



PROJECT MANUAL

IFB #23-16

RPS 205 HVAC Improvements

RPS #2303 - Whitehead Elementary School HVAC Upgrades

RPS #2304 - Welsh Elementary School HVAC Upgrades

RPS #2305 - Maria Montessori at Marsh HVAC Upgrades

RPS #2306 - Brookview Elementary School HVAC Upgrades

RPS #2403 - Jefferson High School HVAC Upgrades

RPS #2404 - Rolling Green Elementary School HVAC Upgrades

**RPS #2406 - Summerdale Early Childhood Center HVAC
Upgrades**

(IMEG Project Nos.: 21002885.07, .08, .09, .10, .11, .12, .14)

Rockford, Illinois

PREPARED FOR:

Rockford School District No. 205

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SECTION 01 11 00 – SUMMARY OF WORK

PART 1 - GENERAL

1.01 GENERAL

- A. The General Conditions, Supplementary Conditions and Division 1 - General Requirements are hereby made a part of each Division and Section of the Specifications.

1.02 DESCRIPTION

- A. Work covers complete construction and installation of work specified and/or required, including all trades for the Rockford PS ESSER HVAC Upgrades for Rockford Public School, Winnebago County, Illinois, hereinafter called the Owner and is to be constructed in accordance with the Contract Documents prepared by Saavedra Group Architects, 504 North Church St. Rockford, Illinois, the Architect.
- B. Products shall be installed in strict accordance with manufacturer recommendations. The Contractor shall review substrates prior to installing products. Installation of products shall represent that the Contractor has accepted the substrates as proper for the installation of products. Substrates which are not acceptable shall be corrected prior to the installation of products.

1.03 CONTRACT

- A. Work to be executed under one General Contract, including all trades.

1.04 COOPERATION BETWEEN CONTRACTORS

- A. The Contractor shall coordinate construction activities with the other Contractors performing projects as required to assure a complete, proper, and timely completion of all of the Work.

1.05 COOPERATION OF CONTRACTOR WITH THE OWNER

- A. Contractors are to conduct the Work and operations so that the usual 7 days per week activities which occur in and around the facility, can continue without interruption, and with as little inconvenience to the Owner as possible.
 - 1. Existing building systems must remain operational to facilitate safe, code compliant occupancy and use of the facility. Minor interruptions of short duration shall not occur without prior notification and approval by the Owner and are to be limited to off days or times when the facility is not occupied.
 - 2. Utilities, fire alarm, and security system shut-offs shall not occur without prior notification and approval by the Owner, and not without contact by the Contractor with the Authority Having Jurisdiction. Shut downs are to be limited to off days or times when the facility is not occupied.
- B. Maintain clear and proper exiting through areas of work. Coordinate requirements with Owner.

1.06 WORK SCHEDULE

- A. The schedule for this work shall be as follows:
 - 1. Start the Work immediately after the contract is fully executed.
 - 2. Begin Work in the Field not later than Date.
 - 3. Substantially Complete all Work not later than Date.
- B. Utilities Shut-offs shall not occur without prior notification and approval by the Owner.

- C. The Contractor shall include expedited delivery schedules, additional labor shifts, overtime work, etc. necessary to complete the Work as scheduled.
- D. The only considerations for adjustment of the Substantial Completion Date will be for strikes that shut down the Project, unless such strike was instituted as a result of the conduct of the Contractor; or for delays due to damage caused by Acts of God consisting only of tornadoes or floods in which case the Substantial Completion Date will be extended by the number of days the Project is shut down. Change Orders will be considered part of the Work and will not be a consideration for adjustment of the Substantial Completion Date unless they are specifically requested by the Owner as a Scope of Work Change Order and exceed \$10,000 each, in which case the additional number of days shall be identified and agreed to as part of the Change Order. No other considerations will be allowed.

1.07 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Product Delivery; Schedule deliveries in accordance with the project schedule, to minimize storage time at project site, and to prevent overcrowding of construction areas and Owner's facilities.
- B. Deliver products to project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
- C. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.

1.08 PROJECT CONDITIONS

- A. Utilities Shut-offs shall not occur without prior approval of the Owner.
- B. Furniture and Equipment Relocation
 - 1. Owner will move unfixed and unattached furniture and equipment from the work areas prior to the Contractor starting operations. The Contractor shall relocate and reinstall all fixed and attached furniture and equipment, to location(s) as directed by the Owner. Reinstall to proper working condition. Items placed in storage shall be labeled, with all parts and components packaged together. Contractor to patch holes, etc. at original location to match adjacent surfaces and materials.
- C. Criminal background checks shall be performed for the project.
 - 1. The Contractor shall submit a criminal history background check for all persons who will be working in the school building or on school property including those employed directly by the Contractor and those employed by subcontractors and suppliers who will be utilized on the project.
 - 2. No one will be allowed on-site before the Owner receives and provides the Contractor with the results of the background checks.
 - 3. Only those employees who have been cleared through their background checks will be allowed on-site. The cost of the background check shall be the responsibility of the Contractor.
- D. Security Plan to Identify Construction Trade Workers
 - 1. Buildings and Grounds Dept. will be consulted on construction project scheduling. Schedules for work within the existing building will be coordinated with the principal taking into consideration building activities.

2. All workers are required to sign in at the Custodial Office each morning before proceeding to the work area within the existing building. Sign-in sheets will be turned into the Custodial Office each evening.
 3. Clothing that identifies a worker's employer and/or a badge, worn in plain sight, is required at all times while in and around a school building.
 4. It will be the responsibility of the Contractor to notify all construction trades under his contract of the security plan. The Contractor will be responsible for all workers wearing identifying clothing or badges and will be responsible for assessing and collecting fines from the trade contractors.
- E. Cleaning and Dustproofing
1. Rubbish and debris resulting from the Work shall be collected by the Contractor, removed at the end of each day, and legally disposed of away from the site.
 2. Furniture and equipment in the work area shall be covered to prevent dust accumulation and damage.
 3. Surfaces in the work area shall be vacuumed and wiped clean. Books and similar items exposed to dust shall be individually dusted.
- F. Cutting of Masonry Units
1. Cutting of new masonry units shall be done outside of the existing building in an area to prevent dust from entering the existing building. At no time will contractors be allowed to saw cut new masonry within the existing building.
- G. Protection of Existing Surfaces
1. The Contractor shall provide and maintain during the course of construction temporary protection to protect existing surfaces in the existing building from damage due to the construction activities. Such protection will include, but not be limited to temporary barricades to separate work areas from occupied areas to prevent dust and fume penetration, temporary floor covers to protect existing surfaces from damage, etc.
 2. Should damage to existing surfaces occur, the Contractor shall repair at his own expense.
- H. Installation of Materials with Color Variations
1. Materials are subject to color variation during the manufacturing or installation process. For this reason, there may be variations in shade, color or texture.
 2. Contractor shall mix and/or blend these materials to produce a uniform and consistent final appearance to meet the approval of the Architect.
 3. Should there be variation in shade, color or texture which are not acceptable, the Contractor shall repair or replace at his own expense.

1.09 ENVIRONMENTAL TESTING

- A. The Contractor shall be responsible for ensuring that there is no fungal growth on new building components and that there is acceptable indoor air quality (IAQ) within the new building and within the addition areas. Verification of the absence of fungal growth and of acceptable indoor air quality shall be accomplished through a visual inspection and indoor air quality testing of the building. The inspection and testing shall be performed by a Certified Industrial Hygienist (CIH) hired by the Contractor but who shall report directly to the Architect. A minimum of two IAQ tests shall be performed at

and one outside the building to establish a baseline. The inspection and indoor air quality testing shall be performed after building finishes (flooring, painting, ceilings) have been installed and prior to Substantial Completion of the work. The indoor air quality testing shall be performed while the HVAC systems are operating.

- B. The Contractor shall provide the Architect with the CIH=s written report detailing the inspection and testing. Air testing shall include monitoring for the following factors:
 - 1. Airborne fungi
 - 2. Carbon monoxide
 - 3. Carbon dioxide
 - 4. Nitrogen dioxide
 - 5. Sulfur dioxide
 - 6. Formaldehyde
 - 7. Hydrocarbons
 - 8. Dust
 - 9. Ozone
 - 10. Hydrogen sulfide
 - 11. Temperature
 - 12. Humidity
- C. The above testing results shall be compared to the Occupational Safety and Health Administration (OSHA) permissible exposure limits (PELs), the American Conference of Governmental Industrial Hygienists (ACGIH) threshold limit values (TLVs), and recommended air quality and comfort standards developed by the American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE). Since no current standards exist for fungal growth, airborne fungal sampling results will be subject to interpretation by the CIH.
- D. Report documentation of any of the following problems shall require action on the part of the Contractor to undertake remediation activities, followed by another series of CIH inspection and testing:
 - 1. Visible fungal growth
 - 2. Air testing results exceeding the standards set forth above
 - 3. Total indoor airborne fungal concentrations which exceed outdoor concentrations
 - 4. Significant fungal species present indoors that were not present outdoors on the day of the survey, indicating an indoor source of fungal growth.
- E. The Work or designated portion thereof will not be considered Substantially Complete in accordance with the Contract Documents until the Contractor submits a report of the IAQ test results which demonstrates that the factors tested are within permissible exposure limits.
- F. The Contractor shall provide the Architect with a second set of IAQ test results which are to be taken approximately two months after occupancy of the building to test for carbon dioxide only. The second set of IAQ tests shall be taken while the building is occupied in its intended use. The second set of test results are not required to achieve Substantial Completion.

