

SAPLING GUIDE NOTE: This master specification section includes guide notes identified as “SAPLING GUIDE NOTE” for information purposes and to assist the specification writer in making appropriate decisions. The SAPLING GUIDE NOTE always immediately precedes the text to which it is referring. The section serves as a guideline only and should be edited with deletions and additions to meet specific project requirements.

SAPLING GUIDE NOTE: This specification section follows the recommendations of the Construction Specifications Institute, Project Resource Manual including MasterFormat™, SectionFormat™, and PageFormat™. Optional text is indicated by square brackets [\_\_\_\_]; delete the optional text including the brackets in the final copy of the specification and retain only text pertaining directly to the project. Delete the SAPLING GUIDE NOTES in the final copy of the specification. Trade/brand names with appropriate product model numbers, styles, and types are used in SAPLING GUIDE NOTES and in the specification text Article or Paragraph titled “Basis of design”.

## **1 GENERAL**

### **1.01 SUMMARY OF WORK**

- A. This Section specifies materials and accessories for IP clock system.
- B. Section Includes:
  - 1. (S)NTP server/master clock;
  - 2. Elapsed timer;
  - 3. Secondary analog IP clock;
  - 4. Secondary digital IP clock.

### **1.02 RELATED REQUIREMENTS**

SAPLING GUIDE NOTE: Include in this Paragraph only those sections and documents that directly affect the work of this section. If a reader of this section could reasonably expect to find a product or component specified in this section, but it is actually specified elsewhere, then the related section number(s) should be listed in the Paragraph below. Do not include Division 00 Documents or Division 01 Sections since it is assumed that all technical sections are related to all project Division 00 Documents and Division 01 Sections to some degree. Refer to other documents with caution since referencing them may cause them to be considered a legal part of the Contract. Edit the following paragraphs to suit specific project conditions.

- A. Section [27 05 00 - Common Work Results for Communications: conductors and cables].
- B. Section [27 15 00 - Communications Horizontal Cabling].
- C. Section [27 10 53 - Clock System Commissioning].

SAPLING GUIDE NOTE: In the following Article, include only those reference standards which appear in the finished version of the project specification.

### **1.03 REFERENCE STANDARDS**

- A. Federal Communications Division (FCC)
  - 1. Part 15 - Code of Federal Regulations.
- B. Institute of Electrical and Electronics Engineers (IEEE)
  - 1. IEEE 802.3af-[1998], Standard for Information Technology - Telecommunications and Information Exchange Between Systems.
- C. National Fire Protection Association (NFPA).
  - 1. NFPA 70E-[2012], Standard for Electrical safety in the Workplace.
- D. US Green Building Council (USGBC).
  - 1. LEED® NC Version 2.2-[2009], LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations.
- E. Underwriter’s Laboratories (UL)

#### 1.04 ADMINISTRATIVE REQUIREMENTS

- A. Co-ordination: Co-ordinate work of this Section with communications and electronics work and with work of other trades for proper time and sequence to avoid construction delays.

SAPLING GUIDE NOTE: The pre-installation meeting may be deleted if the size and complexity of the project does not require prior co-ordination and review of the barrier system installation.

- B. Pre-installation Meeting: Convene pre-installation meeting after Award of Contract and [one week] before starting work of this Section to verify project requirements, substrate conditions and coordination with other building sub-trades, and to review manufacturer's written installation instructions.
1. Comply with Section 01 31 19 - Project Meetings and co-ordinate with other similar pre-installation meetings.
  2. Notify attendees 2 weeks prior to meeting and ensure meeting attendees include as minimum:
    - a. Owner;
    - b. Consultant;
    - c. [Communications and electronics] Subcontractor;
    - d. Manufacturer's Technical Representative.
  3. Ensure meeting agenda includes review of methods and procedures related to insulation installation including co-ordination with related work.
  4. Record meeting proceedings including corrective measures and other actions required to ensure successful completion of work and distribute to each attendee within 1 week of meeting.

SAPLING GUIDE NOTE: Article below includes submittal of relevant data to be furnished by Contractor.

