Exhibit A - Functional Requirements

Required: Requirements are features or functionalities that must be provided by the selected proposer to fulfill the core mission of the traffic signal system for the City of Knoxville. If the feature or functionality is not within the standard product, such a feature must be provided through software customization. Any cost required to implement such a feature must be included in the total amount of the proposal. Although an indication that a feature with a weight of required will not be included by the proposer, it may not necessarily cause City of Knoxville to reject the proposal. The proposer must clearly indicate why the requirement will not be met and if an alternative functionality is proposed.

Preferred: Requirements are features or functionalities that are desirable to the city and that enhance the functionality of the traffic signal system, but are not necessarily needed in the initial implementation covered by this RFP process. Including more preferred requirements in the proposed system will improve the proposal's overall score. If the proposer commits to providing a preferred requirement, the cost of implementation must be part of total amount of the proposal. If the proposer does not commit to providing a preferred requirement within this proposal, the proposer may comment on the possible offering of the requirement at a separate fee in a later phase.

Considered: Requirements are features or functionalities that would be worthwhile to have in the initial implementation, but describe features or functionalities that are not expected to yet be available from the proposer or because the city is not yet ready to implement them. The city is requesting that the proposer provide information regarding the function or feature for evaluating the overall suitability of the traffic signal system for use by city. Any considered requirements that the proposer commits to providing in the proposal must be implemented as part of the total amount of the proposal.

Traffic Signal System Functional Requirements

System Vendor:
Primary Contact: Central System:

For each Function noted, please identify if your proposed system is Compliant, Partially Compliant or Not Compliant. Please explain the reason for any Functions that are noted Partially Compliant.

	Category			Function	Requirement (see RFP)		Function Compliance			Comments
A	Required	Preferred	Considered		Central	Local	Compliant	Partially Compliant	Not Compliant	
1.0 Standards										
1.1		x		System should support integration with cabinet components such as controller, Malfunction Management Unit (MMU), power supply, detector units (veh & ped), Bus Interface Unit (BIU), load switches, transfer relays and solid- state flasher.	x					
1.2	x			System shall support all mandatory and optional National Transportation Communications for ITS Protocol 1201 objects.	x	x				
1.3	x			System shall support all mandatory and optional NTCIP 1202 objects.	x	x				
1.4	x			Conformance to the NTCIP communication protocols previously stated shall not be accomplished through the use of embedding proprietary protocols.	x	x				
1.5	x			System application software shall be compatible with shipping and currently supported server-class versions of the Microsoft® (MS) Windows® Operating Systems (OS). List all OS systems supported in Comments.	x					
1.6	x			System application software shall be compatible with shipping and currently supported workstation and laptop versions of MS Windows® operating systems. List all OS systems supported in Comments.	x					
1.7	x			System servers and workstations shall not require a "dongle" or hardware key for software copy protection.	x					
1.8	x			System servers shall utilize Active Directory for network administration and security.	x					
1.9	x			System software shall have a demonstrable ability to run in a virtual server environment. Please list supported platforms, host CPU/OS and guest CPU/OS, as applicable.	x					
1.10	x			System shall support data outputs in Extensible Markup Language (XML) format.	x					
1.11	x			System shall employ and operate on a standards-based database storage platform. Please list database systems supported in Comments section.	x					
1.12	x			System application software shall access database using Open Database Connectivity (ODBC) interface.	x					

	Category				Requirement (see RFP)		Function Compliance			
A	Required	Preferred	Considered	Function	Central	Local	Compliant	Partially Compliant	Not Compliant	Comments
				System shall support user access to the system as listed below. Describe means of access for each in Comments section.						
1.13	x			Networked computer	x					
1.14		x		Direct database sync using a laptop or tablet PC	x					
1.15	x			Remote connection via Virtual Private Network (VPN) access	x					
1.16	x			System shall provide manual or user-defined time intervals per day for time synchronization obtained from an NTP server.	x					
1.17		x		System should support Universal Resource Locator (URL) parameters at the local TCP/IP system level and the Internet.	x					
1.18	x			System shall be able to store data indefinitely based on hard drive capacity	x					
1.19		x	x	**System shall have the ability to read and write data to USB back and forth from controller to central.**	x	x				

