SECTION 01 11 00

SUMMARY OF THE WORK

PART 1: GENERAL

1.01 RELATED DOCUMENTS

A. Drawings, Details of Construction and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work specified in this section.

1.02 SUMMARY

A. This Section includes the following:

1. Work covered by the Contract Documents.
2. Work phases.
3. Work under other contracts.
4. Products ordered in advance.
5. Owner-furnished products.

B. Related Sections include the following:

1. Division 1 Section "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.03 PROJECT IDENTIFICATION

A.	Project Name:	Redford Union Mechanical/Electrical Improvements Project, Redford, Michigan
B.	Owner:	Redford Union School District 19990 Beech Daly Road Redford, Michigan 48240
C.	Architect:	Wold Architects and Engineers 333 West Seventh Street, Suite 320 Royal Oak, Michigan 48067
D.	Mechanical Engineer:	Wold Architects and Engineers 333 West Seventh Street, Suite 320 Royal Oak, Michigan 48067
E.	Electrical Engineer:	Strategic Energy Solutions 4000 West Eleven Mile Road Berkley, Michigan 48072

1.04 SUMMARY OF THE WORK

Briefly and without force and effect upon the Contract Documents, the Work of this single prime Contract can be summarized as follows:

A. Work under this Contract includes:

1. General Construction.

   a. Insulated gypsum board/metal stud partitions, and concrete block as needed for patching associated with mechanical work.

   b. Wall finishes of paint and plaster associated with mechanical work.

   c. Mechanical equipment pads.

   d. Ceiling finishes of plaster, gypsum board, and acoustical lay-in tile associated with mechanical work.

   e. Roof patching.

2. Mechanical Systems

   a. Plumbing including, supply and waste piping systems, piping insulation, plumbing fixtures.

   b. Heating including piping, piping insulation, and ventilation systems.

   c. Temperature control system.

   d. Testing, Adjusting and Balancing.

3. Electrical Systems

   a. Electrical service, switchgear, distribution panels, conduit and wiring.

   b. Interior site, and emergency lighting.

4. Keep Architect fully informed about progress of the work, performance of the work and potential problems.

1.05 WORK PHASES

A. Start submittal process immediately upon contract award by the Board of Education. All work to be completed by October 4, 2013.

1.06 WORK UNDER OTHER CONTRACTS

A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract. Coordinate the Work of this Contract with work performed under separate contracts.

B. Abatement: The Owner's Abatement Consultant is Arch Environmental Group, 23937 Research Drive Farmington Hills, Michigan 48335

1.07 USE OF PREMISES

A. General: Contractor shall have full use of premises for construction operations, including use of Project site, during construction period. Contractor's use of premises is limited only by Owner's right to perform work or to retain other contractors on portions of Project.

1. Contractor is to visit site and be familiar with existing conditions. Contractor will be required to accept existing conditions on site prior to mobilizing.

A. Use of Site: Limit use of premises to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Allow for Owner occupancy of Project site and use by the public.

2. Driveways and Entrances: Keep driveways, loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.

a. Schedule deliveries to minimize use of driveways and entrances.
b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

3. Public Streets: Maintain clear of automobile parking, equipment or material storage unless arrangements have been made with the appropriate jurisdiction.

4. Lock automotive type vehicles, such as passenger cars and trucks and other mechanized or motorized construction equipment, when parked and unattended, so as to prevent unauthorized use. Do not leave such vehicles or equipment unattended with the motor running or the ignition key in place.

B. Do not allow construction waste and debris to accumulate; remove debris as it accumulates and, unless specified otherwise, dispose of legally off-site.

C. Conform to City's noise control regulations, including limited hours of construction operations.

D. Use of Existing Building: Maintain existing building in a weathertight condition throughout construction period. Repair damage caused by construction operations. Protect building and its occupants during construction period.

1.08 LAYING OUT WORK

A. Locate all general reference points. Where dimensions or observed scope of work differ substantially from Drawings, notify Architect for decision.

B. Lay out Work from the reference points furnished and be responsible for all lines, elevations, and measurements inside workspace. Exercise proper precaution to verify figures shown on Drawings before laying out work and will be held responsible for any error resulting from his failure to exercise such precaution.

C. Hire the services of a locator company to locate all privately owned utilities that may be disturbed by construction operations.

D. Coordinate utility connections with municipality/utility company in which project is being constructed.

1.09 OWNER'S OCCUPANCY REQUIREMENTS

A. Partial Owner Occupancy: Owner will occupy the premises during entire construction period, with the exception of areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits, unless otherwise indicated.

1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.

2. Provide not less than 72 hour's notice to Owner of activities that will affect Owner's operations.

B. Owner Occupancy of Completed Areas of Construction: Owner reserves the right to place and install equipment in completed areas of building, before Substantial Completion, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and partial occupancy shall not constitute acceptance of the total Work.

1. Architect will prepare a punchlist for each specific portion of the Work to be occupied before Owner move in.

2. Obtain a temporary Certificate of Occupancy if required from authorities having jurisdiction before Owner occupancy to install furnishings and equipment.

1.10 WORK RESTRICTIONS

A. The Contractor's access to and use of the facilities for completion of work shall be subject to the following:

1. Should the Contractor have additional work to complete after Substantial Completion dated indicated including punchlist work within the existing building, continuous use of facilities is required by the Owner during regular business hours of 7:30 a.m. to 2:25 p.m. Work in those areas shall occur during evenings and weekends and shall be cleaned and available for use the following school or business day.

2. Buildings are open between the hours of 6:00 a.m. and 5:00 p.m. Hours of operation are 7:30 a.m. to 2:25 p.m. and no work shall be performed in occupied areas during these times.

    a. Coordinate schedule with Owner's designated building representative.

3. Should the Contractor choose to perform work after normal business hours when the building is occupied, the Contractor shall:

    a. Maintain access, building utilities, and services to allow full and free use of the facility during this time. All temporary conditions, re-routing of services, utilities and/or power are the Contractor's responsibility.

    b. Coordinate access and storage of materials and equipment with the Owner's designated building representative. To the fullest extent possible provide for normal building operation, and the safety of the building's occupants. Work in areas that occur during evenings and weekends shall be cleaned and available for use the following business day.

    c. Coordinate schedule with the Owner's designated building representative.

B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Architect not less than seven (7) days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Architect's or Owner's permission.

1.12 SPECIFICATION FORMATS AND CONVENTIONS

A. Specification Format: The Specifications are organized into Division and Sections using the 49-division format and CSI/CSC's "Master Format" numbering system.

1. Division 1: Sections in Division 1 govern the execution of the Work of all Sections in the Specifications.

B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.

2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.

    a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

END OF SECTION 01 11 00

SECTION 01 21 00

ALLOWANCES

PART 1: GENERAL

1.01 RELATED DOCUMENTS

A. Drawings, Details of Construction and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work specified in this section.

1.02 SUMMARY

A. This Section includes administrative and procedural requirements governing allowances.

B. Related Sections include the following:

1. Roof Patching – Section 07 51 15.

1.03 SELECTION AND PURCHASE

A. The Redford Union School District has selected Summit Roofing, LLC to complete all roof patching and new roof work pertaining to requirements included in this project for all buildings. The Contractor shall use Summit Roofing, LLC as a sub-contractor and include the quote attached as an allowance in their base bid.

B. Contact Information:

Michael Kearns
Summit Roofing, LLC
1755 Waldon Road
Lake Orion, Michigan
Tel: (248) 393-8300
Fax: (248) 393-8307

PART TWO: PRODUCTS (Not Applicable)

PART THREE: EXECUTION

3.01 SCHEDULE OF ALLOWANCES

A. Allowance No. 1: Include a lump sum for the total amount indicated on the attached proposal from Summit Roofing, LLC.

1. The above allowance shall be included in the Lump Sum Base Bid on the Bid Form, specification section 00 41 13.

END OF SECTION 01 21 00

SECTION 01 23 00

ALTERNATES

PART 1: GENERAL

1.01 DESCRIPTION

A. This Section describes the limits of the requested alternates to the Contract work. Refer to the Product/Execution Articles of the appropriate Specifications and the Drawings for information pertaining to the work of each alternate.

B. Each proposal under an alternate shall include all incidental work and all adjustments necessary to accommodate the changes. All work shall meet the requirements of the Drawings, Specifications and appropriate details.

C. Submit each alternate proposal as an individual cost for the particular alternate and shall be proposed under the premise that no other alternates have been accepted. Should the work of an alternate called for by the Bid Form not affect the cost of the work, state "No Change" in the space provided. If an alternate is left blank, the Owner reserves the right to throw out the entire bid or interpret the alternate as "No Change".

D. Include taxes which are applicable to work involved in alternates as well as costs, if any, for increased coverage of bonds and insurance.

E. Any of the alternates may be accepted by Owner and will be used in determining the low bidder.

F. Owner may, at his option, vary the scope of the work by authorizing alternates which will add to the work, deduct from the work or substitute materials, equipment or methods.

G. Each Bidder shall examine the Drawings and Specifications to determine the extent to which his work is affected by bid alternates. Include in the space provided on the bid form the cost of any added or deducted work resulting from each alternate.

H. Contractor is responsible for providing work if applicable to each alternate, whether or not an added or deducted cost is included on his bid form.

PART 2: EXECUTION

2.01 IMPLEMENTATION

A. If the Owner elects to proceed on the basis of one or more of the alternates, make all modifications to the Work required in the furnishing and installation of the selected alternate or alternates subject to the approval of the Architect at no additional cost to the Owner except as proposed in the Bid.

B. Coordinate pertinent related work and modify surrounding work as required to properly integrate the work under each alternate, and to provide the complete construction required by Contract Documents.

C. If so stated in the Agreement, or modifications thereto, provide alternate materials, equipment and/or construction as specified.

2.02 ALTERNATES

A. Alternate No. 1 High School Domestic Water Heaters

1. Provide a cost to replace existing Domestic Hot Water Heater System located at and serving High School Athletics area as indicated in the Drawings and Specifications in lieu of modifications to the existing system as provided for in base bid work outlined in the Drawings and Specifications.

B. Alternate No. 2 Stuckey Center Domestic Water Heaters

1. Provide a cost to replace and consolidate existing Domestic Hot Water Heater Systems located throughout the building as indicated in the Drawings and Specifications.

C. Alternate No. 3 Grooved Mechanical Couplings

1. Provide a cost to allow Grooved Mechanical Couplings as manufactured by Victaulic for all Hydronic Heating Piping sized 2" and larger at all three buildings.