#### 1.05 ACTION AND INFORMATIONAL SUBMITTALS

- A. Make submittals in accordance with Contract Conditions and Section 01 33 00 - Submittal Procedures.
- B. 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 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.
- C. 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. Include wiring diagrams detailing wiring for power, signal and control and showing typical connections to equipment and devices.
  3. Indicate integration with the Owner's network and servers. Include line diagram of network relationships.
  4. Show system power requirements.
- D. Samples:
1. Submit one sample of each type of device used on project. Samples will be returned to Contractor for incorporation into Work after Consultant's review.
- E. Test Reports:
1. Submit evaluation and test reports or other independent testing agency reports showing compliance with specified performance characteristics and physical properties.
- F. Subcontractor Experience: Submit verification of communication and electronics subcontractor's experience.

- G. Manufacturer's Authorization: Submit verification that of communication and electronics subcontractor's authorization from clock system manufacturer to perform Work of this section.
- H. Sustainable Design (LEED).
  - 1. LEED Submittals: In accordance with Section [01 35 21 – LEED Requirements]

#### **1.06 CLOSEOUT SUBMITTALS**

- A. Operation and Maintenance Data: Supply maintenance data for clock system for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

SAPLING GUIDE NOTE: If LEED is not a part of the project delete the following Paragraph in its entirety as well as the reference standards in 1.03.F.

- B. Sustainable Design Closeout Documentation (LEED).
  - 1. Provide calculations on end-of-project recycling rates, salvage rates, and landfill rates for work of this Section demonstrating percentage of construction wastes which were recycled.
  - 2. Submit verification from recycling facility showing receipt of materials.
- C. Record Documentation: In accordance with Section 01 78 00 - Closeout Submittals.
  - 1. List materials used in clock system work.
  - 2. Warranty: Submit warranty documents specified.

#### **1.07 QUALITY ASSURANCE**

- A. Communications and Electronics Subcontractor Quality Assurance:
  - 1. Work experience of [3] years minimum with work similar to work of this Section.
  - 2. Manufacturer's authorization to perform work of this section.
- B. Supplier's Accreditation: Use only suppliers accredited by clock system manufacturer.
- C. Supplier's Maintenance Requirements:
  - 1. Ensure local supplier has adequate facility for storage of spare parts for clock system.

SAPLING GUIDE NOTE: If LEED is not a part of the project delete the following Paragraph in its entirety as well as the reference standards in Articles 1.03 and 1.05.

- D. Sustainability Standards Certification (LEED).
  - 1. LEED submittals: In accordance with Section [01 35 21 - LEED Requirements].

SAPLING GUIDE NOTE: The following Article although not part of Quality Assurance, can be used to enhance the quality of materials by ensuring that they are delivered and handled properly at the work site.

#### **1.08 DELIVERY STORAGE AND HANDLING**

- A. Delivery and Acceptance Requirements:
  - 1. Deliver material in accordance with Section 01 61 00 - Common Product Requirements.
  - 2. Deliver materials and accessories in clock system manufacture's original packaging with identification labels intact and to suit project.
  - 3. Ensure clock system materials are not exposed to moisture during delivery.
  - 4. Replace damaged clock system materials.
- B. Storage and Handling Requirements: Store materials off ground in dry location and protected from exposure to fumes and harmful weather conditions and at temperature conditions recommended by manufacturer.
  - 1. Store in original packaging until installed.
- C. Packaging Waste Management:

SAPLING GUIDE NOTE: For smaller projects that do not have a separate Section for waste management and disposal, delete the following

paragraph.

1. Separate and recycle waste packaging materials in accordance with Section [01 74 19 - Construction Waste Management and Disposal].
2. Remove waste packaging materials from site and dispose of packaging materials at appropriate recycling facilities.

SAPLING GUIDE NOTE: For smaller projects that do not have a Waste Management Plan, delete the option referring to a Waste Management Plan.

3. Collect and separate for disposal, paper and plastic material in appropriate on-site storage containers for recycling [in accordance with Waste Management Plan].

## **1.09 WARRANTY**

- A. Project Warranty: Refer to Contract Conditions for project warranty provisions.
- B. Manufacturer's warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to and not intended to limit other rights Owner may have under Contract Conditions.

SAPLING GUIDE NOTE: Co-ordinate article below with manufacturer's warranty requirements.

- C. Warranty period: [2] years commencing on Date of Purchase.

