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. Owner-furnished products.
3. Use of premises.
4. Owner's occupancy requirements.
5. Punchlist Completion.
6. Work restrictions.
7. Specification formats and conventions.

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:	WIHi Science Lab Remodel, Ypsilanti, Michigan
B.	Owner:	Washtenaw ISD, 1819 South Wagner Ann Arbor, Michigan 48103
C.	Architect:	Wold Architects and Engineers 333 West Seventh Street, Suite 320 Royal Oak, Michigan 48067
D.	Structural Engineer:	MacMillan Associates 714 East Midland Street Bay City, Michigan48706
E.	Mechanical Engineer:	Wold Architects and Engineers 333 West Seventh Street, Suite 320 Royal Oak, Michigan 48067
F.	Electrical Engineer:	Strategic Energy Solutions Strategic Energy Solutions 4000 West Eleven Mile 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. Building Structure

    a. Existing masonry bearing walls, steel framing, and columns.

2. Building Enclosure

    a. Exterior wall metal panel infill.

    b. Patching of existing EPDM roofing systems.

3. Interior Finishes

    a. Insulated gypsum board/metal stud partitions.

    b. Floor finishes of VCT.

    c. Wall finishes of paint.

    d. Ceiling finishes of acoustical lay-in tile, gypsum board, gypsum board soffits.

    e. Existing wood science casework salvaged and reinstalled, minor architectural woodwork, pre-manufactured wood science casework units, wood doors, hardware, glazing, markerboards, miscellaneous specialties.

4. Mechanical Systems

    a. Plumbing including, supply and waste piping systems, piping insulation, re-installation of existing plumbing fixtures, and miscellaneous plumbing devices.

    b. Heating including piping, piping insulation.

    c. Ventilation to include, rooftop air handlers, ductwork, duct insulation.

    d. Temperature control system as provided and installed by ControlNET, LLC per the assigned bid allowance.

5. Electrical Systems

    a. Electrical conduit, wiring, and power distribution.

    b. Reconfiguration of existing interior lighting.

    c. Reconfiguration of existing Fire alarm systems.

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

1.05 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.

B. 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.

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

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

E. 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.

1.06 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.

1.07 OWNER'S OCCUPANCY REQUIREMENTS

A. Full Owner Occupancy: Owner will occupy portions of the site and existing building during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day 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 hours' notice to Owner of activities that will affect Owner's operations.

1.08 WORK RESTRICTIONS

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

1. The Contractor may begin construction operations immediately following award of the contract. Areas of construction are located within a currently unoccupied portion of the facility.
2. Should the Contractor have additional work to complete after August 8, 2013 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 3:00 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.

3. The building is open between the hours of 7:00 a.m. and 5:00 p.m. Hours of operation are 8:00 a.m. to 4:00 p.m. and no work shall be performed in occupied areas during these times.

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

4. 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.

1.09 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. Change Orders – Section 01 26 63.
2. Building Automation System – 23 09 00.
3. BAS Sequence of Operations – 23 09 93.

1.03 SELECTION AND PURCHASE

A. The Washtenaw Intermediate School District, in conjunction with Ypsilanti Community School District, has selected Tridium – based control system software/hardware with a LONworks communication protocol for the controls system(s) for this project. The Contractor shall use ContolNET, LLC as a sub-contractor and include the quote attached for the Building Automation System work for this project in their base bid.

B. Contact Information:

Eric Followell
ControlNET, LLC
5686 E ML Ave.
Kalamazoo, Michigan 49048
Mobile: (269) 330-3182
Tel: (269) 978-4129
Fax: (269) 978-4160

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 ControlNET, 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: Storage Room Upgrades

1. Provide a cost to include upgrades indicated in Drawings and Specifications in Storage Room C110, including installation of salvaged storage and science casework systems, mechanical and electrical upgrades.

B. Alternate No. 2: ERU-1 Alterations

1. Provide a cost to eliminate the Bolt-on Energy Recovery System to the mechanical rooftop unit ERU-1 and provide a Bypass Mixing Box Assembly in its place. Cost shall include, but not be limited to, any adjustments to mechanical and/or electrical equipment and installation costs.

C. Alternate No. 3: Compressed Air Piping

1. Provide a cost to furnish and install all distributed compressed air piping throughout Science Lab C124 as indicated on Mechanical Drawings and Specifications.

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 a single manufacture is specified and acceptable manufacturer are also listed, acceptable manufacturers must provide an identical product or accept responsibility for all design implications when providing a product other than the specified product.

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

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

D. 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.

E. 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.

F. 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 or Specifications 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 or Specifications.

