The technical material and data contained in the Specifications were prepared under the supervision and direction of the undersigned, whose seal as a Professional Architect, licensed in the State of New Mexico, is affixed above.

All questions about the meaning or intent of these documents shall be submitted only to the Architect of Record, stated above, in writing.

Richard Haas, AIA
February 19, 2020
ARCHITECT OF RECORD

NMSU JETT HALL RM. 292
FUME HOOD REPLACEMENT

February 19, 2020
NMSU Project #3578
Desert Peak Project # 206-108
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Per NMSU Invitation to Bid Document and Supplemental Conditions

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Not Applicable

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Not Applicable
SECTION 01 1000 - SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Work covered by the Contract Documents.
2. Use of premises.
3. Owner's occupancy requirements.
4. Specification formats and conventions.
5. Work under other contracts.
6. Site cleaning.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. Project Identification: NMSU Jett Hall Rm. 292 Fume Hood Replacement

Desert Peak Architects Project No. 206-106

1. Project Location: Jett Hall - New Mexico State University – 1040 South Horseshoe St., Las Cruces NM 88001

B. Owner: New Mexico State University, P.O. Box 30001, Las Cruces, NM.

1. Owner's Representative: Michael Nevarez, Project Manager, New Mexico State University, P.O. Box 30001, MSC 3545, Las Cruces, NM 88003.

C. Architect: Richard Haas, Desert Peak Architects, P.C. 311 N. Main St., Las Cruces, NM.

D. The Work consists of the following:

1. The Base Bid Work includes:
   a. Removal of existing fume hood as indicated on drawings.
   b. Installation of new fume hood per specifications. Modifications to existing electrical, mechanical and plumbing infrastructure as indicated on drawings.
   c. Removal and replacement of existing ceiling tiles as required to conduct the work. The contractor is responsible for replacing ceiling tiles that are damaged during construction.
   d. ASHRAE field testing and certification by qualified technician prior to initial use.

E. Project will be constructed under a single prime contract.
1.3 USE OF PREMISES

A. General: Contractor shall have limited use of premises for construction operations. Contractor to coordinate with Owner for site access and allowable areas for construction operations.

B. Use of Site: Limit use of premises to areas within the Contract limits indicated by Owner. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Owner Occupancy: Allow for Owner occupancy of Project site and use by the public.
2. Driveways and Entrances: Keep driveways 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.

C. 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.

D. Schedule of Construction*
   1. 03/20/2020 – Finalization of CES contract / Notice to Proceed
   2. 04/29/2020 – Construction Completion; Certificate of Occupancy

*Schedule for Construction is subject to change.

1.4 CONTRACTOR'S DUTIES

A. Secure and pay for permits, fees, and licenses necessary for execution of Work as applicable at time of receipt of bids or as otherwise required in other sections of the Specifications.

B. Secure and pay for utility meters, including impact and development fees. Give required notices.

C. Comply with codes, ordinances, regulations, and other legal requirements of public authorities which bear on performance of Work.

1.5 OWNER'S OCCUPANCY REQUIREMENTS

A. Full Owner Occupancy: Owner will occupy site and portions of the 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.
1.6 WORK RESTRICTIONS

A. Nonsmoking Building: Smoking is not permitted within the building or within 25 feet (8 m) of entrances, operable windows, or outdoor air intakes.

1.7 SPECIFICATION FORMATS AND CONVENTIONS

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

1.8 WORK UNDER OTHER CONTRACTS

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

B. Concurrent Work: Owner will award separate contract(s) for the following construction operations at Project site. Those operations will be conducted simultaneously with work under this Contract.

C. Items noted NIC (Not in Contract) will be supplied by Owner and installed by Contractor, when noted, before Substantial Completion.

1.8 SITE CLEANING

A. See Division 2 Section "Site Cleaning" for these requirements.
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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01100
SECTION 01 2600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY
   A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.

1.2 MINOR CHANGES IN THE WORK
   A. Architect will issue supplemental instructions authorizing Minor Changes in the Work, not involving adjustment to the Contract Sum or the Contract Time as authorized by the General Conditions.

1.3 PROPOSAL REQUESTS
   A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

   1. Proposal Requests issued by Architect are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
   2. Within 10 days after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
      a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
      b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
      c. Include costs of labor and supervision directly attributable to the change.
      d. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
      e. Limit mark-ups as stipulated in the general conditions.

   B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by submitting a request for a change to Architect.

   1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
   2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.

4. Include costs of labor and supervision directly attributable to the change.

5. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

6. Comply with requirements in Division 1 Section "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.

7. Limit mark-ups as stipulated in the general conditions.

C. Stipulated Sum/Price Change Order: Based on Proposal Requests and Contractor's fixed price quotation or Contractor's request for a Change Order as approved by the Architect.

1.4 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on New Mexico State University Standard Change Order Form.

1.5 CONSTRUCTION CHANGE DIRECTIVE


1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01250
NMSU JETT HALL FUME HOOD REPLACEMENT

SECTION 01 2900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.

1.2 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.

1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including Application for Payment forms with Continuation Sheets, and Contractor's Construction Schedule.

2. Submit the Schedule of Values to Architect at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.

B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the Schedule of Values:

   a. Project name and location.
   b. Name of Architect.
   c. Architect's project number.
   d. Contractor's name and address.
   e. Date of submittal.

2. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate. Include separate line items under required principal subcontracts for operation and maintenance manuals, punch list activities, Project Record Documents, and demonstration and training in the amount of 3 percent of the Contract Sum.

3. Round amounts to nearest whole dollar; total shall equal the Contract Sum.

4. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

5. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.

6. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.

7. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.3 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.

1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

B. Payment Application Times: See General Conditions of the Contract.

C. Payment Application Forms: Use New Mexico State University Standard Form – Application and Certificate for Payment and AIA Document G703 Continuation Sheets as form for Applications for Payment.

D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.

1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.

E. Transmittal: Submit two copies signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt. One copy shall include waivers of lien and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

F. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of Values.
3. Contractor's Construction Schedule (preliminary if not final).
4. Submittals Schedule (preliminary if not final).
5. List of Contractor's staff assignments.

G. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete, less amounts for close-out documentation.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

H. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Contract Sum.
4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
6. AIA Document G707, "Consent of Surety to Final Payment."
7. Evidence that claims have been settled.
8. Contractor’s "Letter of Warrantee" for a one-year period.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01290
SECTION 01 3100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. Project meetings.
2. Requests for Interpretation (RFIs).

B. See Division 1 Section "Execution Requirements" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.

1.2 DEFINITIONS

A. RFI: Request from Contractor seeking interpretation or clarification of the Contract Documents.

1.3 COORDINATION

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, depending on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.
4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.

B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts.
and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's Construction Schedule.
2. Preparation of the Schedule of Values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.
9. Project closeout activities.

1.4 PROJECT MEETINGS

A. General: The Architect will coordinate, and schedule meetings and conferences at Project site, unless otherwise indicated.

1. Attendees: Contractor will determine, and inform participants and individuals whose presence is required, of date and time of each meeting. The Architect will notify the Owner of scheduled meeting dates and times.
2. Agenda: The Architect will prepare and distribute the meeting agenda to all invited attendees.
3. Minutes: The Architect will record significant discussions and agreements achieved and distribute the meeting minutes to everyone concerned, including Owner, within five days of the meeting.

B. Preconstruction Conference: The Owner will schedule a preconstruction conference before starting construction, no later than 15 days after execution of the Agreement. Hold the conference at Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.

1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Discuss items of significance that could affect progress, including the following:
   
a. Tentative construction schedule.
b. Critical work sequencing and long-lead items.
c. Designation of key personnel and their duties.
d. Procedures for processing field decisions and Change Orders.
e. Procedures for RFI's.
f. Procedures for testing and inspecting.
g. Procedures for processing Applications for Payment.
h. Distribution of the Contract Documents.
i. Submittal procedures.
j. Preparation of Record Documents.
k. Use of the premises and existing building.
1. Work restrictions.
m. Owner's occupancy requirements.
n. Responsibility for temporary facilities and controls.
o. Construction waste management and recycling.
p. Parking availability.
q. Office, work, and storage areas.
r. Equipment deliveries and priorities.
s. First aid.
t. Security.
u. Progress cleaning.
v. Working hours.

3. Minutes: Record and distribute meeting minutes.

C. Preinstallation Conferences: The Contractor will conduct a pre-installation conference at Project site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.

2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

   b. Options.
   c. Related RFI’s.
   d. Related Change Orders.
   e. Purchases.
   f. Deliveries.
   g. Submittals.
   h. Review of mockups.
   i. Possible conflicts.
   j. Compatibility problems.
   k. Time schedules.
   l. Weather limitations.
   m. Manufacturer's written recommendations.
   n. Warranty requirements.
   o. Compatibility of materials.
   p. Acceptability of substrates.
   q. Temporary facilities and controls.
   r. Space and access limitations.
   s. Regulations of authorities having jurisdiction.
   t. Testing and inspecting requirements.
   u. Installation procedures.
   v. Coordination with other work.
   w. Required performance results.
   x. Protection of adjacent work.
   y. Protection of construction and personnel.
3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.
5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Progress Meetings: The Contractor will conduct progress meetings at regular intervals. Coordinate dates of meetings with preparation of payment requests.

1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.

2. The Contractor shall provide an Agenda for each progress meeting

3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

   1) Review schedule for next period.

b. Review present and future needs of each entity present, including the following:

   1) Interface requirements.
   2) Sequence of operations.
   3) Status of submittals.
   4) Deliveries.
   5) Off-site fabrication.
   6) Access.
   7) Site utilization.
   8) Temporary facilities and controls.
   9) Work hours.
  10) Hazards and risks.
  11) Progress cleaning.
  12) Quality and work standards.
  13) Status of correction of deficient items.
  14) Field observations.
  15) RFIs.
  16) Status of proposal requests.
  17) Pending changes.
  18) Status of Change Orders.
19) Pending claims and disputes.
20) Documentation of information for payment requests.

4. Minutes: The Contractor shall record the meeting minutes.
5. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.
   a. Schedule Updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

1.5 REQUESTS FOR INTERPRETATION (RFIs)

A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI in the form specified.