END OF SECTION 01 10 00

SECTION 01 11 00 - SUMMARY OF WORK

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work covers HVAC improvements at Whitehead Elementary School, Welsh Elementary School, Maria Montessori at Marsh, Brookview Elementary School, Jefferson High School, Rolling Green Elementary School, and Summerdale Early Childhood Center in the Rockford School District No. 205.

1.2 CONTRACTS

- A. Project shall be constructed under a single contract(s) that shall include the General, HVAC, Piping and Plumbing, and Electrical work.

1.3 WORK OF CONTRACTORS

- A. In addition to fulfilling Contract Requirements, Contractor shall fulfill the requirements of all drawings, specifications, and the requirements of the General Conditions, Supplementary Conditions, and Division 1, General Requirements, all of which are hereby made a part of each division and section of the project specifications.
- B. Contractor shall provide work and/or services as may be specified in all the respective specification sections and/or indicated on the drawings for all divisions of work. Contractor shall review specification sections and drawings for all divisions of work to determine extent of work and/or services each section requires for other divisions as well as its own division of work.

1.4 WORK BY OWNER

- A. Items not in contract: Asbestos abatement
- B. Owner to remove and/or retain: Turn over existing equipment to Owner where noted on the drawings.

1.5 CONTRACTOR'S USE OF SITE

- A. Access: Hours of access shall be as allowed by RSD 205, typically 6am to 5pm.
- B. Time restrictions for performing work: All work performed during the school year must be coordinated directly with the Owner and coordinated with the school schedule to be determined whether the work can occur.
- C. Utility outage and shutdown: Coordinate all utility shutdowns with the Owner two weeks in advance.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 11 00

SECTION 01 21 00 - ALLOWANCES

PART 1 - GENERAL

1.1 DESCRIPTION OF REQUIREMENTS

A. Types of allowances scheduled herein for the work include the following:

1. Owner Contingency Allowance in accordance with the following paragraph:

- a. Contingency allowance shall be used only as directed for Owner's purposes, and only by change orders that designate amounts to be charged to contingency allowance carried by the Owner. Contractor's related costs are not included in the Contract Sum for work so ordered to be charged to contingency allowance. The change orders will include costs and allowable overhead/profit margins. At time of project closeout, unused amounts remaining in contingency allowance shall remain the Owner's.

PART 2 - PRODUCTS (Pre-ordered items assigned to Contractor)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALLOWANCES

A. Contingency Allowances to be included in General Contractor's Base Bid:

1. None.

B. Lump Sum Allowances:

1. None.

END OF SECTION 01 21 00

SECTION 01 23 00 - ALTERNATES/ALTERNATIVES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 specification sections, apply to this section.

1.2 SUMMARY

- A. This section specifies administrative and procedural requirements for alternates.
- B. Definition: An alternate is an amount proposed by Bidders and stated on the Bid Form for certain construction activities defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if the Owner decides to accept a corresponding change in either the amount of construction to be completed, or in the product, material, equipment, systems, or installation methods described in the Contract Documents.
- C. Coordination: Coordinate related work and modify or adjust adjacent work as necessary to ensure that work affected by each accepted alternate is complete and fully integrated into the project.
- D. Notification: Immediately following the award of the Contract, prepare and distribute to each party involved, notification of the status of each Alternate. Indicate whether Alternates have been accepted, rejected or deferred for consideration at a later date. Include a complete description of negotiated modifications to Alternates.
- E. Schedule: A "Schedule of Alternates" is included under Part 3 of this Section. Specification sections referenced in the Schedule contain requirements for materials and methods necessary to achieve the work described under each Alternate.
 - 1. Include as part of each Alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation, whether or not mentioned as part of the alternate.

PART 2 - PRODUCTS (Note Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

- A. Alternate Bid No. 1:
- B. Alternate Bid No. 2:

END OF SECTION 01 23 00

SECTION 01 31 19 - PROJECT MEETINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 specification sections apply to this section.

1.2 SUMMARY

- A. This section specifies administrative and procedural requirements for project meetings including but not limited to:
 - 1. Preconstruction conference.
 - 2. Coordination meetings.
 - 3. Progress meetings.
 - 4. Construction schedule.

1.3 PRECONSTRUCTION CONFERENCE

- A. Architect will schedule a preconstruction conference and organizational meeting at the project site or other convenient location no later than 15 days after execution of the Agreement between Owner and Contractor and prior to commencement of construction activities. Architect will conduct the meeting to review responsibilities and personnel assignments.
- B. Attendees: The Owner, Architect, Contractor and superintendent, major subcontractors, manufacturers, suppliers, and other concerned parties shall each be represented at the conference by persons familiar with and authorized to conclude matters relating to the work.
- C. Agenda: Discuss items of significance that could affect progress, including such topics as:
 - 1. Tentative construction schedule.
 - 2. Critical work sequencing.
 - 3. Designation of responsible personnel.
 - 4. Procedures for processing field decisions and Change Orders.
 - 5. Procedures for processing Applications for Payment.
 - 6. Distribution of Contract Documents.
 - 7. Submittal of shop drawings, product data, and samples.
 - 8. Preparation of record documents.
 - 9. Use of the premises.
 - 10. Office, work and storage areas.
 - 11. Equipment deliveries and priorities.
 - 12. Housekeeping.
- D. Architect will record and issue preconstruction conference meeting minutes.

1.4 COORDINATION MEETINGS

- A. Contractor shall conduct project coordination meetings on an as-needed basis convenient for all parties involved. Project coordination meetings are in addition to specific meetings held for other purposes, such as regular progress meetings and special pre-installation meetings.
- B. Contractor shall request representation at each meeting by every party currently involved in coordination or planning for the construction activities involved.

1.5 CONSTRUCTION PROGRESS MEETINGS

- A. Contractor shall conduct construction progress meetings at the project site at intervals convenient for all parties involved. The meetings for the duration of the project will be regularly scheduled at the pre-construction conference.
- B. Attendees: In addition to representatives of the Owner and Architect, each Subcontractor, supplier or other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings by persons familiar with the project and authorized to conclude matters relating to progress.
- C. Contractor's Construction Schedule: Review progress since the last meeting. Determine where each activity is in relation to the Contractor's Construction Schedule, whether on time, ahead of, or behind schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the contract time.
- D. Review the present and future needs of each entity present, including such items as:
 - 1. Interface requirements
 - 2. Time
 - 3. Sequences
 - 4. Deliveries
 - 5. Off-site fabrication problems
 - 6. Access
 - 7. Site utilization
 - 8. Temporary facilities and services
 - 9. Hours of work
 - 10. Hazards and risks
 - 11. Housekeeping
 - 12. Quality and work standards
 - 13. Change orders
 - 14. Documentation of information for payment requests
- E. Contractor shall record and issue meeting minutes for all construction progress meetings to all attendees and parties involved.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 31 19

SECTION 01 50 00 - CONSTRUCTION FACILITIES & TEMPORARY CONTROLS

PART 1 - GENERAL

1.1 JOB CONDITIONS AND WORK SEQUENCE

- A. Contractor(s), Subcontractor(s), and Material Supplier(s) shall inform themselves as to conditions relating to the execution of work. Neglect of this requirement will not be accepted as cause for additional compensation and/or additional time for completion.
- B. Existing building will remain in operation during construction. Contractor shall schedule work in consultation with the Owner so there will be no interruption of existing building operations.

1.2 SITE EXAMINATION

- A. The Contractor shall take all measurements related to the existing building as required for the new work and to locate existing utilities. Contractor shall contact the City, Owner, and all utilities to carefully review all records of exposed, concealed, and buried points of connections, as to location, size, type, depth, operating characteristics, etc., including but not limited to, electrical service, telephone service, and water, gas, and sewer lines.

1.3 GRADES, LINES, AND LEVELS

- A. The Contractor shall lay out the building and establish all lines and levels for the work as required by drawings and specifications. The General Contractor shall maintain proper base lines, levels, and benchmarks outside or inside the building, where necessary, for the use by all trades.
- B. Each trade shall lay out and establish at the job all other lines and levels necessary for own work.
- C. The Contractor is responsible for coordination of work by all trades to ensure that potential conflicts are eliminated prior to installation beginning.

1.4 SUBMITTAL PROCEDURES FOR SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

- A. Shop Drawings:
 - 1. Each Contractor shall prepare and submit shop drawings, where requested, to the Architect for review. All shop drawings shall bear verification of Contractor's review and approval prior to submittal. No work shall be fabricated by the Contractor except at Contractor's own risk, until shop drawings have been reviewed in accordance with review procedure.

2. Unless otherwise specified in the respective specification sections of Division 1 through 31, the Contractor shall submit one (1) reproducible transparency and three (3) opaque prints of all fabricated work and line type shop drawings to the Architect for review. The reviewed reproducible transparency will be returned to the Contractor for reproduction and distribution purposes. For products covered by catalog cuts or brochures, unless otherwise specified, the Contractor shall submit a minimum of eight (8) copies of each item for review.
3. Corrections or changes indicated on shop drawings shall not be considered as extra work orders. Final drawings will be considered reviewed only if they bear the stamp and signature of Architect.
4. Contractor shall be responsible for final distribution of reviewed shop drawings to the various Subcontractors or Trades.

B. Samples:

1. The Contractor shall furnish for review, with reasonable promptness, all samples as directed by the Architect. The Architect will review such samples, with reasonable promptness, only for conformance with the design concept of the project and for compliance with the information given in the Contract Documents. The work shall be in accordance with reviewed samples approved for design concept conformance.
2. The Contractor shall submit transmittal letter requesting sample review and prepay transportation charges to Architect's office on samples forwarded.
3. The Contractor shall order no material until receipt of written approval of shop drawing submitted.