## **2 PRODUCTS**

### **2.01 MANUFACTURER**

- A. Manufacturer: Sapling Inc., 1633 Republic Rd Huntingdon Valley, PA 19006, Phone: 1-215-322-6063, URL: [www.sapling-inc.com](http://www.sapling-inc.com).

### **2.02 SYSTEM REQUIREMENTS**

- A. Ensure clock system components are designed to operate as part of complete system and include "fail-proof" design to ensure power interruption does not cause system failure.

SAPLING GUIDE NOTE: Use the following paragraph only if system is being installed as part of a renovation in an existing building.

- B. Ensure system can work in conjunction with existing wiring.
- C. Ensure system synchronizes all clocks and devices to each other.
- D. Ensure system operates utilizing Power over Ethernet to IEEE 802.3af.
- E. Ensure system works with monitoring software for system controls from one location and including options as follow:
  1. Mark clocks as priority for quick viewing;
  2. Uploading and downloading configuration capabilities;
  3. Sending numeric messages to digital clocks;
  4. Sending countdown functions to digital clocks;
  5. Sending alphanumeric messages to digital clocks;
  6. Displaying which clocks are not receiving (S)NTP time.
- F. Ensure system monitor is run on PC on same network as IP (PoE) system.
  1. Server installation is not required.
- G. Ensure system is capable of operating without physical servers and software.

- H. Ensure each clock in system has built-in web interface for programming.
- I. Ensure system is capable of programming clocks immediately upon receipt of signal.
  - 1. Analog and digital clocks automatically correct themselves on receipt of 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 a digital signal.
  - 4. Ensure analog clocks are capable of functional tests of electronics and gears.
- J. Ensure each individual product is bench tested at manufacturer's facility.
  - 1. Random testing is unacceptable.
- K. Ensure each product is designed, assembled and tested in United States of America.
- L. Basis of Design: Sapling Inc., IP Clock System.

## 2.03 MASTER CLOCK

SAPLING GUIDE NOTE: Master Clock is not required for use with an IP Clock System. Include the following paragraph if master clock options are required. Contact Sapling Inc., directly for available master clock options.

- A. Master Clock Type 1: To UL and cUL 863.
  - 1. Ensure master clock includes 10 pre-programmed (S)NTP backup addresses.
  - 2. Ensure master clock is capable of acting as (S)NTP server which other devices can point to receive time through (S)NTP protocol.
  - 3. Ensure master clock is capable of receiving (S)NTP time signal via Ethernet.
  - 4. Ensure master clock is capable of receiving digital signals through RS485 connection.
  - 5. Ensure master clock is capable of correcting secondary clocks for Daylight Saving Time
  - 6. Ensure master clock is capable of customizing Daylight Saving Time, in the event of international use or a change in government regulations.
  - 7. Ensure master clock is capable of outputting RS485 signals.
  - 8. Ensure master clock has two clock circuits capable of outputting signals including:
    - a. 59 minute correction;
    - b. 58 minute correction;
    - c. National Time or Rauland correction;
    - d. Once a day pulse;
    - e. Rauland digital correction.
  - 9. Communications Interface: Ensure master clock system is capable of being programmed remotely through online interface accessible through LAN and compatible with Microsoft Internet Explorer and Mozilla Firefox web browsers.
    - a. Ensure interface includes functions as follows:
      - 1) Allow users to schedule bells and other events;
      - 2) Display features;
      - 3) Show IP settings;
      - 4) Show other master clock settings;
      - 5) Set time and date;
      - 6) Download or upload master clock settings;
      - 7) Configure e-mail alerts for various instances.
  - 10. Display: Two row, 20 character LED and backlit LED display and 2 x 8 inch rubber keypad for operator programming.

SAPLING GUIDE NOTE: Include the following paragraph if optional relays are required. Identify the number optional relays required. Number of relays is dependent on the number of systems or system events scheduled for the facility.

- 11. Optional relays: Include [ ] relays to ensure master clock is capable of utilizing [4] [8] zones that can be used for scheduling facility systems as follows:

SAPLING GUIDE NOTE: Identify systems which require event scheduling.

- a. Bells;
  - b. Lights;
  - c. [\_\_\_\_\_].
12. Allow for programming of master clock through 16 button rubber tactile keypad or built-in web interface.
  13. Ensure master clock can contain up to 800 events.
  14. Ensure master clock can contain up to 255 schedule changes.
  15. Ensure system is capable of interfacing with GPS, Internet and intranet systems.
  16. Power Requirements: [110 V AC, 60 Hz] [220 V AC, 50 Hz].
    - a. Ensure master clock is capable of 10 years battery power backup in event of power failure.