1. RFIs shall originate with Contractor. RFIs submitted by entities other than Contractor will be returned with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing interpretation and the following:

1. Project name.
2. Date.
3. Name of Contractor.
5. RFI number, numbered sequentially.
6. Specification Section number and title and related paragraphs, as appropriate.
7. Drawing number and detail references, as appropriate.
8. Field dimensions and conditions, as appropriate.
9. Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
10. Contractor's signature.
11. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.

C. Architect's Action: Architect will review each RFI, determine action required, and return it. Allow seven working days for Architect's response for each RFI.

1. The following RFIs will be returned without action:
   a. Requests for approval of submittals.
   b. Requests for approval of substitutions.
   c. Requests for coordination information already indicated in the Contract Documents.
   d. Requests for adjustments in the Contract Time or the Contract Sum.
   e. Requests for interpretation of Architect's actions on submittals.
f. Incomplete RFIs or RFIs with numerous errors.

2. Architect's action may include a request for additional information, in which case Architect's time for response will start again.

3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 1 Section "Contract Modifications."

D. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Include the following:

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect.
4. RFI number including RFIs that were dropped and not submitted.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's response was received.
8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01310
SECTION 01 3200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 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 Schedule.
2. Submittals Schedule.
3. Daily construction reports.
4. Field condition reports.
5. Prevailing wage reports.
6. As-builts.

B. See Division 1 Section "Payment Procedures" for submitting the Schedule of Values.

1.2 COORDINATION

A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.

B. Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from parties involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 SUBMITTALS SCHEDULE

A. Preparation: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, re-submit, ordering, manufacturing, fabrication, and delivery when establishing dates.

1. Coordinate Submittals Schedule with list of subcontracts, the Schedule of Values, and Contractor's Construction Schedule.
2. Submit concurrently with the first complete submittal of Contractor's Construction Schedule.
2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Substantial Completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

B. Activities: Treat each story or separate area as a separate numbered activity for each principal element of the Work. Comply with the following:

1. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
2. Submittal Review Time: Include review and resubmittal times indicated in Division 1 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with Submittals Schedule.
3. Startup and Testing Time: Include not less than 30 days for startup and testing.
4. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.

C. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion.

D. Contract Modifications: For each proposed contract modification and concurrent with its submission, complete a time-impact analysis to demonstrate the effect of the proposed change on the overall project schedule.

2.3 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:

1. List of subcontractors at Project site.
2. Equipment at Project site.
3. Material deliveries.
4. High and low temperatures and general weather conditions.
5. Accidents.
7. Meter readings and similar recordings.
8. Orders and requests of authorities having jurisdiction.
9. Services connected and disconnected.
10. Equipment or system tests and startups.

B. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a request for interpretation. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.
PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule before each regularly scheduled progress meeting.

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.
2. As the Work progresses, indicate Actual Completion percentage for each activity.

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.

3.2 AS-BUILTS

A. Maintain on site a set of Drawings to document as-built conditions, and keep up-to-date with all revisions to the work and deviations from the plans. As-built documents shall be reviewed by the Architect upon the completion of the work.

END OF SECTION 01320
SECTION 01 3300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1  SUMMARY

A.  This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B.  See Division 1 Section "Construction Progress Documentation" for submitting schedules and reports.

C.  See Division 1 Section "Quality Requirements" for submitting test and inspection reports.

D.  See Division 1 Section "Closeout Procedures" for submitting warranties.

E.  See Division 1 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.

F.  See Division 1 Section "Operation and Maintenance Data" for submitting operation and maintenance manuals.

1.2  DEFINITIONS

A.  Action Submittals: Written and graphic information that requires Architect's responsive action.

B.  Informational Submittals: Written information that does not require Architect's responsive action. Submittals may be rejected for not complying with requirements.

1.3  SUBMITTAL PROCEDURES

A.  Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1.  Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

2.  Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

   a.  Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

B.  Submittals Schedule: Comply with requirements in Division 1 Section "Construction Progress Documentation" for list of submittals and time requirements for scheduled performance of related construction activities.
C. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow 15 days for review of each resubmittal.

D. Identification: Place a permanent label or title block on each submittal for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space on label or beside title block to record Contractor's review and approval markings.
3. Include the following information on label for processing and recording action taken:
   a. Project name.
   b. Date.
   c. Name and address of Architect.
   d. Name and address of Contractor.
   e. Name and address of subcontractor.
   f. Name and address of supplier.
   g. Name of manufacturer.
   h. Submittal number or other unique identifier, including revision identifier.
   i. Number and title of appropriate Specification Section.
   j. Drawing number and detail references, as appropriate.
   k. Location(s) where product is to be installed, as appropriate.
   l. Other necessary identification.

E. Deviations: Highlight, encircle, or otherwise specifically identify deviations from the Contract Documents on submittals.

F. Additional Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.

G. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return submittals, without review, received from sources other than Contractor.

H. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked "APPROVED AS NOTED."
I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

J. Use for Construction: Use only final submittals with mark indicating "APPROVED" taken by Architect.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

A. General: Prepare and submit Action Submittals required by individual Specification Sections.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.

2. Mark each copy of each submittal to show which products and options are applicable.

3. Include the following information, as applicable:
   a. Manufacturer's written recommendations.
   b. Manufacturer's product specifications.
   c. Manufacturer's installation instructions.
   d. Manufacturer's catalog cuts.
   e. Wiring diagrams showing factory-installed wiring.
   f. Printed performance curves.
   g. Operational range diagrams.
   h. Compliance with specified referenced standards.
   i. Testing by recognized testing agency.

4. Number of Copies: Submit Product Data digitally, unless otherwise indicated. Architect will return a copy of the submittal indicating required action, if any. Mark up and retain one returned copy as a Project Record Document.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal of Architect's CAD Drawings is otherwise permitted.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
   a. Dimensions.
   b. Identification of products.
   c. Fabrication and installation drawings.
   d. Roughing-in and setting diagrams.
   e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
   f. Shopwork manufacturing instructions.
g. Templates and patterns.
h. Schedules.
i. Notation of coordination requirements.
j. Notation of dimensions established by field measurement.
k. Relationship to adjoining construction clearly indicated.
l. Seal and signature of professional engineer if specified.
m. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches (215 by 280 mm) but no larger than 24 by 36 inches (610 by 915 mm).

3. Number of Copies: Submit two opaque (bond) copies of each submittal or a digital copy of each submittal. Architect will return one copy if hard copies are received.

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:
   a. Generic description of Sample.
   b. Product name and name of manufacturer.
   c. Sample source.
   d. Number and title of appropriate Specification Section.

3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
   a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.

E. Submittals Schedule: Comply with requirements specified in Division 1 Section "Construction Progress Documentation."

F. Application for Payment: Comply with requirements specified in Division 1 Section "Payment Procedures."

G. Schedule of Values: Comply with requirements specified in Division 1 Section "Payment Procedures."

H. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design.
2.2 INFORMATIONAL SUBMITTALS

A. General: Prepare and submit Informational Submittals required by other Specification Sections.

1. Number of Copies: Submit two copies of each submittal or one digital copy, unless otherwise indicated. Architect will not return copies.

2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

3. Test and Inspection Reports: Comply with requirements specified in Division 1 Section "Quality Requirements."

B. Coordination Drawings: Comply with requirements specified in Division 1 Section "Project Management and Coordination."

C. Contractor's Construction Schedule: Comply with requirements specified in Division 1 Section "Construction Progress Documentation."

D. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

E. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.

F. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

G. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

H. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

I. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

J. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

K. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
L. Research/Evaluation Reports: Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project.

M. Preconstruction Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

N. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

O. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

P. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements specified in Division 1 Section "Operation and Maintenance Data."

Q. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

R. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer.

S. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:

2. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
3. Results of operational and other tests and a statement of whether observed performance complies with requirements.

T. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.

U. Material Safety Data Sheets (MSDSs): Submit information directly to Owner; do not submit to Architect.
PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:

1. Final Unrestricted Release: When submittals are marked "Approved", that part of the work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents; final acceptance will depend upon that compliance.

2. Final-But-Restricted Release: When submittals are marked "Approved as noted", that part of the work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents; final acceptance will depend on that compliance.

3. Returned for Resubmittal: When submittals are marked "Revise and Resubmit", do not proceed with that part of the work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal in accordance with the notations; resubmit without delay. Repeat if necessary to obtain a different action mark.
   a. Do not permit submittals marked "Revise and Resubmit" to be used at the Project Site, or elsewhere where work is in progress.

C. Informational Submittals: Architect will review each submittal and will not return it, will return it if it does not comply with requirements, or return it marked "Action not required". Architect will forward each submittal to appropriate party.

D. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.
E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 01330
SECTION 01 4000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for quality assurance and quality control to be coordinated and paid by the Contractor.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.

2. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

C. See Divisions 2 through 16 Sections for specific test and inspection requirements.

1.2 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.

C. Preconstruction Testing: Tests and inspections that are performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.

D. Product Testing: Tests and inspections that are performed by a testing agency qualified to conduct product testing and acceptable to the Owner, to establish product performance and compliance with industry standards.

E. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.

F. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
G. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

H. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

I. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.3 CONFLICTING REQUIREMENTS

A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Architect for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.4 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

C. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or products that are similar to those indicated for this Project in material, design, and extent.
F. Testing Agency Qualifications: An independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 548; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.

G. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

1.5 QUALITY CONTROL

A. Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.

1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

B. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 1 Section "Submittal Procedures."

C. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.


1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.

E. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

F. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01400
SECTION 01 5000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

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

B. See Division 1 Section "Execution Requirements" for progress cleaning requirements.

C. See Divisions 2 through 16 Sections for temporary heat, ventilation, and humidity requirements for products in those Sections.

1.2 DEFINITIONS

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

1.3 USE CHARGES

A. General: Cost or use charges for temporary facilities shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Architect, testing agencies, and authorities having jurisdiction.

B. Water Service: Water from Owner's existing water system is available for use without metering and without payment of use charges. Contractor may provide connections and extensions of services as required for construction operations. Restore sources to as-found or specified conditions at Contract Closeout.

C. Electric Power Service: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations. Restore sources to as-found or specified conditions at Contract Closeout.

D. Telephone Service: Provide telephone service for use by supervisory personnel. Monthly cost of service shall be paid by the Contractor.

1.4 SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.
1.5 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.6 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Chain-Link Fencing: Panelized 6 foot high commercial grade chain link fence. Equip with vehicular and pedestrian gates with locks.