	Category				Requirement (see RFP)		Function Compliance			
A	Required	Preferred	Considered	Function	Central	Local	Compliant	Partially Compliant	Not Compliant	Comments
2.0 Communications										
2.1	x			System shall support Internet Protocol (IP) addressable field controllers.	x	x				
2.2	x			System shall utilize an IP address mapped to the Medium Access Control (MAC) address without the use of a serial converter.	x	x				
2.3	x			System shall support Central and Field data communication over a 10/100/1000/10000 Mbps Ethernet network (i.e., fiber and wireless spread spectrum radio).	x	x				
2.4		x		User shall also be able to access CMU/MMU via local controller through direct connection. Monitor logs and setup files can be viewed through the software.	x	x				
2.5		x		Central system shall support a direct connection (Ethernet) with UPS. User shall be able to access UPS via local Ethernet switch and/or controller.	x	x				
2.6		x		Central system shall support a direct connection (Ethernet) with preemption detector cards. User shall be able to access detector cards via local Ethernet switch and/or controller. List compatible preemption vendors, supported connections and connection type in Comments section.	x	x				
2.7	x			System shall provide second by second polling to signalized intersections.	x	x				
2.8		x		System shall provide exception-based polling to signalized intersections.	x	x				
2.9		x		**While communication polling to signalized intersections, the system shall support a non-requested "heartbeat" or "status" response from the field in real-time. At minimum the status should show coordination status and alarms.**	x	x				
2.10	x			System shall communicate with standard IEEE 802.3x Ethernet specifications.	x	x				
2.11	x			System shall allow a minimum of 200 independent communications threads.	x					
2.12	x			System shall be able to extract Virtual Local Area Networks (VLANs) from a tagged trunk of VLANs being received from the Ethernet network.		x				

	Category			Function	Requirement (see RFP)		Function Compliance			Comments
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3.0 Graphical User Interface										
3.1	x			GUI shall be uniform and consistent in its use of buttons, function keys, menus and screen designs using accepted industry standards such as Multiple Document Interface (MDI) and Tabbed Document Interface (TDI) to manage the system's window workspace environment.	x					
3.2	x			System shall provide templates for intersection graphics and the ability to copy/paste existing intersection graphics.	x					
				The system shall support the display of signalized intersections by:						
3.3	x			Multi-level, logical groupings regardless of intersection's physical location, jurisdiction or communication channel	x					
3.4	x			Geographical location in Knoxville, TN	x					
3.5	x			Device or IP address	x					
3.6	x			Specific corridors	x					
3.7	x			Membership to a group or groups	x					
3.8		x	x	Must provide KGIS system format to be used as a system map or list currently supported versions and other options (i.e. Microsoft Bing or Google Maps) in Comments.	x					
3.9	x		x	System shall allow hyperlinks from the GUI to other Windows®-based applications to facilitate a "loosely integrated" IP addressable multifunction system.	x					
3.10	x			System shall provide full Signal System manual access from the application software.	x					
3.11	x			System shall provide a graphical display for scheduling and reviewing scheduled events.	x					
				System should support customizable graphics configuration to include the following options:						
3.12		x		User customizable window display (organize window display, show/hide tools, savable customized windows configurations for each user)	x					
3.13		x		User selectable map layers (drop down box of available layers)	x					
3.14		x		User configurable links (each individual link) to be placed on map displays	x					
3.15	x			View all intersections at once (system level map)	x					
3.16	x			View one intersection at a time (intersection level map)	x					
3.17	x			View user defined subset of intersections (section level map)	x					