SAPLING GUIDE NOTE: Include the following paragraph if the GPS option is required.

17. 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.
  18. Basis of design: Sapling Inc., NTP 8000 Series NTP Server/Master Clock.
- B. Master Clock Type 2: To UL and cUL E192482.
1. Ensure master clock includes 10 pre-programmed (S)NTP backup addresses.
  2. Ensure master clock is capable of acting as (S)NTP server which other devices can point to receive time through (S)NTP protocol.
  3. Ensure master clock is capable of receiving (S)NTP time signal via Ethernet.
  4. Ensure master clock is capable of receiving digital signals through RS485 connection.
  5. Ensure master clock is capable of correcting secondary clocks for Daylight Saving Time.
  6. Ensure master clock is capable of customizing Daylight Saving Time, in the event of international use or a change in government regulations.
  7. Ensure master clock is capable of outputting RS485 signals.
  8. Ensure master clock has two clock circuits capable of outputting signals including:
    - a. 59 minute correction;
    - b. 58 minute correction;
    - c. National Time or Rauland correction;
    - d. Once a day pulse;
    - e. Rauland digital correction.
  9. Ensure system is capable of interfacing with GPS, Internet and intranet systems.
  10. Allow for programming of master clock through two push button switches on front panel.
  11. Ensure master clock is capable of interfacing with both analog and digital secondary clocks.
  12. Communications Interface: Ensure master clock system is capable of being programmed remotely through online interface accessible through LAN and compatible with Microsoft Internet Explorer and Mozilla Firefox web browsers.
    - a. Ensure interface includes functions as follows:
      - 1) Display features;
      - 2) Show IP settings;
      - 3) Show other master clock settings;
      - 4) Set time and date;
      - 5) Download or upload master clock settings;
      - 6) Configure e-mail alerts for various instances.
  13. Power Requirements: [110 V AC, 60 Hz] [220 V AC, 50 Hz].
    - a. Ensure master clock is capable of 10 years battery power backup in event of power failure.

SAPLING GUIDE NOTE: Include the following paragraph if the GPS option is required.

14. 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.
15. Basis of design: Sapling Inc., NTP 7000 Series NTP Server/Master Clock.

## 2.04 SECONDARY CLOCKS

- A. Analog Clocks: To UL and cUL, designed for IP (PoE) system with fully automatic plug and play capability.
1. Ensure secondary clock is capable of receiving NTP protocol through CAT5 or CAT6:

SAPLING GUIDE NOTE: 12 hour display is standard but 24 is available as an option. If standard black or white face is not desirable, custom colors are available and may be specified in the following paragraph. Contact Sapling Inc., directly for other available color combinations.

2. Clock display: [12] [24] hour [white face with black numbers] [black face with white numbers] [custom face [\_\_\_\_\_] custom logo [\_\_\_\_\_] ].
  - a. Size: [Round [12.65] [16.65] inches diameter] [Square [9 x 9] [12 x 12] inches].
3. Built-in Web Interface includes features such as:
  - a. Password protected interface. Open access is unacceptable;
  - b. Naming of the clock;
  - c. Selecting time interval clock receives NTP time;
  - d. Bias seconds configuration for altering correct time +/- 9999 seconds;
  - e. Setting GMT offset for time zone configuration;
  - f. Built-in diagnostic mode;
  - g. Select all IP settings;
  - h. DHCP capability;
  - i. Server redundancy capability. Up to 10 servers can be used as backup in case of failure.
  - j. Domestic and International Daylight Saving Time capability;
  - k. E-mail alerts for situations as follow:
    - 1) If NTP synchronization received is larger than specified interval.
    - 2) If time sync received is larger than specified interval.
    - 3) If clock has been reset.
4. Materials:
  - a. Dial: Polystyrene
  - b. Case: Shallow profile, smooth surface [metal] [ABS].
  - c. Crystal: Shatter-proof, side-molded, polycarbonate.
5. Hand tolerance:
  - a. Hour and minute hands:  $\pm 1/4$  minute.
  - b. Second hand:  $\pm 1/2$  minute.
6. Power Requirements: Power over Ethernet (PoE), 48 V DC.
7. Basis of design: Sapling Inc., SAP Series Clock.