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 10 00		X										
03 30 00	X	X	X	X		X		X	X			
03 30 13		X				X						
03 41 00			X	X	X		X	X				
03 45 00			X	X	X		X	X	X			
04 20 00		X	X	X	X				X			
05 12 00			X					X				
05 21 00			X					X				
05 31 00		X	X					X				
05 40 00		X	X				X	X				
05 50 00			X				X	X				X
06 10 53		X						X				
06 40 00		X	X	X	X			X				
06 41 00		X	X	X				X				
07 13 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
07 53 25	X		X	X				X	X		X	X
08 51 13			X	X				X			X	X
09 51 00			X	X								
09 65 00		X		X								X
09 91 00		X		X	X		X					X
12 32 16		X	X								X	X
12 32 17		X	X		X						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 4533

STRUCTURAL TESTING AND SPECIAL INSPECTION

PART 1 GENERAL

1.01 INTENT AND CONDITIONS

A. Intent
   1. Define and coordinate structural testing and special inspection services.
   2. Provide a greater level of confidence that the specified work is constructed in compliance with the contract documents and the intent of applicable codes including Sections 106 and 1704 of the 2006 International Building Code (IBC) as adopted by the current Minnesota State Building Code.
   3. Structural testing and special inspection services are intended to assist in determining probable compliance of the work with requirements specified. These services do not relieve the Contractor of responsibility for compliance with the requirements of the contract documents.

B. Conditions
   1. If inspection of a fabricator's work is required, the Owner's representative may require testing and inspection of the work at the plant, before shipment. Owner and Architect reserve the right to reject material not complying with the Contract Documents.
   2. Refer to individual technical specification sections for specific qualifications, inspections, tests, frequency and standards required. Testing and inspection shall be performed in accordance with the referenced standard for the specific material or procedure unless other criteria are specified. In the absence of a referenced standard, tests shall be performed in accordance with generally accepted industry standards.
   3. Work shall be checked as it progresses. Failure to detect any defective work or materials shall not prevent later rejection if defective work or materials are discovered, nor shall it obligate Owner to accept such work.
   4. Structural testing, special inspection, and periodic inspections by the Building Official do not preclude the normal field involvement and site observations by Architect or SER.
   5. Structural testing, special inspection, and periodic inspections by the Building Official do not relieve the Contractor of any responsibility to complete the work in accordance with the approved drawings and specifications.
   6. Testing agents and/or special inspectors may not waive or alter contract requirements, or approve or accept any portion of the work unless specifically authorized by the Architect or SER. They may not assume any duties of the Contractor, and they have no authority to stop or reject work.

1.02 RELATED REQUIREMENTS

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

1.03 DEFINITIONS

A. Testing: Evaluation of systems, primarily requiring physical manipulation and analysis of materials, in accordance with approved standards.

B. Inspection: Evaluation of systems, primarily requiring observation and judgment.

C. Structural Special Inspections: Structural special inspections include inspections of structural items required by the 2006 IBC Section 1704, as adopted by the 2007 Minnesota State Building Code, and other items, which in the professional judgment of the Structural Engineer of Record, are critical to the integrity of the building structure and are indicated to be performed under the requirements of this section. They do not include special inspections for non-structural items such as fireproofing, EIFS, and smoke control systems.

D. Structural Testing: Structural testing includes those tests of structural items required by the 2006 IBC, as adopted by the 2007 Minnesota State Building Code, or its referenced standards, and other tests, which in the professional judgment of the Structural Engineer of Record, are critical to the integrity of the building structure and are indicated to be performed under the requirements of this section.

E. Architect of Record: The prime consultant in charge of overall design and coordination of the project.

F. Structural Engineer of Record (SER): The licensed professional engineer in responsible charge of the structural design for the project.

G. Licensed Structural Engineer: A professional engineer with education and experience in the design of structures similar to this project licensed to practice in the State in which the Project is located.

H. Testing Agency (TA): The properly qualified firm performing testing services.

I. Special Inspector (SI): A properly qualified individual or firm performing special inspections.

J. Building Official: The officer or his duly authorized representative charged with the administration and enforcement of the building code for the project.

1.04 REFERENCES

A. ASTM C1077-02 – Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.

B. ASTM C1093-95 - Practice for the Accreditation of Testing Agencies for Unit Masonry.

C. ASTM D3740-01 - Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.

D. ASTM E329-02 - Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.

E. ASTM E543-02 - Practice for Agencies Performing Nondestructive Testing.

F. International Building Code (IBC), 2006.

G. Minnesota State Building Code 2007.

1.05 QUALIFICATIONS

A. Testing Agency: An approved independent testing agency acceptable to the Owner, Architect, and SER and meeting the following:
   1. Authorized to operate in the State in which the project is located and experienced with the requirements and testing methods specified in the Contract Documents.
   2. Meet applicable requirements of references stated in paragraph 1.4.
   3. Have available testing equipment that is calibrated, at reasonable intervals, by devices of accuracy traceable to either the National Bureau of Standards, or to accepted values of natural physical constants.
   4. Provide individuals performing tests and taking samples with appropriate certifications for work performed.

