SECTION 275313

WIRELESS, SYNCHRONIZED, GPS CLOCK SYSTEM

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**NOTE TO SPECIFIER**

*Use this Specification Section for Mail Processing Facilities.*

***This is a Type 2 Specification with primarily editable text; therefore, most of the text can be edited, but there is some required text which is noted within the Section with a “Note to Specifier.” Do not revise these paragraphs without an approved Deviation from USPS Headquarters, Facilities Program Management, through the USPS Project Manager.***

*For Design/Build projects, do not delete the Notes to Specifier in this Section so that they may be available to Design/Build entity when preparing the Construction Documents.*

*For the Design/Build entity, this specification is intended as a guide for the Architect/Engineer preparing the Construction Documents.*

*The MPF specifications may also be used for Design/Bid/Build projects. In either case, it is the responsibility of the design professional to edit the Specifications Sections as appropriate for the project.*

*Text shown in brackets must be modified as needed for project specific requirements.* *See the “Using the USPS Guide Specifications” document in Folder C for more information.*

*The last date that USPS revised this standard specification section occurs in two places, at the end of this section and in the Table of Contents. If the date in this section matches the date in the Table of Contents, then you are using the latest version. Do not delete or revise the “last revised” date at the end of the section during the development of the Project Manual.*

*The footer in this section should be edited to replace the text, “USPS MPF SPECIFICATION” with the project name, and the blank date in the center should be replaced with the submission date, for interim design reviews, or the issue date of the completed Project Manual.*

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1. GENERAL
	1. SUMMARY
		1. General Requirements and Scope: Furnish and install a completely new wireless, synchronized, GPS clock system, including equipment, accessories, and materials in accordance with these specifications and drawings.
		2. This section addresses the needs and requirements of the wireless clock system, it includes requirements for the wireless clock system components including, but not limited to, the following:
			1. Master Clock.
			2. Repeaters.
			3. Secondary Analog Clocks.
		3. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
		4. Related Sections:
			1. Section 260500 - Common Work Results for Electrical.
	2. REFERENCES
		1. Federal Communications Division (FCC).
			1. Part 15 - Code of Federal Regulations.
		2. National Fire Protection Association (NFPA).
			1. NFPA 70 – National Electrical Code.
		3. Underwriter’s Laboratories (UL).
	3. ADMINISTRATIVE REQUIREMENTS
		1. Coordination: Coordinate work of this Section with work of other trades for proper time and sequence to avoid construction delays.

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**NOTE TO SPECIFIER**

The pre-installation meeting may be deleted if the size and complexity of the project does not require prior coordination of the system installation.