END OF SECTION 01 23 00

SECTION 01 25 00

SUBSTITUTIONS AND PRODUCT OPTIONS

PART 1: GENERAL

1.01 DESCRIPTION

A. This Section defines procedures to be followed to gain acceptance of products in the Work which are not listed in the individual specification sections. A two step process is required.

B. Requests for acceptance for bidding purposes of alternative manufacturers is encouraged except where specifically prohibited by this Project Manual.

1.02 PRODUCT OPTIONS NOT REQUIRING PRE-BID SUBMITTAL

A. Where products are specified by reference standards, any product established by a material testing agency to meet these standards is acceptable.

B. Where multiple manufacturers and associated models are specified, select any one named.

C. Where manufacturer(s) alone are specified, select any manufacturer and the product recommended in writing by the manufacturer as most suited to the application shown on the Drawings and Specifications.

D. Where the phrase "or equal" follows the name of a manufacturer, any product which meets the performance and appearance standards established by the specified manufacturer may be selected, subject to the Architect's acceptance.

E. Where a manufacturer is listed in both a technical specification section and the Material Finish/Color Schedule, on Architectural Drawings and a color is provided.

1.03 PRODUCT SUBSTITUTIONS REQUIRING PRE-BID SUBMITTALS

A. Step One - Manufacturers Acceptance

1. Individual specification sections may be amended by the Architect during the bid period to include additional names of manufacturers determined to be capable of providing acceptable materials.

2. The Material Finish/Color Schedule, on Architectural Drawings may be amended by the Architect during the bid period to include colors by manufacturers listed in technical sections, but not noted on the Material Finish/Color Schedule, on Architectural Drawings.

3. To propose the names of specific manufacturers, submit, or arrange for suppliers to submit, written requests to Architect or appropriate Architect's Consultant. Requests received ten (10) calendar days prior to bid date will be considered.

    a. Provide sufficient review data. Include specified manufacturer's model numbers and proposed manufacturer's product literature, noting product numbers for proposed substitutions, and where appropriate, samples and data relating to construction details. If the product is not identical to specified product, submit letter stating proposed manufacturer will custom make products to meet specified product.

    b. Architect's acceptance is based upon his determination that a manufacturer is capable of supplying acceptable materials. Approval is not assured or implied for a specific material, item of equipment, color or finish.

c. Official notification will be by addendum to the Contract Documents. However, in addition, if letters of request are delivered in duplicate with accompanying stamped self addressed envelopes, copies may be returned with Architect's decision in advance.

B. Step Two - Product Acceptance

1. Upon award of a construction contract, accepted manufacturers may submit for review to the Architect through the General Contractor or Construction Manager, specific products, materials or equipment items as substitutes for those specified. Contractor to provide letter stating they will reimburse Architect to review substitutions.

2. Architect will review substitute products for performance, appearance, color, finish, size and suitability for inclusion in the work. If a substitute product is not accepted, submit another product by the same or other accepted manufacturer or provide the specified product.

3. Match specified colors and dimensions exactly, whether or not they are standard with the substitute product, unless a minor variation is accepted by the Architect.

4. If a substitute product is accepted, coordinate any necessary changes in other related work and pay for these changes. Pay cost of architectural or engineering services, if any, required to incorporate substitute products in the Work.

1.04 SUBSTITUTIONS BY CHANGE ORDER

A. A substitution for a specified product may be permitted by "change order" at no additional cost to the Owner if product proposed is determined to be equivalent in performance and suitability, and if at least one of the following conditions apply:

1. Owner is given a credit for the work.

2. Product is of superior quality than product specified.

3. Product color or finish selection is preferable.

4. Products specified and upon which building is designed have been discontinued by manufacturer.

B. Provide Architect, through Owner, reasonable compensation for product evaluation.

END OF SECTION 01 25 00

SECTION 01 26 63

CHANGE ORDERS

1.01 CHANGE ORDER PROCEDURES

A. Changes in the Project scope of work affecting the project cost can be made only through AIA Document G701 - Change Order.

B. The procedures for processing changes in the scope of Work are listed as follows:

1. The Architect prepares one of the following documents to modify the scope of work.

   a. Supplemental Instructions (SI) which are used for no cost changes.

   b. Proposal Request (PR) to be used for proposed changes that need written approval on cost prior to proceeding.

   c. Construction Change Directive AIA Document G714 (CCD) which is used when the work must proceed immediately and time and material cost submitted as soon as possible for review by the Architect.

2. The Contractor reviews and responds as follows:

   a. Supplemental Instructions (SI): This no cost change is to be carried out in accordance with the following modifications to the contract documents described herein. If this change effects cost, do not proceed with this change. Notify the Architect in writing within 10 days of receipt that an itemized (labor and material) quotation will be submitted within 21 days of initial receipt of this Supplemental Instruction. If a cost is not submitted within 21 days, this Supplemental Instruction will be accepted at no additional cost.

   b. Proposal Request (PR): Submit an itemized (labor and material) quotation for the proposed modifications to the contract documents as described herein within 21 days of receipt. If a cost is not submitted within 21 days, this Proposal Request can be accepted at no additional cost. Written approval is required prior to proceeding with this change.

   c. Construction Change Directive AIA Document G714 (CCD): Proceed immediately to carry out this change in the contract documents as described herein. If this revision effects cost, submit an itemized (labor and material) quotation within 21 days of receipt. If a cost is not submitted within 21 days this Change Directive will be accepted at no additional cost.

3. The Architect will review the Contractor's labor and material itemized quotation and respond in writing whether it is acceptable or needs revision. When all pricing is accepted by the Architect and Owner, a Change Order will be processed. Change Orders will be processed at increments determined by the Architect throughout the construction schedule.

C. See General Conditions and Supplementary Conditions of the Work for methods of determining cost or credit, mark-up and schedule on submitting claims.

END OF SECTION 01 26 63

SECTION 01 31 19

PROJECT MEETINGS

PART 1: GENERAL

1.01 DESCRIPTION

A. Schedule and administer pre-construction meeting, periodic progress meetings, and specially called meetings throughout the progress of the work.

1. Notify Architect in advance.
2. Prepare agenda for meetings.
3. Make physical arrangements for meetings.
4. Preside at meetings.

B. Representatives of contractors, subcontractors and suppliers attending the meetings shall be qualified and authorized to act on behalf of the entity each represents.

C. Architect may attend meetings to ascertain that Work is expedited consistent with Contract Documents and the construction schedules.

1.02 PRE-CONSTRUCTION MEETING

A. Schedule within 15 days after date of Notice to Proceed.

B. Location: A central site, convenient for all parties, designated by Contractor.

C. Attendance:

1. Owner's representative
2. Architect and his professional consultants
3. Resident Project representative
4. Contractor's superintendent
5. Major subcontractors
6. Major suppliers
7. Others as appropriate

D. Suggested Agenda:

1. Distribution and discussion of:
    a. List of major subcontractors and suppliers
    b. Projected construction schedules
2. Critical work sequencing.

3. Major equipment deliveries and priorities.

4. Project coordination and scheduling:

    a. Designation of responsible personnel.

    b. Pre-installation conference.

    c. Mock-up panels.

5. Procedures and processing of:

    a. Field decisions

    b. Proposal Requests/Supplemental Instructions

    c. Submittals

        1) Mechanical Electrical Coordination drawings

    d. 21 day time limit on claims

    e. Change orders

    f. Applications for payment

6. Adequacy of distribution of Contract Documents.

7. Procedures for maintaining Record Documents.

8. Use of premises:

    a. Office, work and storage areas

    b. Owner's requirements

9. Construction facilities, controls and construction aids.

    b. Construction Dust Control.

10. Temporary utilities.

11. Safety and first-aid procedures

12. Security procedures

13. Housekeeping procedures

1.03 PROGRESS MEETINGS

A. Schedule regular periodic meetings, as required.

B. Hold called meetings as required by progress of the work.

C. Location of the meetings: The project field office of the Contractor.

D. Attendance:

1. Architect and his professional consultants may attend as needed.
2. Subcontractors as appropriate to the agenda.
3. Suppliers as appropriate to the agenda.
4. Others

E. Suggested Agenda:

1. Review, approval of minutes of previous meeting.
2. Review of work progress since previous meeting.
3. Field observations, problems, conflicts.
4. Problems which impede Construction Schedule.
5. Review of off-site fabrication, delivery schedules.
6. Corrective measures and procedures to regain projected schedule.
7. Revisions to Construction Schedule.
8. Plan progress, schedule, during succeeding work period.
9. Coordination of schedules.
10. Review submittal schedules; expedite as required.
11. Maintenance of quality standards.
12. Review proposed changes for:
    a. Effect on Construction Schedule and on completion date.
    b. Effect on other contracts of the Project.
13. Other business

END OF SECTION 01 31 19

SECTION 01 32 00

CONSTRUCTION SCHEDULING

PART 1: GENERAL

1.01 RELATED DOCUMENTS

A. Drawings, Details of Construction and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work specified in this section.

1.02 SUMMARY

A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Contractor's Construction (CPM) Schedule.
2. Shop Drawing Submittals Schedule
3. CPM Reports

1.03 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

1. Critical activities are activities on the critical path. They must start and finish on the planned early start and finish times.

2. Predecessor activity is an activity that must be completed before a given activity can be started.

B. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

C. Critical Path: The longest continuous chain of activities through the network schedule that establishes the minimum overall Project duration and contains no float.

D. Event: The starting or ending point of an activity.

E. Float: The measure of leeway in starting and completing an activity.

1. Float time is for the exclusive use or benefit of the Contractor to meet schedule milestones and Contract completion date.

2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the following activity.

3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

F. Fragnet: A partial or fragmentary network that breaks down activities into smaller activities for greater detail.

G. Major Area: A story of construction, a separate building, or a similar significant construction element.

H. Milestone: A key or critical point in time for reference or measurement.

I. Network Diagram: A graphic diagram of a network schedule, showing activities and activity relationships.

1.04 SUBMITTALS

A. Submittals Schedule: Submit six copies of schedule. Arrange the following information in a tabular format:

1. Scheduled date for first submittal.
2. Specification Section number and title.
3. Submittal category (action or informational).
4. Name of subcontractor.
5. Description of the Work covered.
6. Scheduled date for Architect's final release or approval. (Assume 15 working day turnaround.)
7. Identify submittals that effect critical path.

B. Contractor's Construction (CPM) Schedule: Submit two printed copies of initial schedule large enough to show entire schedule for entire construction period.