B. Special Inspector: Either an appropriately certified inspector or a civil/structural engineer

performing under the direct supervision of a licensed structural engineer (as defined earlier in this section) and acceptable to the SER and Building Official. Unique special inspector requirements, for specific materials and systems, are noted in related technical specification sections.

1.06 RESPONSIBILITIES

A. Special Inspectors:
   1. Inspect the work assigned for conformance with the building department approved plans, specifications, and applicable material and workmanship provisions of the code. Perform inspection in a timely manner to avoid delay of work.
   2. Bring nonconforming items to the immediate attention of the contractor for correction. If not corrected within 24 hours or if inspector will not be on site the following day, bring to the attention of the SER by the end of the business day. If uncorrected after a reasonable period of time, bring to the attention of the Building Official, and to the Architect. Notify SER immediately if non-conforming items are enclosed, embedded, or obscured prior to verification of correction.
   3. Submit inspection reports to the Building Official, Contractor, the Architect, the SER, and other designated persons in accordance with the structural testing and special inspection schedule.
   4. Submit a final signed report stating whether the work requiring special inspection was, to the best of his/her knowledge, in conformance with the approved plans, specifications and the applicable workmanship provisions of the code.
   5. Sign the structural testing and special inspection schedule in conjunction with other responsible parties.
   6. Attend preconstruction meeting to review scope of special inspection.

B. Testing Agency:
   1. Test the work assigned for conformance with the building department approved plans, specifications, and applicable material provisions of the documents. Perform tests in a timely manner to avoid delay of work.
   2. Submit test reports to the Building Official, Contractor, the Architect, the SER, and other designated persons in accordance with the structural testing and special inspection schedule.
   3. Sign the structural testing and special inspection schedule in conjunction with other responsible parties.
   4. Attend a preconstruction meeting to review scope of structural testing.

C. Contractor:
   1. Attend a preconstruction meeting to review scope of structural testing and special inspection.
   2. Post or make available the structural testing and special inspection schedule within its office at the job site. Also, provide adequate notification to those parties designated on the schedule so they may properly prepare for and schedule their work.
   3. Provide special inspectors access to the approved plans and specifications at the job site.
   4. Review all reports issued by special inspectors.
   5. Retain, at the job site, all reports submitted by the special inspectors for review on the Building Official's request.
   6. Correct deficiencies identified in inspection or testing reports in a timely manner.
   7. Provide safe access to the work requiring inspection or testing.
   8. Provide labor and facilities to provide access to the work, to obtain, handle and deliver samples, to facilitate testing and inspection and for storage and curing of test samples.
   9. Verify conformance of the work with specified construction tolerances.

10. Inspections by Building Official: Provide adequate notice for inspections performed by the building official, as required by IBC Section 109, the Minnesota State Building Code, and local ordinances.
11. Sign the structural testing and special inspection schedule in conjunction with other responsible parties prior to commencing construction.

D. Fabricator:
1. Submit a Certificate of Compliance to the Building Official, Special Inspector, and SER that the work was performed in accordance with the approved plans and specifications.
2. Sign the structural testing and special inspection schedule in conjunction with other responsible parties prior to commencing construction.

E. Owner:
1. Establish direct funding to provide for cost of structural testing and special inspection services.
2. Provide special inspector with approved plans, specifications and approved shop drawings.
3. Provide special inspectors and testing agencies with full access to the site at all times.
4. Sign the Structural testing and special inspection schedule in conjunction with other responsible parties.

1.07 PAYMENT

A. Owner or Architect/SER, acting as the Owner's agent, will employ and pay for services of the special inspectors and testing agency to perform required structural testing and special inspection.

B. Unless noted otherwise, the Contractor shall provide and pay for all materials, samples, mock-ups, and assemblies required for testing and inspection and shall pay for shipping costs related to delivery of such items. Testing agency will pay for shipping costs of samples transported from site to lab.

C. If items requiring testing or inspection are enclosed, embedded or obscured prior to testing or inspection or if such items are placed without tests or inspections, the Contractor shall pay for the costs of any exploratory work deemed necessary by the Architect/SER to verify compliance with the Contract Documents.

D. Contractor shall pay for the costs of any retests or re-inspections caused by work that does not comply with the Contract Documents based on initial tests or inspections, or work that is later revised or replaced by the Contractor. This does not include revisions requested by the Owner.

1.08 INSPECTION NOTICE

A. Provide minimum of 24 hours notice for all items requiring testing or inspection. Items requiring testing and inspection services prior to or during placement shall not be placed until testing and inspection services are available. Items requiring testing and inspection services after placement shall not be enclosed or obscured until testing and inspection services are performed.

