SECTION 275315 – CLOCK SYSTEMS SYNCHRONOUS WIRELESS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY
   A. This Section specifies a synchronous wireless clock system including but not limited to the following components:
      1. Wireless indicating clocks
      2. Scheduler and Time Supervision Server
      3. Wireless access points
      4. Interface to the educational intercommunication and program system.
      5. System wire and security
   B. Related Sections:
      1. Division 26, Electrical
      2. Division 27, Communications
      3. Division 2, Safety and Security

1.3 DEFINITIONS
   A. NIST: National Institute of Science and Technology
   B. LED: Light-emitting diode
   C. UTC: Universal Time Coordinated. The precisely measured time at zero degrees longitude used as a worldwide standard for time synchronization.
   D. SNTP: Simple Network Time Protocol
   E. SSID: Service Set Identifier. Is the name that identifies a defined wireless network.

1.4 SYSTEM DESCRIPTION AND PERFORMANCE REQUIREMENTS
   A. System shall work with the existing building 802.11 b/g/n network.
   B. Maintain correct synchronized time and transmit time correction signals over the building network from an internet timeserver or local SNTP timeserver to the indicating clocks.
C. System shall perform the following functions:

1. The indicating clocks shall receive a time correction signal a minimum of every 15 seconds.
2. The indicating clocks shall be capable of two-way local and remote communication. The indicating clocks shall be capable of transmitting the following:
   a. Wifi Signal strength
      1) For the mapping of the facility’s WiFi signal strength in the areas of coverage
   b. Connectivity
      1) For the verification, testing, troubleshooting, and maintenance of the clock system, leading to lower life cycle maintenance cost.
   c. Network configuration parameters
      1) For the easy of setup and initialization

3. Daylight Savings Time Correction shall be configured for automatic correction.
4. Regulate system timing using backed up for power outages by an internal battery-less power source, crystal-controlled oscillator, automatic reference to an internet timeserver or local SNTP timeserver by way of the building 802.11 b/g/n network. Reference time signals shall be automatically accessed at programmable intervals.

1.5 SUBMITTALS

A. Shop Drawings:

1. Wiring diagrams to detail power source and breaker locations for future clock system service and maintenance.

B. General Submittal Requirements:

1. Refer to Division 01 – Specification Sections.
2. Shop Drawings shall be prepared by persons with the following qualifications:
   a. Trained and certified by manufacturer in system clock design.
   b. Licensed or certified by authorities having jurisdiction.

3. Product Data: Include for each product indicated construction details, material description, dimensions of individual components and profiles, and finish color.

4. Floor Plans: Indicate final outlet locations of the system clock by type.

5. Samples for initial selection:
   a. Representative operating models of clock types.

C. Qualification Data: For qualified Installer and manufacturer

D. Field quality-control test reports samples

E. Closeout Submittals:
1. Operation and Maintenance Data:
   a. Including operation and maintenance manuals
   b. Completed field quality test report

1.6 SOFTWARE SERVICE AGREEMENT
   A. Technical Support: Beginning with Substantial Completion, provide software support for one year.

1.7 QUALITY ASSURANCE
   A. Codes and Standards
      1. Americans with Disabilities Act
      2. National Electrical Code
      3. Underwriter’s Laboratory
   B. Installer Qualifications: Clock System Manufacturer’s authorized representative who is trained and approved for the installation and maintenance of the units required for this project.
   C. Manufacturer Qualifications: A Manufacturer specializing in the development and manufacturing of Time Indicating Appliances for a minimum of fifteen years of documented experience as a clock system manufacturer.
   D. Supplier Qualifications: Authorized distributor of specified manufacturer with minimum three years documented experience.
   E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
   F. Substitution Approval: Ten days in advance of bid, Contractors seeking approval must submit, in writing to the owner, any and all, deviations from these specifications and obtain Owner’s written approval, prior to bidding.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
   A. Manufacturers: Subject to compliance with the requirements, provide product by the following:
      1. Clock Equipment Manufacturer:
         a. National Time and Signal Corporation
         b. Or equal, if approved:
            1) Bogen Communication, Inc.
2.2 WiFi ANALOG CLOCK

A. Manufacturer: National Time and Signal Corporation

B. Series: TIME WiSETM Rotor Drive Analog Clock

1. Model Numbers of the 12 Inch Round Dial Analog Clock (120V) and associated accessories
   a. Model: SR-12RD-WiFi-HW-SP, 12 inch clock with transformer power supply
   b. Protective Guard: Model Number: 12WGS

