system shall support the use of static background images for system maps and sub-system displays.
- The system shall permit users to "un-dock" system maps from the main application and display maps on separate monitors/screens.
- On mouse hover, a tool-tip shall appear, displaying intersection name, operational status and alarm status.
- The system maps shall provide the following status indicators:
  - Controller operational status (inactive, free, coordinated, preempt, flash, transition, offline).
  - Active Pattern Number
  - Controller alarm status (Critical alarms, Minor alarms, Non-critical alarms, offline).
  - Link status (volume, occupancy, congestion index color).
  - Detection cameras (location).
  - CCTV cameras (location).
  - Field devices – such as battery backup units, etc. (location).

A3.1.5: *Device Lists*

- The system shall provide a list of devices currently configured within the system.
- The device list shall provide the operational status of the devices.
- The device list shall be easily sorted or filtered by the properties of the devices.
- The device lists shall be printable providing the user with the ability to define the data included in the printed report.

A3.1.6: *Groups*

- The system shall permit users to create coordination, adaptive, and jurisdiction groups.
- The system shall permit users to assign a traffic controller to one or many groups.
- The system shall permit users to define any number of groups with any number of traffic controllers as members of the group.
- The system shall enable operators to manually issue pattern change commands to signals within a coordination group.
    - Commands issued by the system shall override conflicting commands issued by other command sources.

A3.1.7: *Signal Control Source*

- The system shall provide an interface detailing a list of active operational commands.
- The list of operational command sources shall be listed in order of categorical priority.
- Command sources with the same categorical priority shall be listed in order of relative priority.
- The list of operational command sources shall include:
    - Current pattern and command source
    - Manual pattern
    - Regional patterns
    - Special events
    - Responsive patterns
    - Adaptive patterns
    - Time-of-day patterns

A3.1.8*: Time-Space Diagram*

- The system shall support the display of a time-space diagram.
- The user shall be provided with a graphical interface for the creation of routes to be used in the time-space diagram.
    - Users shall be able to create routes by selecting intersections from a map display of device inventory.
    - Users shall be able to identify any phase as the phase of interest within the route.
- The time-space diagram shall display the relative distance between intersections within the user-defined route.
- The time-space diagram shall display the green times produced by the phases configured within the route.
- The time-space diagram shall display the green band between intersections based on the design speed of the route.
- The time-space diagram shall display either two-way or one-way progression.

A3.1.9: *Traffic Controller Timing Editor*

- The system shall provide a timing editor displaying all programmable timing supported by the traffic controller software.
- The timing editor shall provide an intuitive and nested navigation scheme for displaying timing parameters.
- The timing editor shall print all or a subset of timing parameters.
- The timing editor shall support timing any number of archives and restoration of previously archived parameters.
- The timing editor shall permit users to copy timing parameters.
- The timing editor shall enable users to create timing templates for multiple intersection configurations.
- The timing editor shall permit users to import and export timing.
    - Exported timing shall be capable of being applied to USB memory and applied to traffic controllers supporting import of timing from USB memory.
    - System hardware shall include a USB port for easy copying of timing to a Data Key as described in Section 9.2.6 of the Caltrans TEES.
- The timing editor shall permit users to run a full timing audit of timing parameters.
    - The timing audit shall output a report displaying mismatches between the central and controller databases of timing parameters.
    - The timing audit shall report shall include the values of the mismatched parameters.
    - The timing audit shall permit users to select the mismatch timing parameters and open the timing editor for further action.
    - The system shall permit the user to schedule the timing audits and receive notification of timing parameter mismatches between the central and controller databases.
- The timing editor shall provide immediate feedback when users have entered invalid data.
- The timing editor shall provide immediate feedback when users have unsaved changes.
- The timing editor shall support single page or full timing database uploads/downloads to and from the traffic controller.
- Upon downloading timing from the central system to the local controller, the system shall display any and all errors encountered by the system and/or controller during the transaction.
- The timing editor shall display side-by-side comparison of timing parameters from different sources.
- The timing editor shall permit users to compare timing parameters between:
    - Central database vs. controller database
    - Controller “A” database vs. controller “B” database
    - Controller database vs. archived timing
    - Controller database vs. imported timing from external source
- The system shall permit users to import and export timing parameters from any number of controllers.

