

SECTION 01050**RECORD DOCUMENTS and FIELD ENGINEERING****PART 1-- PART 1 - GENERAL**

1.01 RELATED DOCUMENTS

- A. THE GENERAL CONDITIONS DIVISION I, and SPECIAL PROVISIONS DIVISION II and SAMPLE CONTRACT FORMS DIVISION IV are hereby made part of this Section.
- B. Examine all Drawings and all Sections of the Specifications for requirements and provisions affecting the work of this Section.

1.02 SCOPE OF WORK

- A. Work under this Section, without limiting the generality thereof, consists of the furnishing and installation of all materials, equipment, labor, testing, transportation facilities, and all operations and adjustments required for the complete and operating installation as indicated on the drawings, stipulated in the specifications and as reasonably implied by either or both. This includes, but is not limited to the following:
 - 1.
 - 2.
- B. Incidental materials necessary for the completion of this installation, and usually furnished in connection therewith, shall be furnished and installed whether or not specifically mentioned.
- C. Should drawings not agree within themselves or not agree with the specifications, the greater quantity or superior quality of work or materials shall be included.
- D. Work to be performed under this Section is primarily shown on Drawings

1.03 RELATED WORK IN OTHER SECTIONS

- A. The following items of labor and/or materials and equipment are furnished and/or installed under other Sections of the specifications.
 - 1. Section -
 - 2. Section -

1.04 QUALITY CONTROL

- A. The Contractor shall employ a Professional Civil Engineer or Professional Land Surveyor registered in the Commonwealth of Massachusetts and acceptable to the Authority to establish the construction baseline. A minimum of three intervisible horizontal control points with locations based on the Massachusetts State Plane Coordinate System Mainland Zone (NAD 83, FEET) shall be established for all projects which include site work, utility installation or modifications, and structures with foundation systems. A minimum of three vertical control points (Benchmarks) will be established based on NGVD.29.

- B. The Contractor's Professional Civil Engineer or Professional Land Surveyor shall provide copies of all working baseline established for construction and, as a minimum, verify the accuracy of the control on a monthly basis. A copy of each monthly survey shall be submitted to the Authority.

1.05 SUBMITTALS

- A. Submit the resume of the Professional Civil Engineer or Professional Land Surveyor, which includes the name, address, telephone number, professional registration number and employment history to the Authority for approval prior to starting survey work.
- B. On request by the Authority, submit documentation verifying accuracy of survey work for this project. Documentation shall include electronic files of data collection, AutoCAD drawing files, field books, sketches, drawings and layouts.
- C. Submit two copies of progress AAs-Built drawings with each partial requisition.
- D. Before the Authority endorses the work as "complete," the Contractor must submit to the Consultant all of the Contractor-prepared As-Built Prints. East As-Built Print must include a Contractor-signed certification statement that confirms the completeness and accuracy of as-built conditions. The Consultant then updates the As-Built Drawings as follows: 4-mil Mylar drawings and electronic AutoCAD files, along with scanned 200 dbi TIFF files of As-Built Mylar drawings. Each As-Built Mylar drawing must also include a Contractor-signed certification statement that confirms the completeness and accuracy of documented as-built conditions. Such statement shall read: "This Drawing reflects As-Built Conditions as certified by (insert contractor's name) ." The Consultant then delivers to the Authority the certified As-Built Drawings.

1.06 PROJECT RECORD DOCUMENTS

- A. Maintain a complete and accurate log of control and survey work as it progresses.
- B. Throughout the Project Duration maintain, on site, one set of the following record documents; record actual revisions to the work:
 - 1. Contract Drawings.
 - 2. Electronic AutoCAD drawing files for Contract Drawing and Shop Drawings.
 - 3. Addenda
 - 4. Change Orders and other modifications to the Contract Drawings.
 - 5. Reviewed and approved shop drawings, product data, and samples.
 - 6. Written interpretations and clarifications.
 - 7. Field orders or directives.
 - 8. Field test reports.
 - 9. Construction photographs.
- C. Store Record Documents separate from documents used for construction.

- D. Record information concurrent with construction progress. Refer to Division II.
- E. Specifications: Legibly mark and record at each product section description of the actual products installed, including the following:
1. Manufacturer's name, address, telephone number and product model and serial number.
 2. Product substitutions or alternates utilized.
 3. Changes made by Addenda, clarifications or interpretations, field orders and directives.
- F. Record Documents and Shop Drawings: Upon commencement of work, the Authority will provide six (6) sets of Contract Drawings to the Contractor. The Contractor and Subcontractors shall legibly record actual construction on these drawings and shop drawings. The information, which is required to be recorded, includes:
1. **SITE/CIVIL**
 - a. All site and civil work shall be located by survey based on the Massachusetts State Plane Coordinate System Mainland Zone for Northings and Eastings. All site and civil work shall be located vertically with elevations based on project datum as shown on the Contract Plans
 - b. All site utilities coordinates and elevations shall be recorded at the point of origin, building penetrations, building perimeter, all changes in direction (vertically or horizontally), all changes in sizes, valve locations, Tee locations, duct bank profile changes, and minimally every 50' of all buried/concealed utility work. Notations describing the size and type of material shall be included.
 - c. Gravity systems (sewer and drain) shall show centerline invert elevations at 50' intervals, at every bend in the pipe (vertically or horizontally), and at structures (manholes, buildings, bulkheads, etc.). Include top and bottom elevations and locations of corners of rectangular structures, centerline top and bottom elevations, centerline location and diameter of circular structures (chamber, manholes, tanks, etc.). Indicate the size and type of materials.
 - d. All existing underground utilities encountered during the execution of work shall be located within the excavation horizontally and vertically with same requirements specified for new construction.
 - e. Forced systems (water, steam, high temperature hot water, chilled water, condensate, forced sanitary, forced drainage, fuel and gas) shall show centerline top of pipe at 50' intervals, at every bend or joint (vertically or horizontally), end points, valves, Tees and fittings, and at structures. Include bottom and top elevations and locations of corners for rectangular structures,