C. CPM Reports: Concurrent with CPM schedule, submit three printed copies of the following computer-generated reports. Format for each activity in reports shall contain activity number, activity description, original duration, early start date, early finish date, late start date, late finish date, and total float.

1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.

1.05 QUALITY ASSURANCE

A. Prescheduling Conference: Conduct conference at Project site to review methods and procedures related to the Contractor's Construction (CPM) Schedule, including, but not limited to, the following:

1. Discuss constraints, including phasing, work stages, area separations, interim milestones and partial Owner occupancy.
2. Review delivery dates for Owner-furnished products.
3. Review schedule for work of Owner's separate contracts.
4. Review time required for review of submittals and resubmittals.
5. Review requirements for tests and inspections by independent testing and inspecting agencies.
6. Review time required for completion and startup procedures.
7. Review and finalize list of construction activities to be included in schedule.
8. Review submittal requirements and procedures.
9. Review procedures for updating schedule.

1.06 COORDINATION

A. Coordinate requirements in this Article with "Submittals Schedule" Article in Part 2. If a submittal review sequence policy governs, revise this Article to comply with requirements. See Evaluations for discussion on submittal review sequence policies.

PART 2: PRODUCTS

2.01 SUBMITTALS SCHEDULE

A. Preparation: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, resubmittal, ordering, manufacturing, fabrication, and delivery when establishing dates. Identify items that affect critical path.

2.02 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

A. General: Prepare network diagrams using CPM (critical path method) format.

B. Preliminary Network Diagram: Submit diagram within 14 days from the Notice to Proceed. Outline significant construction activities for the first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

C. CPM Schedule: Prepare Contractor's Construction Schedule using a CPM network analysis diagram.

1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted prior to first pay request.

2. Establish procedures for monitoring monthly and updating CPM schedule if work is not on schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.

3. Use "one workday" as the unit of time. Activities should not be shorter than 2 work days or longer than 10 work days for projects with a construction period over 6 months and/or longer than 5 work days for projects with a construction period under 6 months.

D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the preliminary network diagram, prepare a skeleton network to identify probable critical paths.

1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:

a. Preparation and processing of submittals.
b. Purchase of materials.
c. Delivery.
d. Fabrication.
e. Installation.

2. Processing: Process data to produce output data or a computer-drawn, logic network diagram. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.

PART 3: EXECUTION

3.01 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each payment request submittal.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.

B. Distribution: Distribute copies of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.

2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 01 32 00

SECTION 01 33 00

SUBMITTALS

PART 1: GENERAL

1.01 DESCRIPTION

A. This Section defines procedures for the following submittals required by the Contract Documents.

B. Provide submittals as noted in each Section.

C. Allow for two weeks review of submittals to avoid delay of Work.

D. Include with submittal preparation, field verifications of measurements, field construction criteria, verification of catalog numbers and similar data, and coordination of Work requirements and Contract Documents.

E. Submit all color samples within 45 days of contract award for Architect's use in color selections. The Architect will not start the color schedule until all samples are received.

PART 2: REQUIRED SUBMITTALS

2.01 SHOP DRAWINGS AND SAMPLES

A. Submit shop drawings in accordance with Article 3 of the General Conditions and the following.

B. Prepare clearly identified shop drawings or schedules to this specific project, containing only data applicable. Include with the shop drawings or schedules a letter of transmittal listing and dating the submitted drawings in sets.

C. Contractor to review all submittals prior to submittal to Architect, and indicate such review with a stamp and signature. Review submittals for conformance to Drawings, Specifications, coordination with other trades and adjacent construction and verification of field dimensions. Failure of Contractor to adequately review submittals shall be cause for rejection.

D. Prepare and furnish to Architect for review, all shop drawings and manufacturers catalog sheets showing illustrated cuts of items to be furnished, scale details, sizes, dimensions, performance characteristics, capacities, wiring diagrams, weights and arrangements.

1. The Contractor will provide submittals in the appropriate quantities for:

    a. Distribution to sub-contractors.
    b. Jobsite office.
    c. Owner's maintenance manuals.
    d. Four copies to be kept by Architects and Architect's consultants.

2. Provide each shop drawing with a clear space of approximately twenty square inches for stamps on the right hand side.

E. The Architect will take one of the following actions on submittals:

1. "Reviewed": Contractor shall proceed with ordering and/or fabrication.

2. "Review Comments": Contractor shall proceed with ordering and/or fabrication after taking into account noted comments.

3. "Rejected": Contractor shall provide a submittal that meets the intent of the specifications.

4. "Revise and Resubmit": Contractor shall modify submittal to address comments and resubmit.

F. If equipment other than that used in the design of this project is proposed to be used, the Contractor and/or supplier shall verify electrical differences, dimension variations and weight increases. The Contractor shall be responsible for any extra costs incurred as a result of equipment substitutions.

G. Information submittals and submittals that are not required shall be for Architects' and Engineers' use and be available for the design team's review at the jobsite. Quantity of submittals will be the same for Architect as noted under shop drawings. These submittals will not be reviewed, stamped or returned to the Contractor.

H. Unless otherwise specified, submit to the Architect's office samples of size, and nature representing typical qualities. Where required, submit a sufficient number of samples to demonstrate the complete range of variations of the material or quality. Written acceptance of the Architect is required prior to ordering any item for which samples are required.

I. Submit samples to Architect's office, securely packaged, with the name of the Project clearly indicated on the package exterior. Each physical sample shall have a label or tag, firmly attached to the sample, bearing the following information: (a) Name of Project, (b) Name of Supplier, (c) Name of Contractor, and (d) Product information such as manufacturer's designation, finish, type, class, grade, etc. as is appropriate. The Architect will retain one copy of each sample.

2.02 LIST OF MATERIALS

A. Within 7 days after the award of the Contract (notice to proceed or letter of intent), submit 4 copies of a complete list of all material, products, and equipment proposed to be used in construction to the Architect for acceptance. Do not order materials until the proposed listed materials, products and equipment to be used in construction are accepted by the Architect.

B. Where two or more makes or kinds of items are named in the specifications (or additional names are called for in addenda), the Contractor shall state which particular make or kind of each item he proposes to provide. If the Contractor fails to state a preference, the Owner shall have the right to select any of the makes or kinds named without change in price.

C. This list shall be arranged generally in order of specification sections. The items listed shall fully conform to project requirements and specifications. All materials are subject to the Architect's acceptance. After acceptance, changes or substitutions will not be permitted.

D. Clearly identify or list the material, product or equipment by manufacturer and brand by listing the names for all items, including those where only one material or product is specified. Each and every material, product and equipment shall be specifically named, not listed "as specified".

2.03 LIST OF SUBCONTRACTORS

A. Refer to the General Conditions.

B. Propose use of subcontractors or sub-subcontractors who are established, reputable firms of recognized standing with a record of successful and satisfactory past performance. Include the following information: specification section, item of work, subcontractor or supplier, material/manufacturer (as specified will not be allowed), project manager, phone and facsimile numbers. List major sub-subcontractors for mechanical and electrical work. Use only those subcontractors (and sub-sub-contractors, when appropriate) who are acceptable to the Architect and Owner on the Work.

2.04 SCHEDULE OF VALUES

A. Requirements

1. Submit separate Schedule of Values for each building or phase to Architect ten (10) days prior to first Application For Payment (AIA Form G702, G702a).

2. Use Schedule of Values only as basis for Contractor's Application For Payment.

B. Form of Submittal

1. Base format on Sections listed in Section 00 01 10 Table of Contents, as well as, the Mechanical and Electrical Table of Contents. Break down labor and material separately.

2. Round off amounts to nearest ten dollars.

2.05 PROGRESS SCHEDULE

A. Refer to the General Conditions for submittal requirements.

2.06 SUBMITTAL LIST

A. The following submittal list is a guide for submittals required for specification divisions 2-14 on the project. Inconsistencies or omissions from the list does not relieve the contractor from required submittals delineated in each specification section.

Section	Pre-Installation Conference	Product Data, Install Instruction, Wiring Diagrams	Shop Drawing	Samples	Mock-Up Panel	Design Data, Mix Design	Reports/Sched. Calculations	Qualification/ Certification	Source Quality Control Tests/Reports	Reference Specs	Warranty	Maint. & Operation Manual
03 30 13		X				X						
04 20 00		X	X	X	X				X			
05 50 00			X				X	X				X
06 10 53		X						X				
07 21 00												
07 21 29		X						X	X			X
07 84 00		X					X		X			
07 92 00		X		X								
08 10 00			X						X			X
08 14 00		X	X	X			X				X	X
08 16 00		X	X	X								
08 31 00			X									
08 33 00		X	X									
08 40 00			X	X				X	X		X	X

Section	Pre-Installation Conference	Product Data, Install Instruction, Wiring Diagrams	Shop Drawing	Samples	Mock-Up Panel	Design Data, Mix Design	Reports/Sched. Calculations	Qualification/ Certification	Source Quality Control Tests/Reports	Reference Specs	Warranty	Maint. & Operation Manual
08 71 00		X	X	X					X			
08 80 00		X		X							X	X
09 21 16		X		X								
09 24 00			X		X							
09 30 00				X				X				
09 51 00			X	X								
09 65 00		X		X								X
09 91 00		X		X	X		X					X
10 11 00			X	X				X			X	X
10 51 13.15			X	X								

END OF SECTION 01 33 00

SECTION 01 45 16

QUALITY CONTROL

PART 1: GENERAL

1.01 SELECTION AND PAYMENT

A. The Contractor shall select, hire and pay for the services of an independent testing laboratory(s) acceptable to the Owner and Architect to perform specified Source Quality Control and other tests and inspections called for in the Specifications.

B. The Owner will select, hire, pay for services of an independent testing laboratory, to perform specified Field Quality Control and other inspections, test of materials and construction called for in the Specifications.

C. The Owner will select, hire and pay for services of a special inspector to perform Special Inspections and Testing defined in Specification Section 01 45 33.

1.02 RESPONSIBILITY OF CONTRACTOR

A. Be responsible for furnishing materials and construction in full conformance with Plans and Specifications.

B. Pay for all tests, conducted by the testing laboratory that fail and also pay for all scheduled tests for which the pours are cancelled and a test field crew is on site before that particular pour is cancelled.

1.03 COOPERATION OF CONTRACTOR

A. Contractor: Cooperate with the Laboratory, and:

1. Make available, without cost, samples of all materials to be tested in accordance with applicable standard specifications.