2. Model Numbers of the 24 Inch Round Dial Analog Clock (120V) and associated accessories
   a. Model: SR-24RD-WiFi-HW-SP, 24 inch clock with transformer power supply
   b. Protective Guard: Model Number: 24WGS

C. Optimal viewing of the Analog Clock requires that the clock meet the following criteria:

1. 12 inch Clock with viewing to 50 feet
   a. Clock dial diameter shall be a minimum of 12.5 inches
   b. Each numeric display number shall have a minimum height of 1 3/8 inch
   c. Clock minute hand shall have:
      1) A minimum length of 5 5/8 inches from the center bushing
      2) A minimum hand width of an ½ inch
   d. Clock hour hand shall have:
      1) A minimum length of 4 inches from the center bushing
      2) A minimum hand width of an ½ inch

2. 24 inch Clock with viewing over 80 feet
   a. Clock dial diameter shall be a minimum of 23.5 inches
   b. Each numeric display number shall have a minimum height of 2 5/16 inches
   c. Clock minute hand shall have:
      1) A minimum length of 9 ½ inches from the center bushing
      2) A minimum hand width of 7/8 of an inch
   d. Clock hour hand shall have:
      1) A minimum length of 6 3/8 inches from the center bushing
      2) A minimum hand width of 7/8 of an inch

D. The Rotor Drive Analog clock shall be microprocessor based device capable of:

1. Optical sensing of the hands positioning, providing:
   a. Precision hand position correlation to NIST time base resulting in accurate timekeeping
   b. Precision hand position correlation to the clocks drive train mechanism resulting in maintenance free calibration

2. Audible alert for classroom change
E. Furnished in a metal case, enameled powder gray, black hands, and marking.

F. Clock face shall be white complete with a shatterproof lens.

G. 1 to 12 hour display format with Arabic numerals.

H. The wireless security encryption of the Analog Clock shall be capable of supporting the following industry standard security protocols:
   1. WPA2-AES
   2. WPA-TKIP
   3. WEP-64
   4. WEP-128

I. The Analog Clock network interface shall be password protected.

J. The Analog Clock shall use the industry standard SNTP protocol in acquiring system time.

K. The Analog Clock shall be capable of two way communication allowing the facility network operator the following capability:
   1. Viewing of the WiFi Signal strength at the clock location
   2. Verify of the network connectivity
   3. Viewing of the Network configuration parameters
   4. Identifying clock location by way of a custom message entered at the time of configuration.

L. The configuration of the Analog Clock for connection to the facility WiFi network shall be achievable by way of:
   1. Wireless Ad Clock™ connection, allowing the configuration of the clock to the defined facility WiFi network by accessing the clock's web browser setup page by way of a consumer based hand held device.
   2. By default, upon power up the clock shall connect to the preconfigured National Time facility WiFi network SSID.
   3. By default, upon power up the clock shall connect to an open facility WiFi network

M. Protective guards shall be WGS Series wired guards.
   1. Formed-steel wire, shaped to fit around guarded clock, with a 1-inch maximum clearance.
   2. Mounting guard shall be fixed tab, with tabs welded to guard, and arranged for screw attachment to the mounted surface.

2.3 WiFi DIGITAL CLOCK

A. Manufacturer: National Time and Signal Corporation

B. Series: TIME WiSE™ Digital Clock
1. Model Numbers: Corridor Clock
   
a. Dual 4.0 Inch Four Segment Digital Clock (120V) for display of hours and minutes
      1) Model: DF-400DLS4-WiFi-HW complete with transformer power supply
   
b. 4.00 inch display with viewing over 80 feet
      1) Each numeric number shall be comprised of a 7 segment epoxy filled display, white diffused epoxy filled lens, and a black surface
      2) Each segments have a minimum of width of 10.0 mm
      3) Red segment shall have a wavelength of 645 nm
      4) Segment shall have a minimum height of 101.60 mm (4.0 inch) inches

C. The Digital clock shall be microprocessor based device must be capable of:
   1. 9 levels of display brightness adjustment for optimum readability
   2. Timer mode for count up and down for increased clock functionality
   3. Audible alert for classroom change and/or count down completion
   4. Auto-dim, to synchronize the display brightness output with the room’s lighting level for:
      a. Surgical operating suites
      b. Theatrical and video production areas
      c. Night time dimming to reduce energy consumption and increase display life

D. The Digital clock housing shall be of steel construction finished in neutral powder grey enamel

E. The clock shall be capable of 12 and 24 hour display formats.

F. The wireless security encryption of the Digital Clock shall be capable of supporting the following industry standard security protocols:
   1. WPA2-AES
   2. WPA-TKIP
   3. WEP-64
   4. WEP-128