- centerline bottom and top locations of circular structures (chambers, tanks, valve pits, metering pits, etc.). Indicate the size and type of materials.
- f. Electrical and Communication systems shall show centerline top of cable, conduit or duct bank at 50' intervals, at every bend or change in section of duct bank and at all end points. Include bottom and top elevations and locations of corners for rectangular structures, centerline bottom and top locations of circular structures (chambers, tanks, manholes, vaults, etc.). Include duct bank configuration and typical section at every change in shape, orientation or size.
 - g. Piles, Caissons and deep foundations shall include top centerline location, elevation, orientation, pile type, depth of structure from top elevation and typical section and type of material. Indicate either battered or straight pile. If battered, the direction and slope of batter shall be indicated.
 - h. Underground structural elements (bulkheads, seawalls, retaining walls, building foundation, etc.) shall include locations, sizes and elevations of anchoring slabs, pile caps, grade beams, footings and other structural elements which project beyond the exterior face of foundation wall.
 - i. Underground Tanks shall show the location and elevation of anchoring slabs with corner locations, bottom and top elevations and locations of corners of rectangular structures, centerline bottom and top locations and elevations of circular structures. Indicate the size and types of materials.
 - j. Earth Retention systems which are abandoned in place, by design, shall show location and elevations of all structural elements of the system, including deadman, anchors and tiebacks.
2. **ARCHITECTURAL**
- a. Field changes of dimension or detail.
 - b. Details not originally included on the original Contract Drawings.
3. **STRUCTURAL**
- a. NAD 83 coordinate locations (FEET) and NGVD 29 elevations (FEET) of foundation elements at all corners.
 - b. Field changes of dimension or detail.
 - c. Details not originally included on original contract documents.
4. **PLUMBING**
- a. Measured horizontal and vertical locations of all under-slab drains, vents, sanitary and water lines referenced to permanent surface features. Include piping sizes and materials. Measurements are required at 50' intervals and at all bends (vertically and horizontally), joints and fittings.

- b. Measured locations of all internal drains, vents, waste, waterlines and appurtenances, referenced to visible and accessible features of the work.
- c. Provide original permits and record of inspections.

5. **FIRE PROTECTION**

At the completion of the installation of a new automatic Standpipe/ Sprinkler system or any modifications, alterations, additions or deletions to an existing automatic fire sprinkler system, the following record documents shall be provided **PRIOR TO THE REQUEST FOR WITNESSING AND ACCEPTANCE OF THE FIRE SPRINKLER SYSTEM.** Architectural reflected ceiling plans showing only the automatic standpipe/sprinkler system installation and related components with specific identification of the following:

- a. Riser diagram
- b. Name, address and Massachusetts Contractor's License Number of the installing contractor.
- c. Name, address of specifying engineer (PE responsible for design of the system)
- d. Legend
- e. Equipment and devices manufacturer name and model number.
- f. Sequence of operation: Interactive operation of sprinkler/standpipe alarm and supervisory devices interconnected with the fire alarm system and resulting effects of activation of the alarm and supervisory devices.
- g. Testing protocol
- h. Owner's maintenance manual, both printed and electronic versions. The electronic version shall be on CD in Adobe Acrobat PDF format.
- i. Complete sprinkler system piping layout indicating all sizes and components.
- j. Complete standpipe system piping layout indicating all sizes and components.
- k. Complete water supply feed main with (underground fire main) source of connection including type of valves, material type and sizes.
- l. Water supply data, hydrant want flow test results, location of test in relation to new system fire main connection.
- m. Design criteria, hazard classification, design basis.
- n. Hydraulic calculations and results
- o. Sprinkler system flow alarm device location, identification and time setting.
- p. Sprinkler flow alarm device ATest Valve≡ location and identification.
- q. Location of floor/ceiling penetrations with fire sleeves.

- r. Location of all low point (auxiliary) drains.
- s. Siamese connections location and system identification
- t. Material and Test Certificates (NFPA Forms) properly executed; sprinkler system, standpipe system, fire pump system, underground fire mains.