1.5 SITE LIMITS AND MATERIALS STORAGE

- A. Space Limitations: No areas outside construction limits may be used for any purpose by Contractor(s) or Subcontractor(s).
- B. Contractor(s) or Subcontractor(s) shall not store their materials or equipment on the structure or permit any part of any structure to be loaded to such an extent as to endanger its safety.
- C. Contractor(s) and Subcontractors(s) shall confine equipment, storage of materials, parking, and operations of their workers to limits indicated or by direction of Architect. Storage space will be confined to area of site.
- D. Store, place, and handle material and equipment delivered to job site to preclude inclusion of foreign substances or causing of discoloration. Pile neatly and compactly; barricade to protect public from injury. Protect materials as required to prevent damage thereto from weather or the ground. Should it be necessary at any time to move materials, sheds, or storage platforms, Contractor shall move same, as and when required, at Contractor's expense.
- E. Owner assumes no responsibility for materials stored in buildings or on site. Contractor assumes full responsibility for damage due to storage of materials.
- F. Repairing of areas used for parking, placing of sheds, offices, and storage of materials shall be done by Contractor at Contractor's expense.
- G. Contractor's personnel shall not use the existing building for any purpose except as required to perform the work of this Contract unless otherwise specified.

1.6 CLEANING

- A. General Cleaning: The Contractor and each Subcontractor shall remove rubbish and debris from the building site promptly as it accumulates but, in any case, not less frequently than each Friday afternoon. The Contractor shall perform an overall cleanup of the entire site including a broom cleaning of all appropriate surfaces as required but, in any case, not less frequently than each Friday afternoon.
- B. No burning of rubbish or debris will be allowed at site, nor shall rubbish at any time be thrown from structure. No debris shall be buried at the site. Do not dispose of wastes into streams or waterways.
- C. All dumpsters used on the project site shall have lids or canvas covers securely fastened to prevent debris from blowing about site.
- D. Keep streets and public roadways clean of dirt and mud tracked onto such surfaces by vehicles or equipment used or parked on construction site.

1.7 PROTECTION

- A. The Contractor shall:
 - 1. Provide, and maintain fences, planking, guard lights, barricades, warning signs, and guards as necessary for protection of material storage, curbs, sidewalks, streets, drives, and adjoining property, public, and new building. Use caution at all times to protect persons against injury resulting from job operations, movement of materials, and standing equipment.
 - 2. Notify in writing, the Owners of corporate or private property that interferes with work and arrange with them for disposition of such property.
 - 3. Provide and maintain proper shoring and bracing to prevent earth from caving or washing into excavation, and/or undermining present building. Provide temporary protection around openings through and at floors and roofs.
 - 4. Provide and maintain proper shoring and bracing for existing underground utilities, sewer, etc., encountered during excavation work, to protect them from collapse or other type of damage until they are to be removed, incorporated into work of new building, or can be properly backfilled upon completion of new work.
 - 5. Protect trees, shrubs, lawn, and landscape work from damage. Provide guards and covering. Provide and maintain plank covering over walks, drives, newly installed service facilities, etc., to prevent damage by trucking or otherwise. This shall include areas outside of grading and/or construction limits.
 - 6. Provide protection against rain, snow, wind, ice, storms, or heat to maintain work, materials, apparatus and fixtures free from damage. At the end of a day's work, cover new work likely to be damaged. Remove snow and ice, as necessary for safety and proper execution of work.
 - 7. Protect building from damage at all times from rain water, ground water, backing up of drains or sewers and other water. Provide pumps, equipment, and enclosures to provide this protection.
 - 8. Provide temporary fence or barricade at least 5'-0" high. Snow fencing or similar type fencing acceptable. Posts for fencing shall be spaced a maximum of 10'-0" OC.

- B. Each Contractor and Subcontractor shall protect own materials, work, and equipment not normally covered by above protection; protect work of other trades, adjust damage when performing work; protect work outside of building lines such as trenches and excavations, as specified above; when performing work, maintain protection provided above. Contractor causing damage to any work shall repair or replace damaged work at Contractor's expense.
- C. Work outside of property line shall be repaired in accordance with requirements of authority having jurisdiction.
- D. Provide temporary dust barriers as required to protect existing areas during work of the contract.

1.8 TEMPORARY OFFICES/TRAILERS, EQUIPMENT AND SHEDS

- A. Offices/Trailers: The Contractor shall provide and maintain temporary watertight office of suitable size for use by Contractor, Subcontractors, and Architect. Contractor's space shall be as required for general use and to provide space and furnishings for project meetings. Telephone service in this office, local and long distance, shall be paid for by the Contractor. Location of office/trailer shall be approved by the Owner.
- B. Equipment: The Contractor shall provide and maintain a plain paper copier, telephone, and fax machine in the office for use by the Architect for job related business. The operating cost of all electronic equipment shall be paid for by the Contractor.
- C. Sheds: The Contractor and each Subcontractor shall provide sheds for storing tools and materials. Storage sheds shall be watertight and storm proof, and shall have floors raised above ground. The Contractor and each Subcontractor will be held responsible for water or storm damage to stored tools or materials.

1.9 ENCLOSURES

- A. Definitions of Enclosures:
 - 1. Temporary: Sufficient preliminary enclosures of an area or structure, or of an entire building, to prevent entrance or infiltration of rain water, wind, and other elements, and which will prevent undue heat loss from within enclosed areas.
 - 2. Permanent: Stage of construction at which all moisture and weather protection elements of construction have been installed in accordance with the Contract, either for a portion of structure or for entire building.
- B. The Contractor shall construct temporary enclosures as required during construction in areas where interior work may proceed.
 - 1. Temporary enclosures shall be provided and maintained by the Contractor until the areas temporarily enclosed become permanently enclosed.
 - 2. The Contractor shall remove temporary enclosures at completion of construction or when directed by Architect.

3. Temporary enclosures shall consist of fire resistive plywood panels or one layer of 3-ply fire resistive, reinforced polyethylene film fastened to wood framework, consisting of fire resistant 2" x 4" fire resistive wood studs spaced 24" OC, securely spiked to wood plates top and bottom. Provide fire resistive intermediate girts between studs as required for fastening of plywood or film.
4. Make suitable provisions for passage of air to permit proper drying out of building.
5. Windows will not require temporary enclosures if glazed promptly when approved. If Contractor considers it impractical or is unable to glaze windows when approved, Contractor shall provide temporary enclosures as specified above.
6. At the end of the day's work, the Contractor shall securely close temporary enclosures, supervise effectiveness of enclosures, see that every precaution is used to prevent unnecessary escape of temporary heat, and take additional precautions as may be directed by Architect.

1.10 CONSTRUCTION HEAT AND VENTILATION

- A. The Contractor shall provide construction heat and ventilation as specified in enclosed areas throughout construction period as required to:
 1. Facilitate progress of work.
 2. Protect work and products against dampness and heat.
 3. Prevent moisture condensation on surfaces.
 4. Provide suitable ambient temperatures for installation and curing of finish materials.
 5. Provide adequate ventilation to meet health regulations for safe working environment.
 6. Prevent hazardous accumulations of dusts, fumes, mists, vapors, or gases in areas occupied during construction.
- B. The Contractor shall maintain, as construction heat, an even temperature of at least 60°F in the building or buildings under construction for all trades.
 1. No salamanders or open fires will be permitted in the building or buildings.
- C. The Contractor shall provide own fuel, apparatus, and heat as necessary for the thawing or heating of frozen ground and material, and in the case of the latter, sufficient heat shall be maintained until material incorporated in construction has set and all danger of frost has passed.
- D. The Contractor shall furnish, install, maintain, and operate oil or gas-fired, blower type portable heating units for providing construction heat.
 1. Heating units shall be self-contained units and furnished in sufficient number and adequate capacity to conform to the requirements for construction heat stated above.
 2. Ventilation shall be adequate for specific operations, but not less than one (1) air change per hour in work areas.
 3. Each heating unit shall be properly vented if required to dissipate noxious fumes and prevent discoloration of building construction.
 4. Each heating unit shall be provided with the normal safety devices to prevent injury to building and workers.
 5. All oil or gas-fired equipment and methods used for construction heat, shall be presented to the Architect for review.
 6. All fuel oil and gas for self-contained units shall be provided and paid for by the Contractor.