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

C. Gypsum Board: Minimum 1/2 inch (12.7 mm) thick by 48 inches (1219 mm) wide by maximum available lengths; regular-type panels with tapered edges. Comply with ASTM C 36/C 36M.

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

2.2 TEMPORARY FACILITIES

A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

B. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC 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 for type of fuel being consumed, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return air grille in system and remove at end of construction.

PART 3 - EXECUTION

3.1 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 by progress of the Work.

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

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.

C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.

D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

E. 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 that will not have a harmful effect on completed installations or elements being installed.

F. 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 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.

G. Electric Power Service: Use of Owner's existing electric power service will be permitted, as long as equipment is maintained in a condition acceptable to Owner.

H. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
   1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

I. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install one telephone line(s) for each field office.

J. Electronic Communication Service: Provide temporary electronic communication service, i.e. facsimile machine, or computer with access to electronic mail in field office.

3.3 SUPPORT FACILITIES INSTALLATION

A. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas in same location as permanent roads and paved areas. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.
   1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
   2. Recondition base after temporary use, including removing contaminated material, re-grading, proof-rolling, compacting, and testing.

B. Traffic Controls: Comply with requirements of authorities having jurisdiction.
   1. Protect existing site improvements to remain including curbs, pavement, and utilities.
   2. Maintain access for fire-fighting equipment and access to fire hydrants.

C. Parking: Use designated areas of Owner's existing parking areas for construction personnel.

D. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

E. Project Identification and Temporary Signs: Provide Project identification and other signs as indicated on Drawings. Install signs where indicated to inform public and individuals seeking entrance to Project. Unauthorized signs are not permitted.

F. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with Division 1 Section "Execution Requirements" for progress cleaning requirements.

G. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
H. Temporary Elevator Use: Refer to Division 14 Sections for temporary use of new elevators.

I. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.

J. Temporary Use of Permanent Stairs: Cover finished, permanent stairs with protective covering of plywood or similar material so finishes will be undamaged at time of acceptance.

3.4 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.

B. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.

C. Stormwater Control: Comply with storm water pollution prevention plan. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

D. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

E. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Obtain extended warranty for Owner. Perform control operations lawfully, using environmentally safe materials.

F. Site Enclosure Fence: When excavation begins, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.

   1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.

   2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Provide Owner with one set of keys.

G. 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.

H. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
I. 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 weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.

J. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner from fumes and noise.

1. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire-retardant plywood on construction operations side.
2. Insulate partitions to provide noise protection to occupied areas.
3. Seal joints and perimeter. Equip partitions with dustproof doors and security locks.
4. Protect air-handling equipment.
5. Weather strip openings.
6. Provide walk-off mats at each entrance through temporary partition.


1. Prohibit smoking in construction areas.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.5 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.

C. Temporary Facility Changeover: 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 property of Contractor. Owner reserves right to take possession of Project identification signs.
2. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 1 Section "Closeout Procedures."

END OF SECTION 01500
SECTION 01 6000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; product substitutions; and comparable products.

B. See Division 1 Section "Closeout Procedures" for submitting warranties for Contract closeout.

C. See Divisions 2 through 16 Sections for specific requirements for warranties on products and installations specified to be warranted.

1.2 DEFINITIONS

A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown, or listed in manufacturer's published product literature that is current as of date of the Contract Documents.

2. New Products: Items that have not previously been incorporated into another project or facility, except that products consisting of recycled-content materials are allowed, unless explicitly stated otherwise. Products salvaged or recycled from other projects are not considered new products.

3. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

C. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.

1.3 SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
1. **Documentation:** Show compliance with requirements for substitutions and the following, as applicable:
   
a. Statement indicating why specified material or product cannot be provided.
b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction that will be necessary to accommodate proposed substitution.
c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.
f. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
h. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
i. Detailed comparison of Contractor's Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery.
j. Cost information, including a proposal of change, if any, in the Contract Sum.
k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

2. **Architect's Action:** If necessary, Architect will request additional information or documentation for evaluation within 7 days of receipt of a request for substitution.

B. **Comparable Product Requests:** Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. **Architect's Action:** If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request.

C. **Basis-of-Design Product Specification Submittal:** Comply with requirements in Division 1 Section "Submittal Procedures." Show compliance with requirements.
1.4 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Store cementitious products and materials on elevated platforms.
5. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
7. Protect stored products from damage and liquids from freezing.

1.6 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using appropriate form properly executed.
3. Refer to Divisions 2 through 16 Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Division 1 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, that are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.

B. Product Selection Procedures:

1. Product: Where Specifications name a single product and manufacturer, provide the named product that complies with requirements.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements.
3. Available Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
4. Available Manufacturers: Where Specifications include a list of manufacturers, provide a product by one of the manufacturers listed, or an unnamed manufacturer, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
5. **Product Options:** Where Specifications indicate that sizes, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide the specified product or system. Comply with provisions in Part 2 "Product Substitutions" Article for consideration of an unnamed product or system.

6. **Basis-of-Design Product:** Where Specifications name a product and include a list of manufacturers, provide the specified product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product by the other named manufacturers.

7. **Visual Matching Specification:** Where Specifications require matching an established Sample, select a product that complies with requirements. Architect's decision will be final on whether a proposed product matches.
   
a. If no product available within specified category matches and complies with other specified requirements, comply with provisions in Part 2 "Product Substitutions" Article for proposal of product.

8. **Visual Selection Specification:** Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product that complies with other specified requirements.
   
a. **Standard Range:** Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that does not include premium items.

b. **Full Range:** Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 **PRODUCT SUBSTITUTIONS**

   **A. Timing:** Architect will consider requests for substitution if received within 60 days after commencement of the Work. Requests received after that time may be considered or rejected at discretion of Architect.

   **B. Conditions:** Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

1. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.

2. Requested substitution does not require extensive revisions to the Contract Documents.

3. Requested substitution is consistent with the Contract Documents and will produce indicated results.

4. Substitution request is fully documented and properly submitted.
5. Requested substitution will not adversely affect Contractor's Construction Schedule.
6. Requested substitution has received necessary approvals of authorities having jurisdiction.
7. Requested substitution is compatible with other portions of the Work.
8. Requested substitution has been coordinated with other portions of the Work.
9. Requested substitution provides specified warranty.

2.3 COMPARABLE PRODUCTS

A. Conditions: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require extensive revisions to the Contract Documents, whether consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01600
SECTION 01 7000 - EXECUTION REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:

2. Field engineering and surveying.
4. Progress cleaning.
5. Starting and adjusting.
6. Protection of installed construction.
7. Correction of the Work.

B. See Division 1 Section "Closeout Procedures" for submitting final Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.

1. Before construction, verify the location and points of connection of utility services.

B. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction affecting the Work.

1. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

C. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
2. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
3. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
4. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.


3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.

B. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and invert elevations.

C. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

D. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.
3.4 FIELD ENGINEERING

A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

B. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.

1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.

3.5 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

G. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.

2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F (27 deg C).
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
J. Limiting Exposures: Supervise construction operations to assure that no part of the construction completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.7 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Division 1 Section "Quality Requirements."

3.8 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.9 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 1 Section "Selective Demolition."

   1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

B. Restore permanent facilities used during construction to their specified condition.

C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.

D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 01700
SECTION 01 7419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for the following:
   1. Recycling nonhazardous construction waste.
   2. Disposing of nonhazardous construction waste.

B. Contractor will provide solid waste and recyclable containers, and bear the associated cost of disposal.

1.2 DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

C. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

1.3 QUALITY ASSURANCE

A. Waste Management Training: Conduct training at Project site.

1.4 WASTE MANAGEMENT

A. Waste Identification: Indicate anticipated types and quantities of demolition, site-clearing, and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.

B. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
   1. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
   2. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
3. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 IMPLEMENTATION

A. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management. Coordinator shall be present at Project site full time for duration of Project.

B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.
   1. Educate entities when they first begin work on-site on waste management effort. Review procedures and locations established for salvage, recycling, and disposal.

C. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
   1. Designate specific areas on Project site necessary for separating materials that are to be salvaged, recycled, or reused.
   2. Comply with Division 1 Section "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 RECYCLING CONSTRUCTION WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers.

B. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical.
   1. Contractor will provide appropriately marked containers or bins for controlling recyclable and solid waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
      a. Inspect containers and bins for contamination and remove contaminated materials if found.
   2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
   3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
   4. Store components off the ground and protect from the weather.
3.3 RECYCLING CONSTRUCTION WASTE

A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

B. Site-Clearing Wastes: Chip brush, branches, and trees on-site.

C. Wood Materials:

1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

D. Gypsum Board: Stack large clean pieces on wood pallets and store in a dry location. Grind and arrange for delivery to City of Las Cruces Recycling Center.

3.4 DISPOSAL OF WASTE

A. Burning: Do not burn waste materials.

B. Disposal: Contractor will transport waste and recycled materials off property and legally dispose of them.
PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Inspection procedures.
2. Videotaping of systems specific training.
3. Warranties.
4. Final cleaning.

B. See Division 1 Section "Payment Procedures" for requirements for Applications for Payment for Substantial and Final Completion.

C. See Division 1 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.

D. See Division 1 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.

E. See Divisions 2 through 16 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

F. See Divisions 2 through 16 Sections for systems specific training requirements for the Work in those Sections.

1.2 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.

1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
2. Advise Owner of pending insurance changeover requirements.
3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications and similar documents.
4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
5. Prepare and submit Project Record Documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
7. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
8. Complete startup testing of systems.
10. Terminate and remove temporary facilities from Project site, construction tools, and similar elements.
11. Advise Owner of changeover in heat and other utilities.
12. Submit changeover information related to Owner's occupancy, use, operation, and maintenance. Provide videotaped training sessions for NMSU employee use for systems specific training.
13. Complete final cleaning requirements, including touchup painting.
14. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for Final Completion.

1.3 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:

1. Submit a final Application for Payment according to Division 1 Section "Payment Procedures."
2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.
1.4 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Preparation: Submit three copies of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.

1.5 WARRANTIES

A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.