A3.1.10: *Real-time Status Displays for Individual Intersections*

- The system shall be capable of displaying detailed individual intersection status. A minimum capability of four individual intersections in individual windows is highly desired.
- The system shall present detailed real-time signal controller status displays which include:
  - Operational status (free, coordinated, adaptive coordination)
  - Active pattern
  - Active cycle length
  - Active offset
  - Master cycle timer
  - Local cycle timer
  - Vehicle phase calls
  - Pedestrian calls
  - Vehicle detector status
  - Pedestrian detector status
  - Phase status
  - Overlap status
  - Preemption status (emergency vehicle, transit, and/or rail)
  - Alarm status
  - Current date-time
  - Configured SPM status
- The real-time signal controller status shall be viewable within an aerial depiction of the intersections geometry.
  - The aerial display shall support user-defined backgrounds in format of png, bitmap, jpeg, gif, and/or tiff.
  - The aerial display shall permit users to place the precise location of status objects.
  - The aerial display shall depict the actuation of individual vehicle detectors.
- The system shall permit the user to activate the aerial display from within the system wide and/or sub-system displays.
- The real-time signal controller status displays shall permit users to issue the following commands to test intersection performance:
  - Phase calls (detector inputs)
  - Pedestrian calls
  - Emergency preemption calls

A3.1.11: *Event Notifications*

- The system shall provide event notifications for traffic controller and arterial link alarms.
- System administrators shall be permitted to select users to receive special event notifications.
- Users shall receive notifications when alarms are added and removed.
  - Users shall receive notification via their system assigned email address or via text messaging.
- System administrators shall be permitted to identify the controllers and arterial links for which notifications will be issued.
- Traffic controller events from which notifications shall be issued include:
  - Coordination alarms (coord fail and coord fault)

- Cycle fail
- Critical alarms
- Vehicle detector fault
- Pedestrian detector fault
- External alarms
- Local override
- Manual plan activation
- Preemption events
- Cabinet flash

- Arterial link events from which notifications shall be issued include:
  - Congestion events
  - Occupancy events
  - Speed events

A3.1.12: *Failure Notification*

1. The system shall immediately notify maintenance and operations staff of alarms and alerts.
2. The system shall maintain a complete log of alarms and failure events.

A3.1.13: *Central Scheduler*

- The system shall provide a single interface for all centrally scheduled events.
- The central scheduler shall permit users to purge and aggregate data from the system database.
- The central scheduler shall permit users to collect logs from signal controllers on a recurring interval defined by the user.
  - Logs collected by the central scheduler shall include:
    - Volume, occupancy, and speed
    - Split MOE
    - Speed
    - General traffic controller log of all events
  - Users shall be permitted to identify and select any number of controllers from which to collect logs.
- The central scheduler shall permit users to issue a date/time broadcast to any number of signal controllers.
- The central scheduler shall permit users to audit the date/time from any number of signal controllers.
- The central scheduler shall permit users to automatically audit signal timing and report discrepancies between the central database and controller database.
- The central scheduler shall permit users to run traffic adaptive and/or traffic responsive operations.
- The central scheduler shall permit users to execute user-defined coordination patterns/plans.
- The central scheduler shall permit users to define special events which have higher priority over normal time-based operations.

A3.1.14: *Security*

The traffic signal system software shall provide and maintain a security system to prevent unauthorized access to the system. Operator privileges shall be definable on a functional level. The security levels shall include, at a minimum: view only, upload only, download only, and full access and System Supervisor Administration Access.

Each operator shall have a privilege level defined by the traffic management center supervisor. The level shall define the specific functions that the particular operator is authorized to perform. For example, a particular operator may be given the ability to view all reports, but not to modify some or all levels of the database. This shall allow for any number of different levels of operator access capability. The system administrator level shall have full access to the system as well as the responsibility for maintaining account and privilege level masks.