- E. The Contractor, at all times, will be held responsible for the damage to all materials and work due to insufficient heat. The Contractor shall also remove all construction heating equipment upon conclusion of its use.
1. NOTE: No new permanent equipment shall be used for construction heating unless in the opinion of the Architect's representative, the building and the mechanical work has progressed to a stage where the use of the new heating equipment would be expedient and permanent. The Contractor shall pay for all maintenance and attendance required for the permanent heating system up to the time of Substantial Completion. The Contractor shall pay the cost of fuel for the permanent system up to the time of Substantial Completion. The percentage of the utility bill to be paid by the Contractor shall be determined by the percentage of square footage of the total building that is being used for construction purposes as opposed to that being occupied by the Owner.
- F. The Subcontractor for the heating work shall have the heating system and units, as described by the Contract Documents, in place and ready for operation as soon as the Contractor has enclosed the building with glass and temporary wood doors that can be locked, has completed all interior masonry partitions, and has swept the building clean inside. The Subcontractor for the heating work shall, at this time, make available the contractual heating system for the purposes of construction heat and ventilation.
- G. The Subcontractor for the heating work shall provide specified filters in all air handling units before same are started up for use in furnishing construction heat and ventilation and shall maintain clean filters in the units for duration of construction heat and ventilation period. No fan units shall be run for construction heat without filters.
- H. Failure of the Subcontractor for heating work to make available the contractual central heating system shall in no way relieve the Contractor of the responsibility to provide heating and ventilating protection for all work.
- I. The Subcontractor for electrical work shall provide electrical services to the contractual heating units when they are ready for use.
- J. When the building is ready to be accepted by the Owner, the Subcontractor for heating work shall leave the heating system and units clean and in proper and acceptable condition. All fan units for construction heat shall be provided with new filters by Subcontractor for heating and ventilating work.
- K. Guarantee period for contractual heating system and units shall not begin until date of Substantial Completion.
- L. The Contractor shall provide, without cost to the Owner, such ventilation as may be necessary during construction to adequately dry out the construction, and prevent the buildup of fumes, humidity, gases, etc., that may be detrimental to the construction. This will not alter any other provisions of this specification.
- M. Contractual duct systems shall not be used during construction unless such use is authorized in writing by the Architect.

1.11 CONSTRUCTION ELECTRICITY

- A. The Contractor shall make the necessary application, pay all fees and charges, including power consumed, take out all permits and provide and maintain construction electric power service from sources other than the Owner, for power and light for all electric machinery and lights required for carrying on the work of all trades. Power service requirements shall be coordinated with all Contractors and be of size, phase, and voltage required for construction purposes, but in no case shall be less than 400 amp, single phase, 120/240 volts, located at temporary office area with a separate meter. At the Owner's option, the Contractor may be permitted to pay all fees and charges including power consumed, take out all permits and provide and maintain construction electric power service by extending from the Owner's source and providing a separate meter.
- B. Existing power sources may be used for work in areas to be remodeled. The Contractor shall provide and maintain construction electricity as required for the Work by extending power feeder switches, etc., from the Owner's existing system. Owner will pay cost of power used. Do not connect any equipment requiring more than 110 volts to Owner's system.
- C. During the construction period, the Contractor shall provide and pay for all wiring, switches, outlets, lamps, etc., required to provide construction electric service for light and power throughout the building and shall maintain these services as the work progresses, providing the necessary temporary feeders and extensions therefrom to provide sufficient construction lighting and power in all spaces as required for carrying on the work of all contracts.
- D. All temporary wiring shall be erected and maintained by the Contractor in accordance with rules of the Underwriters Laboratory and the local electrical utility company, and shall be arranged as not to interfere with the progress of the work throughout the building. Remove all temporary wiring, etc., upon conclusion of its use.
- E. Until permanent services are available, the Contractor shall provide construction electric services to all points not more than 50 feet from where the work is in progress. All extensions, controls, and equipment beyond the point of construction electric services shall be provided under the work of the respective contractors requiring such extensions. Subcontractors shall make their own arrangements with the Contractor for lighting their construction offices, sheds, or fabrication shanties.
- F. The Contractor shall provide wiring for single phase power for electric construction lighting and for normal equipment used by the various Subcontractors or trades.
- G. If a Subcontractor requires power different than initially agreed, Contractor shall arrange and pay for the necessary wiring and power needed.
- H. Heavy equipment such as welders, winches, air compressors, etc., shall be gasoline driven or energized from gasoline or diesel engine generators. This equipment shall be furnished and the fuel paid for by the party who requires this equipment.
- I. The Contractor shall maintain general lighting in all spaces not receiving sufficient daylight as required for safety. The Contractor shall furnish and maintain lamps required to properly light the work.

- J. Use of the permanent electrical system will be permitted for construction purposes as soon as use of construction services becomes impractical. However, any use of the permanent electrical system before the project is completed or accepted by the Owner, shall be subject to the approval of the Owner or Architect. If the permanent systems are permitted to be used prior to acceptance by the Owner, the Contractor shall remove all temporary work as rapidly as allowed by the installation of the permanent work. As the permanent electrical systems are put into service, the Contractor shall replace all burned out bulbs, tubes, and all other damaged elements, fixtures, receptacles, etc., and turn the entire system over to the Owner, whole and undamaged.

1.12 CONSTRUCTION TELEPHONES AND FAX

- A. Cost of installation, removal, and all service charges for telephones and fax lines in the construction trailer shall be paid by the Contractor.

1.13 CONSTRUCTION WATER AND SEWER

- A. The Contractor shall make arrangements for and furnish, at Contractor's expense, from sources within existing building, all water required for drinking and construction purposes, and shall install and maintain necessary supply connections and piping for same at such locations and in such manner as may be approved by Architect. Before final acceptance, temporary connections and piping shall be removed by the Contractor in a manner acceptable to the Architect.

1.14 CONSTRUCTION TOILETS

- A. The Contractor shall construct and maintain, in such manner and location as the Architect may approve, temporary toilet facilities for use by all personnel engaged in the work. Toilet facilities shall have approved plumbing fixtures and shall be serviced twice weekly; including emptying tanks, recharging with a germicidal and deodorizing solution, and scrubbing entire interior with a germicidal solution. Portable chemical units will be acceptable if they meet the above conditions. Permanent toilets shall not be used for temporary toilet facilities.

1.15 TEMPORARY STAIRS, LADDERS, RAMPS, AND RUNWAYS

- A. Contractor shall provide and maintain temporary stairs, fixed ladders, ramps, chutes, and runways as required for proper execution of work by all trades.

1.16 TEMPORARY ROADWAYS AND PARKING

- A. Contractor shall construct temporary access roads and parking area with limestone as required for the work of the project. Temporary roads and parking areas shall be located only where finished roads and parking areas are to be constructed and shall be maintained until building is complete or finish surfaces are installed.
- B. The Contractor shall construct parking area and access roads from the streets to the building with limestone. After completion of the building, Contractor shall scrape clean and level, leaving site ready for the finish grading, walks, drives, etc., as called for. The temporary roadway shall remain until all phases of construction have been completed.
- C. Construction personnel may park vehicles on site (within the limits of construction area) as directed by Owner.

1.17 PROJECT SIGN

- A. The Contractor shall provide and maintain in good condition, a 4' x 8' x 3/4" thick exterior grade plywood sign. This sign shall contain the name of the Institution, Owner, Architect, and General Contractor. The sign shall remain until all phases of construction have been completed. No other signs will be permitted on the site, other than the Contractor's name on trailer or on the construction building.
- B. Paint the entire sign, frames, and supports, with a primer coat and one finish coat of oil-based paint; colors as directed by the Architect.

1.18 REPLACEMENT OF BROKEN GLASS

- A. Contractor shall be held responsible for damaged, broken, or scratched glass and at completion of contract shall replace such glass without cost to Owner. Include existing glass damaged, broken, or scratched due to work of Contract.
- B. In general, glass which is merely cracked will be considered damaged due to faulty setting and shall be replaced by glass installer.
- C. It shall be the Contractor's prerogative to charge cost of replaced glass to the party responsible. Building shall be turned over to Owner with glazing work complete and in perfect condition.

1.19 MANUFACTURER'S DIRECTIONS

- A. The Contractor shall apply, install, connect, erect, use, clean, and condition manufactured articles, materials, and equipment as directed by manufacturer unless specified to contrary.

1.20 CUTTING AND PATCHING

- A. Cutting and patching requirements specified herein, apply to all sections and divisions of the specifications, and all drawings covering demolition, remodeling, and new construction work to be performed by the Contractor and Mechanical and Electrical Subcontractors.
- B. All on site welding shall conform to the requirements and techniques of FM Global Engineering Division.
- C. Portions of the existing structure where existing work is to be demolished or removed, and where new work is to be done, connections made, materials handled, or equipment moved and relocated, shall be temporarily protected. Temporary protection shall be such that the interior of existing structure will at all times be protected from dust and weather inclemency and interior heat and/or air conditioning conserved. Temporary openings in exterior walls shall be protected by temporary weatherproof closures. Contractor will be held responsible for any damage to the existing structure or contents due to the insufficiency of such protection.
- D. Cutting and Patching Requirements:

1. Where new work connects with present building and where remodeling of existing work occurs, the Contractor shall do all cutting, notching, keying, removal and trimming of existing construction required to make connections between the new and the old work and shall do all patching, repairing or refinishing of cut and immediately adjacent surfaces to provide a finish in conformance with industry standards and appropriate to finish materials intended to be used.
 2. Holes through existing floors, walls, and roofs for Mechanical and Electrical work shall be cut, patched, sealed, fire proofed, and flashed by the trade requiring the opening.
 3. Before breaking of surfaces, cut primary saw-cut 1" to 1-1/2" deep around areas where portions of work will be removed. Lines shall be straight.
 4. Materials and workmanship employed in patching, repairing, or refinishing existing surfaces and/or involving new construction shall conform to that of original work, unless otherwise shown or specified.
 5. Clean existing surfaces remaining exposed as a result of demolition work and/or new construction. Clean entire wall faces, floor surfaces, column faces, etc., using sandblasting, wire brushing, or carborundum wheel. Where dovetail or other insert slots are exposed, they shall be filled with grout.
- E. Keep property adjacent to buildings clean and free from accumulation of rubbish. Remove excess debris resulting from demolition operations, as it accumulates.
- F. Walls, floors, etc., required to carry the excess weight of stored materials and equipment during demolition, removal and remodeling work, or which will be subjected to undue pressure from waste material, shall be shored or braced to withstand these excess loads.