6. FIRE ALARM SYSTEMS

At the completion of the installation of a new fire alarm system or any modifications, alterations, additions or deletions to an existing fire alarm system, the following record documents shall be provided **PRIOR TO THE REQUEST FOR WITNESSING AND ACCEPTANCE OF THE FIRE ALARM SYSTEM**. Architectural reflected ceiling plans showing only the fire alarm system installation and related components including interconnected life safety system devices and equipment with specific identification of the following:

- a. Riser diagram
- b. Name, address and Massachusetts Contractor's License Number of the installing Contractor.
- c. Name and address of the specifying engineer (PE responsible for design of the system).
- d. Legend.
- e. Equipment and devices manufacturer name and model number.
- f. Sequence of operation: interactive operation of fire alarm system and all interconnected life safety systems and resulting effect of activation of initiating devices.
- g. Testing protocol.
- h. Record of completion certificate (NFPA - 72 Form)
- i. Hard copy input/output sequence program.
- j. Owner's maintenance manual, both printed and electronic versions. The electronic version shall be on CD in Adobe Acrobat format.
- k. Writing methods (EMT, pipe, exposed)
- l. Wire type, wire size and number of wires.
- m. Identification label.
- n. Accurate routing/location of all wiring, conduit, raceways, junction boxes referenced to column lines and finished floor elevations.
- o. Junction and terminal boxes
- p. Location of fire alarm control panels and sub-panels.
- q. Location of remote annunciators

- r. Main power supply and location
- s. Emergency communication equipment: fire phones, jacks or emergency telephones.
- t. Secondary power supply type and location.
- u. Standby batteries location, size and calculations.
- v. Location of all initiating devices: smoke detectors, heat detectors, flame detectors, duct detectors, and pull-boxes
- w. Location of all initiating remote test devices, if applicable.
- x. Location of all notification devices: bells, horns, strobes, combination horn/strobe, speakers
- y. Device wiring circuit and type.
- z. Order of devices on a wiring circuit.
- aa. Device/circuit identification.
- bb. Power wattage of device
- cc. Device setting (if applicable)
- dd. Interconnected life safety system devices and locations: damper, fan control relays, elevator recall relays, door unlocking devices, door releasing devices, temperature sensors.
- ee. Sprinkler flow alarm device location, identification and time setting.
- ff. Sprinkler flow alarm device Atest valve≡ location and identification.
- gg. Sprinkler system supervisory device location, identification: tamper switches, high/low pressure alarms and pressure settings.
- hh. Special suppression system interconnection device/relay/contact.

7. **MECHANICAL / HVAC**

- a. Indicate the names, addresses, telephone numbers and contact persons for all manufacturers. Include model number, motor H.P., CFM rating, and other pertinent data for all equipment.
- b. Provide air balancing reports.
- c. Record the filter type, category and quantity on the drawings adjacent to each Air Handling Unit.
- d. Provide valve tag identification numbers on drawings. Provide a valve tag chart which identifies the tag number, system, column line referenced location and elevation, valve type and size.

- e. Provide color coded AutoCAD plot of piped systems in accordance with the Massport's standard color coding. The plot shall identify the system and flow directions.
- f. Provide bound original permits and inspection certificates for Backflow Preventers, Elevators/Escalators, Pressure Vessels and Boilers.

8. ELECTRICAL

- a. Provide AutoCAD color plots of one line diagrams for Power, Emergency Power, Energy Management System, Security Card Access System, Mechanical systems, Fire Alarm, Electronic Switch Gear Control, Sound, Telephone and Security. Each system shall be submitted separately and color coded consistent with Massport's Standard Color Coding. Locate major system components to column lines, elevation or floor designation.
- b. Provide a site block diagram for Medium Voltage, Low Voltage, Site Lighting and Fiber Optic cabling.
- c. Provide locations, elevations or floor designations for lighting panels and distribution panels.
- d. Provide conduit layout drawings for all conduit 2" and larger. Indicate the point of origin, termination, junction boxes, fittings, contents of pipe and materials.
- e. Provide a replacement lamp chart, which shall include: location manufacturer, model, lamp type, wattage.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify locations of survey control points prior to starting work.
- B. Verify horizontal and vertical position of temporary benchmarks by field traverse to at least two known reference monuments.

3.02 SURVEY REQUIREMENTS

- A. Utilize procedures and practices defined in 250 CMR to establish horizontal and vertical control of the work.
- B. Establish coordinates based on the Massachusetts State Plane Coordinate System Mainland Zone (FEET), and elevations based on NGVD 29 (FEET). Locate and layout by instrumentation:
 - 1. Site improvements including pavements; stakes for grading, fill and topsoil

- replacement.
 - 2. Utility installation slopes and invert elevations.
 - 3. Grid or axis for structures.
 - 4. Building foundation, column locations, floor elevations, and equipment location and elevations.
 - 5. Verify layout control periodically, in accordance with accepted survey practices.
- C. Where the dimensions and locations of existing structures are of critical importance in the installation or connection of any part of the work, verify such dimensions and locations in the field before the fabrication and installation of any material or equipment, which is dependent on the correctness of such information.

END OF SECTION 01050

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