B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (215-by-280-mm) paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

C. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

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

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:

   a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
   b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
   c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
   d. Remove tools, construction equipment, machinery, and surplus material from Project site.
   e. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
   f. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
   g. Sweep concrete floors broom clean in unoccupied spaces.
   h. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
   i. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
   j. Remove labels that are not permanent.
   k. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
   1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
   l. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
   m. Replace parts subject to unusual operating conditions.
   n. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
   o. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
   p. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
   q. Leave Project clean and ready for occupancy.
C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION 01770
PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Emergency manuals.
2. Operation manuals for systems, subsystems, and equipment.
3. Maintenance instructions for the care and maintenance of products, materials, finishes, systems and equipment.

B. See Divisions 2 through 16 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

1.2 SUBMITTALS

A. Manual: Submit one copy of each manual in final form at 75% project completion. Architect will return copy with comments within 15 days after initial submittal.

1. Correct or modify each manual to comply with Architect's comments. Submit 1 hard copy and one digital copy of each corrected manual within 10 days of receipt of Architect's comments.

PART 2 - PRODUCTS

2.1 MANUALS, GENERAL

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain a title page, table of contents, and manual contents.

B. Title Page: Enclose title page in transparent plastic sleeve. Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name, address, and telephone number of Contractor.
6. Name and address of Architect.
7. Cross-reference to related systems in other operation and maintenance manuals.
C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

1. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch (215-by-280-mm) paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
   a. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.

3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.

4. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
   a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
   b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.2 EMERGENCY MANUALS

A. Content: Organize manual into a separate section for type of emergency, emergency instructions, and emergency procedures.

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component for fire, gas leak, water leak, power failure, water outage, and equipment failure.

C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

D. Emergency Procedures: Include instructions on stopping, shutdown instructions for each type of emergency, operating instructions for conditions outside normal operating limits, and required sequences for electric or electronic systems.
2.3 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and equipment descriptions, operating standards, operating procedures, operating logs, wiring and control diagrams, and license requirements.

B. Descriptions: Include the following:

1. Product name and model number.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include start-up, break-in, and control procedures; stopping and normal shutdown instructions; routine, normal, seasonal, and weekend operating instructions; and required sequences for electric or electronic systems.

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

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

2.4 PRODUCT MAINTENANCE MANUAL

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

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

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

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

D. Maintenance Procedures: Include manufacturer's written recommendations and inspection procedures, types of cleaning agents, methods of cleaning, schedule for cleaning and maintenance, and repair instructions.
E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

2.5 SYSTEMS AND EQUIPMENT MAINTENANCE MANUAL

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

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

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including maintenance instructions, drawings and diagrams for maintenance, nomenclature of parts and components, and recommended spare parts for each component part or piece of equipment:

D. Maintenance Procedures: Include test and inspection instructions, troubleshooting guide, disassembly instructions, and adjusting instructions, that detail essential maintenance procedures:

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
B. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

C. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

D. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

E. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in Record Drawings to ensure correct illustration of completed installation.

1. Do not use original Project Record Documents as part of operation and maintenance manuals.

END OF SECTION 01782
SECTION 01 7839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for Project Record Documents prior to certification for final payment, and within 30 days of Substantial Completion, including the following:

1. Record Drawings (As-built).
2. Record Specifications.
3. Record Product Data.

B. See Division 1 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.

C. See Divisions 2 through 16 Sections for specific requirements for Project Record Documents of the Work in those Sections.

1.2 SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit copies of Record Drawings as follows:
   a. Initial Submittal: Near Substantial Completion of Work, submit one set of marked-up Record Prints completed from original Contract Documents that are acceptable to the Architect.
   b. Final Submittal: Architect will prepare the final Record Drawings submittal to the Owner.

B. Record Specifications: Submit one copy of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Submit one copy of each Product Data submittal.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of blue- or black-line white prints of the Contract Drawings and Shop Drawings marked prominently as "PROJECT RECORD DRAWINGS".

1. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data,
whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.

a.  Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
b.  Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.

2.  Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.

3.  Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B.  Record Drawings: Immediately before inspection for Certificate of Substantial Completion, review marked-up Record Prints with Architect. All final and revised as-built drawings and close-out documents are to be delivered to the Architect with delivery of the Substantial Completion document. The Architect will prepare a full set of corrected CAD Drawings of the Contract Drawings.

2.2 RECORD SPECIFICATIONS

A.  Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1.  Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.

2.  Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.

3.  Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.

4.  Note related Change Orders, Record Product Data, and Record Drawings where applicable.

2.3 RECORD PRODUCT DATA

A.  Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1.  Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.

2.  Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.

3.  Note related Change Orders, Record Specifications, and Record Drawings where applicable.
2.4 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.

B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.

END OF SECTION 01781
SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Interior gypsum board.
   2. Texture finishes.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.
B. Samples: For each texture finish indicated on same backing indicated for Work.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agent.

2.2 GYPSUM BOARD, GENERAL

A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following
   a. American Gypsum Co.
   b. BPB America Inc.
   c. G-P Gypsum.
   d. Lafarge North America Inc.
   e. National Gypsum Company.
NMSU JETT HALL FUME HOOD REPLACEMENT

f. PABCO Gypsum.
g. TempleInland.
h. USG Corporation

B. Gypsum Wallboard: ASTM C 1396/C 1396M.
   1. Thickness: 5/8 inch.
   2. Long Edges: Tapered.

C. Gypsum Board, Type X: ASTM C 1396/C 1396M.
   1. Thickness: 5/8 inch.
   2. Long Edges: Tapered.

D. Gypsum Ceiling Board: ASTM C 1396/C 1396M.
   1. Thickness: 5/8 inch.
   2. Long Edges: Tapered.

E. Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.
   1. Core: 5/8 inch Type X.
   2. Long Edges: Tapered.
   3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.4 SPECIALTY GYPSUM BOARD

A. Gypsum Board, Type C: ASTM C 1396/C 1396M. Manufactured to have increased fire-resistant capability.
   1. Thickness: As required by fire-resistance-rated assembly indicated on Drawings.
   2. Long Edges: Tapered.

2.5 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.
   1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet.
   2. Shapes:
      a. Cornerbead.
      b. Bullnose bead.
      c. LC-Bead: J-shaped; exposed long flange receives joint compound.
      d. L-Bead: L-shaped; exposed long flange receives joint compound.
      e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
      f. Expansion (control) joint.
      g. Curved-Edge Cornerbead: With notched or flexible flanges.

   1. Material: Hot-dip galvanized-steel sheet, plastic, or rolled zinc.
2. Shapes:
   a. Cornerbead.
   b. LC-Bead: J-shaped; exposed long flange receives joint compound.
   c. Expansion (Control) Joint: One-piece, rolled zinc with V-shaped slot and removable strip covering slot opening.

2.6 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:
   1. Interior Gypsum Board: Paper.
   4. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.
   1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
   2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping drying-type, all-purpose compound.
      a. Use setting-type compound for installing paper-faced metal trim accessories.
   3. Fill Coat: For second coat, use setting-type, sandable topping compound.
   4. Finish Coat: For third coat, use setting-type, sandable topping compound.
   5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound.

D. Joint Compound for Exterior Applications:
   1. Exterior Gypsum Soffit Board: Use setting-type taping compound and setting-type, sandable topping compound.
   2. Glass-Mat Gypsum Sheathing Board: As recommended by sheathing board manufacturer.

E. Joint Compound for Tile Backing Panels:
   1. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.
   2. Cementitious Backer Units: As recommended by backer unit manufacturer.

2.7 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.
B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

C. Steel Drill Screws: ASTM C 1002 unless otherwise indicated.
   1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
   2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

D. Sound-Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
   1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

E. Acoustical Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

F. Thermal Insulation: As specified in Section 072100 "Thermal Insulation."

G. Vapor Retarder: As specified in Section 072600 "Vapor Retarders."

2.8 TEXTURE FINISHES

A. Primer: As recommended by textured finish manufacturer.

B. Polystyrene Aggregate Ceiling Finish: Water-based, job-mixed, polystyrene aggregate finish with flame-spread and smoke-developed indexes of not more than 25 when tested according to ASTM E 84.
   1. Texture: match existing texture

C. Aggregate Finish: Water-based, job-mixed, aggregated, drying-type texture finish for spray application.
   1. Texture: match existing texture
PART 3 - EXECUTION

3.1 APPLYING AND FINISHING PANELS

A. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

B. Comply with ASTM C 840.

C. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

D. For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

E. Prefill open joints, rounded or beveled edges, and damaged surface areas.

F. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

G. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:

1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
2. Level 2: Panels that are substrate for tile.
3. Level 3: None.
4. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.
   a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

5. Level 5: All locations not noted above.
   a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

H. Glass-Mat Gypsum Sheathing Board: Finish according to manufacturer's written instructions for use as exposed soffit board.

I. Glass-Mat Faced Panels: Finish according to manufacturer's written instructions.

J. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.2 APPLYING TEXTURE FINISHES

A. Surface Preparation and Primer: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes. Apply primer to surfaces that are clean, dry, and smooth.
B. Texture Finish Application: Mix and apply finish using powered spray equipment, to produce a uniform texture matching approved mockup and free of starved spots or other evidence of thin application or of application patterns.

3.3 PROTECTION

A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

B. Remove and replace panels that are wet, moisture damaged, and mold damaged.

END OF SECTION 092900
SECTION 095000 - ACOUSTICAL TILE CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Acoustical ceiling panels
   2. Exposed grid suspension system
   3. Wire hangers, fasteners, main runners, cross tees, and wall angle molding
   4. Perimeter Trim

B. Alternates
   1. Prior Approval: Unless otherwise provided for in the Contract documents, proposed product substitutions may be submitted no later than TEN (10) working days prior to the date established for receipt of bids. Acceptability of a proposed substitution is contingent upon the Architect's review of the proposal for acceptability and approved products will be set forth by the Addenda. If included in a Bid are substitute products that have not been approved by Addenda, the specified products shall be provided without additional compensation.
   2. Submittals that do not provide adequate data for the product evaluation will not be considered. The proposed substitution must meet all requirements of this section, including but not necessarily limited to, the following: Single source materials suppliers (if specified in Section 1.5); Underwriters' Laboratories Classified Acoustical performance; Panel design, size, composition, color, and finish; Suspension system component profiles and sizes; Compliance with the referenced standards.

1.2 ACTION SUBMITTALS

A. Product Data: Submit manufacturer's technical data for each type of acoustical ceiling unit and suspension system required.