G. The Digital Clock network interface shall be password protected.

H. The Clock shall use the industry standard SNTP protocol in acquiring system time.

I. The Clock shall be capable of two way communication allowing the facility network operator the following capability:
   1. Viewing of the WiFi Signal strength at the clock location
   2. Verify of the network connectivity
   3. Viewing of the Network configuration parameters
   4. Identifying clock location by way of a custom message entered at the time of configuration.
J. The configuration of the Digital Clock for connection to the facility WiFi network shall be achievable by way of:

1. Wireless Ad Clock™ connection, allowing the configuration of the clock to the defined facility WiFi network by accessing the clock's web browser setup page by way of a consumer based handheld device.
2. By default, upon power up the clock shall connect to the preconfigured National Time facility WiFi network SSID.
3. By default, upon power up the clock shall connect to an open facility WiFi network

K. The Digital Clock shall be capable of providing an elapse timer mode of operation from a handheld device or networked personal computer. The elapse mode timer provides for both count up or count down operation by way of the web browser in the WiFi Digital Clock.

1. The elapsed mode shall display elapsed time in seconds and minutes when using a 4-digit display and seconds, minutes and hours with the use of the 6 digit display...
2. In the elapsed time mode the handheld device shall be capable of selecting time duration, count up, count down, start, stop, and reset.

2.4 CLOCK SYSTEM SCHEDULER AND TIME SUPERVISION SERVER

A. Manufacturer: National Time and Signal Corporation

B. Series: TIME WiSE™ Scheduler and Time Supervision Server

C. The TIME WiSE™ Scheduler and Time Supervision Server shall provide:

1. One LAN 10BASE-T/100BASE-T port for connection to the existing facility network
2. A single point connection to the internet or local time authority for time synchronization to the TIME WiSE™ series of devices
3. Notification of lost communication with:
   a. The TIME WiSE™ series of devices
   b. The facility Wireless Access Point
4. WiFi signal strength level recording of the TIME WiSE™ series of devices
5. Event scheduling for:
   a. The system wide TIME WiSE™ series of devices
   b. Up to 32 virtual circuits
   c. Up to 20 individual schedules holding 500 events each
   d. Automatic schedule changes by date, for special events for such as holidays, assemblies, exams, vacation, etc.

2.5 Wireless Access Point

A. General Description: The Wireless Access Point shall transmit and receive data to and from the TIME Wi-SE™ Series Clocks.

1. The Wireless Access Point shall meet the following parameters:
   a. Comply with IEEE 802.11 b/g/n
b. Operate in the frequency range of 2.412 to 2.462 GHz  
c. Provide 11 channels of operation  
d. Support certified security protocols WEP, WPA, and WPA2  
e. Wi-Fi certified

2.6 CLOCK SYSTEM PROGRAMING

A. Clock Network Initialization

1. Local Programming Modes: The Clock shall be capable of local configuration to the facility’s network.  
   a. TIME WiSE™ Ad Clock™ Wireless Connection: The analog and digital clock shall be capable of configuration of the clock to the facility network by use of a hand held device. The TIME WiSE™ Ad Clock™ mode shall provide the ability to configure the clock through the clock’s web browser including setting of the network name, password, security setting, time zone, time source, daylight saving time zone, and custom location message  
   b. RS232 Serial Port Connection: The analog and digital clock shall be capable of setting the configuration to the facility network through the clock’s serial communication port utilizing a TIME WiSE™ setup tool. The Serial port mode provides the ability to configure the clock, including setting of the network name, password, security setting, time source, time zone, daylight saving time zone, and custom location message  
   c. Open Network: The analog and digital clock shall be capable of connection to an open network, selectable through the clock’s mode selection switch.  
   d. National Time Network: The analog and digital clock shall be capable of connection to the facility’s preprogrammed National Time Network SSID and Password, selectable through the clock’s mode selection switch.  
   e. Custom Network: The analog and digital clock shall be capable of connection to the facility’s preprogrammed Facility’s defined Network SSID and Password, selectable through the clock’s mode selection switch.  