	Category				Requirement (see RFP)		Function Compliance			
A	Required	Preferred	Considered	Function	Central	Local	Compliant	Partially Compliant	Not Compliant	Comments
3.18	x			Capability to window in/out of the main map using the cursor	x					
				System should support user defined Graphic Display options for current traffic conditions and individual intersection status as follows:						
3.19	x			**System shall show intersection coordination status for one or multiple intersections.**	x					
3.20	x			Real-time split status	x					
3.21	x			Phase max reached	x					
3.22	x			Phase gap out	x					
3.23	x			Phase force off	x					
3.24	x			Full signal indications (green/yellow/red)	x					
3.25	x			Control status (i.e., free, coordinated, preempt, transition, flash, off-line, bad communication)	x					
3.26	x			Transition status (i.e., short, long)	x					
3.27	x			Current timing plan (including local cycle timer)	x					
3.28	x			Timing plan requested	x					
3.29	x			Manual commands active (including police, stop time)	x					
3.30	x			Preemption events	x					
3.31			x	Transit signal priority events	x					
3.32		x		System should support user configurable GUI tool that allows split time utilization (phases 1-8 on standard dual ring controller)	x					
				System should support zoom options as follows:						
3.33		x		User defined zoom preset	x					
3.34		x		User defined zoom box	x					

	Category				Requirement (see RFP)		Function Compliance			
	Required	Preferred	Considered	Function	Central	Local	Compliant	Partially Compliant	Not Compliant	Comments
3.35		x		Dynamic zoom in-out	x					
3.36		x		User selectable home view zoom	x					
3.37		x		User selectable auto layers for user specified layers at predefined zoom levels	x					
				System shall display detector information including the following:						
3.38	x			Detector actuations (per detector and/or per phase)	x					
3.39		x		Volume/occupancy from system detectors	x					
3.40	x			Speed	x					
3.41			x	Classification	x					
3.42	x			Pedestrian phase serviced	x					
3.43	x			System shall display signal programming sheets.	x					
3.44	x			User shall be able to select the signal timing sheet to display.	x					
3.45	x			System should support user configurable links to signalized intersection as-builts and intersection photos.	x					
3.46		x		System shall be able to display a graphical representation of the controller's front panel display in near real-time.	x					
3.47	x			System should create and display real-time time-space diagrams.	x					
3.48	x			System should show green progression on the real-time time-space diagram.	x					
3.49		x		System shall be able to display a virtual sticky note as a reminder or status indication to system operators about any equipment or operational parameters that may need to be checked, such as incidents, construction and special events, work on traffic signals.	x					

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	Category				**Requirement (see RFP)**		**Function Compliance**			
	Required	Preferred	Considered	**Function**	Central	Local	Compliant	Partially Compliant	Not Compliant	**Comments**
4.0 Traffic Signal Operation and Control										
Basic Timing Parameters										
4.1	x			**System shall default to standard eight-phase quad left, dual-ring operation.**	x	x				
4.2	x			System shall provide a minimum of four rings.	x	x				
4.3	x			**System shall provide a minimum of 16 vehicle phases.**	x	x				
4.4	x			**System shall provide a minimum of four pedestrian phases.**	x	x				
4.5	x			System shall support fixed-time operation.	x	x				
4.6	x			System shall provide capability to control multiple intersections with one controller.	x	x				
4.7	x			System shall support interval advance.	x	x				
4.8	x			System shall provide capability to modify left-turn phasing by TOD/DOW plans.	x	x				
4.9	x			System shall allow nesting schedules in local software (deletable events).	x	x				
4.10	x			System shall support soft recall.	x	x				
4.11	x			System shall support time-based coordination.	x	x				
4.12	x			System shall maintain last scheduled plan if communication is lost and revert back to Time of Day (TOD) plan after running special event plans.	x	x				
4.13			x	System shall support traffic responsive operation	x	x				
4.14			x	System shall, in traffic responsive operation, select the timing plan that is best suited to the existing traffic conditions as measured by the system detectors and analyzed by the system's traffic responsive process.	x	x				
4.15			x	System shall, in traffic responsive operation, command the selected timing plan 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.	x	x				
				In order to enhance traffic responsive operations, the following four traffic responsive process points shall be implemented:						
4.16			x	Each logical grouping of signals shall be capable of being associated with other groupings, one of which shall be designated as the master grouping. When traffic conditions warrant a traffic responsive timing plan change for the master grouping, the system shall automatically change the timing plans for the other associated groupings. If no other groupings are associated with the process, only that grouping shall change timing plans.	x	x				