1.09 REPORTS

A. Testing agency and special inspectors shall submit reports for structural testing and special inspection in a timely manner to the Contractor, Building Official, SER, and Architect of Record. Provide reports of daily activities to the SER and Contractor. Submit reports to the Contractor on a daily basis and to the SER on a daily or weekly basis. Provide summary reports to the Building Official and Architect on a monthly basis unless they request otherwise.

B. Provide reports for ongoing work, containing the following information:
1. Date issued.
2. Project title and number.
3. Firm name and address.
4. Name and signature of tester or inspector.
5. Date and time of sampling, test, or inspection.

6. Identification of product and specification section.
7. Location in project, including elevations, grid location and detail.
8. Type of test or inspection.
9. Whether test specimens, test results or observations indicate compliance with Contract Documents. Specifically state any discrepancies
10. Types and locations of discrepancies found in work
11. Work required performed to correct discrepancies and work performed to correct previously noted discrepancies. Discrepancies corrected during an inspection need not be reported
12. Submit certified final special inspection report stating that, to the best of the special inspector's knowledge, the work requiring special inspection conformed to the Construction Documents.

1.10 FREQUENCY OF TESTING AND INSPECTION

A. For detailed requirements, see individual technical specification sections and the structural testing and special inspection schedule.

1.11 PROTECTION AND REPAIR

A. Upon completion of testing, sample-taking, or inspection, the Contractor shall repair damaged work and restore substrates and finishes to eliminate deficiencies, including deficiencies in the visual qualities of exposed surfaces, as judged solely by the Architect/SER. Protect work exposed by or for testing and/or inspection and protect repaired work. Repair and protection is the Contractor's responsibility, regardless of the assignment of responsibility for testing and/or inspection.

1.12 TESTS TO DEMONSTRATE QUALIFICATION

A. Any tests required to qualify the Contractor or the workers for any phase of the work, shall be performed at no additional cost to the Owner.

B. If the Contractor proposes a product material, method, or other system that has not been pre-qualified, the Architect/SER may require applicable tests to establish a basis for acceptance or rejection. The Contractor shall pay for these tests.

C. The Architect/Engineer of Record reserves the right to require certification or other proof that the system proposed is in compliance with specified tests, criteria or standards. A representative of an independent testing agency shall sign the certificate.

1.13 STRUCTURAL TESTING AND SPECIAL INSPECTION Schedule

A. The parties involved shall complete and sign the structural testing and special inspection schedule. Schedule to be complete at time of permit issuance.

B. The completed schedule is an element of the construction documents and after permit issuance, becomes part of the building department approved plans and specifications

END OF SECTION

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 for 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, all pressure ranges; including variable volume systems.
2. Return air systems.
3. Exhaust air 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
      5) Special Systems
      6) Sound and Vibration Systems
      7) Domestic Hot Water Recirculation Loop

   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

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 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.

3.03 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.

3.04 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. Verification controls systems for all systems as defined in Division 23 Control Specifications.

2. 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.

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. Housekeeping and waste disposal facilities.
2. Construction aids and miscellaneous services and facilities.
3. Temporary heating, cooling, and ventilation.
4. Temporary power and lighting.

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

1. Pest control.
2. Security enclosure and lockup.
3. Barricades, warning signs, and lights.
4. 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.

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

C. 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.

D. 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.

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

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

G. Water: Potable.

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

I. 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.

C. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking-water fixtures. Comply with regulations and health codes for type, number, location, operation, and maintenance of fixtures and facilities.

1. Disposable Supplies: Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Maintain adequate supply. Provide covered waste containers for disposal of used material.

2. Provide safety showers, eyewash fountains, and similar facilities for convenience, safety, and sanitation of personnel as required by government jurisdictions.

3. 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.

D. 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.

E. 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.

G. Telephone Service: Provide temporary telephone service throughout construction period for common-use facilities used by all personnel engaged in construction activities. Install separate telephone line for each field office and first-aid station.

1. Provide additional telephone lines for the following:

a. Provide a dedicated telephone line for each facsimile machine and computer with modem in each field office.

2. Provide an answering machine or voice-mail service on superintendent's telephone.

3. Provide a portable cellular telephone for superintendent's use in making and receiving telephone calls when away from field office.

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. Common-Use Field Office: Provide an insulated, weather-tight, air-conditioned field office for use as a common facility by all personnel engaged in construction activities; of sufficient size to accommodate required office personnel and meetings of 12 persons at Project site. Keep office clean and orderly.

1. Furnish and equip offices as follows:

a. Desk and four chairs, file cabinets in quantities to file shop drawings, supplemental instructions, proposal requests, and change orders, a plan table, a plan rack, and bookcase to store project manuals, detail books, and addenda.

b. Provide a room of not less than 240 sq. ft. for Project meetings. Furnish room with conference table, 12 folding chairs, and 4-foot square markerboard.

F. 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.

G. 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.

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.

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