The traffic signal system software shall validate the code against an encrypted database of authorized operators. 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 the operator may utilize. Any functions that a particular operator is not authorized to access shall either not be shown or shall be "grayed out" so that the operator can easily distinguish the functions to which he/she has access.

Local area network (LAN) access shall support full functionality for engineering and field staff to access system functions in the same fashion they could access them from the AMTS master.

Unsuccessful log-in attempts shall be logged to the traffic signal system software log.

A3.1.15 *Preemption and Priority*

1. The system shall accommodate emergency vehicle preemption technology used by the Agency.
2. The system shall accommodate and support transit signal priority operations.
3. Railroad Preemption

A3.2: MODES OF OPERATION-

A3.2.1: *Time-of-Day Schedule*

- The system shall permit users to define time-based traffic controller operations.
- Time-based operations may be downloaded to each signal controller and implemented by the controller.
- Controller time clocks shall be synchronized with the ATMS master once per day at a User-programmable time.
- The system shall permit users to issue patterns/plans from the central scheduler.
- The system shall permit users to define levels of priority for each time-based schedule.

A3.2.2: *Pedestrians*

1. The system shall permit the use of phase splits smaller than pedestrian time to accommodate smaller cycle lengths where pedestrian service is infrequent. Upon servicing the full duration of pedestrian time, the controller shall recover coordination.

- The system shall permit users to reduce specific phases when servicing pedestrian time longer than the programmed phase split time. This option provides the ability to avoid a cycle-overrun and subsequent recovery when servicing pedestrian time that is longer than phase split time;
- The system shall permit users to define the amount of time to be reduced from each phase upon servicing a pedestrian cycle over-run.

2. The system shall permit the use of phase split times that accommodate the full duration of pedestrian walk and clearance time as to prevent the need for cycle recovery.
3. The system shall accommodate early or delayed start of walk and exclusive pedestrian phases.

A3.2.3: *Non-Adaptive Situations*

1. The system shall detect traffic conditions during which adaptive control is not the preferred operation, and implement a pre-defined operation while that condition is present. For example, running free when volumes drop below an operator defined threshold.
2. The system shall permit scheduling of pre-determined operations by time of day.
3. The system shall permit the operator to over-ride adaptive operation.
4. The system shall permit implementation of Peer-to-Peer synchronization
    - The system shall be capable of implementing Peer-to-Peer synchronization when traffic conditions meeting user-defined criteria;
    - The system shall be capable of implementation Peer-to-Peer synchronization per time-of-day schedule;
    - The system shall permit users to manually implement Peer-to-Peer synchronization.

A3.2.4: *System Responsiveness*

The system shall modify the ATCS operation to closely follow changes in traffic conditions.

- The system shall constrain the selection of cycle lengths to those that provide acceptable operations, such as when two-way progression solutions are desired;
- The system shall permit users to define the frequency of changes in adaptive signal timing parameters;
- The system shall permit users to define the number of phase demand events that shall indicate the presence of a trend in phase demand;
- The system shall permit users to define the amount of split utilization that results in no change to phase split time.

A3.2.5: *Complex Coordination and Controller Features*

The system shall implement the following advanced controller features while maintaining adaptive operation:

- Operate at least 4 overlap phases;
- Permit different phase sequences under different traffic conditions;
- Allow one or more phases to be omitted under certain traffic conditions or signal states;
- Prevent one or more phases being skipped under certain traffic conditions or signal states;
- Allow detector logic at an intersection to be varied depending on local signal states;
- Allow any phase to be designated as the coordinated phase;
- Allow the operator to specify unused time from a preceding phase to be used by the next phase in sequence or coordinated phases;
- Allow the controller to respond independently to individual lanes of an approach. This may be implemented in the signal controller using extension/passage timers, which may be assignable to each vehicle detector input channel. This may allow the adaptive operation to be based on data from a specific detector, or by excluding specific detectors;
- Allow flexible timing of non-coordinated phases (such as late start of a phase) while maintaining coordination;
- Allow Protected/permissive phasing and alternate left turn phase sequences;
- Use of flashing yellow arrow to control permissive left turns and right turns.