	Category				Requirement (see RFP)		Function Compliance			
A	Required	Preferred	Considered	Function	Central	Local	Compliant	Partially Compliant	Not Compliant	Comments
4.17			x	The operator shall be able to define a single detector station as a grouping. When the traffic responsive process detects that this station has exceeded operator defined thresholds, the associated groupings shall implement the appropriate traffic responsive plan. This process is intended for use in conjunction with special events, such as a surge of traffic leaving a parking lot at the end of an event.	x	x				
4.18			x	Logical groupings of signals shall be changeable on a time-of-day basis. The intersections within a grouping shall be changeable, allowing intersections to be in different groupings depending on the time-of-day. Definition of master groupings and associated groupings shall be changeable, allowing groupings to be associated with different master groupings depending on the time-of-day.	x	x				
4.19			x	If an operator-definable number (or percent) of controllers or detectors are offline due to a communications failure then the traffic responsive plan shall not be initiated.	x	x				
4.20		x		System application software shall provide stop time.	x					
				Basic phase timing and status shall be accessible using a:						
4.21	x			Laptop	x					
4.22		x		Tablet or other mobile platform	x					
4.23		x		Smartphone	x					
4.24	x			System shall allow access to all timing tables offered by the local controller firmware.	x					
4.25	x			System shall monitor for duplicated commands programmed from central and warn user prior to implementation.	x					
4.26		x		System shall allow single or continuous actuation (vehicle or pedestrian phases) remotely without changes to timing plans.	x					
4.27	x			System shall allow remote recall (vehicle or pedestrian phases) without changes to timing plans.	x					
4.28		x		System should have a control hierarchy (e.g., manual, TOD, standby/local controller default) via GUI menus.	x					
4.29		x		Manual override Assignment screen - groups all defined manual step entries and actions (Enabled, entity, entity description, action, authorized by, start date/time, stop date/time, duration, description) via GUI menus	x					
4.30		x		Action set editor menu - Allows for a series of actions to be applied to various entities in a single entry	x					
4.31	x			System shall allow the user to send manual commands to a controller to initiate patterns, free operation or flash.	x	x				
4.32	x			System shall provide the user with the ability to initiate a single manual command to one or all intersections to turn on/off free operation and, by phase, turn on/off max recall and adjust max green.	x	x				
4.33	x			System shall support TOD, DOW, WOY and central scheduling.	x	x				

	Category			Function	Requirement (see RFP)		Function Compliance			Comments
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4.34	x			System shall provide editing capabilities of all timing parameters.	x	x				
4.35	x			System shall store a backup of intersection timings organized by intersection numbers or names.	x					
4.36	x			System shall have the capability to store a minimum of three versions of timing parameters for each intersection.	x					
4.37	x			System to allow local and remote download/upload of controller database to/ from the field	x	x				
4.38	x			User shall be able to upload or download user-defined data one timing page at a time.	x					
4.39		x		System shall allow the user to select, single, multiple, or user-defined groups of intersections to upload/download timing tables at one time.	x					
4.40	x			System shall provide upload and download capabilities for user-defined or all timing parameters to one or multiple controllers.	x					
4.41	x			System shall allow user to compare and display differences in the uploaded controller database versus the database stored on the server.	x					
4.42	x			System shall allow remote upload/download of entire intersection database from the field to the central database via the controller's front panel.	x	x				
4.43	x			System shall support automatic upload and comparison of timing plans by the central system at user-defined time intervals.	x					
4.44	x			System shall not place controllers into flashing operation during uploads or downloads.	x	x				
4.45	x			System shall support the use of a rugged, portable and non-volatile memory data storage device (e.g., USB flash drive, etc.) that can be used by field personnel for controller data transport and firmware updates.	x	x				
4.46	x			System shall provide the ability to copy controller timing data from one controller to another through user selection of one or multiple pages of a controller's database.	x					
				System shall allow for automatic synchronization of timing data with field personnel's:						
4.47		x		Desktop	x					
4.48		x		**Laptop**	x					
4.49		x		Tablet computer	x					
4.50		x		Smartphone	x					
4.51	x			System shall provide a configurable start and end time of manual commands.	x					