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* + 1. Pre-installation Meeting: Convene pre-installation meeting after Award of Contract and before starting work of this Section to verify project requirements, conditions, and coordination with other building sub-trades, and to review manufacturer’s written installation instructions.
			1. Notify attendees 2 weeks prior to meeting and ensure meeting attendees include as minimum:
				1. Architect/Engineer.
				2. General Contractor.
				3. Clock System Installer.
				4. Clock System Manufacturer’s Representative.
			2. Ensure meeting agenda includes review of methods and procedures related to installation including co-ordination with related work.
			3. Record meeting proceedings including corrective measures and other actions required to ensure successful completion of work and distribute to each attendee within 1 week after meeting.
	1. SUBMITTALS
		1. Prepare submittals in accordance with Contract Conditions and Section 013300 ‑ Submittal Procedures.
		2. Product Data: Submit product data including manufacturer’s literature for clock system materials and accessories, indicating compliance with specified requirements and material characteristics.
			1. Submit list on clock system manufacturer’s letterhead of materials and accessories to be incorporated into the Work.
			2. Include product name.
			3. Include preparation instructions and recommendations, installation methods, and storage and handling requirements.
			4. Include contact information for manufacturer and their representative for this Project.
		3. Shop Drawings: Submit shop drawings with information as follows:
			1. Diagram of proposed system showing system platform appliance, communication pathway, and schedule of individual device locations.
			2. Show system power requirements.
		4. Samples:
			1. Submit one sample of each type of device used on project. Samples will be returned to Contractor for incorporation into the Work after A/E’s review.
		5. Test Reports:
			1. Submit evaluation and test reports or other independent testing agency reports showing compliance with specified performance characteristics and physical properties.
		6. Installer Experience: Submit verification of communication and electronics installer’s experience.
		7. Manufacturer’s Authorization: Submit verification of communication and electronics installer’s authorization from clock system manufacturer to perform Work of this section.
	2. QUALITY ASSURANCE
		1. Communications and Electronics Installer Quality Assurance:
			1. Work experience of [5] years minimum with work similar to work of this Section.
			2. Manufacturer’s authorization to perform work of this section.
		2. Supplier’s Accreditation: Use only suppliers accredited by clock system manufacturer.
		3. As specified in Section 260500 - Common Work Results for Electrical.
		4. All items of equipment shall be designed by the manufacturer to function as a complete system and shall be accompanied by the manufacturer’s complete service notes and drawings detailing all interconnections.
		5. Electrical Component Standard: Provide work complying with applicable requirements of NFPA 70 “National Electrical Code” including, but not limited to:
			1. Article 250, Grounding.
			2. Article 300, Part A. Wiring Method.
			3. Article 310, Conductors for General Wiring.
			4. Article 725, Remote Control, Signaling Circuits.
			5. Article 800, Communication Systems.
		6. Installation and startup of all systems shall be under the direct supervision of a local agency regularly engaged in installation, repair, and maintenance of such systems. The supplier shall be accredited by the proposed equipment manufacturers.
		7. The agency providing equipment shall be responsible for providing all specified equipment and mentioned services for all equipment as specified herein. The agency must be a local authorized distributor of all specified equipment for single source of responsibility and shall provide documents proving such. The agency must provide written proof that the agency is adequately staffed with factory-trained technicians for all of the specified equipment. The agency must have established business for and currently be providing all services for the equipment.
		8. Maintenance shall be provided at no cost to the Owner for a period of one year (parts and labor) from date of acceptance unless damage or failure is caused by misuse, abuse, neglect, or accident. Additionally, all manufacturer supplied products must be covered by 3-year (parts only) limited warranty from the date of acceptance. The warranty period shall begin on the date of project substantial completion.
		9. A service contract offering continuing factory authorized service of the system after the initial warranty period shall be provided upon the Owner’s request.
		10. The contractor is responsible for all cost associated with proper installation, termination, configuration, programming, impedance, and load matching of all system components.
	3. DELIVERY, STORAGE, AND HANDLING
		1. Delivery and acceptance requirements:
			1. Deliver materials and accessories in clock system manufacture’s original packaging with identification labels intact and to suit project.
			2. Ensure clock system materials are not exposed to moisture during delivery.
			3. Replace damaged clock system materials.
		2. Deliver products in factory boxes. Store in clean, dry, temperature controlled space in original boxes until installed. Protect products from fumes and construction traffic. Handle carefully to avoid damage.
	4. IN-SERVICE TRAINING
		1. Provide training of owner staff. These sessions shall be broken into segments that will facilitate the training of individuals in the operation of this system. Operators Manuals and Users Guides shall be provided at the time of this training.
1. PRODUCTS

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**NOTE TO SPECIFIER**

***REQUIRED****: Do not modify the basis of design.*

*Verify manufacturer information, product numbers, and availability at time of Project Manual preparation for Project. Report any discrepancies to the USPS Project Manager; an approved deviation may be necessary if the product has changed.*