2. Furnish such nominal labor and working space as is necessary to obtain samples at the Project.

3. Advise Laboratory of the identity of material sources and instruct the suppliers to allow test or inspections by the Laboratory.

4. Notify Laboratory sufficiently in advance of operations to allow completion of initial tests or inspections by the Laboratory.

1.04 REJECTION OF MATERIALS/INSTALLATION

A. Laboratory: Notify the Owner, Architect Engineer and Contractor or his authorized representative of any materials or installation which are not in full conformance with the specifications.

1.05 FILING OF REPORTS

A. Laboratory: File a copy of the inspection report with the Architect, appropriate Architect's Consultant, Owner and Building Official.

PART 2: PRODUCTS – Not Applicable.

PART 3: EXECUTION

3.01 GENERAL SCOPE OF TESTING, INSPECTION

A. Require laboratory to conduct tests and inspections as directed by the Owner, Architect or Engineer.

B. Refer to individual specification sections for test requirements.

3.02 QUALIFICATION TESTING

A. In addition to tests specified, if a product, material, or method of assembly that is of unknown or questionable quality to Architect, the Architect may require and order suitable tests to establish a basis for acceptance or rejection. Pay for these tests. "Standard" test reports or reports on "similar" material will not be accepted.

3.03 MISCELLANEOUS (REGULATORY) INSPECTIONS

A. Should specifications, Architect's instructions, laws, ordinances or any public authority require any work to be inspected or approved, Contractor shall give timely notice of its readiness for inspection and a reasonable date fixed for such inspection. If any work should be covered up without approval or consent of approving agency, or Architect, it must be uncovered for examination at Contractor's expense.

END OF SECTION 01 45 16

SECTION 01 45 43

TESTING, ADJUSTING, AND BALANCING

PART 1: GENERAL

1.01 RELATED DOCUMENTS

A. Drawings, Details of Construction and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work specified in this section.

B. Related Sections:

1. Other Division 22 and Division 23 Sections specify balancing devices and their installation, and materials and installations of mechanical systems.

2. Individual Division 23 system sections specify leak testing requirements and procedures.

1.02 SUMMARY

A. The Mechanical Contractor shall select, hire, and pay for services of a testing, adjusting, and balancing contractor as defined under this section.

B. This Section specifies the requirements and procedures total mechanical systems testing, adjusting, and balancing. Requirements include measurement and establishment of the fluid quantities of the mechanical systems as required to meet design specifications, recording and reporting the results.

C. Test, adjust, and balance the following mechanical systems:

1. Supply air systems.
2. Return air systems.
3. Exhaust air systems.
4. Hydronic systems.

D. This Section does not include:

1. Testing boilers and pressure vessels for compliance with safety codes;

2. Specifications for materials for patching mechanical systems;

3. Specifications for materials and installation of adjusting and balancing devices. If devices must be added to achieve proper adjusting and balancing, refer to the respective system sections for materials and installation requirements.

4. Requirements and procedures for piping and ductwork systems leakage tests.

1.03 DEFINITIONS

A. Systems testing, adjusting, and balancing is the process of checking and adjusting all the building environmental systems to produce the design objectives. It includes:

1. the balance of air and water distribution;
2. adjustment of total system to provide design quantities;
3. electrical measurement;
4. sound and vibration measurement.

B. Test: To determine quantitative performance of equipment.

C. Adjust: To regulate the specified fluid flow rate and air patterns at the terminal equipment (e.g., reduce fan speed, throttling).

D. Balance: To proportion flows within the distribution system (submains, branches, and terminals) according to specified design quantities.

E. Procedure: Standardized approach and execution of sequence of work operations to yield reproducible results.

F. Report forms: Test data sheets arranged for collecting test data in logical order for submission and review. These data should also form the permanent record to be used as the basis for required future testing, adjusting, and balancing.

G. Terminal: The point where the controlled fluid enters or leaves the distribution system. There are supply inlets on water terminals, supply outlets on air terminals, return outlets on water terminals, and exhaust or return inlets on air terminals such as registers, grilles, diffusers, louvers, and hoods.

H. Main: Duct or pipe containing the system's major or entire fluid flow.

I. Submain: Duct or pipe containing part of the systems' capacity and serving two or more branch mains.

J. Branch main: Duct or pipe serving two or more terminals.

K. Branch: Duct or pipe serving a single terminal.

L. Construction Tests: Tests specified in other sections. Includes leak testing of piping and duct systems.

1.04 SUBMITTALS

A. Agency Data:

1. Submit proof that the proposed testing, adjusting, and balancing agency meets the qualifications specified below.

B. Engineer and Technicians Data:

1. Submit proof that the Test and Balance Engineer assigned to supervise the procedures, and the technicians proposed to perform the procedures meet the qualifications specified below.

C. Procedures and Agenda: Submit a synopsis of the testing, adjusting, and balancing procedures and agenda proposed to be used for this project.

D. Maintenance Data: Submit maintenance and operating data that include how to test, adjust, and balance the building systems. Include this information in maintenance data specified in Division 1 and Section 23 05 00.

E. Test and Balance Reports:

1. Sample Forms: Submit sample forms, if other than those standard forms prepared by the AABC, NEBB, TABB are proposed.

2. Sample Forms: Submit sample forms, if other than those standard forms prepared by the NEBB are proposed.

3. Certified Reports: Submit testing, adjusting, and balancing reports bearing the seal and signature of the Test and Balance Engineer. The reports shall be certified proof that the systems have been tested, adjusted, and balanced in accordance with the referenced standards; are an accurate representation of how the systems have been installed; are a true representation of how the systems are operating at the completion of the testing, adjusting, and balancing procedures; and are an accurate record of all final quantities measured, to establish normal operating values of the systems. Follow the procedures and format specified below:

   a. Draft reports: Upon completion of testing, adjusting, and balancing procedures, prepare draft reports on the approved forms. Draft reports may be hand written, but must be complete, factual, accurate, and legible. Organize and format draft reports in the same manner specified for the final reports. Submit 2 complete sets of draft reports. Only 1 complete set of draft reports will be returned.

   b. Final Report: Upon verification and approval of draft reports, prepare final reports, type written, and organized and formatted as specified below. Submit 2 complete sets of final reports.

   c. Report Format: Report forms shall be those standard forms prepared by the referenced standard for each respective item and system to be tested, adjusted, and balanced. Bind report forms complete with schematic systems diagrams and other data in reinforced, vinyl, three-ring binders. Provide binding edge labels with the project identification and a title descriptive of the contents. Divide the contents of the binder into the below listed divisions, separated by divider tabs:

      1) General Information and Summary
      2) Air Systems
      3) Hydronic Systems
      4) Temperature Control Systems

   d. Report Contents: Provide the following minimum information, forms and data:

      1) General Information and Summary: Inside cover sheet to identify testing, adjusting, and balancing agency, Contractor, Owner, Architect, Engineer, and Project. Include addresses, and contact names and telephone numbers. Also include a certification sheet containing the name, address, telephone number, and signature of the Certified Test and Balance Engineer. Include in this division a listing of the instrumentations used for the procedures along with the proof of calibration.

      2) The remainder of the report shall contain the appropriate forms containing as a minimum, the information indicated on the standard report forms prepared by the AABC and NEBB, for each respective item and system. Prepare a schematic diagram for each item of equipment and system to accompany each respective report form.

4. Calibration Reports: Submit proof that all required instrumentation has been calibrated to tolerances specified in the referenced standards, within a period of six months prior to starting the project.

1.05 QUALITY ASSURANCE

A. Test and Balance Engineer's Qualifications: The on-site test and balance technician shall be NEBB or TABB certified, be in the employ of the Test and Balance agency and have at least 3-years of successful testing, adjusting, and balancing experience on projects with testing and balancing requirements similar to those required for this project.

B. Agency Qualifications: The testing, adjusting and balancing technicians and supervisor staffed to perform work on site shall be certified by the National Environmental Balancing Bureau (NEBB) or TABB in the following disciplines:

1. Testing, adjusting, and balancing.

    a. Air
    b. Hydronics

2. Building Commissioning

    a. HVAC

C. Codes and Standards:

1. NEBB: "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems".
2. ASHRAE: ASHRAE Handbook, 2007 HVAC Applications, Chapter 37. Testing, Adjusting, and Balancing.

D. Pre-Balancing Conference: Prior to beginning of the testing, adjusting, and balancing procedures, schedule and conduct a conference with the Architect and representatives of installers of the mechanical systems. The objective of the conference is final coordination and verification of system operation and readiness for testing, adjusting, and balancing.

1.06 PROJECT CONDITIONS

A. Systems Operation: Systems shall be fully operational prior to beginning procedures.

1.07 SEQUENCING AND SCHEDULING

A. Coordinate all onsite inspections with the prime contractor.

B. Develop detailed work plan with the prime contractor, HVAC subcontractors, and Building Automation System contractor such that testing work will proceed in areas as systems are started and available.

PART 2: PRODUCTS

Not Used.

PART 3: EXECUTION

3.01 PRELIMINARY PROCEDURES FOR AIR SYSTEM BALANCING

A. Before operating the system, perform these steps:

1. Obtain design drawings and specifications and become thoroughly acquainted with the design intent.

2. Obtain copies of approved shop drawings of all air handling equipment, outlets (supply, return, and exhaust) and temperature control diagrams.

3. Compare design to installed equipment and field installations.

4. Walk the system from the system air handling equipment to terminal units to determine variations of installation from design.

5. Check filters for cleanliness.

6. Check dampers (both volume and fire) for correct and locked position, and temperature control for completeness of installation before starting fans.

7. Prepare report test sheets for both fans and outlets. Obtain manufacturer's outlet factors and recommended procedures for testing. Prepare a summation of required outlet volumes to permit a crosscheck with required fan volumes.

8. Determine best locations in main and branch ductwork for most accurate duct traverses.

9. Place outlet dampers in the full open position.

10. Prepare schematic diagrams of system "as-built" ductwork and piping layouts to facilitate reporting.

11. Lubricate all motors and bearings.

12. Check fan belt tension.

13. Check fan rotation.

3.02 PRELIMINARY PROCEDURES FOR HYDRONIC SYSTEM BALANCING

A. Before operating the system perform these steps:

1. Open valves to full open position. Close coil bypass valves.

2. Remove and clean all strainers.

3. Examine hydronic systems and determine if water has been treated and cleaned.

4. Check pump rotation.

5. Clean and set automatic fill valve for required system pressure.

6. Check expansion tanks to determine that they are not air bound and that the system is completely full of water.

7. Check air vents at high points of systems and determine if all are installed and operating freely (automatic type) or to bleed air completely (manual type).