A3.2.6: *Monitoring and Control*

1. The system shall monitor and control all required features of adaptive operation from the following locations:
   - Agency's Traffic Management Center;
   - Agency Yard/Maintenance facility;
   - Remote facilities operated by Agency;
   - Local controller cabinets (local intersection only).
2. The system shall provide user access to the database management, monitoring and reporting features and functions of the signal controllers and any related signal management system from the access points defined for those system components.
3. The system shall provide access to the traffic signal system and adaptive with the aid of graphics, menus and tables.

A3.2.7: *Traffic Responsive Operations*

- The system shall support traffic responsive operations.
- Users shall define the groups of intersections for traffic responsive coordination.

- The traffic responsive routine shall utilize data collected from user-defined system detectors to select a timing pattern/plan that is best suited for the traffic conditions.
- Users shall be able to define the volume and occupancy thresholds that best suit each coordination pattern/plan.
- Traffic responsive shall utilize a user-defined "lockout" period to prevent excess transitions.
- The system shall provide a graphical interface depicting the user-defined volume or occupancy thresholds and reported volume or occupancy from field detectors.
- Traffic responsive features shall include a capability to keep an arterial in coordination beyond the scheduled times if volume and occupancy thresholds indicate the plan should remain in operation

A3.2.8: *Traffic Adaptive Operations*

Adaptive traffic control systems (ATCS) shall conform to "Adaptive Control Systems: Domestic and Foreign State of the Practice", Chapter 3, (NCHRP Synthesis 403). Specific system names mentioned in NCHRP 403 will be ignored by City staff when evaluating proposals. ATCS use detector data to determine the characteristics of traffic approaching a traffic signal and then adjust the signal timings according to real-time predictive algorithms in order to optimize their performance. Adjustments shall be made approximately once per cycle.

The main benefits of ATCS technology to be provided include:

- Continuously distribute green light time equitably for all traffic movements according to volume-to-capacity ratios or saturation
- Improve travel time and travel time reliability by progressively moving vehicles through green lights
- Reduce congestion by creating smoother flow
- Accommodating planned or unplanned events in real time such as collisions, special events, or lane closures for construction.
- Provide cycle lengths that are appropriate for the shoulders of the peak periods and peak-of-the-peak, as may not be possible with time-of-day interconnect.

In the case where a traffic signal operated by another agency is in the middle of a coordinated grouping, and that agency is not willing to participate in adaptive coordination, the ATMS shall allow switching to time-of-day coordination with minimal key strokes.

A3.2.8.1: Network Characteristics

1. The system shall be capable of running adaptive signal control of all traffic signals concurrently.
2. The system shall adaptively control a minimum of 8 independent groups of signals.
3. The system shall adaptively control a minimum of 30 individual signals.

A3.2.8.2: Cycle Length Optimization

The system shall calculate optimum cycle length according to the user specified coordination strategy.

- The system shall limit cycle lengths to a user-specified range (minimum/maximum cycle length);
- The system shall limit changes in cycle length to not exceed a user specified value;
- The system shall permit the user to program different maximum cycle lengths for different levels of traffic volumes;
- The system shall permit the cycle length increase or decrease beyond the incremental change limit when traffic conditions meet user specified criteria.

A3.2.8.3 Phase Split Optimization

1. The system shall calculate phase lengths for all phases at each signal controller to suit the current coordination strategy.
2. The system shall be capable of adjusting the phase split-cycle ratio as the phase demand increases or decreases (equitable distribution).
3. The system shall be capable of calculating phase green times in splits or force-offs.
4. The system shall be capable of adjusting splits so left turn pocket queues are served and queue spillover into adjacent through lanes is eliminated within one cycle.