B. Samples: Minimum 6 inch x 6 inch samples of specified acoustical panel; 8 inch long samples of exposed wall molding and suspension system, including main runner and 4 foot cross tees.

C. Delegated-Design Submittal: For seismic restraints for ceiling systems.
   1. Include design calculations for seismic restraints including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

D. Shop Drawings: Layout and details of acoustical ceilings show locations of items that are to be coordinated with, or supported by the ceilings.

E. Acoustical Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and
standards. For acoustical performance, each carton of material must carry an approved independent laboratory classification of NRC, CAC, and AC.

1. If the material supplied by the acoustical subcontractor does not have an Underwriter's Laboratory classification of acoustical performance on every carton, subcontractor shall be required to send material from every production run appearing on the job to an independent or NVLAP approved laboratory for testing, at the architect's or owner's discretion. All products not conforming to manufacturer's current published values must be removed, disposed of and replaced with complying product at the expense of the Contractor performing the work.

F. Warranty information

G. Maintenance information

1.3 QUALITY ASSURANCE

A. Single-Source Responsibility: Provide acoustical panel units and grid components by a single manufacturer.

1. Fire Performance Characteristics: Identify acoustical ceiling components with appropriate markings of applicable testing and inspecting organization.

2. Surface Burning Characteristics: As follows, tested per ASTM E 84 and complying with ASTM E 1264 Classification.

3. Fire Resistance: As follows tested per ASTM E119 and listed in the appropriate floor or roof design in the Underwriters Laboratories Fire Resistance Directory

B. Coordination of Work: Coordinate acoustical ceiling work with installers of related work including, but not limited to building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver acoustical ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical ceiling units, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical ceiling units carefully to avoid chipping edges or damaged units in any way.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design seismic restraints for ceiling systems. A majority of the
existing ceiling grid is to remain in the project. Delegated design engineer to assess the seismic restraints of the existing ceiling and recommend corrections as required.

B. Seismic Performance: Suspended ceilings shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

C. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: Class A according to ASTM E 1264.
2. Smoke-Developed Index: 50 or less.

2.2 WARRANTY

1. Acoustic Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace panels that fail within the warranty period. Failures include, but are not limited to the following:
   a. Acoustical Panels: Sagging and warping
   b. Grid System: Rusting and manufacturer's defects

2. Warranty Period:
   a. Acoustical panels: One (1) year from date of substantial completion
   b. Grid: One (1) year from date of substantial completion

3. The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

2.3 MAINTENANCE

A. Extra Materials: Deliver extra materials to Owner. Furnish extra materials described below that match products installed. Packaged with protective covering for storage and identified with appropriate labels.

1. Acoustical Ceiling Units: Furnish quality of full-size units equal to 5.0 percent of amount installed.
2. Exposed Suspension System Components: Furnish quantity of each exposed suspension component equal to 2.0 percent of amount installed.

2.4 ACOUSTICAL TILES

A. Acoustical Tile Standard: Manufacturer's standard tiles of configuration indicated that comply with ASTM E 1264.

1. Contractor to replace ceiling tiles and grids damaged during construction with ceiling tiles and grids that match existing
2.5 METAL SUSPENSION SYSTEM

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

1. Seismic Secure Suspension System – Match Existing
2. Color: Match Existing

B. Metal Suspension-System – Match Existing

C. Direct-Hung, Double-Web Suspension System: Main and cross runners roll formed from and capped with cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized, G30 coating designation.

2. Access: Upward, with initial access openings of size indicated below and located throughout ceiling within each module formed by main and cross runners, with additional access available by progressively removing remaining acoustical tiles.

   a. Initial Access Opening: In each module, 24 by 24 inches.

2.6 ACCESSORIES

A. Attachment Devices: Size for five times the design load indicated in ASTM C 635/C 635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

B. Seismic Clips: Manufacturer's standard seismic clips designed to secure acoustical tiles in-place during a seismic event.

2.7 METAL EDGE MOLDINGS AND TRIM

A. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations complying with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for of suspension-system runners.

PART 3 - EXECUTION

3.1 PREPARATION

A. Measure each ceiling area and establish layout of acoustical tiles to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width tiles at borders unless otherwise indicated.

B. Layout openings for penetrations centered on the penetrating items.
3.2 INSTALLATION OF SUSPENDED ACOUSTICAL TILE CEILINGS

A. Install suspended acoustical tile ceilings according to ASTM C 636/C 636M, seismic design requirements, and manufacturer's written instructions.

B. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical tiles.
   1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
   2. Do not use exposed fasteners, including pop rivets, on moldings and trim.

C. Arrange directionally patterned acoustical tiles as indicated on reflected ceiling plans.

3.3 ADJUSTING AND CLEANING

A. Replace damaged and broken panels.

B. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage. Remove any ceiling products that cannot be successfully cleaned and or repaired. Replace with attic stock or new product to eliminate evidence of damage.

C. Before disposing of ceilings, contact the Armstrong Recycling Center at 877-276-7876, select option #1 then #8 to review with a consultant the condition and location of building where the ceilings will be removed. The consultant will verify the condition of the material and that it meets the Armstrong requirements for recycling. The Armstrong consultant will provide assistance to facilitate the recycle of the ceiling.

END OF SECTION 095123
SECTION 099123 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes surface preparation and the application of paint systems on Interior substrates.

1. Steel.
2. Galvanized metal.

1.2 DEFINITIONS

A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
B. MPI Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
C. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
D. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
E. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
F. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
G. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

1. Include Printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.

B. Samples: For each type of paint system and in each color and gloss of topcoat.
1.4 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system.
   a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft.
   b. Other Items: Architect will designate items or areas required.

2. Final approval of color selections will be based on mockups.
   a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

PART 2 - PRODUCTS

2.1 PAINT, GENERAL

A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."

B. Material Compatibility:
   1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
   2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

C. Colors: Match Existing

PART 3 - EXECUTION

3.1 PRIMERS/SEALERS

A. Interior Latex Primer/Sealer: MPI #50.

B. Base Coat: United States Gypsum, Product "First Coat", or equal.

3.2 METAL PRIMERS

A. Rust Inhibitive Latex Metal Primer: MPI #107.

B. Waterborne Galvanized-Metal Primer: MPI #134.
3.3 WOOD PRIMERS
   A. Interior Latex-Based Wood Primer: MPI #39.

3.4 SOLVENT-BASED COATINGS
   A. Alkyd Varnish, Interior, Semi-Gloss (Gloss Level 5): MPI #74.

3.5 LATEX PAINTS
   A. Interior Latex (Satin): MPI #43 (Gloss Level 4).
   B. Interior Latex (Semigloss): MPI #43 (Gloss Level 4).
   C. Interior Latex Fire Retardant: MPI #64

3.6 EXAMINATION
   A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
   B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
      1. Concrete: 12 percent.
      2. Fiber-Cement Board: 12 percent.
      3. Masonry (Clay and CMUs): 12 percent.
      5. Gypsum Board: 12 percent.
      6. Plaster: 12 percent.
   C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
   D. Proceed with coating application only after unsatisfactory conditions have been corrected.
      1. Application of coating indicates acceptance of surfaces and conditions.

3.7 PREPARATION
   A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
   B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

3.8 APPLICATION

A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."

B. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

C. Painting Mechanical and Electrical Work: Paint items exposed in equipment rooms and occupied spaces including, but not limited to, the following:

1. Mechanical Work:
   a. Uninsulated metal piping.
   b. Uninsulated plastic piping.
   c. Pipe hangers and supports.
   d. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
   e. Mechanical equipment that is indicated to have a factory-primed finish for field painting.

2. Electrical Work:
   a. Switchgear.
   b. Panelboards.
   c. Electrical equipment that is indicated to have a factory-primed finish for field painting.
   d. Telephone Backer Panels.

D. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

E. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.9 INTERIOR PAINTING SCHEDULE

A. Steel Substrates:

1. Quick-Drying Latex Enamel System: MPI INT 5.1B. Gloss Level 4
   a. Prime Coat: Rust Inhibitive Water Based primer.
   c. Topcoat: W.B. Light Industrial Coating.
B. Galvanized-Metal Substrates:

1. Latex over Waterborne Primer System: MPI INT 5.3J. Gloss Level 4
   c. Topcoat: Interior latex.

C. Gypsum Board Substrates:

1. Latex System: MPI INT 9.2A. Gloss Level 3
   d. Topcoat: Interior latex (Satin).

2. Latex System: MPI INT 9.2A. Gloss Level 4
   c. Top Coat: Interior latex topcoat. (Semigloss).

Note: Substrates not listed are subject to architectural review to determine the MPI standard during the submittal process.

END OF SECTION 099123
SECTION 230000 HEATING, VENTILATING AND AIR CONDITIONING

PART 1 - GENERAL

1.1 CONTENTS

A. This section of the specifications contains items applicable only to the Heating, Ventilating and Air conditioning system. This section of the specifications supplements and modifies some of the statements herein as to apply specifically to the heating, ventilating and air conditioning system.

1.2 SCOPE

A. It is the intent of these specifications and drawings to furnish a heating, ventilating and air conditioning system inside and outside of the building, complete, fully adjusted and ready to use. All work and material must conform to all State and Local Codes in every respect.

PART 2 - PRODUCTS

2.1 INSULATION

A. Insulation shall be as specified in Section 220700, Insulation for Mechanical Systems.

2.2 VALVES

A. Valves shall be as specified in Section 220500 Mechanical General Conditions.

2.3 SHEET METAL

A. All ductwork shall be fabricated and installed so that no undue vibration or noise results. All joints shall be airtight with additional caulking provided if necessary. Ducts shall be constructed of the best grade galvanized mild steel sheets with joints and reinforcing in accordance with the recommended construction as listed in the current edition of HVAC Metal Duct Construction Standards - SMACNA. Ductwork installed between outlet of air handling units and terminal units shall be constructed to 4” water gage pressure class and sealed to class A sealing requirements. Ductwork downstream of terminal units, fan coil units, evaporative coolers, and downstream of exhaust fans shall be constructed to 1” water gage pressure class and sealed to class B sealing requirements. Hang ducts with straps attached to bottom of ducts spaced in accordance with SMACNA Standards. Curved elbows, if used, shall have a center line radius equal to 1-1/2 times the duct width. Square elbows shall have turning vanes equal to HEP Aerodyne Co. ducturns. Job fabricated vanes will not be accepted without prior approval.