8. Set temperature controls so all coils are calling for full flow.

9. Check operation of automatic bypass valves.

10. Check and set operating temperatures of chillers to design requirements.

11. Lubricate all motors and bearings.

3.03 MEASUREMENTS

A. Provide all required instrumentation to obtain proper measurements, calibrated to the tolerances specified in the referenced standards. Instruments shall be properly maintained and protected against damage.

B. Provide instruments meeting the specifications of the referenced standards.

C. Use only those instruments which have the maximum field measuring accuracy and are best suited to the function being measured.

D. Apply instrument as recommended by the manufacturer.

E. Use instruments with minimum scale and maximum subdivisions and with scale ranges proper for the value being measured.

F. When averaging values, take a sufficient quantity of readings which will result in a repeatability error of less than 5 percent. When measuring a single point, repeat readings until 2 consecutive identical values are obtained.

G. Take all readings with the eye at the level of the indicated value to prevent parallax.

H. Use pulsation dampeners where necessary to eliminate error involved in estimating average of rapidly fluctuation readings.

I. Take measurements in the system where best suited to the task.

3.04 PERFORMING TESTING, ADJUSTING, AND BALANCING

A. Perform testing and balancing procedures on each system identified, in accordance with the detailed procedures outlined in the referenced standards.

B. Cut insulation, ductwork, and piping for installation of test probes to the minimum extent necessary to allow adequate performance of procedures.

C. Patch insulation, ductwork, and housings, using materials identical to those removed.

D. Seal ducts and piping, and test for and repair leaks.

E. Seal insulation to re-establish integrity of the vapor barrier.

F. Mark equipment settings, including damper control positions, valve indicators, fan speed control levers, and similar controls and devices, to show final settings. Mark with paint or other suitable, permanent identification materials.

G. Retest, adjust, and balance systems subsequent to significant system modifications, and resubmit test results.

3.07 SYSTEMS DEMONSTRATION

A. Purpose: To demonstrate functioning of controls systems for HVAC systems concurrent with related instruction of Owner's personnel.

B. Staffing Requirements: Determined by Contractor.

1. Instructors: Qualified to instruct Owner's personnel.

2. Technicians: To operate systems for demonstration and recording of data.

C. Schedule:

1. After completion of functional performance testing and systems balancing.

2. Prior to occupancy.

3. Coordinated with related demonstrations and testing specified in Division 26.

D. Demonstration Objectives:

1. Collection of data from DDC control system to document proper functioning of control systems for all demonstrated modes.

3.08 RECORD AND REPORT DATA

A. Record all data obtained during testing, adjusting, and balancing in accordance with, and on the forms recommended by the referenced standards, and as approved on the sample report forms.

B. Prepare report of recommendations for correcting unsatisfactory mechanical performances when system cannot be successfully balanced.

C. Include an allowance of 8 hours per building location to provide re-testing and re-balancing at the direction of the architect/engineer. The goal of this re-testing and re-balancing will be to verify the performance of any corrective work and to help assure that all areas perform within the design range set for air and water flow rates.

3.09 DEMONSTRATION AND TRAINING

A. Training:

1. Train the Owner's maintenance personnel on troubleshooting procedures and testing, adjusting, and balancing procedures in accordance with the requirements of specification section 01 79 00, "Demonstration and Training."

2. Schedule training with Owner through the Architect/Engineer with at least 7 days prior notice.

END OF SECTION 01 45 43

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1: GENERAL

1.01 RELATED DOCUMENTS

A. Drawings, Details of Construction and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work specified in this section.

1.02 SUMMARY

A. This Section includes requirements for temporary facilities and controls, including temporary utilities, support facilities, and security and protection facilities.

B. Support facilities include, but are not limited to, the following:

1. Project identification and temporary signs.
2. Housekeeping and waste disposal facilities.
3. Field offices.
4. Storage and fabrication sheds.
5. Lifts and hoists.
6. Temporary elevator usage.
7. Temporary stairs.
8. Construction aids and miscellaneous services and facilities.
9. Temporary heating, cooling, and ventilation.
10. Temporary power and lighting.

C. Security and protection facilities include, but are not limited to, the following:

1. Environmental protection.
2. Security enclosure and lockup.
3. Barricades, warning signs, and lights.
4. Temporary enclosures.
5. Temporary partitions.
6. Fire protection.

D. Related Sections include the following:

1. Division 1 Section "Submittal Procedures" for procedures for submitting copies of implementation and termination schedule and utility reports.

2. Division 1 Section "Execution Requirements" for progress cleaning requirements.

3. Division 1 Section “Construction Dust Control” for partitions and procedures for control of construction dust.

4. Divisions 3 through 49 for temporary heat, ventilation, and humidity requirements for products in those Sections.

1.03 DEFINITIONS

A. Permanent Enclosure: As determined by Architect, permanent or temporary roofing is complete, insulated, and weather-tight; exterior walls are insulated and weather-tight; and all openings are closed with permanent construction or substantial temporary closures.

1.04 USE CHARGES

A. General: Cost or use charges for temporary facilities are not chargeable to Owner or Architect and shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, the following:

1. Owner's construction forces.
2. Occupants of Project.
3. Architect.
4. Testing agencies.
5. Personnel of authorities having jurisdiction.

B. Water Service: Use water from Owner's existing water system without metering and without payment of use charges.
1. Pay for pumps, pipe, hoses, and backflow preventors as required to distribute water.

B. Electric Power Service: Use electric power from Owner's existing system without metering and without payment of use charges.

PART 2: PRODUCTS

2.01 MATERIALS

A. General: Provide new materials or undamaged, previously used materials in serviceable condition. Provide materials suitable for use intended.

B. Chain-Link Fencing: Minimum 2-inch, 0.148-inch thick, galvanized steel, chain-link fabric fencing; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8-inch OD line posts and 2-7/8-inch OD corner and pull posts.

C. Portable Chain-Link Fencing: Minimum 2-inch 9-gage, galvanized steel, chain-link fabric fencing; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8-inch OD line posts and 2-7/8-inch OD corner and pull posts, with 1-5/8-inch OD top and bottom rails. Provide **concrete** or **galvanized steel** bases for supporting posts.

D. Lumber and Plywood: Comply with requirements in Division 6 Section "Carpentry."

E. Gypsum Board: Minimum 1/2 inch thick by 48 inches wide by maximum available lengths; regular-type panels with tapered edges. Comply with ASTM C 36.

F. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indices of 25 and 50, respectively.

G. Paint: Comply with requirements in Division 9 Section "Painting."

H. Tarpaulins: Fire-resistive labeled with flame-spread rating of 15 or less.

I. Water: Potable.

J. Wood Walkways: ¾" Plywood, framed with 2x__ joists (size as required to support span), with wood rails to contain occupants.

K. Poly Film Guard: 3 mil. self adhering clear poly film utilizing tack water-based adhesive.

2.02 EQUIPMENT

A. General: Provide equipment suitable for use intended.

B. Field Offices: Prefabricated with lockable entrances, insulated, weather-tight; heated and air conditioned. Provide stairs with handrails as required for accessibility.

C. Fire Extinguishers: Hand carried, portable, UL rated. Provide class and extinguishing agent as indicated or a combination of extinguishers of NFPA-recommended classes for exposures.

1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

D. Self-Contained Toilet Units: Single-occupant units of chemical, aerated recirculation, or combustion type; vented; fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material.

E. Drinking-Water Fixtures: Containerized, tap-dispenser, bottled-water drinking-water units, including paper cup supply.

F. Heating Equipment: Unless Owner authorizes use of permanent heating system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.

2. Heating Units: Listed and labeled, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use for type of fuel being consumed.

PART 3: EXECUTION

3.01 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.

B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.02 TEMPORARY UTILITY INSTALLATION

A. General: Engage appropriate local utility company to install temporary service or connect to existing service. Where utility company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with utility company recommendations.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

2. Provide adequate capacity at each stage of construction. Before temporary utility is available, provide trucked-in services.

3. Obtain easements to bring temporary utilities to Project site where Owner's easements cannot be used for that purpose.

B. Water Service: Use of Owner's existing water service facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

1. Provide rubber hoses as necessary to serve Project site.

2. Where installations below an outlet might be damaged by spillage or leakage, provide a drip pan of suitable

size to minimize water damage. Drain accumulated water promptly from pans.

3. Provide pumps if required due to low static pressure on-site. Equip pumps with surge and storage tanks and automatic controls to supply water uniformly at reasonable pressures.

4. Provide backflow prevention devices to protect Owner's water system.

B. Sanitary Facilities.

1. Toilets: Use of Owner's existing toilet facilities (as designated by Owner's representative) will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

C. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment from that specified that will not have a harmful effect on completed installations or elements being installed.

1. Maintain a minimum temperature of 50 deg F (10 deg C) in permanently enclosed portions of building for normal construction activities, and 65 deg F (18.3 deg C) for finishing activities and areas where finished Work has been installed.

D. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment from that specified that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

F. Power is available on-site.

1. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations and to maintain schedule.

2. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and to meet government regulations.

a. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

3.03 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Locate field offices, storage sheds, sanitary facilities, and other temporary construction and support facilities for easy access.

2. Provide incombustible construction for offices, shops, and sheds located within construction area or within 30 feet of building lines. Comply with NFPA 241.

3. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Project Identification and Temporary Signs: Prepare Project identification and other signs in sizes indicated. Install signs where indicated to inform public and persons seeking entrance to Project. Do not permit installation of unauthorized signs.

1. Prepare temporary signs to provide directional information to construction personnel and visitors.

2. Construct signs of exterior-type Grade B-B high-density concrete form overlay plywood in sizes and thicknesses indicated. Support on posts or framing of preservative-treated wood or steel.

3. Engage an experienced sign painter to apply graphics for Project identification signs. Comply with details indicated.

    a. Paint sign panel and applied graphics with exterior-grade alkyd gloss enamel over exterior primer.

C. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Containerize and clearly label hazardous, dangerous, or unsanitary waste materials separately from other waste. Comply with Division 1 Section for progress cleaning requirements.

1. If required by authorities having jurisdiction, provide separate containers, clearly labeled, for each type of waste material to be deposited.

