SPECIAL SPECIFICATION
8778
Traffic Adaptive Control System

1. Description. Furnish all labor, equipment and material to install or remove an Adaptive Control System designed for transportation and traffic applications. The system must include an adaptive control system closed loop master field processor, upgrade existing traffic signal controllers, installation of additional detectors (if required), adaptive control system software, integration and training of the adaptive control system.

2. Materials. Provide new materials that meet the requirements of the plans and this specification.

   A. The adaptive control system software is designed to adapt the splits and offsets of signal control patterns/plans in a “closed-loop” master-based traffic control system. Changes to cycle time are handled on a time-of-day schedule like traditional traffic control systems. At each optimization step, which occurs about every 10 minutes, the system changes the splits and offsets a small amount (2-5 seconds) to accommodate changes in traffic flows.
   
   B. The adaptive control system performs its optimizations by polling each local controller for detection and phase status data once per minute. This allows the adaptive control system management computer system to manage many local controllers (12-32) depending upon communications rates. A minimum of 9600bps is required to run 12 local controllers.
   
   C. The adaptive control system must support both serial and Internet Protocol (IP) communications with controllers using any communications media, i.e. fiber, wireless, hard wire. It must be capable of utilizing both serial and IP communication in one adaptive control system.
   
   D. The adaptive control system must be configurable through a web-based user interface from a laptop computer connected to the adaptive control system field processor. The configuration data must be uploaded directly from the local controllers with no additional user data entry, allowing the user to configure links, ring sequences and detectors so the system can begin processing the data for traffic adaptive control.
   
   E. As the adaptive control system is running, web pages must be updated each cycle to provide the status of each intersection performance and the changes that the adaptive control system makes to the splits and offsets. The performance measures must then be archived to a data store (up to a month of data must be stored on the field processor in compressed files) for future analysis and retrieval.
4. **Functional Requirements.** The principal adaptive control system must consist of:
   A. An adaptive control system central hardened PC in a field cabinet or a Standard PC in an office environment if Ethernet is available to the local controllers.
   B. Field hardware controllers
   C. Central Communications Equipment
   D. Remote workstations with Internet access to the adaptive control system central.
   E. Field communications
   F. The central office must support the distributed client/server architecture via a local area network (LAN).
   G. NTCIP communications protocols must be used for all interfaces between controllers and central and between central and other external systems.

5. **Technical Requirements.**
   A. The system must be provided with an environmentally hardened PC processor for field deployment with adaptive control system software installed. The PC, as a minimum, must have 233Mhz Pentium III processor, 256MB RAM, Windows XP Professional, 20 GB HD, USB port, Ethernet port and a Serial port. The system server must run on Windows Server 2003 or 2008.
   B. The system client applications(s) must be network-deployable.
   C. The system must provide a browser-based client application, Microsoft Internet Explorer 6 or higher.
   D. The system must be provided with 9600bps or faster hardened multi-drop serial modems or IP network communications.
   E. There must be an IP connection to the field master cabinet location for viewing status and configuration web pages on the adaptive control system processor.
   F. Upgrade existing controllers with an M50 series controller with SEPAC latest version NTCIP controllers with SEPAC latest version NTCIP.
   G. Convert signal control plans from SEPAC vendor-specific format to NTCIP format.
   H. Provide traffic detection as required on the plans.
   I. Provide IP addressable modem or other IP communication media for upload-download of controller databases, remote web-page viewing for configuration and status and for remote management and support.
   J. The system must provide time synchronization between the server and field devices using GPS, WWV or NTP.
   K. Contractor will provide a new signal controller assembly that meets the requirements of DMS-11170, “Traffic Signal Controller Assembly,” and the details shown on the plans. Provide controller assemblies from manufactures prequalified by the Department. The Traffic Operations Division maintains a list of prequalified controller assembly manufacturers.
6. Operational Requirements
   A. There must be 7 operational modes for the adaptive control system; Configuration mode, Synchronization mode, Validation mode, Monitoring mode, Analysis mode, Control mode and Shutdown mode.
   B. The adaptive control system must be configured so the timing plans will adjust to traffic fluctuations without the need for operator over-ride.
   C. The adaptive control system must have the capability to be manually turned off and on.
   D. The adaptive control system must operate on a time-of-day schedule or through manual commands.
   E. The adaptive control system must provide real time adaptive control information for cycle times, offsets, split allocation, phase length, demand dependent phase activation and detector fault warnings.
   F. The adaptive control system must provide for pre-emption of the controller for emergency vehicles and signal-timing optimization must automatically recover after pre-emption.
   G. The adaptive control system must recover automatically after a power outage, power surge, or communications failure.
   H. The system must use existing traffic detectors, where available, for data collection and performance tuning.
   I. The adaptive control system must provide status displays for monitoring the traffic adaptive operation for split tuning, offset tuning, pattern history and phase timing history.
   J. The adaptive control system must maintain once per minute communications from the field processor and local controllers.

7. Construction. The contractor must upgrade existing controllers, provide and install the adaptive control system field processor, establish communications with local intersection controllers, provide communications with system workstations, and configure all operational parameters to complete an operational adaptive control system.

8. Training.
   A. Upon successful operation of the adaptive control system the contractor must provide two days training. The training must consist of classroom and hands on field training for up to 6 maintenance personnel. Training must include field controller and firmware training, detector system operation and adaptive control system master controller operation.
   B. In addition, three (3) manuals supporting the system must be included. As a minimum, these manuals must consist of adaptive control system operations manual, SEPAC operations manual, SEPAC tutorial guide, controller hardware operations guide, hardware and software manuals from any third party system provider, i.e. Windows XP, modem manuals, computer manuals, etc.
9. **Warranty.** The contractor must provide a warranty statement that provides a minimum of one (1) year technical support for the adaptive control system. The support must include phone, e-mail and hyper-link connections from the manufacturer to the system. In addition, the manufacturer must provide a designated local representative for additional support.

10. **Measurement.** This Item will be measured as each signalized intersection controlled by a single traffic signal controller.

11. **Payment.** The work performed and materials furnished in accordance with this item and measured as provided under “Measurement” will be paid for at the unit price bid for "Traffic Adaptive Control System”. This price is full compensation for furnishing, installing, and testing the completed installation of the new controller, the adaptive control system, (1) one license for the master signalized intersection and additional licenses as called out in the general notes or plans for future intersections controlled by the master intersection. The Department will pay for electrical energy consumed by the traffic signal.