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* 1. MANUFACTURERS
		1. The “Basis of Design” manufacturer:
			1. Sapling, Inc.; 670 Louis Drive, Warminster, PA 18974; Phone: 215-322-6063; URL: [www.sapling-inc.com](http://www.Sapling-Inc.com).
		2. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
			1. Sapling, Inc., Warminster, PA (215) 322-6063.
			2. Primex Wireless, Inc., Lake Geneva, WI (855) 602-2934.
			3. Substitutions permitted with approval from the USPS Project Manager.
		3. The intent of this specification is to establish a standard of quality, function, and features. It is the responsibility of the Contractor to ensure that the proposed product meets or exceeds every standard set forth in these specifications.
		4. The functions and features specified are vital to the operation of this facility, therefore, the acceptance of alternate manufacturers does not release the Contractor from strict compliance with the requirements of this specification.
		5. Provide a complete functional system including all necessary components whether included in this specification or not.
		6. Any approval of an alternate system does not automatically exempt the supplier from the intent of these specifications. Failure to comply with the operational and functional intent of these specifications may result in the total removal of the alternate system at the expense of the Contractor.
	2. SYSTEM REQUIREMENTS
		1. Ensure clock system components are designed to operate as a wireless clock system and as part of complete system including “fail-proof” design to ensure power interruption does not cause system failure.
		2. Ensure system synchronizes all clocks and devices to each other.
		3. Ensure system works in 915-928 MHz frequency range.
		4. Ensure system uses frequency-hopping technology.
		5. Ensure system is capable of correcting clocks immediately upon receipt of wireless signal.
			1. Analog clocks automatically correct themselves on receipt of wireless signal.
			2. Include built-in closed-loop system in analog clocks capable of allowing clocks to detect position of hands and bring clocks to correct time even if clocks are manually altered.
			3. Ensure analog clocks have diagnostic function capable of allowing user to view how long since clock received wireless signal.
			4. Ensure analog clocks are capable of functional tests of electronics and gears.
		6. Ensure each individual product is bench tested at manufacturer’s facility.
			1. Random testing is unacceptable.
		7. Ensure each product is designed, assembled and tested in the United States of America.
		8. The wireless clock system shall not be interfaced with the structured cabling system and shall operate independent of the data network.
	3. SYSTEM
		1. The system shall be capable of automatic transmission of data along 51 alternating frequencies that allows for an enhanced signal, even if there is interference in one of the frequencies.
			1. Obtain a federal assignment for the transmit frequency that is to be utilized by the clock system. Frequency clearance shall be requested through USPS Raleigh IT Service Center.
		2. Each secondary clock in the system shall be capable of receiving and transmitting the wireless signal which allows it to be used as a repeater while boosting the data stream and sending along the system. With this dual capability there shall be no limit on the number of clocks that can be used in the installation. The clocks shall be designed to automatically work together without interference with each other. The system shall be capable of increasing the quality of the signal while increasing the quantity of the clocks.
		3. The analog secondary clocks shall include automatic digital calibration for time base to minimize deviation from each other.
		4. The analog secondary clocks shall have a built-in close-loop system that will allow the clock to detect the position of the hands and bring the clock to the correct time even if the clock were manually or forcefully altered.
		5. The analog secondary clocks shall have the capability for diagnostic function that will allow the user to view the quality of the signal, how long since the last time the clock received a signal, as well as functional tests of the electronics and the gears.
	4. FCC APPROVAL
		1. This equipment shall be tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a commercial installation. This equipment shall not cause harmful interference to radio or television communications.
		2. Ensure system does not require FCC licensing.
	5. PRODUCTS
		1. Master Clock Type 2: to UL and cUL 863
			1. Ensure master clock includes 10 pre-programmed (S)NTP backup addresses.
				1. The master clock shall have a GPS receiver built into the unit and a roof mounted antenna for synchronization from the satellites via UTC.
			2. Ensure master clock is capable of correcting secondary clocks for Daylight Saving Time
			3. Ensure master clock is capable of customizing Daylight Saving Time, in the event of international use or a change in government regulations.
			4. Ensure master clock is capable of outputting RS485 signals.
			5. Ensure master clock has two clock circuits capable of outputting signals including:
				1. 59 minute correction.
				2. 58 minute correction.
				3. National Time or Rauland correction.
				4. Once a day pulse.
				5. Rauland digital correction.
			6. Clock System: Wireless with transmitter to FCC, Part 15.
				1. Transmitter: Capable of transmitting data to SAL wireless analog.

Ensure transmitter utilizes 915 -928 MHz frequency-hopping technology and is capable of acting as repeater when receiving wired or wireless signal from master clock.

* + - * 1. Automatic bi-annual Daylight Savings Time changes.
			1. Ensure system is capable of interfacing with GPS.
			2. Allow for programming of master clock through two push button switches on front panel.
			3. Ensure master clock is capable of interfacing with analog secondary clocks.
			4. Communications Interface: Web interface not required.
			5. Ensure master clock has internal battery to save settings and operate internal real-time clock for 10 years.
			6. Input Voltage: 85 V AC – 130 V AC, 60 Hz.
				1. Ten year battery backup for timekeeping.
			7. GPS: Built-in GPS receiver capable of receiving synchronization signal from satellites with roof mounted antennae and connected with 75 foot long cable with options for 150 or 300 foot cable.
				1. GPS Mounting Kit: M-GPS-MTG-KIT-1.
				2. GPS Antenna Cable (150 ft.): E-ANT-CBL150F-1.
				3. GPS Surge Protector / Arrestor: E-GPS-SURGE-1.
			8. Basis of Design: Sapling Inc., SMA 2000 Series Master Clock.

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**NOTE TO SPECIFIER**

Repeaters are optional since the wireless analog clocks have built-in repeaters. Include paragraph 2.5.B if the facility consists of multiple buildings or is of such size and construction that wireless repeaters are necessary. Consult with manufacturer to determine if repeaters will be needed.