2. Develop a waste management plan for Work performed on Project. Indicate types of waste materials Project will produce and estimate quantities of each type. Provide detailed information for on-site waste storage and separation of recyclable materials. Provide information on destination of each type of waste material and means to be used to dispose of all waste materials.

D. Housekeeping

1. Do not allow debris to accumulate on-site or within the building work areas. The contractor shall implement and provide the following cleaning services:

    a. Debris shall be removed from the construction site and police exterior project site area on a weekly basis at a minimum to clean-up any wind-blown or excess construction materials or debris and dispose of in construction dumpsters to maintain a clean project site.

    b. Debris shall be removed from interior of the buildings on a daily basis and disposed of in construction dumpsters.

    c. Lower waste materials in a controlled manner with as few handlings as possible; do not drop or throw materials from heights.

    d. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet, newly painted surfaces.

    e. Once floor slabs are in place, walk-off mats shall be provided at all exterior entrances that are utilized by the workers. Mats shall be cleaned on a daily basis and change out mats on a monthly basis.

    f. Areas without final floor finish in place shall be cleaned of debris and swept on a daily basis.

    g. Areas that workers have access to with final floor finish in place shall be vacuumed on a daily basis. Carpeted major circulation paths shall be covered with poly film guard. Replace poly film guard when it develops holes or tears as they occur. Poly film guard to be replaced if left in place over 45 days. Horizontal and vertical surfaces shall be wiped down as construction dust has accumulated.

    h. Where Contractor has periodic access to ancillary spaces occupied by Owner, thoroughly clean after each use, so as to not disrupt Owner's ongoing operations.

    i. Failure to maintain a clean construction area may result in the Owner cleaning the site and back-charging the Contractor.

    j. Remove waste materials, rubbish and debris from the site and legally dispose of at public or private dumping areas off the Owner's property.

E. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment involved, including temporary utility services. Sheds may be open shelters or fully enclosed spaces within building or elsewhere on-site.

F. Lifts and Hoists: Provide facilities for hoisting materials and personnel. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

G. Existing Elevator Usage: Use of Owner's existing or new elevators (as designated by Owner's representative) will be permitted, as long as elevators are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore elevators to condition existing before initial use, including replacing worn cables, guide shoes, and similar items of limited life.

1. Provide protective coverings, barriers, devices, signs, or other procedures to protect elevator car and entrance doors and frame. If, despite such protection, elevators become damaged, engage elevator Installer to restore damaged work so no evidence remains of correction work. Return items that cannot be refinished in field to the shop, make required repairs and refinish entire unit, or provide new units as required.

H. Existing Stair Usage: Use of Owner's existing stairs (as designated by Owner's representative) will be permitted, as long as stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.

1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If, despite such protection, stairs become damaged, restore damaged areas so no evidence remains of correction work.

3.04 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects. Avoid using tools and equipment that produce harmful noise. Restrict use of noisemaking tools and equipment to hours that will minimize complaints from persons or firms near Project site.

1. Maintain security by limiting number of keys and restricting distribution to authorized personnel.

B. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.

C. Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erecting structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and public of possible hazard. Where appropriate and needed, provide lighting, including flashing red or amber lights.

1. For safety barriers, sidewalk bridges, and similar uses, provide minimum ¾-inch thick exterior plywood and appropriate 2x___ framing for support.

D. Food Consumption: Limit food and soft drink consumption to within the Contractor's trailer or out of the building.

E. Building Environmental Protection:

1. When operating equipment adjacent to occupied areas of the building:

a. Coordinate in advance temporary shutdown of building air supply systems.

b. Close all windows and cover other openings with poly securely taped whenever equipment or vehicle exhaust fumes are present.

c. Reactivate air supply systems when exhaust emitting activities have been completed.

F. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weather-tight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is not complete, provide insulated temporary enclosures. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.

G. Temporary Dust Control Partitions: Refer to Construction Dust Control Section 01 56 00.

H. Temporary Fire Protection: Until fire-protection needs are supplied by permanent facilities, install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses as required by the local fire marshal.

3.05 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage caused by freezing temperatures and similar elements.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

2. Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.

C. Temporary Facility Changeover: Except for using permanent fire protection as soon as available, do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are the property of Contractor. Owner reserves right to take possession of Project identification signs.

2. Remove temporary paving not intended for or acceptable for integration into permanent paving. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.

3. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements in Division 1 Section "Closeout Procedures."

END OF SECTION 01 50 00

SECTION 01 56 00

CONSTRUCTION DUST CONTROL

PART 1: GENERAL

1.01 RELATED DOCUMENTS

A. Drawings, Details of Construction and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work specified in this section.

1.02 SUMMARY

A. Section Includes:

1. Airborne construction dust/containment control in:

   a. Buildings occupied during remodeling.

   b. Existing buildings temporarily unoccupied (i.e. summer breaks for schools)

   c. Finished spaces that are unoccupied and construction dust/airborne containments are still being generated (i.e. punchlist completion).

B. Related Sections:

1. Section 01 73 29-Cutting, Drilling and Patching: Removal of debris.
2. Section 01 33 00-Submittals: Work and procedures for containment of construction dust/airborne contaminants.
3. Section 01 50 00-Temporary Facilities: Temporary barriers/chutes; cleaning.
4. Section 02 41 19-Selective Demolition

1.03 POLICY

A. Airborne contaminants control is critical in all areas noted in Paragraph 1.02A. Contractor shall limit dissemination of airborne contaminants produced by construction-related activities, including dust, chalk, powders, aerosols, fumes, fibers and other similar materials, in order to provide protection of persons and equipment.

1. Construction activities causing disturbance of existing dust, or creating new dust, or other airborne contaminants, must be conducted in tight enclosures cutting off any flow of particles into occupied areas.

2. Ceilings, walls in Project area must be secure at all times.

1.04 SUBMITTALS

A. Progress Schedules: Submit work areas and procedure schedules for containment of construction dust/airborne contaminants.

B. Work Plan: Drawings and details of extent of enclosures, construction of necessary temporary barriers and exhaust fans, and description of procedures to be used to achieve and maintain control of construction-related airborne contaminants.

1.05 GENERAL ACCESS PROCEDURES

A. Contractor shall notify Architect each time that work requiring access to occupied areas within two weeks of when work is about to begin.

B. Dust Control Preconstruction Meeting: Before any construction on site begins, Contractor and workers are required to attend a mandatory dust control preconstruction orientation session held by Owner's Representative/Architect for training and instruction on precautions to be taken.

1. Conditions in construction area may be presumed to be in a condition similar to other existing surfaces or a survey of work area to record pre-existing damage may occur at this time.

C. Notification: Contractor shall notify Architect a minimum of 48 hours prior to starting construction activity which might be expected to produce excessive construction dust and airborne contaminants in occupied areas so that additional precautions may be taken.

1.06 TESTING

A. The Owner may provide the following tests and observations:

1. Air Samples: Baseline particle counts and conduct periodic air sampling of Project Areas during construction to monitor effectiveness of containment procedures.

2. Air Pressure: Using visual indicators, the maintenance of negative air pressure in Containment Area relative to Project Areas will be verified on a daily basis.

1.07 DEFINITIONS

A. Containment producing activities include, but are not limited to:

1. Demolition and removal of walls, floors, ceilings, and other finish materials.
2. Demolition of plumbing, mechanical and electrical systems and equipment.
3. Finish operations such as sawcutting, shotblasting/grinding, sanding, painting, and application of special surface coatings.

B. Containment Areas: As determined by Architect and Owner's Representative and shown within entire construction limits of project area. Includes area of construction, adjacent staging and storage areas, and passage areas for workers, supplies, and waste; includes ceiling spaces above and adjacent to construction, if shown.

C. Project Areas: As determined by Architect and Owner's Representative and shown within entire construction limits of project area. Includes occupied areas adjacent to Project Area, either occupied or used for passage, as well as areas connected to construction area by mechanical system air intake, exhaust and ductwork.

PART 2: PRODUCTS

2.01 MATERIALS

A. Carpet or Mats: Provide carpets or mats at containment entrances, vacuumed or changed as often as necessary (minimum daily) to prevent accumulation of dust. All vacuuming outside areas not under negative pressure shall be with a certified HEPA-filtered vacuum.

B. Dust Caps: Block off all existing ventilation ducts within the construction area. Method of capping ducts shall be dust tight, withstand airflow and potential damage from construction activities.

C. Portable Enclosures: Whenever work is done outside existing barricaded work areas, provide 4 mil portable polyethylene enclosure capable of sealing off opening fitted tight to ceiling, or provide prefabricated unit.

D. Polyethylene: Polyethylene shall be fire retardant type listed by Fire Underwriter's Laboratories, Griffolyn #T55R with Griffolyn fire retardant tape, or equal.

E. Exhaust fans: Maintain continuous uninterrupted operation.

PART 3: EXECUTION

3.01 INSPECTION

A. Before any demolition or construction begins, a complete field review of all Project Areas (airborne contaminant control areas) and policies will be conducted and work plan revised if required. Initial work plan shall be presented at dust control preconstruction meeting.

3.02 CONTAINMENT, ENCLOSURES AND BARRIERS

A. Air Quality Contaminant Control: Fasten windows shut, ventilate barricaded construction areas by use of fans to the outside of building.

1. Maintain a minimum negative airflow of 100 +/- 10 FPM with door fully open at barricade entrance openings and during window replacement by use of fans vented to outside of building.

2. Secure operable exterior windows and doors/windows not required for construction access as required to maintain negative airflow.

3. Provide additional local exhaust during welding.

B. Contractor shall install dustproof enclosures for work as submitted on work plan and when required to protect areas occupied by the Owner from dust, debris and damage.

1. Construction must be conducted in tight enclosures cutting off any flow of dust particles into occupied areas.

2. The Contractor shall provide additional dustproof enclosures as requested by the Owner when enclosure locations are not adequately containing the dust.

3. Provide all barricades, warning signs and warning lights to protect the public, the existing building, storage areas and materials or equipment.

C. Enclosure Barricades: Full height, noncombustible construction, with minimum ½ inch gypsum board both sides with 3-1/2 inch R-11 insulation batts to reduce noise. Use 3-inch wide masking tape to tightly seal top, bottom, and all seams to prevent spread of dust to occupied areas, including above ceiling.

1. Barricade Doors: 3'-0" minimum width (pair of 3'-0" wide doors as required by plans), solid core wood with metal frame and hardware, including closer, tightly weather-stripped to prevent flow of dust. Locate as directed and swing out of construction area (unless directed otherwise by fire marshal). Keep barriers locked outside of working hours. Provide signage at each door "Keep Door Closed." Three keys for emergency access shall be furnished to the Owner.