1.21 CODE REQUIREMENTS

- A. The Contractor shall conform to all requirements of local, state, and national codes, laws, ordinances, and utility company requirements and other regulations having jurisdiction over this installation.
- B. If there is a discrepancy between the codes and regulations having jurisdiction over this installation and these specifications, the codes and regulations shall determine the method of the Work.
- C. If the Contractor notes, at the time of bidding, any parts of the drawings and specifications that are not in accord with the applicable codes or regulations, Contractor shall inform the Architect in writing, requesting a clarification. If there is insufficient time to allow this procedure, Contractor shall submit, with proposal, a separate price required to make the system shown on the drawings comply with the codes and regulations.
- D. All changes to the system made after the letting of the contract in order to comply with the applicable codes or requirements of the Inspector, shall be made by Contractor without cost to the Owner.

1.22 PROGRESS SCHEDULE

- A. Immediately after being awarded the contract, the Contractor shall prepare an estimated Progress Schedule and submit same for the Architect's approval. It shall indicate the dates for the starting and completion of the various stages of construction.

1.23 IAQ MAINTENANCE FOR OCCUPIED FACILITIES UNDER CONSTRUCTION

- A. Contractors shall make all reasonable efforts to prevent construction activities from affecting the air quality of the occupied areas of the building or outdoor areas near the building. These measures shall include, but not be limited to:
1. General Contractor shall erect and maintain dust barriers throughout the construction work. These barriers shall be reasonably airtight and shall prevent entry into the construction zone by unauthorized persons. Reasonably airtight means construction equivalent to full-height temporary or permanent walls with joints taped or sealed, and shafts and other penetrations sealed as well as possible. Fire resistant polyethylene is acceptable; if flame spread/smoke developed ratings are demonstrated to conform to the applicable building codes and licensing acts.
 2. All contractors shall endeavor to minimize the amount of contaminants generated during construction. Methods to be employed shall include, but not be limited to:
 - a. Minimizing the amount of dust generated.
 - b. Reducing solvent fumes and VOC emissions.
 - c. Maintain good housekeeping practices, including sweeping and periodic dust and debris removal. There should be no visible haze in the air.
 3. Request that the Owner designate an IAQ representative.
 4. Review and receive approval from the Owner's IAQ representative for all IAQ-related construction activities and negative pressure containment plans.
 5. Inform the IAQ representative of all conditions that could adversely impact IAQ, including operations that will produce higher than normal dust production or odors.
 6. Schedule activities that may cause IAQ conditions that are not acceptable to the Owner's IAQ representative during unoccupied periods.
 7. Request copies of and follow all Owner's IAQ and infection control policies.
 8. Unless no other access is possible, the entrance to construction site shall not be through the existing facility.
 9. To minimize growth of infectious organisms, do not permit damp areas in or near the construction area to remain for over 24 hours.
 10. In addition to the criteria above, provide measures as recommended in the SMACNA "IAQ Guidelines for Occupied Buildings Under Construction."

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 50 00

SECTION 01 73 20 – CUTTING AND PATCHING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The Contractor shall provide connections, repairs, watertight facilities, etc., as required in new construction. Each subcontractor shall furnish information to the Contractor as to size, location, etc., or accept the responsibility of doing the necessary cutting, patching at his own expense.
- B. The Contractor shall provide cutting, fitting or patching for work that may be required to make several parts come together properly, in accordance with the Contract Documents.
- C. Do not endanger the stability of the structure or any part thereof by cutting, digging or otherwise.
- D. The Contractor shall patch and match existing surfaces and materials, etc., affected by the work or patch and match existing surfaces with new materials, etc. as noted.

END OF SECTION 01 73 20

SECTION 01 75 00 - STARTING AND ADJUSTING

PART 1 - GENERAL

1.1 DESCRIPTION OF REQUIREMENTS

- A. This section applies to all new HVAC, plumbing, and electrical including, but not limited to, air handling units, fan coil units, pumps, etc.

1.2 STARTING SYSTEMS

- A. Coordinate schedule for startup of various equipment and systems suppliers.
- B. Notify Architect, Owner, and Equipment/Systems Representative, seven (7) days prior to startup of each item or system.
- C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, or for other conditions that may cause damage.
- D. Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- E. Verify wiring and support components for equipment are complete and tested.
- F. Execute startup under supervision of applicable manufacturer's representative in accordance with manufacturer's instructions.
- G. When specified in Divisions , 22, or 23 or Division 26, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to startup, and to supervise placing equipment or system in operation.
- H. Submit a written report that equipment or system has been properly installed and is functioning correctly.

1.3 DEMONSTRATION AND INSTRUCTIONS

- A. Demonstrate operation and maintenance of products to Owner's personnel prior to date of Substantial Completion.
- B. Contractor and System Representative to demonstrate project equipment operations and provide instructions by a qualified manufacturer's representative who is knowledgeable about the product and/or system. Instructions to be of adequate length for Owner to understand and be able to operate and maintain the product and/or systems.
- C. For equipment or systems requiring seasonal operation, perform demonstration for other season shall be given at the start of the season.
- D. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.

- E. Demonstrate startup, operation, control, adjustment, troubleshooting, servicing, maintenance, and shutdown of each item of equipment at agreed time with Owner.
- F. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.
- G. Specify the amount of time required for instruction on each item of equipment and system that is specified in Divisions 21, 22, and 23 and Division 26.

1.4 TESTING, ADJUSTING, AND BALANCING

- A. The Contractor will perform services specified in Divisions 22, 23 and 26.
- B. Reports will be submitted by the testing and balancing firm to the Architect indicating observations and results of the tests and indicating compliance or non-compliance with the requirements of the Contract Documents. Non-compliance items will be corrected by the Contractor immediately and the testing and balancing shall be performed again to verify that the corrective action was taken.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 75 00

SECTION 01 77 00 - CONTRACT CLOSEOUT

PART 1 - GENERAL

1.1 CLOSEOUT PROCEDURES

- A. Submit written certification that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's review, normally referred to as "final punch list."
- B. Provide submittals to Architect that are called for in other specification sections.
- C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and remaining sum due.

1.2 FINAL CLEANING

- A. The Contractor and each Subcontractor shall perform thorough cleaning, sweeping, washing, and polishing of the entire new structure and site. The Contractor and each Subcontractor shall remove from work and equipment, provided under their respective divisions of work, all foreign matter, spots, and soil so as to put all such work and equipment, including finishes, in a complete and finished condition to the satisfaction of the Architect.
 - 1. Cleaning shall include removal of foreign matter from all drains, exterior and interior.
 - 2. Clean debris from roofs, gutters, downspouts, and drainage systems.
 - 3. Clean and sweep all paved areas; rake clean all landscaped areas.
- B. Initial protection of aluminum will be provided by Subcontractor providing work. Maintenance and any additional protection and repair work required shall be the responsibility of Contractor who shall have damaged work refinished where possible or replaced where required.
- C. Immediately prior to the occupancy of this project or parts thereof, the Contractor shall have all glass cleaned by a professional window washing contractor. Work shall include the removal of labels, paint spattering, excess glazing sealant, etc. Surfaces shall include mirrors, both sides of all glass in windows, borrowed lights, partitions, and doors.
- D. Upon completion of the work, the Contractor and each Subcontractor shall remove and dispose of all equipment, unused materials, waste, and construction facilities provided for the Contractor's work.
- E. After all outside cleanup work has been completed, interior cleanup shall be completed as follows:
 - 1. Subcontractor for plumbing work shall wash and leave free of stains and dust, all fixtures, and all piping, etc. This Contractor shall also clean all faucet aerators.
 - 2. Subcontractor for heating work shall wash and leave clean all radiation covers, etc. Vacuum clean all air handling units, unit ventilators, unit heaters, and finned radiation, inside and out, cap, replace all filters with new filters if units have been used for temporary heating, and clean all motors.

3. Subcontractor for electrical work shall wash and clean all plates on switches and receptacles, light fixture lenses and trim reflectors, etc., and vacuum clean all panels (inside), etc.
4. The Contractor shall, after the above work has been done, completely vacuum all floors and walls, dust and clean all cabinet and wall materials, exposed steel and wood, clean all glass and scrub and clean all floors.
5. If Contractor does not remove rubbish or clean building as specified above, Owner reserves the right to have work done by others at Contractor's expense. If Subcontractors fail to perform their cleaning, the Contractor shall perform such work at the offending Subcontractor's expense.

1.3 ADJUSTING

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.

1.4 PROJECT RECORD DOCUMENTS

- A. Maintain one set of drawings with changes marked on record documents on site; record actual revisions to the work and turn over the following to the Architect:
 1. Drawings.
 2. Specifications.
 3. Addenda.
 4. Change orders and other modifications to the Contract.
 5. Reviewed shop drawings, product data, and samples.
 6. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress.
- E. Specifications: Legibly mark and record at each Product Section description of actual products installed, including the following:
 1. Manufacturer's name and product model and number.
 2. Product substitutions or alternates utilized.
 3. Changes made by Addenda and modifications.
- F. Record Documents and Shop Drawings: Legibly mark each item to record actual construction including:
 1. Measured depths of foundations in relation to finish main floor datum.
 2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
 4. Field changes of dimension and detail.
 5. Details not on original Contract drawings.

- G. Submit documents to Architect with claim for final Application for Payment.