- B. Digital Clocks: To UL and cUL, designed for wireless system.

1. Display: High-efficiency red LED numeral display with [4] [6] digits.
  - a. Display size: [2.5] [4.0] inches
  - b. Format: [12] [24] hour.
  - c. Brightness: Ensure display has four level of brightness adjustment.
  - d. Bezel:
    - 1) Smooth Surface, red colored.

SAPLING GUIDE NOTE: For 4 digit display clocks choose either the 4.69 x 10.31 inches or the 6.75 x 13.31 inches bezel sizes. For 6 digit display clocks choose either the 4.69 x 13.56 inches or the 6.75 x 18.31 inches bezel sizes.

- 2) Bezel size: [4.69 x 10.31] [6.75 x 13.31] [4.69 x 13.56] [6.75 x 18.31] inches.

SAPLING GUIDE NOTE: For visibility from 100 feet away choose either the 4.69 x 10.31 inches or the 6.75 x 13.31 inches bezel sizes. For visibility from 250 feet away choose either the 4.69 x 13.56 inches or the 6.75 x 18.31 inches bezel sizes.

- 3) Visibility: [100] [250] feet minimum.
- e. "BELL", "FirE" messaging capabilities;
- f. Alternating Time/Date functionality.
2. Power Requirements: Power over Ethernet (PoE), 48 V DC.
3. Clock mounting: [ABS, surface mount housing] [Metal, flush mount housing] [ABS double mount housing].
4. Built-in Web Interface includes feature options as follow:
  - a. Password protected interface. Open access is unacceptable;

- b. Naming of the clock;
- c. Selecting time interval clock receives NTP time;
- d. Bias seconds configuration for altering correct time +/- 9999 seconds;
- e. Setting GMT offset for time zone configuration;
- f. 12/24 hour mode;
- g. Select all IP settings;
- h. DHCP capability;
- i. Server redundancy capability. Up to 10 servers can be used as backup in case of failure.
- j. Domestic and International Daylight Saving Time capability;
- k. E-mail alerts for situations as follow:
  - 1) If NTP synchronization received is larger than specified interval
  - 2) If time sync received is larger than specified interval
  - 3) If clock has been reset
  - 4) If count up has been activated
  - 5) If countdown has been activated.
    - a) Alternating time/date functionality
- m. Four levels of brightness;
- n. American or European time format [MM:DD:YY][DD:MM:YY]
- o. Brightness scheduling capability:
  - 1) Ensure clock is capable of changing brightness level two times minimum throughout day
  - 2) Ensure clock brightness is selectable [Off][Low][Medium][High]

**SAPLING GUIDE NOTE:** Choose the SBP 3200 Series Digital Wireless Clock if the clock is to be used in conjunction with an Elapsed timer. Choose the SBP 3300 Series Digital Clock if the clock is to be used in conjunction with the Elapsed Timer and/or relays are required.

- 5. Basis of design: Sapling Inc., [SBP 3100 Series Digital Clock] [SBP 3200 Series Digital Clock] [SBP 3300 Series Digital IP Clock].

## 2.05 ACCESSORIES

- A. Elapsed Timer: Digital Timer: Interface capability with digital clock.
  - 1. Capable of working with 4-digit or 6-digit digital clocks.
  - 2. Count up functionality from 00:00:00 to 99:59:59.
  - 3. Programmable countdown functionality starting at 99:59:59.
  - 4. Customizable backlit buttons.
  - 5. Ensure timer is capable of controlling digital clock functions.
  - 6. Ensure timer is capable of activating relay at completion of count down on the digital clock (SBP 3300 Series only)
  - 7. Basis of design: Sapling Inc., Digital Elapsed Timer.
- B. Conductor and cables: In accordance with Section [27 05 00 - Common Work Results for Communications].
- C. Signal and Control Circuits: Manufacturer's recommended stranded, single conductors or twisted pair cable.
- D. Data Circuits: Category 5 minimum, twisted pair cable.
- E. Plenum Cable: UL listed and labelled for plenum installation.
- F. Hangers and Supports: In accordance with Section [27 05 00 - Common Work Results for Communications].