2. Seal all ductwork, piping, conduit, structure and miscellaneous penetrations in enclosure barricades.

3. Materials for barricade shall be precut in unoccupied areas.

D. Enclosure outside of work area (including spaces above ceilings): Whenever work is necessary outside of the construction barricades the space where work is being done, including ladders, shall be contained within full height enclosure. Contractor may use prefabricated unit.

1. All work performed outside the construction barricade shown on drawings including all work in corridors and lobbies shall be performed outside of normal working hours and shall be scheduled in advance with Owner except where specified otherwise.

2. At no time shall any construction equipment or material be stored outside the construction barricade.

E. Furniture and Equipment Protection:

1. Cover all furniture and equipment remaining in the space with polyethylene. Seal with tape to prevent dust/dirt from reaching the furniture and equipment.

3.03 PROCEDURES

A. General: Contractor shall provide and maintain all barriers, filters, ventilation, walk-off mats and cleaning and removal procedures as detailed in work plan.

1. Traffic between barricaded areas and open areas shall be kept to a minimum. Instruct workers to refrain from tracking dust into adjacent occupied areas or opening windows or doors allowing construction dust/airborne contaminants into adjacent occupied or finished areas. Any dust tracked outside of construction area shall be cleaned up immediately. Contractor shall have the necessary manpower and equipment (HEPA vacuum cleaners, dust and wet mops, brooms, buckets and clean wiping rags) to keep adjacent occupied areas clean at all times. Keep door to such areas closed at all times. Transport materials and refuse into an area from an external site without violating occupied areas by transporting in covered containers.

2. Provide negative pressure in construction area by use of fans to the outside of the building. Block supply and return ventilation as to not recirculate air from construction area to air handlers supplying occupied areas. Rebalance air handling equipment to maintain correct airflow to occupied areas.

a. Provide adequate forced ventilation of enclosed areas to cure installed materials, to prevent excessive humidity, and to prevent hazardous accumulations of dust, fumes, vapors, or gases in the building.

b. Direct exhaust from equipment away from building air intakes and operable windows; assure that filters on building air intakes are operational and protected from excessive amounts of airborne contaminants. Cover intakes of air handling equipment not in operation in proximity to exhaust locations.

B. Sealing of Openings: Use tape or other impenetrable sealant to seal barrier wall seams, cracks around window and door frames, exhaust system ductwork, pipes, floor penetrations, joints and ducts. Seal or filter all open return and exhaust ductwork.

C. Dust Control: The Contractor shall take appropriate steps throughout the term of the Project to prevent airborne dust due to work under this contract. Water shall be applied wherever practical to settle and hold dust to a minimum, particularly during demolition and moving of materials. No chemical palliatives shall be used without permission of the Owner's Representative.

1. Spray surfaces with water mist during dust-producing interior demolition activities. Hard surface floors in work area, adjacent hallways and passage areas require vacuuming with HEPA-filtered vacuum cleaners and frequent wet-mopping during demolition and construction; protect adjacent carpeted areas with plastic and plywood and vacuum with HEPA-filtered vacuum cleaners.

2. Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent airborne dust from dispersing into atmosphere.

D. Whenever access panels are opened in occupied areas, for work above ceilings, provide portable enclosure ladder and sealing off opening, fitted tight to ceiling.

E. Provide thorough cleaning of existing surfaces which become exposed to dust, before start of Owner's occupancy.

3.04 FINAL CLEANING

A. Removal of construction barriers shall be done carefully, and when necessary, outside of normal work hours. Remove all tape residue from existing/new surfaces. HEPA vacuum and clean all surfaces free of dust after the removal prior to Owner's occupancy.

B. Rebalance existing HVAC systems to restore modified systems back to the original design intent.

3.05 ENFORCEMENT

A. Failure to maintain containment areas will result in issuance of written warning: if situation is not corrected within eight (8) hours of receipt of warning, Owner will have cause to stop the work as provided in Article 2.3 of A201 General Conditions of the Contract for Construction. All costs associated with Owner's written order to stop the Work and remobilization shall be borne by the Contractor.

END OF SECTION 01 56 00

SECTION 01 73 29

CUTTING AND PATCHING

PART 1: GENERAL

1.01 DESCRIPTION

A. Execute cutting, fitting or patching of Work, required to:

1. Make several parts fit properly.
2. Uncover Work to provide for installation of ill-timed Work.
3. Remove and replace defective Work.
4. Remove and replace Work not conforming to requirements of Contract Documents.
5. Install specified Work in existing construction.
6. Provide finished surfaces (to match adjacent existing surfaces) to fill in voids caused by removal or replacement of materials.

B. Pay for costs caused by ill-timed or defective Work, or Work not conforming to Contract Documents, including costs for additional services of Architect/Engineer.

PART 2: PRODUCTS

2.01 MATERIALS

A. Replacement of Work Removed: Comply with specifications for type of Work to be done.

B. Placement of Work to fill Voids caused by Removal: Comply with latest industry standards for type of Work to be done.

PART 3: EXECUTION

3.01 INSPECTION

A. Inspect existing conditions of Work, including elements subject to movement or damage during:

1. Cutting and patching.

B. After uncovering Work, inspect conditions affecting installation of new products.

3.02 PREPARATION PRIOR TO CUTTING

A. Provide shoring, bracing and support as required to maintain structural integrity of Project.

B. Provide protection for other portions of Project.

C. Provide protection from elements.

3.03 PERFORMANCE

A. Neatly cut or demolish along straight, true, square lines.

B. Execute cutting and demolition by methods which will prevent damage to other Work, and will provide proper surfaces to receive installation of repairs and new Work.

C. Restore Work which has been cut or removed; install new products to provide complete Work in accord with requirements of Contract Documents.

D. Refinish entire surfaces as necessary to provide an even finish.

1. Continuous Surfaces: To nearest intersections.

2. Assembly: Entire refinishing.

END OF SECTION 01 73 29

SECTION 01 74 00

FINAL CLEANING

PART 1: GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Cleaning required for specified work is specified in sections pertaining to that work.

B. Cleaning during construction and prior to substantial completion – Section 01 50 00 Temporary Facilities and Controls.

PART 2: PRODUCTS

2.01 CLEANING MATERIALS

A. Use only cleaning materials recommended by manufacturer of surface to be cleaned.

B. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3: EXECUTION

3.01 FINAL CLEANING

A. Employ experienced workers or professional cleaners for final cleaning.

B. At completion of construction and just prior to acceptance or occupancy, conduct a final inspection of exposed interior and exterior surfaces.

C. Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials from interior and exterior surfaces.

D. Repair, patch and touch up marred surfaces to match adjacent finishes.

E. Broom clean paved surfaces; rake clean other surfaces of grounds.

F. Maintain cleaning until the Building or portion thereof, is occupied by the Owner.

END OF SECTION 01 74 00

SECTION 01 77 00

PROJECT CLOSEOUT

1.01 GENERAL

A. Comply with requirements stated in Conditions of the Contract and in Specifications for administrative procedures in closing out the Work.

B. Related requirements in other parts of the Project Manual

1. Fiscal provisions, legal submittals and additional administrative requirements: Conditions of the Contract.

C. Related requirements specified in other sections

1. Closeout Submittals Required: The respective sections of specifications.

1.02 SUBSTANTIAL COMPLETION

A. Refer to the General Conditions of the Contract for Construction.

B. When the Project is determined by the Architect to be sufficiently complete to permit utilization for the intended use, the Architect will issue a Certificate of Substantial Completion.

C. To receive the Certificate of Substantial Completion, perform the following:

1. Submit to the Architect a notice declaring that work is believed to be substantially complete.

2. Submit a list of work items that remain to be completed or corrected and the date this work will be accomplished.

3. Obtain Occupancy certificate when required from governing municipality.

D. Architect will visit the project to evaluate the request for issuance of a Certificate of Substantial Completion.

1. If the Architect concurs that the Project is substantially complete, the Architect will deliver a Certificate of Substantial Completion and a list of work items necessary for completion or correction prior to request for inspection for final completion.

2. If the Architect determines that the work is not substantially complete, the Architect will deliver to the Contractor a written statement including reasons.

3. Complete work on the items required by the Architect for achieving substantial completion and make additional written requests for issuance of a Certificate of Substantial Completion until the Architect determines that sufficient Work has been performed.

1.03 FINAL INSPECTION

A. When the Work is considered complete, submit written certification that:

1. Contract Documents have been reviewed.

2. Work has been completed and inspected by the Contractor for compliance with Contract Documents and is ready for final inspection.

B. Architect will make an inspection to verify the status of completion with reasonable promptness after receipt of such certification.

C. Should Architect consider that the Work is incomplete or defective:

1. Architect will notify the Contractor in writing, listing the incomplete or defective work.

2. Take immediate steps to remedy the stated deficiencies, and send a second written certification to Architect that the Work is complete.

3. Architect will reinspect the Work.

D. When the Architect finds that the Work is acceptable under the Contract Documents, he will request preparation of closeout submittals.

1.04 REINSPECTION FEES

A. Should Architect perform reinspections due to failure of the Work to comply with the claims of status of completion made by the Contractor:

1. Owner will compensate Architect for such additional services.

2. Owner will deduct the amount of such compensation from the final payment.

1.05 CLOSEOUT SUBMITTALS TO ARCHITECT

A. When the Architect has determined that the Construction Work is acceptable under the Contract Documents and the Contract fully performed, prepare and submit final Application for Payment to the Architect together with the following:

1. A letter recommending acceptance of the Project and indicating all punch list items are complete.

2. Contractor's Affidavit of Payment of Debts and Claims, AIA Document G706, with bonds for any exceptions.

3. Consent of surety to final payment on Consent of Surety Company to Final Payment, AIA Document G707.

4. Contractors Affidavit of Release of Liens, AIA Document G706A.

5. Project Record Documents, if required.

6. Warranties and Bonds.

7. Energy Rebate Applications and specified back-up.

B. Submit one original and one copy for Items A1 through A7.

1.06 FINAL ADJUSTMENT OF ACCOUNTS

A. Submit a final statement of accounting to Architect.

B. Statement shall reflect all adjustments to the Contract Sum:

1. The original Contract Sum.

2. Additions and deductions resulting from:

a. Previous Change Orders

b. Allowances

c. Unit Prices

d. Deductions for uncorrected Work

e. Penalties and Bonuses

f. Deductions for liquidated damages

g. Deductions for reinspection payments and costs incurred by Architect or Architect's Consultants if project is not closed out within sixty (60) days of Substantial Completion.

h. Other adjustments

3. Total Contract Sum, as adjusted.

4. Previous payments.

5. Sum remaining due.

C. Architect will prepare a final Change Order, reflecting approved adjustments to the Contract Sums which were not previously made by Change Orders.