A3.2.8.4 Offset Optimization

1. The system shall calculate offsets to suit the current coordination strategy for each signal controller within a coordinated group.
2. The system shall measure the ratio of directional volume and calculate the appropriate mode of progression.
    - The system shall determine if progression shall be preferential for the favored direction, semi-preferential or balanced for each direction.
    - The system shall make use of real-time link speed or user-defined design speed in offset optimization.

A3.2.8.5 Benefit requirements for Adaptive:

- **Performance Requirements**
    - Provide travel times equal to or better than time-of-day during average peak period conditions, as indicated by peak hour volumes
    - Provide reduced average daily travel times of five percent or more compared to current conditions.
- **Verification Plan**
    - The selected vendor shall collect travel time information for at least three runs in each direction during the morning, midday, and evening peak hours, and one run per hour during the remaining hours of the day from 6:00 am to 8:00 pm. Travel time data of current conditions, the “Before” runs, shall be collected no earlier than 30 calendar days before the Adaptive system is initiated. Travel time data of conditions with the adaptive system in operation, the “After” runs, shall be

collected no later than 30 calendar days after the adaptive system is initiated, and at the same times of day the "Before" data was collected.

- **Validation Plan**
  - Reporting shall include a summary report of the findings with an appendix of travel time data presented in an easy to follow format.
  - Reporting shall also include a plot of cycle lengths selected by the adaptive system from 6:00 am to 8:00 pm on a typical day.
  - City staff will conduct independent travel time runs to validate vendor data.
  - Should the selected system fail to meet performance requirements the vendor will be notified and given 30 days to improve system performance. Additional travel time data collection and reporting will be provided at no cost to the City. Should the selected system continue to fail to meet performance requirements, City reserves the right to withhold further payments to vendor until performance is improved.

A3.3: ACCESS AND SECURITY

A3.3.1 *User Access*

- The system shall require users to login before gaining access to the application.
- The system shall require System Administrators to create unique usernames and passwords for each system user.
- The system shall permit System Administrators to define password complexity and length.
- The system shall permit System Administrators to define password expiration timeframes.
- The system shall allow System Administrators to assign user to Access Levels which define the user's permissions within the application.
- At a minimum, CSS shall enforce the following user permissions:
  - System configuration
  - Broadcast controller date/time
  - Import/Export device timing
  - Save/edit device timing
  - Set vehicle/ped calls
  - Set preemption calls

A3.4 EVENT LOGS AND REPORTS

A3.4.1 *System event logs*

- The system shall store a database record of the following events:
  - Signal controller alarms:
    - Cabinet flash
    - Stop-time
    - External alarms
    - Local override
    - Keyboard entry

        - Coordination alarm (NTCIP controllers only)
        - Detector fault
        - Offline
    - Signal controller operating mode:
        - Coordinated
        - Transition
        - Free
        - Software flash
        - Preempt
            - EV preempt
            - Transit priority
    - The system shall log events related to user activity, such as:
        - Login / logoff
        - Timing parameter modifications
        - User commands to traffic controller
        - System configuration changes
    - The system shall provide a communication error log.
        - The communications error log shall depict the total number of polls, poll errors, total messages, and total message errors of each signal controller defined in the system.

A3.4.2 *Performance Reporting*

1. The system shall automatically monitor the adaptive signal control operation.
2. The system shall store and report data used to calculate signal timing and have the data available for subsequent analysis. Data shall be stored for a minimum of 30 calendar days, with a user-settable schedule for deleting older data.
3. The system shall store and report data that can be used to measure traffic performance under adaptive control.
4. The system shall store all operational data and signal timing parameters calculated by the adaptive system, including cycle lengths, splits, and offsets. Data shall be stored for a minimum of 30 calendar days, with a user-settable schedule for deleting older data.
5. The system shall be able to report the exact state of signal timing and input data for a specified period, to allow historical analysis of the system operation.
6. The system shall generate historic and real time reports that effectively support operation, maintenance and reporting of system performance and traffic conditions.