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* + 1. Repeater: Capable of wirelessly transmitting and receiving data and compliant with FCC, Part 15.
			1. Input Voltage: 85 V AC – 130 V AC, 60 Hz.
			2. Input: RS485. Sapling Wireless Communications.
			3. Input source: Master clock or Secondary Sapling Wireless Clock.
			4. RF power output: 30 dBM (1 Watt).
			5. Frequency hopping technology.
			6. Mounting: Wall mount.
			7. Housing: 11 x 8 x 17 inches black smooth surface metal enclosure.
			8. Basis for design: Sapling Inc., Wireless Repeater.
		2. Secondary Clocks:
			1. Analog Clocks: To UL and cUL 863, designed for wireless system with fully automatic plug and play capability.
				1. Ensure secondary clock is capable of receiving wireless signals from master clock.
				2. Ensure each secondary clock works as an RF signal repeater, establishing a Mesh Network.

Operation frequency range: 915 - 928 MHz frequency-hopping technology.

Ensure clock is capable of receiving and transmitting signals every [2] [4] hours minimum.

* + - * 1. Clock display: 12 hour, white face with black numbers.

Size: Round 12 inch or 16 inch diameter; provide 16 inch diameter clocks within the Workroom and Platform areas.

* + - * 1. Ensure analog secondary clock is capable of receiving Sapling wireless signals every 2 or 4 hours.
				2. Materials:

Dial: Polystyrene.

Case: Shallow profile, smooth surface SlimLine ABS.

Crystal: Shatter-proof, side-molded, polycarbonate.

* + - * 1. Hand tolerance:

Hour and minute hands: ±1/4 minute.

Second hand: ± 1/2 minute.

* + - * 1. Power Requirements: Battery operated.

Batteries: 2 “D” cell batteries.

Basis for design: Duracell Procell “D” Cell batteries.

* + - * 1. Basis of design: Sapling Inc., SAL Series Wireless Round Analog Clock.
	1. SOURCE QUALITY CONTROL
		1. Ensure clock system components and accessories are supplied or approved in writing by single manufacturer.
1. EXECUTION
	1. INSTALLERS
		1. Use only installers with [5] years minimum experience with work similar to work of this Section.
		2. Ensure all clock system components are installed by single communications and electronics installer.
	2. EXAMINATION
		1. As specified in Section 260500 - Common Work Results for Electrical.
		2. Examine conditions, with the Installer present, for compliance with requirements and other conditions affecting the performance of the wireless clock system.
		3. Do not proceed until unsatisfactory conditions have been corrected.
		4. Start of clock system installation indicates installer’s acceptance of substrate installation conditions.
	3. INSTALLATION
		1. General:
			1. Install system in accordance with applicable codes. Install equipment in accordance with manufacturer’s written instructions.
			2. Upon installation completion, a room-by-room test shall be conducted for every device in the system. A factory authorized technician shall perform the test and repairs shall be performed as needed at no cost to the Owner to any devices, which do not function correctly, including cable. A written room-by-room report following testing and repairs shall be prepared and submitted to the Engineer.
			3. Install clocks only after painting and other finish work is completed in each room.
			4. Install clocks and other devices square and plumb.
	4. FIELD QUALITY CONTROL
		1. As specified in Section 260500 - Common Work Results for Electrical.
		2. Provide services of a factory authorized technician to supervise the field assembly and connection of components and the pre-testing, testing, and adjustment of the system.
		3. Make observations to verify that units and controls are properly labeled.
		4. Rectify deficiencies indicated by tests and completely re-test work affected by such deficiencies at the Contractor’s expense. Verify by the system test that the total system meets the specifications and complies with applicable standards.
	5. CLOSEOUT SUBMITTALS
		1. Operation and Maintenance Data: Supply maintenance data for clock system for incorporation into manual specified in Section 017704 ‑ Closeout Submittals.
		2. Record Documentation: In accordance with Section 017704‑ Closeout Submittals.
			1. List materials used in clock system work.
			2. Warranty: Submit warranty documents specified.
	6. DEMONSTRATION AND TRAINING
		1. Train Owner’s maintenance personnel in the procedures and schedules involved in operating, troubleshooting, servicing, and preventative maintenance of the system. Operators Manuals and Users Guides shall be provided at the time of this training.
			1. Arrange system demonstration and training session for Owner’s operation and maintenance personnel.
			2. Break down system demonstration and training session into logical segments for Owner’s operations and maintenance personnel.
			3. Schedule training with Owner through the Architect, with at least 7 days advance notice.
	7. SYSTEM COMMISSIONING
		1. The clock system shall be functionally tested by a factory authorized technician.
	8. CLEANING AND PROTECTION
		1. Protect installed products and accessories from damage during construction.
		2. Repair damage to adjacent materials caused by clock system installation.
		3. Prior to final acceptance, clean system components and protect from damage and deterioration.

END OF SECTION

USPS MPF Specification Last Revised: 10/1/2022