B. Provide all necessary dampers as required for proper adjustment and control of air distribution. Provide volume extractors similar to Metalaire Airtrol extractors set at 20 degrees at all branches in ductwork where other means of control are not indicated or used, and in ductwork behind sidewall supply registers. All damper rods shall be marked to indicate the relative position of the damper lade with respect to rod.

C. Provide one inch (1”) angle collars for all exposed ducts passing through walls, ceiling or floors. Anchor collars in position after installation is complete.
D. Provide flexible connection at inlet and discharge connections of fans and air handling equipment to prevent mechanical noises from being transmitted to connecting ductwork. Use flexible connection similar and equal to "Ventfab".

E. Install hinged doors on ductwork and housing to provide access to all parts of every automatic damper, fire damper and all other items requiring maintenance or inspection. Access doors shall be 18" X 12" if permitted by duct size, and if not, shall be as large as possible. All access panels shall have sponge rubber gaskets cemented in place with cam lock closures.

F. Shop Drawings shall be submitted on all items of sheet metal work specified herein. Shop Drawings of ductwork at air units shall be submitted at a minimum scale of 3/8" equal to one foot.

G. Shop Drawings shall be submitted on all other ductwork. Shop Drawings shall indicate location of all supply, return, exhaust and light fixtures from the approved reflected ceiling plans.

H. Provide sample drives, duct and guage thickness, and reinforcing requirements for Engineers approval.

2.4 FIBERGLASS DUCTBOARD

A. Fiberglass ductboard shall not be used on this project.

2.5 FLEXIBLE DUCT

A. Flexible duct connectors shall be constructed of galvanized spring-steel-wire helix with a two-ply airtight inner core; nominal one inch (1") thick fiberglass insulation and vinyl vapor barrier, suitable to two inch (2") water gauge. Medium pressure duct connection to VAV box terminals shall be rated to a minimum 4” water gage. Entire duct assembly shall be listed to UL label and shall be Thermoid, Portoduct Type 1 or equal. Maximum length of each run shall be eight (5') feet and supported without sagging. Flex duct shall be allowed only where indicated on the drawings.

2.6 VIBRATION

A. Ductwork shall be isolated from rotating or reciprocating equipment to which it is attached by means of a flexible connection. See sheet metal specification elsewhere herein for exact requirements. Equipment base isolators shall be provided where detailed on the drawings for equipment on floors, pads or bases.

2.7 GRILLES, REGISTERS, DIFFUSERS

A. Furnish and install grilles, registers, diffusers and accessories of size and type as indicated on drawings. All to be as manufactured by Nailor, Metal-Aire, Carnes, Titus, or approved equal. See the schedule on the drawings for type and model.

PART 3 - EXECUTION

3.1 WORKMANSHIP
A. All work shall be first-class in every respect and shall be done by mechanics skilled in the trade involved. Careless and/or sloppy work shall be resolved and replaced properly at the Contractor's expense.

3.2 SCHEDULING OF WORK

A. The Contractor shall be required to confer with the Architect, General Contractor and Owner to determine a schedule of times at which the various items of work are to be accomplished.

3.3 CONSULTATION WITH OTHER CONTRACTORS

A. Before commencing the work, the Contractor shall consult with the General Contractor and other Subcontractors and arrive at a thorough understanding as to the location of all equipment, ducts, etc., so that there will be no interference with other work. The time of installation of sleeves, etc. shall be determined by the Contractor. In the event he should fail to have material on the job and such provisions are not made previously with the Gen. Contractor, necessary arrangements shall be made at the expense of the Contractor.

3.4 CLEANING, TESTING AND ADJUSTING

A. The Contractor is cautioned to instruct his mechanics to keep all equipment, ducts and materials free of foreign materials during installation. Any malfunction of the several system resulting from sand, rocks and other foreign material in the systems shall be corrected at the Contractor's expense. Upon completion of the work, the Contractor shall thoroughly cleanout the several duct system. The Contractor shall take precaution during the cleaning operation to protect his work and the work of all other traces and should any damage be done, he shall remedy or repair it to the complete satisfaction of all concerned, and at no additional cost to the Owner.

B. Functional Tests: Make specific tests of all equipment and materials and portions of this installation as required herein to prove their condition and performance and any tests as required by any authority having jurisdiction over this type of installation. The Contractor shall adjust all equipment, air quantities, controls and devices, so that all components of the various systems are left in proper working order. As part of this test the entire piping system shall be pressurized to 100 PSI for four (4) hours. These tests must be witnessed by a representative from the Engineer's office. All hydronic piping to be flushed out and chemical added.

3.5 OPERATING AND MAINTENANCE MANUALS:

1. Three binders shall be submitted to mechanical consultant. Consultant shall review and approve then submit the 3 copies to the owner.

2. Operating and maintenance manuals shall include the following systems:
   a. Mechanical systems
   b. Plumbing systems
   c. Fire protection systems
   d. Energy/management control systems (EMCS)

3. All components specified and/or scheduled of the above systems shall require O&M manuals and shall be identified according to the specifications and/or schedule identification mark/label.

4. Basic information required for O&M manuals:
   a. Operating routines and procedures:
      Control sequences
Temperature set points
Control diagrams
Ventilation requirements

5. Start-up and shut-down procedures i.e. checklist for start-up/shut-down
   a. Equipment/fixture specific information
      Identification mark/label
      Manufacturer name
      Model #
      Etc.
   b. Trouble shooting section
   c. Preventive maintenance program including frequency of actions
   d. Scheduled maintenance programs including frequency of actions
   e. Parts lists with local vendors (multiple if available)

6. Manuals shall be submitted and approved by mechanical consultant prior to substantial completion acceptance.

3.6 SHOP DRAWINGS

Submit shop drawings on the following:

1. All sheet metal ductwork
2. Flex Duct,
3. Grilles, Registers, Diffusers,
4. Kitchen Hoods,
5. Exhaust fans,

END OF SECTION 230000
NMSU JETT HALL FUME HOOD REPLACEMENT

SECTION 23 05 00 – COMMON WORK RESULTS FOR MECHANICAL

PART 1 - GENERAL

1.1 SCOPE

A. The scope of the work included under this Division of the specifications shall include a complete mechanical system as shown on the plans and as specified herein. The Architectural General Conditions of these specifications shall form a part and be included under this section of the specifications. The Mechanical Contractor shall provide all supervision, labor, material, equipment, machinery, plant and any and all other items necessary to complete the mechanical system. All other items of equipment are specified in the singular; however, the Mechanical Contractor shall provide and install the number of items of equipment as indicated on the drawings, and as required for complete systems.

B. It shall be noted that work under this section of the specifications includes: Heating, Ventilating and Air Conditioning, 23 00 00; Mechanical General Conditions, 23 05 00, Insulation for Mechanical Systems, 23 07 00; Test and Balance, 23 05 93;

PART 2 - MATERIALS

2.1 CODES, RULES, PERMITS, FEES

A. The Mechanical Contractor shall give all necessary notices, obtain all permits and pay all government and state sales taxes, fees, and other costs, including utility connections or extensions, in connection with his work; file all necessary plans, prepare all documents and obtain all necessary approvals of all governmental departments having jurisdiction; obtain all required certificates of inspection for his work and deliver same to the Architect before request for acceptance and final payment for the work. The Mechanical Contractor shall include in the work, without extra cost to the Owner, any labor, materials, services, apparatus, drawings, in order to comply with all applicable laws, ordinances, rules and regulations whether or not shown on drawings and/or specified. Refer to General Conditions for additional information.

B. All materials furnished and all work installed shall comply with the National Fire Codes of the National Fire Protection Association, with the requirements of all governmental departments having jurisdiction. All materials and equipment for the electrical portion of the mechanical system shall bear the approval label, shall be listed by the Underwriters Laboratories, Inc. and bear the UL label. All mechanical equipment, electrical wiring, and devices shall be in accordance with the National Electric Code (NEC).

2.2 INTENT

A. It is the intention of these specifications and drawings to call for finished work, tested, and ready for operation. Wherever the word "provide" is used, it shall mean "furnish and install complete and ready for use". Details not usually shown or specified, but necessary for the proper installation and operation, shall be included in the work, the same as if herein specified or shown.

2.3 SURVEYS AND MEASUREMENTS
A. The Mechanical Contractor shall base all measurements, both horizontal and vertical from established benchmarks. All work shall agree with these established lines and levels. Verify all measurements at site and check corrections of same as related to the work. Should the Mechanical Contractor discover any discrepancy between actual measurements and those indicated, which prevents following good practice or the intent of the drawings and specifications, he shall notify the Architect, through the General Contractor, and shall not proceed with his work until he has received instructions from the Architect. The Contractor must carefully locate and verify all of the existing utilities to be used as a part of this contract.

2.4 DRAWINGS

A. Drawings are diagrammatic and indicate the general arrangement of systems and work included in the contract. Drawings are not to be scaled. The architectural drawings and details shall be examined for exact locations of fixtures and equipment. Where they are not definitely located, this information shall be obtained from the Engineer, before he proceeds with the work. The Mechanical Contractor shall follow drawings in laying out work and check drawings of other trades to verify spaces in which work will be installed. Maintain maximum headroom and space conditions at all points. Where headroom or space conditions appear inadequate the Architect shall be notified before proceeding with installation.

2.5 "OR EQUAL"

A. Wherever the words "approved equal", "equal", or words to the same effect are used in connection with any specified material, it is to be understood that such words mean any material or work of any kind claimed to be an equal in quality to the work or material specified and shall be so approved in writing by the Engineer, except as noted. It is further understood that no material or work shall be presented to the Engineer as work or material equal to that specified without the full understanding on the part of the manufacturers and agents for the so-called "equal" material, and the full understanding on the part of the contractors, that the Engineer is to use his own judgment in the matter; that his decision is final, and that in the event of an adverse condition, no claim of any sort shall be made against the Owner or Architect or Engineer.