A3.4.2.1 Volume Occupancy Speed Reports

- The system shall store and provide reports for System Detector Volume, Occupancy, and Speed.
    - The system detector VOS report shall permit users to define the date/time period of the report.

    - The system detector VOS report shall permit users to define the period for which system detector data will be aggregated ranging from 1 minute to 60 minute intervals.
    - The system detector VOS report shall permit users to select the central system or signal controller as the source of the VOS records.
- The system shall store and provide reports for Arterial Link Volume, Occupancy, and Speed.
    - The link VOS report shall permit users to define the date/time period of the report.
    - The link VOS report shall permit users to define the period for which system detector data will be aggregated ranging from 1 minute to 60 minute intervals.
    - The link VOS report shall permit users to select the central system or signal controller as the source of the VOS records.

A3.4.2.2 Split Measures of Effectiveness

- The system shall provide a split MOE report containing the following information:
    - Programmed split of each phase for each cycle
    - Split utilization of each phase for each cycle
    - Active pattern for each cycle
    - Cycle length of each cycle
- Reason for phase termination of each phase for each cycle, including:
    - Phase not serviced
    - Coord. force-off
    - Vehicle gap out
    - Vehicle max out
    - External force-off
    - Ped extend

A3.4.2.3 Turning Count Movement Report

- The system shall provide a turning count movement report to the extent possible given detection capabilities. .
    - The system shall permit users to define the date and time range of the turning count movement report.
    - The turning count movement report shall be exportable to PDF.
    - The turning count movement report shall aggregate data in 15 minute intervals.
    - The turning count movement report shall provide a graphical chart illustrating the volume of each movement/approach for the time period specified by the user.
- At intersections with video detection, the system shall be capable of reporting up to 64 counted volumes per intersection, including bicycle and detection.

A3.4.2.4 Peak Hour Volume Report

- The system shall provide a peak hour volume report.
    - The system shall permit users to define the date of the peak hour volume report.
    - The peak hour volume report shall be exportable to PDF.
    - The peak hour volume report shall aggregate data in 15 minute intervals.
    - The peak hour volume report shall automatically identify the peak hour volume for A.M., Midday, and P.M.

- The peak hour volume report shall sum the volume of each approach for the peak hours.
- The peak hour volume report shall provide a graphical chart illustrating the volume of each 15 minute period for the date specified by the user.

A3.5 SYSTEM INTEGRATION AND TRAINING

Vendor shall provide software, hardware and integration services that allow fully functional operations .

Training shall include:

- An eight-hour session for City engineering staff on all system features and components excluding adaptive operations.
- ~~A four-to-eight hour session on configuring and using SPM information.~~
- A four-hour session for field staff focused on individual intersection operations including uploading and downloading timing plans.
- A four-hour session with City IT staff discussing ATMS communications protocols, troubleshooting, and password parameters.

The Contractor shall be responsible for the complete connection and integration of all the systems and subsystems described in this Request. This includes the communications and interaction between and across the different systems as described below. In general, the systems connection and integration for this item shall include, but not be limited to the following:

- Make all the physical and logical connections between each of the TMC systems and subsystems
- Configure, integrate and test all TMC network switches and routers.
- Prepare network IP address assignments using the IP block address that shall be provided by the City
- Integrate all TMC systems and subsystems to function as a complete and fully operational TMC system between and across all subsystems
- Integrate all the TMC systems and subsystems will all the intersections and field equipment that are interconnected within the City's ITS system.

Provide any required traffic signal controllers and associated software for each intersection connected to the central traffic signal system to facilitate communications to the field units.

The Contractor shall prepare Integration Test Plans for all end to end functions between and across each of the subsystems. The Test Plans shall thoroughly test all functions that relate to the full integration and connection of the various ATMS subsystems and systems. The Test Plans shall test the following items at a minimum:

- Connectivity tests
- Data Exchange Tests
- Load tests

- Functionality tests

The Test Plans shall include details for the following:

- Test Setup
- Test Scripts
- Test Oversight and Witnessing (i.e., roles and responsibilities)
- Test Reports
- Pass/Fail Criteria
- Test Dependencies

During the system connection and integration testing, the City may verify correct operation or configuration of the subsystem with other operational equipment or infrastructure owned by the City.