1.07 FINAL APPLICATION FOR PAYMENT

A. Submit the final Application for Payment in accordance with procedures and requirements stated in the Conditions of the Contract.

END OF SECTION 01 77 00

SECTION 01 78 23

OPERATING, MAINTENANCE AND WARRANTY DATA

1.01 GENERAL

A. Compile product data and related information appropriate for Owner's maintenance and operation of products furnished under the Contract.

B. Prepare operating, maintenance and warranty data as specified in this Section and as referenced in other pertinent section of Project Manual.

C. Instruct Owner's personnel in the maintenance of products and in the operation of equipment and systems.

D. Related requirements specified in other sections:

1. Shop drawings, product data and samples: Section 01 33 00.

2. Project Closeout: Section 01 77 00.

3. Project Record Documents: Section 01 78 39.

1.02 QUALITY ASSURANCE

A. Preparation of data shall be done by personnel with the following qualifications:

1. Trained and experienced in maintenance and operation of the described products.

2. Completely familiar with requirements of this Section.

3. Skilled as a technical writer to the extent required to communicate essential data.

4. Skilled as a draftsman competent to prepare required drawings.

1.03 FORM OF SUBMITTALS

A. Prepare data in the form of an instructional manual for use by the Owner's personnel.

B. Format shall conform to the following:

1. Size: 8½" x 11".

2. Paper: 20 pound minimum, white, for typed pages.

3. Text: Manufacturer's printed data, or neatly typewritten.

4. Drawings

a. Provide reinforced punched binder tab, bind in with text.

b. Fold larger drawings to the size of the text pages.

5. Provide fly-leaf for each separate product, or each piece of operating equipment.

    a. Provide typed description of product, and major component parts of equipment.

    b. Provide indexed tabs.

6. Cover: Identify each volume with typed or printed title "OPERATING, MAINTENANCE AND WARRANTY INSTRUCTIONS". List:

    a. Title of Project

    b. Identity of separate structure as applicable.

    c. Identity of general subject matter covered in the manual.

C. Binders

1. Commercial quality three-ring binders with durable and cleanable plastic cover.

2. Maximum ring size: 2 inch.

3. When multiple binders are used, correlate the data into related consistent groupings.

1.04 CONTENT OF MANUAL

A. Arrange neatly typewritten table of contents for each volume, in the following systematic order.

1. Contractor, name of responsible principal, address and telephone number.

2. A list of each product required to be included, indexed to the content of volume.

3. List, with each product, the name, address and telephone number of:

    a. Contractor or installer.

    b. Maintenance contractor, as appropriate.

    c. Identify the area of responsibility of each.

    d. Local source of supply for parts and replacement.

    e. Include warranty information as specified.

4. Identify each product by product name and other identifying symbols such as set in Contract Documents.

B. Product Data

1. Include only those sheets which are pertinent to the specific product.

2. Annotate each sheet to:

    a. Clearly identify the specific product or part installed.

C. Content, for moisture-protection and weather-exposed products:

1. Manufacturer's data, giving full information on products.

   a. Applicable standards

   b. Chemical composition

   c. Details of installation

2. Instructions for inspection, maintenance and repair.

D. Additional requirements for maintenance data: The respective section of the Project Manual.

1.05 SUBMITTAL SCHEDULE

A. Submit one copy of completed data in final form within thirty days of substantial completion. Copy will be returned with comments.

B. Submit two copies of approved data in final form ten (10) days after comments are received.

END OF SECTION 01 78 23

SECTION 01 78 39

PROJECT RECORD DOCUMENTS

1.01 GENERAL

A. Fully cooperate with the Architect to accomplish the following.

B. These requirements supplement the requirements set forth in the General Conditions.

C. Maintain at each site one record copy, as applicable, of:

1. Drawings and Details with addenda marked in.
2. Specifications with addenda marked in.
3. Addenda.
4. Change Orders and other modifications to the Contract.
5. Architect/Engineer Supplemental Instructions, Proposal Requests or written instructions.
6. Approved shop drawings, product data and samples.
7. Field test records.

1.02 MAINTENANCE OF RECORD DOCUMENTS AND SAMPLES

A. Store record documents and samples in Contractor's field office in files and racks. Provide locked cabinet or secure storage space for storage of samples.

B. File documents and samples in accordance with the Construction Specifications Institute MASTERFORMAT.

C. Maintain record documents in a clean, dry, legible condition and in good order. Do not use record documents for construction purposes.

D. Make record documents and samples available at all times for inspection by Architect or Owner.

1.03 RECORDING

A. Label each document "PROJECT RECORD" in neat large printed letters.

B. Continuously record information and changes.

C. Drawings: Legibly mark to record actual construction.

1. Depths of various elements of foundation in relation to finish first floor datum.
2. Horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
3. Location of internal utilities and appurtenances concealed in the construction, referenced to visible and accessible features of the structure.
4. Field changes of dimension and detail.

5. Changes made by Field Order or by Change Order.

6. Details not on original contract drawings.

D. Specifications and Addenda - Legibly mark each Section to record:

1. Manufacturer, trade name, catalog number, and Supplier of each Product and item of equipment actually installed.

2. Changes made by Field Order or by Change Order.

E. Shop Drawings – Label each set by corresponding specification section. At the completion of the project, provide the Owner with one complete set, reviewed and stamped by architect, organized by specification section in the following formats:

1. Paper (various sizes) folded to 8 1/2" x 11" and boxed with project name and completion date clearly labeled on exterior.

2. Scanned PDF copy on a compact disk, ordered by specification section.

1.04 SUBMITTAL

A. Deliver Record Documents to the Owner at contract close-out.

B. Accompany submittal with transmittal letter in duplicate, containing:

1. Date

2. Project title

3. Title and number of each Record Document

END OF SECTION 01 78 39

SECTION 01 79 00

DEMONSTRATION AND TRAINING

PART 1: GENERAL

1.01 RELATED DOCUMENTS

A. Drawings, Details of Construction and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work specified in this section.

1.02 SUMMARY

A. This Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:

1. Demonstration of operation of systems, subsystems, and equipment.
2. Training in operation and maintenance of systems, subsystems, and equipment.
3. Recording of training sessions.

B. Related Sections:

1. Division 1-14 – Individual sections with training requirements.
2. Divisions 21-25 – Mechanical sections with training requirements.
3. Divisions 26-28 – Electrical sections with training requirements.

1.03 SUBMITTALS

A. Instruction Program: Submit two copies of outline of instructional program for demonstration and training, including a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

1. At completion of training, submit one complete training manual for Owner's use.

B. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

C. Attendance Record: For each training module, submit list of participants and length of instruction time.

D. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

E. Demonstration and Training Videotape: Submit one copy at end of each training module.

1.04 QUALITY ASSURANCE

A. Facilitator Qualifications: 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: A factory-authorized service representative, complying with requirements in Division 1 Section "Quality Requirements," experienced in operation and maintenance procedures and training.

1.05 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations.

B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 – PRODUCTS

2.01 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:

    a. System, subsystem, and equipment descriptions.
    b. Performance and design criteria if Contractor is delegated design responsibility.
    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. Emergency manuals.
    b. Operations manuals.
    c. Maintenance manuals.
    d. Project Record Documents.
    e. Identification systems.
    f. Warranties and bonds.
    g. Maintenance service agreements and similar continuing commitments.

3. Emergencies: Include the following, as applicable:

    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 of normal operating limits.
    e. Sequences for electric or electronic systems.
    f. Special operating instructions and procedures.

4. Operations: Include the following, as applicable:

    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.
    g. Instructions on stopping.
    h. Normal shutdown instructions.
    i. Operating procedures for emergencies.
    j. Operating procedures for system, subsystem, or equipment failure.
    k. Seasonal and weekend operating instructions.
    l. Required sequences for electric or electronic systems.
    m. 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: Include the following:

    a. Inspection procedures.
    b. Types of cleaning agents to be used and methods of cleaning.
    c. List of cleaning agents and methods of cleaning detrimental to product.
    d. Procedures for routine cleaning
    e. Procedures for preventive 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.

PART 3 - EXECUTION

3.01 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a combined training manual.

B. Set up instructional equipment at instruction location.

3.02 INSTRUCTION

A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.

B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

1. Owner will furnish Contractor with names and positions of participants.

C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

1. Schedule training through Architect with at least seven days' advance notice.

D. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration performance-based test.

E. Demonstration and Training Recording: Record each training module separately on digital, window's compatible DVD media.. 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.

F. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

3.03 REQUIRED DEMONSTRATION AND TRAINING

A. The following is a list of demonstration and training requirements listed in individual specification sections. Inconsistencies or omissions from the list does not relieve the Contractor from providing required demonstration and training delineated in each specification section.

Specification Section	Item	Minimum Time
01 45 43	Testing, Adjusting and Balancing	As required
22 11 16	Domestic Water Piping	As required
22 34 00	Fuel-Fire Domestic Water Heaters	4 hours
23 09 00	Building Automation System	16 hours
23 21 13	Hydronic Piping	As required
23 21 23	Hydronic Pumps	2 hours
23 23 00	Refrigerant Piping	As required
23 34 16	Air Handling	4 hours
23 52 16	Condensing Boilers	8 hours
23 73 39	Direct Gas-Fired Heating and Ventilating Units	4 hours
23 81 26	Split-System Air-Conditioners	2 hours
23 82 33	Heating Terminals	4 hours
26 05 26	Grounding and Bonding for Electrical Systems	4 hours
26 23 13	Paralleling Low-Voltage Switchgear	16 hours
26 24 13	Switchboards	4 hours
26 24 16	Panelboards	8 hours
26 24 19	Motor-Control Centers	8 hours

26 29 23	Variable-Frequency Motor Controllers	4 hours

3.04 DEMONSTRATION

A. Manufacturer's onsite field technician shall demonstrate the operation of the doors to the Owner. A video outlining the operation of the door, scheduled maintenance, basic troubleshooting and care of the door system shall be provided to the owner by the door manufacturer. Refer to Section 01 79 00 Demonstration and Training.

END OF SECTION 01 79 00