1.5 OPERATION AND MAINTENANCE INSTRUCTIONS

- A. Submit three properly indexed and bound copies, in 'D' Ring style notebooks, of the Operations and Maintenance Instructions to the Architect. Make all corrections or additions required.
- B. Operation and Maintenance Instructions shall include:
 - 1. Notebooks shall be heavy duty locking three ring binders and incorporate clear vinyl sheet sleeves on the front cover and spine for slip-in labeling. "Peel and stick" labels are not acceptable. Sheet lifters shall be supplied at the front of each notebook. Provide "Wilson-Jones" or equal, color black. Size notebooks a minimum of 1/2" thicker than material for future inserts. Label the spine and front cover of each notebook. If more than one notebook is required, label in consecutive order. For example; 1 of 2, 2 of 2. No other forms of binding will be acceptable.
 - 2. Prepare binder covers (front and spine) with printed title "Operation and Maintenance Instructions", title of project and subject matter of binder when multiple binders are required.
 - 3. Title page with project title, Architect, Contractor and Subcontractors, with addresses, telephone numbers, and contacts.
 - 4. Table of Contents describing all index tabs.
 - 5. Listing of all Subcontractors and major equipment suppliers with addresses, telephone numbers, and contacts.
 - 6. Index tabs dividing information by specification section, major equipment, or systems. All tab titling shall be clearly printed under reinforced plastic tabs.
 - 7. Copies of warranties.
 - 8. Copies of all final approved shop drawings and submittals.
 - 9. Copies of all factory inspections and/or equipment start-up reports.

1.6 WARRANTIES

- A. Provide duplicate notarized copies.
- B. Execute and assemble transferable warranty documents from Subcontractors, suppliers, and manufacturers.
- C. Provide table of contents and assemble in three-ring binder with durable plastic cover.
- D. Submit prior to final Application for Payment.
- E. For items of work delayed beyond date of Substantial Completion, provide updated submittal within 15 days after acceptance, listing date of acceptance as start of warranty period.

1.7 SPARE PARTS AND MAINTENANCE MATERIALS

- A. Provide products, spare parts, maintenance and extra materials in quantities specified in individual specification sections.
- B. Deliver to project site; obtain receipt prior to final payment.

1.8 RECORD DRAWINGS

- A. At completion of work and prior to final payment, the Contractor and each Subcontractor shall provide the Architect with a complete, accurate, clean, and legible set of record drawings that indicate exact location of all material items recorded on a day to day basis during the construction period.

1.9 GUARANTEES AND WARRANTIES

- A. The Contractor shall deliver all guarantees and warranties to the Owner prior to final completion.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 77 00

SECTION 01 77 00 – CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Substantial Completion procedures
 - 2. Final Completion procedures
 - 3. Extended Warranties
 - 4. Record Drawings
 - 5. Record Topographic Survey
 - 6. Operation and Maintenance Manuals
 - 7. Attic stock materials
 - 8. Allowances accounting
 - 9. Final cleaning
 - 10. Repair of the Work

1.02 SUBMITTALS

- A. Submittals Prior to Substantial Completion
 - 1. Letter from the Contractor to the Architect stating the project has achieved Substantial Completion
 - 2. Contractor's List of Items to be Completed or Corrected
 - 3. Specified certifications
- B. Submittals Prior to Final Completion
 - 1. Written notice that the Work is ready for final inspection and acceptance
 - 2. Letter stating that items included in the Architect's (Amended) List of Items to be Completed or Corrected have been completed or otherwise resolved for acceptance
 - 3. Evidence of final, continuing insurance coverage complying with insurance requirements
 - 4. Demonstration and training video recordings
 - 5. Extended Warranties
 - 6. Record Drawings
 - 7. Record Topographic Survey
 - 8. Operation and Maintenance Manuals
 - 9. Attic stock materials
 - 10. Allowances accounting

11. Waste Management Plan documenting a summary of recycling and salvage on-site logs, manifests, weight tickets, receipts, etc.

1.03 SUBSTANTIAL COMPLETION PROCEDURES

- A. Inspection Procedures: Submit a written request for inspection to determine Substantial Completion a minimum of ten (10) calendar days prior to date the work will be completed and ready for inspection. On receipt of request, Architect will either schedule an inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of critical items that must be completed or corrected before a certificate will be issued.
 1. Reinspection: Request reinspection when the critical items previously identified have been completed or corrected.
 2. On receipt of the reinspection request, Architect will either schedule an inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection has confirmed that the critical items have been completed or corrected.
 3. Substantial Completion is contingent upon the issuance of the Occupancy Permit by the Authority Having Jurisdiction (AHJ), therefore the date of Substantial Completion is subject to change to coincide with the date of Occupancy.
- B. List of Incomplete Items: When the Contractor considers the Work to be Substantially Complete, the Contractor shall prepare and submit a list of items to be completed and corrected (Contractor's punch list).
 1. When the Architect determines the Work is Substantially Complete, the Architect will issue the Amended List of Items to be Completed or Corrected (Architect's punch list) to the Contractor.
- C. Submittals Prior to Substantial Completion: Complete the following a minimum of ten (10) calendar days prior to requesting inspection for determining date of Substantial Completion.
 1. Submit specified certifications through the electronic submittal process. Non-reviewed, non-approved and incomplete documentation is not acceptable.
 2. After the electronic submittals have been accepted for contract compliance, submit three (3) clean, legible, approved copies of the specified certifications to the Architect at least ten (10) calendar days prior to the occupancy walk through by the AHJ. Each set of the approved documentation shall be bound in a three ring binder with tab divisions. Approved documentation binders will be transmitted by the Architect to the AHJ and subsequently delivered to Owner.
 3. Following is the list of specified certifications to be included in each binder.
 - a. Contractor Certification that no asbestos containing materials were used on the Project.
 - b. Environmental Remediation Clearance Documents filed by the Contractor to the AHJ.
 - c. Environmental Testing Report including Indoor Air Quality (IAQ) test results which demonstrate that the factors tested are within permissible exposure limits.

- d. Roofing System Manufacturer Inspection Report describing deficiencies with the roofing work and items that are to be completed or corrected.
 - e. Plumbing Systems Site: Chlorination test results for water main work indicating satisfactory compliance with Contract Documents transmitted under letterhead of the responsible Trade Contractor.
 - f. Mechanical Systems: Contractor Certification indicating the Heating, Ventilating, and Air Conditioning Systems have been inspected and start up procedures have been completed by the manufacturer and the systems are fully operational including functional temperature controls.
 - g. Boiler Systems: Certification that the boiler system has been inspected and tested by the manufacturer and is fully operational including functional temperature controls. The boiler system shall be inspected and approved by the Office of State Fire Marshal.
 - h. Mechanical Systems Testing and Balancing: Complete test and balance report including Contractor Certification indicating that at a minimum, code compliant fresh air changes are provided.
 - i. Mechanical System Ductwork Tightness Testing Report including test results which demonstrate the required results to pass.
4. Other items which are required to achieve Substantial Completion include but are not necessarily limited to the following: completed finishes and suspended ceiling systems; functional door hardware; corridors clear of debris and construction equipment; operational plumbing fixtures; electrical panels properly labeled; and interior signage indicating room numbers, directions, offices, and occupancy loads properly posted in assembly areas. Fire extinguishers, furnished by the Owner, must be installed in each cabinet and wall mounted at locations indicated.
- D. Procedures Prior to Substantial Completion: Complete the following a minimum of ten (10) calendar days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
- 1. Advise Owner of pending insurance changeover requirements.
 - 2. Complete startup and testing of systems and equipment.
 - 3. Advise Owner of changeover in heat and other utilities.
 - 4. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
 - 5. Complete final cleaning requirements, including touchup painting.
 - 6. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- E. Procedures Following Substantial Completion: Complete the following items immediately after Substantial Completion.
- 1. Maintenance of seed, sod, plantings and landscaping areas.
 - 2. Removal of temporary facilities and protections. Restore modifications to existing facilities to the original design or configuration.

3. Make final changeover of permanent locks and coordinate delivery of keys to Owner. Advise Owner's personnel of changeover in security provisions.
4. Perform preventive maintenance on equipment used prior to Substantial Completion.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings.
6. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.

1.04 FINAL COMPLETION PROCEDURES

- A. Preliminary Procedures: Before requesting final inspection for determining Final Completion, complete the following:
 1. Submit letter stating that items included in the Architect's (Amended) List of Items to be Completed or Corrected have been completed or otherwise resolved for acceptance.
 2. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 3. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings.
 4. Submit Extended Warranties
 5. Submit Record Drawings
 6. Submit Operation and Maintenance Manuals
 7. Deliver attic stock materials
 8. Submit allowances accounting
- B. Inspection: Submit a written request for final inspection to determine acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will review the final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
 1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.05 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

- A. General: Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.
 1. At beginning of each training module, record each chart containing learning objective and lesson outline.
 2. Training recordings must include both high quality video and audio.
 3. Coordinate with Owner for required staff to be in attendance. Include a sign-in sheet to verify attendance.

- B. Demonstration and Training Video Recordings: Submit two copies within seven days of end of each training module.
- C. Video Recording Format: Provide high-quality color video recordings with menu navigation.
- D. Instructor Qualifications: A factory-authorized service representative experienced in operation and maintenance procedures and training.
- E. Narration: Describe scenes on video recording by audio narration by microphone while video recording is recorded. Include description of items being viewed.

1.06 EXTENDED WARRANTIES

- A. Submit written extended warranties, as defined as warranties beyond the standard one year warranty period from the date of Substantial Completion, via the electronic submittal process.
 - 1. Warranty shall include the following information:
 - a. Name of the project.
 - b. Name of the warranty provider.
 - c. Description of the item being warranted.
 - d. Effective dates of the warranty, starting with the date of Substantial Completion.
 - e. Terms and conditions in conformance with the specified warranty.
- B. Upon acceptance of the warranties through the submittal process, the Contractor shall collect and assemble hard copy originals of the accepted warranties. Organize extended warranty documents into an orderly sequence based on the table of contents of the Project Manual.
 - 1. Bind warranties in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
 - 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
 - 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
- C. Where applicable, provide additional copies of each warranty to include in operation and maintenance manuals.