2.6 SHOP DRAWINGS

A. The Mechanical Contractor shall submit for approval detailed shop drawings of all equipment and all material required to complete the project, and no material or equipment may be delivered to the jobsite or installed until the Mechanical Contractor has in his possession the approved shop drawings for the particular material or equipment. The shop drawings shall be complete as described herein. The Mechanical Contractor shall furnish the number of copies required by the General and Special Conditions of the contract, but in no case less than four (4) copies. Prior to delivery of any material to the jobsite, and sufficiently in advance of requirements to allow the Architect ample time for checking, submit for approval: detailed, dimensions, operating clearances, performance characteristics and capacity. Each item of equipment proposed shall be a standard catalog product of an established manufacturer and of equal quality, finish and durability to that specified.

B. The Mechanical Contractor shall submit for approval detailed ductwork and mechanical room layout shop drawings; showing coordination between disciplines, see above for submission requirements.
2.7 EQUIPMENT DEVIATIONS

A. Where the Mechanical Contractor proposed to use an item of equipment other than that specified or detailed on the drawings, which required any redesign of the structure, partitions, foundations, piping, wiring or any other part of the mechanical, electrical or architectural layout, all such redesign, and all new drawings and detailing required therefore, shall be prepared by the Mechanical Contractor at his own expense and approved by the Architect. Where such approved deviation requires a different quantity and arrangement of ductwork, piping, wiring, conduit and equipment from that specified or indicated on the drawings, the Mechanical Contractor shall furnish and install any such ductwork, piping, structural supports, insulation, controllers, motors, starters, electrical wiring and conduit, and any other additional equipment required by the system at no additional cost to the Owner.

2.8 COOPERATION WITH OTHER TRADES

A. The Mechanical Contractor shall give full cooperation to other trades and shall furnish in writing to the Contractor, with copies to the Architect, any information necessary to permit the work of all trades to be installed satisfactorily and with the least possible interference or delay.

2.9 PROTECTION

A. The Mechanical Contractor shall protect all work and material from damage by his workmen, and shall be liable for all damage thus caused and replace all damaged materials at no cost to the Owner. The Mechanical Contractor shall be responsible for work and equipment until finally inspected, tested and accepted. He shall protect work against theft, injury or damage, and shall carefully store material and equipment received on-site which is not immediately installed. He shall close open ends of work with temporary covers or plugs during storage and construction to prevent entry of obstructing material.

2.10 SCAFFOLDING, RIGGING, HOISTING

A. The Mechanical Contractor shall furnish all scaffolding, rigging, hoisting and services necessary for erection and deliver onto the premises any equipment and apparatus furnished. The Contractor will remove the necessary equipment from the premises when no longer required.

2.11 EXCAVATION AND BACKFILLING

A. Mass excavation to approximate building levels will be carried out under a section of the architectural specifications. The Mechanical Contractor shall; however, do all trench and pit excavation and backfilling required for work under this section of the specifications, inside and outside the building, including repairing of finished surfaces, all required shoring, bracing, pumping and all protection for safety of persons and property. Local or State Safety Codes shall be strictly observed. In addition, it shall be the responsibility of the Mechanical Contractor to check the indicated elevation of the utilities entering and leaving the building. If such elevations require excavations lower than the footing levels, the Architect shall be notified of such conditions and a redesign shall be made before excavations are commenced. It is also the responsibility of the Mechanical Contractor to make the excavations at the minimum required
depths in order not to undercut the footing. Filling, backfilling and compaction shall be as specified under the architectural sections of these specifications.

B. Backfill may be native material except that all material from six inches (6") below the pipe bottom to six inches above the top of the pipe must pass a 3/4" sieve. If the native material is determined to be too rocky by the Engineer, he may require imported material for pipe bedding.

2.12 MATERIALS AND WORKMANSHIP

A. All materials and apparatus required for the work, except as specifically specified otherwise, shall be new, of first-class quality, and shall be furnished, delivered, erected, connected and furnished in every detail, and shall be so selected and arranged as to fit properly into the building spaces. Where no specific kind or quality of material is given a first-class standard article as approved by the Architect shall be furnished. The Mechanical Contractor shall furnish the services of an experienced superintendent, who shall be constantly in charge of the installation of the work, together with all skilled workmen, fitters, metal workers, welders, helpers, and labor required to unload, transfer, erect, connect, adjust, start, operate and test each system.

B. Unless otherwise specifically indicated on the plans or specifications all equipment and materials shall be installed with the approval of the Engineer in accordance with the instructions of the manufacturer. This includes the performance of such tests as the Manufacturer instructs.

2.13 MOTORS

A. Motors shall be built in accordance with the latest standards of NEMA and as specified. Motors shall be tested in accordance with standard of A.S.A., C50 and conform thereto for insulation resistance and dielectric strength. Provide motors manufactured by General Electric, Westinghouse, Allis Chalmers or Century designed for quiet continuous operation with forty (40) degrees C. rise at full load and rated speed as individually specified. Motors shall be of the same make except those incorporated in package units, and all, including those in package units, shall be provided with ball bearings and conduit connection boxes. Unless stated otherwise, motors 1 HP and smaller shall be suitable for operation of single phase, 60 cycle, and 120 volt current. All motors shall be provided with thermal overload protection. Motors 1 HP or larger shall be either 208 volt or 480 volt, three phase as scheduled. Two speed, three phase motors shall be dual winding.

B. All motor starters shall be provided by the Mechanical Contractor if integral with the equipment. All three phase magnetic starters shall be furnished with three coil overload protection. All starters which are not integral with the equipment and other electrical control equipment installed in damp, moist or areas of special conditions, shall be designed and approved for the installation.

2.14 QUIET OPERATION AND VIBRATION

A. All work shall operate under all conditions of load without any sound of vibration which is objectionable in the opinion of the Architect/Engineer. In case of moving machinery, sound or vibration noticeable outside its own room will be considered objectionable. Sound or vibration conditions considered objectionable by the Architect shall be corrected in an approved manner by the Mechanical Contractor at his expense. Vibration control shall be by means of approved vibration eliminators in a manner as recommended by the manufacturer of the eliminators.

2.15 ACCESSIBILITY
A. The Mechanical Contractor shall be responsible for the sufficiency of the size of shafts and chases, the adequate clearance in double partitions and hung ceilings for the proper installation of his work. The Contractor shall cooperate with the General Contractor and all other contractors whose work is in the same space, and shall advise the General Contractor of his requirements. Such spaces and clearances shall; however, be kept to the minimum size required. The mechanical Contractor shall locate all equipment which must be serviced, operated or maintained in fully accessible positions. Equipment shall include but not be limited to: valves, traps, cleanouts, motors and controllers. If required or better accessibility, any change shall be approved by the Architect. The Mechanical Contractor shall provide the General Contractor the exact locations of access panels for each concealed valve, control, damper or other device requiring service. Access panels not shown in the architectural drawings shall be provided and installed by the Mechanical Contractor and as specified in architectural sections of the specifications. Locations of these panels shall be submitted in sufficient time to be installed in the normal course of work.

2.16 FOUNDATIONS, SUPPORTS, PIERS, ATTACHMENTS

A. The Contractor shall furnish and install all necessary foundations, supports, pads and bases required for all equipment furnished under this contract, unless otherwise noted. All equipment where foundations are indicated, furnish and install concrete pads as shown. All pads shall be extended six inches (6") beyond equipment base in all directions with top edge chamfered. All equipment, unless otherwise shown, shall be securely attached to the building structure in an approved manner. Attachments shall be of a strong and durable nature and any attachments that are, in the opinion of the Architect, not strong enough shall be replaced as directed.

2.17 ELECTRICAL CONNECTIONS

A. The Electrical Contractor shall furnish and install all power wiring except the following when rated at 25 VAC or less: (1) temperature control wiring; (2) equipment control wiring; and (3) interlocking wiring. The Electrical Contractor shall furnish and install all power wiring complete from power source to motor or equipment junction box, including power wiring through starters. The Electrical Contractor shall furnish and install all starters not factory mounted on equipment or otherwise noted. The Mechanical Contractor shall furnish and install all temperature control wiring, interlock wiring and equipment control wiring of 25 VAC or less for the equipment that he furnishes. The Mechanical Contractor shall furnish a starter to the Electrical Contractor, where scheduled on the drawings or integral with the equipment. The Mechanical Contractor shall provide and be responsible for the heater in all starters that the Mechanical Contractor furnishes.

2.18 CUTTING AND PATCHING

A. The Mechanical Contractor shall be responsible for all framing, cutting and patching necessary to install the work specified in this section. Patching shall match adjacent surfaces and be performed by qualified workmen approved by the Architect. All work shall be in accordance with the applicable Architectural section of these specifications.

2.19 SLEEVES AND PLATES
A. The Mechanical Contractor shall provide and locate all sleeves and inserts required before the floors and walls are built, or shall be responsible for the cost of cutting and patching required for pipes where sleeves and inserts were not installed, or where incorrectly located, or where they are to be installed in existing walls. Sleeves shall be provided for all mechanical piping passing through concrete floor slabs, masonry, concrete, tile and gypsum wall construction. Where sleeves are placed in exterior walls below grade, the space between the pipe or conduit and the sleeves shall be sealed with link-seal rubber expansion sealers or equal and be made completely watertight. Sleeves shall be constructed of twenty-four (24) gauge galvanized sheet metal with lock seam joints for all sleeves set in concrete floor slabs terminating flush with the floor. All other sleeves shall be constructed of steel pipe unless otherwise indicated on the drawings.

2.20 ESCUTCHEON PLATES
A. Escutcheon plates shall be provided for all exposed uninsulated pipes and all exposed conduit passing through walls, floors and ceilings. Plates shall be nickel-plated, of the split ring type, sized to match the pipe or conduit. Where plates are provided for pipes passing through sleeves which extend above the floor surface, provide deep recessed plates to conceal the pipe sleeves.

2.21 WATERPROOFING
A. Where any work pierces waterproofing including waterproof concrete, the method of installation shall be as approved by the Architect before work is done. The Mechanical Contractor shall furnish all necessary sleeves, caulking and flashing required to make openings absolutely watertight.

2.22 GUARDS
A. The Mechanical Contractor shall provide belt drivers and rotating machinery with readily removable guards. Guards not furnished with equipment requiring it shall consist of heavy angle iron frames, hinged and latched, with heavy galvanized iron wire crimped mesh securely fastened to frames.