	Category			Function	Requirement (see RFP)		Function Compliance			Comments
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4.52	x			User shall be able to configure new templates for signal timing data.	x					
4.53		x	x	User shall be able to manually download server time to the controllers in the field.	x	x				
4.54	x			System shall provide the capability to select for automatic implementation of special signal and/or timing plans to accommodate traffic flow patterns during special events.	x	x				
4.55		x	x	User shall be able to schedule any command for execution at any time. For example; patterns, pedestrian/vehicle calls.	x	x				
4.56	x			System shall be able to support the operation of a flashing yellow arrow (FYA) graphically and within the controller.	x	x				
Overlaps										
4.57	x			System shall provide a minimum of eight overlaps.	x	x				
4.58		x		**System shall support right-turn overlap phasing without additional programming.**	x	x				
Preemption and Priority										
4.59	x			System shall support a minimum of 10 multiple class-based preemption routines.	x	x				
4.60	x			System shall support a minimum of 10 multiple class-based priority routines.	x	x				
4.61	x			System shall support priority service without skipping phases.	x	x				
4.62	x			System shall operate priority service in either free or coordinated modes.	x	x				
4.63	x			System shall support multiple simultaneous conflicting priority calls from different approaches. This will allow a second priority request to be stored and served following the active request.	x	x				
4.64	x			System shall provide early green/green extension for multiple priority routines.	x	x				
4.65	x			System shall support separate max and walk times for use during priority service.	x	x				
4.66		x		System shall continue background cycle timer and have the option to exit preemption in sync or choose exit phases and not be in sync.	x	x				
4.67	x			After preempt, system shall allow capability to serve all other phases, that have a demand, before a second preempt.	x	x				
4.68			x	System shall be able to operate a transit queue jump signal that allows a parallel bus through movement to start a user programmed amount of time before the adjacent through traffic.	x	x				
4.69	x			System shall support green extension. Ability to extend the designated low priority phase green a pre-determined amount of time when a low priority call is received during the priority phase.	x	x				

	Category			Function	Requirement (see RFP)		Function Compliance			Comments
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4.70	x			System shall support early green. Ability to truncate selected non-priority phases to a pre-determined value when a low priority call is received while the intersection is in a phase other than the priority phase.	x	x				
4.71	x			System shall log all early green and green extension events.	x	x				
4.72	x			System shall stay in coordination while truncating or extending phases for a low priority call.	x	x				
4.73	x			System shall provide a frequency timer that controls the amount of time that must pass before the next low priority is served.	x	x				
4.74	x			System shall support ability for the user to select whether a low priority call is locked in when the signal is initially received or if it only stays active as long as the call is present.	x	x				
4.75	x			System shall support user selection of non-conflicting vehicle phases during a heavy rail preemption.	x	x				
4.76	x			System shall support pedestrian inhibit, restricting pedestrian movements upon receiving an advanced rail input separate from the preempt input.	x	x				
Detectors and Input										
4.77	x			System shall support a minimum of 44 addressable detector inputs.	x	x				
4.78	x			System shall support expansion of addressable detector inputs up to 64.	x	x				
4.79		x		User defined detector parameters (Volume, Occupancy, Speed, logging, display, and exporting)	x	x				
4.80		x		User defined secondary poll message and period parameters	x	x				
4.81		x		User defined collection time period and error threshold parameters	x	x				
4.82		x		Configurable Historical Volume, Speed & Occupancy Data Display (tabular or graphical format) through GUI	x	x				
4.83		x		Data exportable to comma delimited text files	x	x				
4.84		x		System detectors supply real time roadway data to update link displays	x	x				
4.85		x		User defined parameter(s) to update link display status (Volume, Occupancy, Speed, Weighted Volume-Occupancy) via GUI menu	x					
4.86	x			System shall provide vehicle and pedestrian detector diagnostics, stuck calls, no calls, based on user defined time frame.	x	x				
4.87			x	System shall provide conflict monitor diagnostics.	x	x				
4.88	x			System shall provide user-definable cabinet input function mappings. This will allow the user to map any detector input to one or more phases.	x	x				