1.07 RECORD DRAWINGS

- A. The Contractor and the Site Utilities, Mechanical, Electrical, Plumbing and Fire Protection Trade Contractors shall each maintain during construction a set of record drawings which shall be kept on site. Each set of these drawings shall be labeled in neat large printed letters "RECORD DRAWINGS". Contractors shall record information concurrently with construction progress and shall not conceal work until the required information is recorded. Concealed portions of the work which have not been documented shall be opened to fully document conditions at the Contractor's own cost.

- B. Record drawings shall be copies of the Contract Document drawings and shall be clearly and legibly marked to record actual construction, including the following.
 - 1. Changes made by Addenda, Change Directives, and/or Change Orders; clarifications not on Contract Documents drawings.
 - 2. Fully document horizontal and vertical locations of underground site utility and storm sewer lines and appurtenances referenced to permanent surface improvements with depths of various elements in relations to finish floor datum.
 - 3. Fully document horizontal and vertical locations of underground and under-slab service lines (plumbing, fire protection, mechanical, electric) and appurtenances referenced to permanent improvements with depths of various elements in relations to finish floor datum.
 - 4. Location of interior service lines (plumbing, fire protection, mechanical, electric) and devices concealed in above ground construction referenced to visible and accessible features of the structure.
 - 5. Location of concealed equipment, valves, ducts, dampers, access panels, outlets, etc. referenced to visible and accessible features of the structure.
 - 6. Field changes of dimensions and details.
 - 7. Other deviations made from the original Contract Document drawings.
- C. The Contractor shall make available record drawings for review for compliance. The frequency of review shall be at a minimum, 50% gross completion of the Contract and at Substantial Completion. The Contractor shall provide complete sets to facilitate review. If it is determined that the record drawings are not being maintained concurrently with construction progress, subsequent pay applications will not be reviewed until the record drawings are brought up to date.
- D. At the completion of the preparation of the record drawings, each contractor shall clearly indicate on the cover sheet of the drawings, "NAME OF CONTRACTOR" and "DATE" identifying the contractor who prepared the record drawings and the date of the record drawings.
- E. Prior to Final Completion, the Contractor shall deliver an electronically scanned copy of the record drawings in PDF format to the Architect for delivery to the Owner.

1.08 OPERATION AND MAINTENANCE MANUALS

- A. Submit operation and maintenance manuals via the electronic submittal process.
- B. Upon acceptance of the operation and maintenance manuals through the submittal process, the Contractor shall submit a final corrected version of the operation and maintenance manuals via the electronic submittal process and shall also collect and assemble hard copies of the accepted operation and maintenance manuals. Organize operation and maintenance manuals into an orderly sequence based on the table of contents of the Project Manual.
 - 1. Bind operation and maintenance manuals in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.

2. Where documents do not allow for hole punching (such as under-sized documents or full size drawings), provide plastic sleeve for insertion into the three-ring binder.
 3. Provide heavy paper dividers with plastic-covered tabs for each separate section. Mark tab to identify the section. Provide a typed description of the sections, including the name of the product and the name, address, and telephone number of Installer.
 4. Identify each binder on the front and spine with the typed or printed title "OPERATION AND MAINTENANCE MANUAL", Project name, and name of Contractor.
 5. Provide additional documentation as specified elsewhere.
- C. Where applicable, provide additional copies of each warranty to include in operation and maintenance manuals.
- D. Submit three (3) copies of each operation and maintenance manual binder to the Architect for processing and distribution.

1.09 ATTIC STOCK

- A. Submit attic stock to the Owner as required. Coordinate time and location of delivery of attic stock with designated Owner's representative. Prepare a sign-off form for signature by the designated Owner's representative indicating acceptance and quantity of the attic stock items. Failure to obtain the designated Owner's representative sign-off shall represent that the attic stock delivery did not occur. A copy of the fully executed sign-off form shall be submitted to the Architect.

1.10 ALLOWANCE ACCOUNTING

- A. The Contractor shall submit a comprehensive accounting of each specified allowance with appropriate supporting documentation to justify the actual quantities used.
- B. Each allowance accounting item shall include the specified allowance amount and the actual amount of the allowance used and the net difference.
- C. A Change Order(s) will be prepared indicating the corresponding adjustments to the contract amount based upon adjusted allowance amounts.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.01 FINAL CLEANING

- A. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
1. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion for entire Project or for a designated portion of Project:

- a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
- b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
- c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
- d. Remove tools, construction equipment, machinery, and surplus material from Project site.
- e. Remove snow and ice to provide safe access to building.
- f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
- g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
- h. Sweep concrete floors broom clean.
- i. Remove protections used to prevent dust accumulation and damage to furniture and equipment in the work area.
- j. Vacuum and wipe clean surface, furniture and equipment in the work area. Books within the work area shall be individually dusted.
- k. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
- l. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
- m. Remove labels, wrapping and protective films that are not permanent.
- n. Wipe surfaces of mechanical and electrical equipment, elevator equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
- o. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
- p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
- q. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
- r. Leave Project clean and ready for occupancy.

3.02 REPAIR OF THE WORK

IMEG #21002885.00

Rockford PS ESSER HVAC Upgrades Phase 2

01 77 00-8

- A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.
- B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.
 - 1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
 - 2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that already show evidence of repair or restoration.
 - a. Do not paint over "UL" and other required labels including door and frame fire ratings.
 - b. Do not paint over identifications including mechanical and electrical nameplates.
 - c. Remove paint applied to required labels and identification.
 - 3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
 - 4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and HID fixtures to comply with requirements for new fixtures.

3.03 ELECTRONIC CLOSEOUT DOCUMENTATION

- A. General: Provide a complete project closeout documentation package in electronic format. This package shall include:
 - 1. Project Record Drawings
 - 2. Project Manual
 - 3. Approved Submittals
 - 4. Operation and Maintenance Manuals
 - 5. Warranties
 - 6. Owner training DVD's
 - 7. Project Contact Directory including sub-contractors
- B. The Electronic Closeout Documentation shall be prepared by Digital Revolution Inc./BHFX LLC Contact TJ Hurckes at 847-899-3414 or tj.hurckes@bhfx.net.
- C. In order to facilitate the Electronic Closeout Documentation process, comply with the following procedures:

1. Contact Digital Revolution, Inc. a minimum of three months prior to the date of Substantial Completion to schedule a pre-closeout meeting. Review the following:
 - a. Format of documents: PDF electronic format for documents.
 - b. Folder structure for storage and transfer of files.
 - c. Schedule for collection and turn-over of closeout documentation.
 - d. Record Document format procedures: Provide clean and accurate paper copies of the marked-up Record Documents (Drawings and Specifications) for scanning.
 - e. Provide contact information for the individual responsible for the collection and transfer of the electronic closeout Documentation package contents.
 - f. Review a complete listing of closeout documentation package contents.
2. Provide Documentation to Digital Revolution, Inc. for processing no later than 30 days after the date of Substantial Completion.
3. Schedule a training conference with the Owner's Representative, Architect, Construction Manager and Digital Revolution, Inc. to present the completed Electronic Closeout Documentation Package.

END OF SECTION 01 77 00

SECTION 01 78 23 - OPERATIONS AND MAINTENANCE MANUALS

PART 1 - GENERAL

1.1 SUMMARY

- A. Description of Work: This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Operation and maintenance documentation directory.
 - 2. Emergency manuals.
 - 3. Operation manuals for systems, subsystems, and equipment.
 - 4. Maintenance manuals for the care and maintenance of products, materials, and finishes, and systems and equipment.

1.2 RELATED WORK

- A. Specific commissioning requirements are given in the following sections of these specifications. All the following sections apply to the Work of this section:
 - 1. Section 01 79 00 - Demonstration and Training
 - 2. Section 01 91 00 - Commissioning
 - 3. Section 23 08 00 - Commissioning of HVAC

1.3 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 SUBMISSION OF MANUALS

- A. Initial Submittal: Submit two draft copies of each manual at least 15 days before requesting inspection for Substantial Completion. Include a complete operation and maintenance directory. Architect/Engineer will return one copy of draft and mark whether general scope and content of manual are acceptable.
- B. Final Submittal: Submit one copy of each manual in final form at least 15 days before final inspection. Architect/Engineer will return copy with comments within 15 days after final inspection.
 - 1. Correct or modify each manual to comply with Architect/Engineer's comments. Submit two copies of each corrected manual within 15 days of receipt of Architect/Engineer's comments.

1.5 COORDINATION

- A. Where operation and maintenance documentation includes information on installations by more than one factory-authorized service representative, assemble and coordinate information furnished by representatives and prepare manuals.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

- A. Organization: Include a section in the directory for each of the following:
 - 1. List of documents.
 - 2. List of systems.
 - 3. List of equipment.
 - 4. Table of contents.
- B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
- C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
- D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 MANUALS, GENERAL

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
 - 1. Title page.
 - 2. Table of contents.
 - 3. Manual contents.
- B. Title Page: Enclose title page in transparent plastic sleeve. Include the following information:
 - 1. Subject matter included in manual.
 - 2. Name and address of project.
 - 3. Name and address of Owner.
 - 4. Date of submittal.
 - 5. Name, address, and telephone number of Contractor.
 - 6. Name and address of Architect/Engineer.

7. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to specification section number in the Project Manual.
1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2 by 11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
 - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
 - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.
 2. Dividers: Heavy paper dividers with plastic-covered tabs for each section. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to specification section number and title of Project Manual.
 3. Protective plastic sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.
 4. Supplementary text: Prepared on 8-1/2 by 11-inch white bond paper.
 5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
 - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
 - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 EMERGENCY MANUALS

- A. Content: Organize manual into a separate section for each of the following:
1. Type of emergency.
 2. Emergency instructions.
 3. Emergency procedures.

- B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
1. Fire.
 2. Flood.
 3. Gas leak.
 4. Water leak.
 5. Power failure.
 6. Water outage.
 7. System, subsystem, or equipment failure.
 8. Chemical release or spill.
- C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- D. Emergency Procedures: Include the following, as applicable:
1. Instructions on stopping.
 2. Shutdown instructions for each type of emergency.
 3. Operating instructions for conditions outside normal operating limits.
 4. Required sequences for electric or electronic systems.
 5. Special operating instructions and procedures.

2.4 OPERATION MANUALS

- A. Content: In addition to requirements in this section, include operation data required in individual specification sections and the following information:
1. System, subsystem, and equipment descriptions.
 2. Performance and design criteria if Contractor is delegated design responsibility.
 3. Operating standards.
 4. Operating procedures.
 5. Operating logs.
 6. Wiring diagrams.
 7. Control diagrams.
 8. Piped system diagrams.
 9. Precautions against improper use.
 10. License requirements including inspection and renewal dates.
- B. Descriptions: Include the following:
1. Product name and model number.
 2. Manufacturer's name.
 3. Equipment identification with serial number of each component.
 4. Equipment function.
 5. Operating characteristics.
 6. Limiting conditions.
 7. Performance curves.
 8. Engineering data and tests.

9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color coding where required for identification.

2.5 PRODUCT MAINTENANCE MANUAL

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of installer or supplier and maintenance service agent, and cross-reference specification section number and title in Project Manual.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds:

1. Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
2. Include procedures to follow and required notifications for warranty claims.

2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUAL

- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
- B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of installer or supplier and maintenance service agent, and cross-reference specification section number and title in Project Manual.
- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
 1. Standard printed maintenance instructions and bulletins.
 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 3. Identification and nomenclature of parts and components.
 4. List of items recommended to be stocked as spare parts.
- D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
 1. Test and inspection instructions.
 2. Troubleshooting guide.
 3. Precautions against improper maintenance.
 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 5. Aligning, adjusting, and checking instructions.
 6. Demonstration and training videotape, if available.
- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
 1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds:

1. Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
2. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

- A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.
- B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
 1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- E. Manufacturers' Data:
 1. Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
 2. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
- F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in Record Drawings to ensure correct illustration of completed installation.
 1. Do not use original Project Record Documents as part of operation and maintenance manuals.
 2. Comply with requirements of newly prepared Record Drawings in Division 01 Section PROJECT RECORD DOCUMENTS.
- G. Comply with Division 01 Section CLOSEOUT PROCEDURES for schedule for submitting operation and maintenance documentation.

END OF SECTION 01 78 23

SECTION 01 79 00 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This Section includes administrative and procedural requirements for instructing the Owner's and operations and maintenance personnel, including the following:
 - 1. Demonstration of operation of systems, subsystems, and equipment. Contractor shall develop training sessions for systems, subsystems, and equipment.
 - 2. Training in operation and maintenance of systems, subsystems, and equipment.
- B. Demonstration and training requirements are described in this section, Section 01 91 00, and in the technical sections of Divisions 02 through 28. The Contractor shall comply with the requirements for demonstration and training data described in all specification sections.

1.2 RELATED WORK

- A. Specific commissioning requirements are given in the following sections of these specifications. All the following sections apply to the Work of this section
 - 1. Section 01 78 23 - Operations and Maintenance
 - 2. Section 01 91 00 - Commissioning
 - 3. Section 23 08 00 - Commissioning of HVAC

1.3 SUBMITTALS

- A. Instruction Program: No later than two (2) months following acceptance of equipment and system submittals, the responsible contractor shall submit written training plans to the CxA and Owner for review and approval per Section 01 91 00 and this section.
- B. Documentation: After each training session, submit the following:
 - 1. Attendance Roster: Submit list of participants and length of instruction time.
 - 2. Evaluations: For each participant and for each training session, submit results and documentation of performance-based test and student evaluations of training.

1.4 COORDINATION

- A. Coordinate instruction schedule with Owner.
- B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
- C. Coordinate content of training sessions with content of approved operation and maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Facilitator Qualifications: Training shall be facilitated by a firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B. Instructor Qualifications: Instructors shall be factory-authorized representatives experienced in operation and maintenance procedures and training.
- C. Pre-instruction Conference: Conduct conference at project site. Review methods and procedures related to demonstration and training including, but not limited to, the following:
 - 1. Inspect and discuss locations and other facilities required for instruction, including classroom training and field training.
 - 2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, and audio/visual equipment.
 - 3. Review required content of instruction.
 - 4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

- A. Program Structure: Develop a comprehensive instruction program. Include individual training sessions for each system and equipment not part of a system as required by technical specification sections and the Cx Plan.
- B. Training Sessions: Coordinate training with the CxA. Develop a learning objective and teaching outline for each system, subsystem, and product specified in Section 01 91 00 and Divisions 02 through 28. Include a description of specific skills and knowledge that participants are expected to learn.
- C. The following list of topics should be applied to each training plan for each equipment or system being presented. Not all will apply, but each major category should be addressed in the training plan with a brief description of how it pertains to the particular training sessions.
 - 1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
 - a. System, subsystem, and equipment descriptions.
 - b. Performance requirements.
 - c. Operating standards.
 - d. Regulatory requirements.
 - e. Equipment function.
 - f. Operating characteristics.
 - g. Limiting conditions.
 - h. Performance curves.
 - 2. Documentation: Review the following items in detail:

- a. Operations manuals.
 - b. Maintenance manuals.
 - c. Project Record Documents.
 - d. Identification systems.
 - e. Warranties and bonds.
 - f. Maintenance service agreements and similar continuing commitments.
3. Emergencies: Include the following:
- a. Instructions on meaning of warnings, trouble indications, and error messages.
 - b. Instructions on stopping.
 - c. Shutdown instructions for each type of emergency.
 - d. Operating instructions for conditions outside normal operating limits.
 - e. Sequences for electric or electronic systems.
 - f. Special operating instructions and procedures.
4. Operations: Include the following:
- a. Startup procedures.
 - b. Equipment or system break-in procedures.
 - c. Routine and normal operating instructions.
 - d. Regulation and control procedures.
 - e. Control sequences.
 - f. Safety procedures, including lockout/tagout requirements.
 - g. Instructions on stopping.
 - h. Normal shutdown and restart instructions.
 - i. Operating procedures for system, subsystem, or equipment failure.
 - j. Seasonal and weekend operating instructions.
 - k. Required sequences for electric or electronic systems.
 - l. Special operating instructions and procedures.
5. Adjustments: Include the following:
- a. Alignments.
 - b. Checking adjustments.
 - c. Noise and vibration adjustments.
 - d. Economy and efficiency adjustments.
6. Troubleshooting: Include the following:
- a. Diagnostic instructions.
 - b. Test and inspection procedures.
7. Maintenance, Care and Cleaning: Include the following:
- a. Inspection procedures.
 - b. Types of cleaning agents to be used and methods of cleaning.
 - c. List of recommended cleaning agents and methods of cleaning and list of agents and cleaning methods detrimental to product.
 - d. Procedures for routine cleaning.
 - e. Procedures for preventive/predictive maintenance.

- f. Procedures for routine maintenance.
 - g. Instruction on use of special tools.
- 8. Repairs: Include the following:
 - a. Diagnosis instructions.
 - b. Repair instructions.
 - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - d. Instructions for identifying parts and components.
 - e. Review of spare parts needed for operation and maintenance.
- D. Training Shifts: Training shall be provided for one shift, unless otherwise noted. Training shall be accomplished during normal business hours.
- E. Training Duration: Duration of training and demonstration is addressed in Section 01 91 00. Training and demonstration duration for specific items within a training session may be adjusted with Owner approval to meet the overall goals of the training session.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training sessions. Assemble training sessions into a combined training manual.
- B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

- A. Scheduling: Provide instruction at mutually agreed-on times. For equipment that requires seasonal operation, provide instruction on actions necessary to prepare for and execute seasonal changeover.
 - 1. Schedule training through the Owner with at least 30 days' notice. This requirement for notice takes precedence over other advance notice requirements in the specification.
- B. Quality and Contents of Training Sessions: Each training session shall include the following.
 - 1. Training plan for each class. Training plan shall contain:
 - a. Class objectives (what the student will learn).
 - b. Script of lecture and demonstrations.
 - c. Duration of each instruction period.
 - d. Participant attendance roster.
 - e. Participant evaluation survey form.
 - 2. Names of instructors, name of company where employed, their credentials and affiliation with product if applicable and their qualifications as instructor.

- C. Evaluation: At conclusion of each training session, assess and document training.
 - 1. Assess and document each participant's comprehension of session by use of an oral performance-based test.
 - 2. Obtain each participant's evaluation of the training.
- D. Cleanup: Collect used and leftover educational materials. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.
- E. Record of Training. Submit the attendance roster as part of the completed training plan upon successful completion of the training session.

END OF SECTION 01 79 00