**SAPLING GUIDE NOTE:** Clock systems work best when all of the components come from a single manufacturer. However, it is possible for components from manufacturers to be mixed within a system as long as the components are compatible. In renovation projects, existing systems may differ from new additions to the system. Check with the manufacturers of both the existing system and the new components to ensure compatibility before specifying different manufacturers of the components. It is recommended that for new projects all system components come from the same manufacturer.

## 2.06 SOURCE QUALITY CONTROL

- A. Ensure clock system components and accessories are supplied or approved in writing by single manufacturer.

## **2.07 PRODUCT SUBSTITUTIONS**

- A. Substitutions: [In accordance with Section 01 23 13 - Product Substitution Procedures] [No substitutions permitted].

## **3 EXECUTION**

### **3.01 INSTALLERS**

- A. Use only installers with [3] years minimum experience with work similar to work of this Section.
- B. Ensure all clock system components are installed by single communications and electronics subcontractor.

### **3.02 EXAMINATION**

- A. Verification of Conditions: Verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for clock system installation in accordance with manufacturer's written recommendations.
  - 1. Visually inspect substrate in presence of Consultant.
  - 2. Ensure surfaces are free of snow, ice, frost, grease and other deleterious materials.
  - 3. Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.
- B. Start of clock system installation indicates installer's acceptance of substrate installation conditions.

### **3.03 INSTALLATION**

SAPLING GUIDE NOTE: Refer to the insulation manufacturer's current installation guide for detailed information regarding installation.

- A. Install IP communication clock system in accordance with manufacturer's written recommendations and in accordance with NFPA 70E.
- B. Integrate clock system with Owner's electrical and communications network.
- C. Install wiring in accordance with requirements of local Authority Having Jurisdiction.
  - 1. Do cabling in accordance with Section [27 15 00 - Communications Horizontal Cabling].
- D. Conceal wiring except in unfinished spaces and as approved in writing by Consultant.
- E. Install clocks only after painting and other finish work is completed in each room.
- F. Install clocks and other devices square and plumb.

### **3.04 FIELD QUALITY CONTROL**

- A. Field Inspection: Coordinate field inspection in accordance with Section [01 45 00 - Quality Control].

### **3.05 SYSTEM STARTUP**

- A. At completion of installation and before final acceptance, turn on equipment and ensure equipment is operating properly, and clock system devices and components are functioning.
- B. Evaluate and test each device in clock system on room-by-room basis using factory-trained technicians.
  - 1. Fix or replace devices which fail test or are functioning incorrectly.

2. Submit evaluation and report showing results of room-by-room tests and overall system compliance within 3 days of testing being carried out.

### **3.06 CLEANING**

SAPLING GUIDE NOTE: For smaller projects that do not have a separate Division 01 Section for cleaning, delete the reference to Section 01 74 00 – Cleaning in the following two Paragraphs.

- A. Progress Cleaning: Perform cleanup as work progresses [in accordance with Section 01 74 00 - Cleaning and Waste Management].
  1. Leave work area clean at end of each day.
- B. Final Cleaning: Upon completion, remove surplus materials, rubbish, tools, and equipment [in accordance with Section 01 74 00 – Cleaning and Waste Management].
- C. Waste Management:
  1. Co-ordinate recycling of waste materials with [01 74 19 - Construction Waste Management and Disposal].
  2. Collect recyclable waste and dispose of or recycle field generated construction waste created during construction or final cleaning related to work of this Section.
  3. Remove recycling containers and bins from site and dispose of materials at appropriate facility.

### **3.07 DEMONSTRATION AND TRAINING**

- A. Arrange system demonstration and training session for Owner's operation and maintenance personnel.
  1. Allow Owner and Consultant [7] days minimum advance notice before training session.
- B. Break down system demonstration and training session into logical segments for Owner's operations and maintenance personnel.
- C. Train Owner's maintenance personnel in procedures and schedules involved in operating, troubleshooting, servicing, and preventative maintenance of clock system.

### **3.08 SYSTEM COMMISSIONING**

- A. Do clock system commissioning in accordance with Section [27 10 53 - Clock System Commissioning].

### **3.09 PROTECTION**

- A. Protect installed products and accessories from damage during construction.
- B. Repair damage to adjacent materials caused by clock system installation.

**END OF SECTION 27 53 13 - IP CLOCK SYSTEM**