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4.89	x			System shall provide user-definable cabinet output function mappings. This will allow the user flexibility to drive signs, flashing beacons, etc.	x	x				
4.90	x			System shall provide logic editor to drive inputs/outputs based on tests.	x	x				
Coordination										
4.91	x			System shall support a minimum of 16 signal timing plans/patterns, which can call for coordinated, free, or programmed flash operation.	x	x				
4.92	x			System shall support plan (pattern) selection manually and local TOD scheduler at the local field controller.	x	x				
4.93		x		System shall support event-based pattern selection based on volume-occupancy and logic timer.	x	x				
4.94			x	System shall be able to coordinate with single and/or multiple band permissives.	x	x				
4.95	x			System shall support maximum recall phases by plan.	x	x				
4.96	x			System shall support minimum recall phases by plan.	x	x				
4.97	x			System shall support pedestrian recall phases by plan.	x	x				
4.98	x			System shall support reservice phases by plan (conditional service).	x	x				
4.99	x			System shall support pedestrian rest-in-walk.	x	x				
4.100	x			System shall allow the user to select phases not to shorten when using short way transition method.	x	x				
4.101	x			Controller shall support multiple offset recovery options (short way, long way, dwell, return to coordination).	x	x				

	Category				Requirement (see RFP)		Function Compliance			
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5.0 Security/User Access										
5.1	x			System shall provide scheduled deletion of log and system detector data (user selectable time intervals).	x					
5.2	x			System shall log all users' (local or central) activities (upload/download, etc.).	x	x				
5.3	x			System shall provide the option to require comments when timing changes are made (system administrator can select as required or optional).	x					
5.4	x			System shall allow access for a minimum of 20 users.	x					
5.5	x			System shall allow users to access the system simultaneously.	x					
5.6	x			System shall allow users to view the same intersection data simultaneously.	x					
5.7	x			System shall simultaneously support all workstations at any one time for both networked and remote users.	x					
5.8	x			System shall provide a login screen with username and password protection, managed by the system administrator, with user selectable time interval for password expiration.	x					
				System Administrator shall be able to set system configuration access privileges, including:						
5.9	x			Ability to define new controllers, groups, users, alarms, masters, system detectors, etc.	x					
5.10	x			Read/write privileges	x					
5.11	x			Upload/download privileges	x					
5.12		x		Ability to develop report queries	x					
5.13		x		Ability to set collection of reports	x					
5.14	x			System shall support configuration of individual user and group profiles.	x					
5.15	x			System shall allow the system Administrator to designate a user by jurisdiction	x					
5.16	x			System shall log user access date and time	x					
5.17	x			System shall log user ID	x					
5.18	x			System shall log amount of time user was logged into the system	x					

A	Category			Function	Requirement (see RFP)		Function Compliance			Comments
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5.19	x			System shall display users currently logged in.	x					
5.20	x			Edits to graphics and changes to system administration shall be refreshed after a save and all clients need to see made changes.	x					