B. Elapse-Timer Mode

1. Elapse-Timer Modes: The Clock shall be capable of local access and configuration to the clocks elapse-timer mode by way of:  
   a. A networked wired or wireless Personal Computer (PC) running the TIME WiSE™ Time Me software, the Time Me software identifies the network clock IP address and provides the user access with network security protection for initiating the count up/down timer mode operation.  
   b. A hand held wireless device running the TIME WiSE™ Time Me application, the Time Me application identifies the network clock IP address and provides the user access with network security protection for initiating the count up/down timer mode operation.  
   c. A WiFi device connecting to the defined IP clock address and enabling the clock’s web browser for initiating the count up/down timer mode operation.  
   d. A wired connection to the lapse-timer Control Interface model DLU-ET-CTRL for initiating the count up/down timer mode operation.
1. System Scheduler Modes: The Clock and Auxiliary Outputs shall be capable of local access and configuration to the system scheduler mode by way of:
   a. A networked wired or wireless Personal Computer (PC) running the TIME WiSE™ Scheduler software, the Scheduler software identifies the network clock IP address and provides the user access with network security protection for initiating the device schedule mode.
   b. A networked wired or wireless Personal Computer (PC) running the TIME WiSE™ Scheduler software, the Scheduler software identifies the network clock IP address and provides the user access with network security protection for initiating the device schedule mode.
   c. A hand held wireless device running the TIME WiSE™ Time Me application, the Scheduler application identifies the network clock IP address and provides the user access with network security protection for initiating the device schedule mode.
   d. A WiFi enabled device connecting to the defined IP clock address and enabling the clock’s web browser for initiating the device schedule mode.
   e. The TIME WiSE™ Scheduler and Time Supervision Server.

2. System Scheduler Functions:
   a. Digital Clocks: The TIME WiSE™ digital clocks shall be capable of scheduling the following functions:
      1) Provide for 250 scheduled events
      2) Class-change timer
      3) Power save mode
      4) Alert tone timer
      5) Auxiliary output timer
   b. Analog Clocks: The TIME WiSE™ analog clocks shall be capable of scheduling the following functions:
      1) Provide for 250 scheduled events
      2) Power save mode
      3) Alert tone timer
      4) Auxiliary output timer

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION DESIGN GUIDLINES

A. The Digital 4 Segment Clocks installed for:
   1. Stationary viewing shall utilize the single face digital clock, with:
      a. Distances less than 80 feet requiring a 2.25 inch displays
      b. Distances greater than 80 feet requiring a 4.00 inch displays
   2. Transient viewing for hallway or corridor areas shall utilize the dual face digital clock, with:
      a. Distances less than 80 feet between dual face clocks requires a 2.25 inch displays
      b. Distances greater than 80 feet and less than 180 feet between dual face clocks requires a 4.00 inch displays

B. The Analog Clocks installed for:
1. Stationary viewing shall utilize the single face analog clock, with:
   a. Distances less than 50 feet requiring a 12 inch dial
   b. Distances greater than 50 feet and less than 80 feet requiring a 16 inch dial
   c. Distances greater than 80 feet requiring a 24 inch dial
2. Transient viewing for hallway or corridor areas shall utilize the dual face analog clock, with:
   a. Distances less than 100 feet between dual face clocks requiring a 12 inch dial
   b. Distances greater than 100 feet and less than 160 feet between dual face clocks requiring a 16 inch dial

C. Mounting

1. Clocks shall be wall mounted at 96" above finished floor with a minimum of 8 inches of clearance from the ceiling. Clock shall be located with a viewable sightline for the intended area of coverage, free of obstructions.

D. Protective Guards

1. Protective guards shall be installed in gymnasiums, pools, loading docks, maintenance areas, and areas where a high probability to accidental contact with foreign objects can occur.

3.2 IDENTIFICATION

A. All Clocks shall be labeled at the device indicating the clock’s model number, serial number, and On-Point ID.

   1. Label shall be made from a UL listed label material

   2. Provide a minimum of 1/4 inch high text for all labels.

3.3 WIRING INSTALLATION

A. Install wiring according to the following:

   1. NECA 1.
   2. TIA/EIA 568-A.

B. Plenum Cable: Listed and labeled for use in air-handling spaces, plenums, and plenum ceilings.

C. Class 2 and 3 Signal, Control, and Data circuits: Single conductor or twisted-pair cable, unshielded, unless manufacture recommends shielded cable.

3.4 FIELD QUALITY CONTROL

A. Visual Inspection: Conduct a visual inspection using system documentation and/or as-built drawings for the inspection. Identifying improperly located, damaged, nonfunctional equipment, improper installation and mounting.
B. Operational Inspection: Engage the TIME WiSE™ qualification report software in verifying the following clock parameters:
1. Clock Serial Number
2. Location message
3. On-Point ID
4. IP Address
5. Signal Strength
6. Network ID setting
7. Time Zone offset
8. Time Zone Date
9. Time Server

C. Conduct Field Quality Test in the presence of the Architect and/or Facility Representative.

D. Review and document test results in writing

3.5 SUPPORT

A. Training

1. Provide both classroom instruction and on-the-job training, conducted before and during the system test period.

END OF SECTION 275315