A3.6 ~~SYSTEM DEMONSTRATION~~PRESENTATION

Short-listed system vendors will be invited to meet with City staff and evaluation committee members to demonstrate the systems. The presentation will include a demo of the product and features. The demo shall be 30 minutes or less followed by 30 minute discussion.

~~Use of the ATMS may vary as much as several times a day to once per year. As such, an opportunity to evaluate the user interface is essential and part of the selection process will simulate use of the ATMS after a long gap when staff may not remember detailed procedures.~~

~~A3.6.1 Demonstration~~

~~Vendor ATMS submittals will be screened to short-list the two highest-ranked systems. Short-listed system vendors will be invited to meet with City staff and evaluation committee members to demonstrate the systems. The meeting will consist of two parts:~~

~~1. A brief introduction of system topology from the vendor via an on-line training tutorial (no live coaching) followed by a staff evaluation of the user interface. The evaluation will be structured to simulate a typical use of the system in Petaluma after a 3- to 6-month break from using the system.~~

~~2. A presentation of the system by the vendor focused on operator training with a time frame of 30 minutes or less, followed by 30 minutes of discussion. Vendors will be encouraged to follow up on part 1 successes and frustrations.~~

~~A3.6.2 Evaluation~~

~~Understandably, your proposed ATMS will be complex. To evaluate your product, we ask that setup a system for us to evaluate its capabilities and intuition (how easy is it to use). During the evaluation process, these tasks will be done by City's representatives:~~

- ~~Determine the ADT at two locations;~~
- ~~Review video footages of the previous day;~~
- ~~Determine the cause of a traffic signal malfunction (or troubleshooting); and~~

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~~• Download timing sheet.~~

~~We want this to be a blind test. Since evaluations will result into points given, we will deduct one point for each unsolicited assistance from you.~~

A3.7 REFERENCES

Vendors shall submit references from all client agencies currently operating the same ATMS as proposed or a recent and similar release that have been installed within the last 5 years in California. For each reference, please provide information on whether they have an adaptive and SPM features. Please provide a phone number and email for the reference provided.

A3.8 COST/SCHEDULE

The City is interested in assessing the overall cost of synchronizing all the traffic signals within the City limits. For this reason, staff is asking for the following information:

- Procurement Cost of your ATMS (including product setup and training up to 3 individuals selected by the City);
- Yearly maintenance cost of your product of 55 intersections. Please note that upon procuring of your product, a system has not been setup yet. We envision that it will take place within 2019. For this reason, we prefer that the yearly maintenance cycle would not start until the next phase of implementation is completed.

CITY RESPONSIBILITIES

Provide a "City Representative", who will represent the City and who will work with the selected vendor in carrying out the provisions of the RFP. The representative will communicate with the Vendor on a regular basis and provide the following:

- Examine documents submitted to the City by the Consultant/Contractor and render timely decisions pertaining thereto.
- Give reasonably prompt consideration to all matters submitted by the Consultant/Contractor for approval to the end that there will be no substantial delays in the Consultant/Contractor's program of work.
- Process invoices submitted by Consultant/Contractor
- Provide Consultant/Contractor with surveys, maps and other documentation, if available and necessary for completion of Consultant/Contractor’s work.
- Provide Consultant/Contractor with information for the project area.
- Act as coordinator between Consultant/Contractor and other City representatives.
- City Record improvement drawings as necessary for design/construction.

EVALUATION CRITERIA

First round: Proposals will be evaluated for the following categories for the first round of selections:

Category	Weighting Factor	Score	Weighted Score

ATMS features	35%		
References	35%		
Cost/Schedule	30%		
Total			

Second round: The top two candidates will be brought in for a system demonstration and simulation. A rubric will be provided prior to the demonstration day