	Category				Requirement (see RFP)		Function Compliance			
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6.0 Data Collection/Reports										
6.1	x			Event Log, Signal Phase Data and Event Log Monitor - allow denoting loggable events and formatting how data is recorded and archived.	x					
6.2	x			Status reports should allow user defined event log and signal phase data monitoring (configurable table sizes to desired record count, tables can be individually managed and archived) via GUI menus.	x					
6.3	x			System should allow user defined filters for status reports	x					
				System shall allow the user to configure system detector logs including:						
6.4	x			Volume - Every lane needs to be able to be counted and reported; reporting needs to be able to be stored in a user-defined format (TMC, 24 hour, etc.) without the software smoothing or rounding the numbers.	x	x				
6.5	x			Occupancy	x	x				
6.6	x			Speed	x	x				
6.7	x			Pedestrian calls (locked and non-locked)	x	x				
6.8	x			Pedestrian phased service (constant on)	x	x				
6.9	x			System shall provide user-definable report query by intersection and/or by failure. Queries shall have an option to be saved for future use.	x					
6.10	x			System shall monitor and report the clock time error in real-time to verify the local offsets/clocks are accurate.	x					
6.11	x			System shall allow user to directly export custom and summary reports to a universal format (e.g., HTML, PDF) for viewing, saving or printing.	x					
6.12	x			User shall be able to select a print of all sheets	x					
6.13	x			User shall be able to select a print out with only sheets containing timing data	x					
6.14	x			User shall be able to select a print out with only user selected sheets	x					
6.15	x			User shall be able to select a print out with only a user-configured set of sheets	x					
6.16	x			System shall support predefined intersection diagrams (i.e.., T-intersection, ramp interchange, one way, etc.) with vehicles, pedestrians, detectors, coordination plans, etc.	x					
				System shall report logs from the following or provided through a hyperlink:						
6.17	x			CMU/MMU	x					

	Category				Requirement (see RFP)		Function Compliance			
A	Required	Preferred	Considered	Function	Central	Local	Compliant	Partially Compliant	Not Compliant	Comments
6.18	x			UPS	x					
6.19	x			EVP phase selector cards	x					
6.20	x			Emergency Vehicle Pre-emption	x					
6.21	x			System shall support HTML or XML data output for traffic flow map (real-time from system detectors).	x					
				System shall log and provide a report of the following performance data:						
6.22	x			Real-time split usage	x					
6.23	x			Phase max reached	x					
6.24	x			Phase gap out	x					
6.25	x			Phase force off	x					
6.26	x			Coordination events & causes	x					
6.27	x			Transition events & causes	x					
				User shall be able to generate a system status report. System status report could be generated by:						
6.28		x		A group of intersections	x					
6.29	x			A group of intersections by event	x					
6.30	x			All intersections	x					
6.31	x			All intersections by event	x					
6.32	x			An individual intersection	x					
6.33		x		System should provide a report for system performance measures (average corridor travel times, stops, delays).	x					

	Category				Requirement (see RFP)		Function Compliance			
A	Required	Preferred	Considered	Function	Central	Local	Compliant	Partially Compliant	Not Compliant	Comments
7.0 Alarms										
7.1	x			User configurable alarm priority	x					
7.2	x			The city shall be able to configure how an alarm will be delivered by the type of event (flash, preempt, transition, cabinet door, etc.):	x					
7.3	x			User defined alarm hierarchy and corresponding on-call technician notification based on time of day, shift, day of week, etc.	x					
7.4	x			Alarm notification (includes alarm text description and location) via GUI menus	x					
7.5			x	Phone	x					
7.6			x	Pop-up window (GUI)	x					
7.7			x	Text message	x					
7.8			x	Email	x					
7.9		x		Report	x					
7.10			x	Instant messaging	x					
7.11		x		System shall provide a minimum of four user-defined redundant alarms. Alarms shall be configurable via controller logic.	x					
7.12		x		System shall provide a date and time stamp for each alarm.	x					
7.13			x	System shall have the capability to filter alarm types and allow predetermined collection of alarms.	x					
7.14			x	System should allow for a trigger function based on an alarm.	x					
				System shall allow the following alarm collection functions:						
7.15	x			Scheduled collection of alarms	x					
7.16	x			User-selected alarms to collect	x					
7.17	x			Automatically display selected alarms	x					
				System shall display user defined system/corridor/intersection alarms including the following:						

A	D	E	F	G	H	I	J	K	L	N
	Category				**Requirement (see RFP)**		**Function Compliance**			
	Required	**Preferred**	**Considered**	**Function**	**Central**	**Local**	**Compliant**	**Partially Compliant**	**Not Compliant**	**Comments**
7.18	x			Cabinet flash (e.g., malfunction)	x	x				
7.19	x			Cabinet door open	x	x				
7.20		x		Off-line	x	x				
7.21		x		UPS activation	x	x				
7.22		x		UPS inactive	x	x				
7.23		x		Keyboard entry	x	x				
7.24		x		Loss of communication	x	x				
7.25	x			Bad communication	x	x				
7.26			x	Loss of coordination and cause	x	x				
7.27	x			Preemption timeout or exceeding a fixed time	x	x				
7.28	x			Cycle failure	x	x				
7.29	x			System and local clock drift/time error, based on user defined thresholds	x	x				
7.30	x			Police Panel Door open	x	x				
7.31	x			Manual Operation	x	x				

	Category				Requirement (see RFP)		Function Compliance			
	Required	Preferred	Considered	Function	Central	Local	Compliant	Partially Compliant	Not Compliant	Comments
8.0 System Configuration										
8.1	x			System is scalable, supporting up to a minimum of 500 intersections	x					
8.2		x		System is scalable, supporting up to minimum of 5,000 system detectors.	x					
8.3	x			System Administrator shall be able to assign an intersection ID number that can be edited by System Administrator.	x					
8.4		x		ID numbers shall have a capability of at minimum of 3 digits or variables	x					
8.5	x			System Administrator shall be able to assign an intersection to logical groups. Intersections must also be able to exist in multiple groups and temporary groups created on the fly. All groups should be able to be created through selection in a map tree.	x					
8.6	x			Intersection groups should be able to be assigned regardless of communication channels intersections are on.	x					
8.7	x			System Administrator shall be able to assign an intersection to a jurisdiction.	x					
8.8	x			System shall provide backup and storage capability for all data as frequently as possible without affecting overall system performance. This data shall be time stamped and archived for records for up to 5 years depending on storage. The system shall also log and record all user activity tagged by date and time.	x					
8.9	x			System shall be designed for unattended operations 24 hours per day, 7 days a week, without requiring an operator to be logged into the system. The system shall provide system control by coordinating intersection operations on an individual, grouping, or system- wide basis.	x					
8.10	x			System shall be capable of dividing the traffic network into a minimum of 50 groupings of signals for items such as special events, pattern changes, traffic responsive, incident management, etc.	x					
8.11			x	System must provide an automatic routine to systematically test all combination of inputs and outputs of a controller cabinet in a bench or test environment.	x	x				
9.0 System Interface										
9.1		x		System shall allow users to import phasing and timing to a selected pattern and split table from a Synchro file using a Wizard tool.	x					
9.2			x	User should be able to select the individual UTDF data elements to upload/download.	x					
9.3	x			System shall be capable of interfacing with the currently deployed ATC and TS2 controllers and hardware already in place.	x	x				
9.4	x			System shall allow selected users with appropriate to reset the system through the Client Application	x					
9.5	x			System shall provide the capability to select from a variety of traffic controller firmware as it relates to 9.3 and the functional requirements contained herein.	x	x				

	Category				Requirement (see RFP)		Function Compliance			
	Required	Preferred	Considered	Function	Central	Local	Compliant	Partially Compliant	Not Compliant	Comments
10.0 Software Standards Compliance										
10.1	x			The system manufacturer shall utilize a methodology for software development, testing, configuration management and quality assurance processes using CMMI, IEEE, ISO or in-house developed procedures.	x					
10.2	x			Testing for NTCIP 1201 and 1202 conformance shall be performed either in-house by the manufacturer or through an Independent Verification and Validation (IVV) process to perform and certify the results.	x					
10.3	x			The system manufacturer must provide the City of Knoxville with a Statement of Compliance (SOC) or certification to substantiate NTCIP- compliance for this procurement.	x					
11.0 System Software										
11.1	x			System documentation shall be in digital form by CD, DVD, or USB Memory Drive	x					
11.2	x			System manufacturer shall be responsible for developing the test plan and procedures, however, it shall be submitted to City of Knoxville for review, modifications and written approval prior to its use.	x					
11.3	x			The system manufacturer's test plan and procedures must include the functional requirements contained herein, as applicable.	x					
11.4		x	x	System software compatible with off-shelf PC software (GIS, CAD, Spreadsheet)	x					
11.5		x	x	System software shall provide customizable tools to interface with other programs	x					