2.23 OPERATING INSTRUCTIONS
A. Upon completion of all work and all tests, the Contractor shall furnish the necessary skilled labor and helpers for operating this system and equipment for a minimum period of three (3) days of eight (8) hours each. During this period, instruct the Owner or his representative fully in the operations, adjustment, and maintenance of all equipment furnished. The Mechanical Contractor shall furnish to the Architect four (4) complete bound sets for delivery to the Owner of typewritten or blueprinted instructions for operating and maintaining all systems and equipment included in this contract. All instructions shall be submitted in draft, for approval, prior to final issue. Mount at a location determined by the Owner, a step-by-step procedure to operate the system in a frame covered with a glass front. The Mechanical Contractor shall include the maintenance schedule for the principal items of equipment furnished under this contract.

2.24 PIPING INSTALLATION
A. All piping at one or more points shall be installed so that they can be easily drained. Provide means of drainage of low points of all piping without disconnecting pipe. If other than valves are
contemplated, the Architect's permission shall be obtained. All installed pipelines shall be straight and remain straight against strains tending to cause distortion, noise, damage, or improper operation. Piping shall be installed square with the building construction and risers shall be plumb. All piping must be kept clean and free from scale or loose dirt when installed, and must be kept clean during the completion of the installation. All openings in the piping system shall be capped or plugged while awaiting further connection whenever there is a reasonable hazard of dirt entering the piping system. Soil, waste and drainage lines shall be properly graded. Cold water, domestic hot water and gas lines shall be slightly pitched toward drain points.

2.25 PIPE HANGERS AND SUPPORTS

A. Horizontal piping shall be suspended from the overhead structure with Grinnell Co. pipe hangers and anchors and threaded rods. Perforated metal straps will not be allowed on the job. Hangers shall be installed to allow for continuity of insulation. Maximum hanger spacing shall be six feet (6').

2.26 VALVES

A. Unless otherwise specified, all valves shall be Stockham, Nibco-Scott, Crane or Hammond.

B. Domestic water use suitable for 125 PSI working pressure. Ball or butterfly valves shall be used on domestic water piping.

C. Ball valves or cast iron greaseable plug valves shall be used in gas lines.

D. Ball valves or butterfly valves shall be used on heating and cooling system water. Ball valves shall be soldered or threaded through two inch (2''), two piece body construction rated for 400 PSIG WOG, chromium plated or stainless steel standard ball port. Butterfly valves shall be cast iron body construction rated for 200 PSIG with an encapsulated stem and disc.

E. Valve locations are either shown or covered by note on the plans. However, the Contractor shall be held responsible for furnishing and installing all valves inadvertently omitted from the drawings in locations where valves are customarily furnished for operation and maintenance without undue disruption of service.

F. The Mechanical Contractor shall prepare and install in a suitable glazed frame, typewritten valve charts giving the number, location and function of each line and valve installed under this contract. Provide and install for each valve a stamped brass tag, numbered to correspond to the number indicated on the valve chart. Tags shall be secured to valve stems by heavy, figure-eight hooks.

2.27 UNIONS

A. Unions shall be provided at all equipment and wherever else necessary to allow for ease in making repairs or replacements. Furnish and install approved insulating couplings at all connections between dissimilar metals, steel to copper.

2.28 INSTALLATION OF THREADED PIPE
A. Screw joints shall be made with lubricant applied to the male threads only; threads shall be full cut and not more than three (3) threads on the pipe shall remain exposed. All new cut ends must be deburred and reamed.

2.29 JOINTS IN COPPER WATER PIPING

A. The pipe shall be cut square and true. The end shall be deburred, reamed, and/or sized as necessary. The pipe shall be cleaned with medium grit emery cloth and if the fitting socket is tarnished or shows oxidation, it shall be likewise cleaned. The pipe and fitting shall be fluxed with Nokorode Paste. Joints shall be made up with the type of solder as hereinafter specified. Reducing tees formed by extruding the larger pipe will not be acceptable for pipe two (2") inches or smaller. On pipe 2-1/2 inches and larger extruding the reducing tee will be acceptable provided flux is applied to both tee and pipe and the joint silver soldered with a torch using a mixture of oxygen and acetylene.

2.30 IDENTIFICATION OF PIPING

A. All service piping which is accessible for maintenance operations will be identified with SETMARK semi-rigid plastic markers or equal. Direction of flow arrows are to be included on each marker, unless otherwise specified. For pipes under 3/4" OD, brass identification tags 1-1/2" in diameter will be fastened securely at specified locations.

B. Locations for pipe markers to be as follows:

- At each pipe passage through wall, floor and ceiling construction.
- At each pipe passage to underground.
- On all horizontal pipe runs - marked every 15 feet.
- At each branch and riser take-off.
- Adjacent to each valve and fitting (except on plumbing fixtures and equipment)

C. Provide ceiling tack markers at all location of equipment located within ceiling space. Including terminal units, fan coil units, etc…

PART 3 - EXECUTION

3.1 SYSTEM TEST AND CLEANING

A. Scope: Before the final air balance test, the heating, ventilating and air conditioning system shown on the drawings shall be tested to assure performance of all units. District personnel to be present during startup procedures.

B. Heating System: The entire heating system shall be tested at the completion of the building and it shall be established that all controls are calibrated accurately and performing satisfactorily and that all units are heating satisfactorily. The system shall be checked for vibration and excessive noise and all such conditions corrected.

C. Air Conditioning System: The entire air conditioning system shall be tested at the first summer weather next following the completion of the building; and it shall be established that all controls
are calibrated accurately and performing satisfactorily and that all units are cooling satisfactorily. The system shall be checked for vibration and excessive noise and all such conditions corrected.

D. Ventilating System: The entire ventilation system shall be tested at the completion of the project; and it shall be established that controls are performing satisfactorily and that all rooms are ventilating properly. The systems shall be checked for vibration and excessive noise and all such conditions corrected.

E. Final Check-up: At the completion of all work all equipment on the project shall be checked and thoroughly cleaned including coils, plenums, pipes, plumbing fixtures, etc., and all other areas around or in equipment provided under this section. Any filters used during construction shall be replaced with new filters after final clean up. All start-up strainers shall be removed and replaced with operating strainers. Strainer mesh shall be approved by the Engineer.

F. Painting: At the completion of all work all equipment on the project shall be checked for painting damage, and any factory finished paint that has been damaged shall be repaired to match the adjacent areas. Any metal or specially covered areas that have been deformed shall be replaced with new material and repainted to match the adjacent areas.

3.2 LUBRICATION OF EQUIPMENT

A. The Mechanical Contractor shall properly lubricate all pieces of equipment before turning the building over to the Owner. He shall attach a tag to each motor showing the date of lubrication and lubricant needed.

3.3 GUARANTEE

A. The entire mechanical system shall be guaranteed for a period of one year after final acceptance of the project against any defects in equipment, material or workmanship. Any necessary labor, equipment or material required to correct such defects shall be furnished and paid for by the Mechanical Contractor without further cost to the Owner. Provide the Owner a written guarantee on the above item. Deliver to the Architect for his approval.

END OF SECTION 23 05 00
SECTION 230593 TEST AND BALANCE

PART I - GENERAL

1.1 SCOPE

A. This section covers the testing and balancing of environmental system including but not limited to: air distribution systems, hydronic distribution system and the equipment and apparatus connected thereto.

B. The work required herein shall consist of setting volume (flow) and speed adjusting facilities provided or specified for the systems, recording data, making tests and preparing reports, all as hereinafter specified.

1.2 GENERAL REQUIREMENTS

A. The work described in this section shall be performed by a firm(s) certified by the National Environmental Balancing Bureau. If the Installing Contractor is not certified by the NEBB, he shall submit appropriate data indicating experience and qualifications.

PART 2 - PROCEDURE

2.1 PROCEDURES

A. The environmental systems including all equipment, apparatus and distribution system shall be tested and balanced in accordance with the NEBB “Procedural Standards for Testing Adjusting and Balancing of Environmental Systems” published by the NEBB, Current Edition.

B. All work performed under this section shall be under the direction of the supervisor who is designated and qualified under the certification requirements of NEBB.

C. All instruments used for measurement shall be accurate, and calibration histories for each instrument shall be available for examination. Calibration and maintenance of all instruments shall be in accordance with the requirements of NEBB.

D. Accuracy of measurement shall be in accordance with NEBB standards.

E. General Information

1. The Testing, Adjusting, and Balancing (TAB) Contractor shall be independent from the controls contractor and equipment sales representative for the specific construction project.

2. The contractor shall test adjust and balance the following mechanical systems.

   a. Supply air systems
   b. Return air systems
   c. Exhaust air systems
   d. Verify control systems
3. A certified NEBB supervisor must be onsite at all times during TAB work to completely oversee the testing, adjusting, and balancing of the system.

4. A pre-balance conference shall take place between the mechanical engineer, mechanical contractor, controls contractor, electrical contractor and possibly the owners representative prior to beginning of the testing, balancing and adjusting. Discussion shall focus on the verification that the system is ready or TAB work.

5. TAB work shall be completed with final report prior to the completion of the pre-punch checklist for equipment.

6. Field reports shall be issued to mechanical contractor and mechanical consultant directly form TAB contractor regarding deficiencies in the system that prevent proper TAB work as well as proper system operation.

7. Preliminary and final reports shall be outlined by mechanical consultant regarding submission of data and formatting requirements.

8. Calibration of instruments and balancing tolerances to be outlined by mechanical consultant.

9. Preliminary data shall include the following information with deficiencies reported on field reports.

F. AIR SYSTEM BALANCING

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

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

3. Check filters for cleanliness.

4. Check dampers for correct and locked position, and temperature control for completeness of installation before starting fans.

5. 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 cross-check with required fan volumes.

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

7. Place outlet dampers in the full open position.

8. Prepare schematic diagrams of system “as-built” ductwork and piping layouts to facilitate reporting.

9. Verify that all motors and bearings are lubricated.

10. Verify that Volume, fire and smoke dampers are properly installed and functional.

11. Verify that supply, return exhaust and transfer grilles, registers, diffusers, terminal units with controls and filters are installed properly.

12. Verify that air handling systems, units, duct systems and associated apparatus, such as heating and cooling coils, filter sections, access doors, etc. are correctly blanked and/or sealed to eliminate by-pass or leakage of air.
13. Verify that fans operating at full load and verify for freedom vibration, proper fan rotation and belt tension and those elements in motor starters to be of proper size and rating.

14. Verify proper installation of duct mounted smoke detectors.

15. Verify that mixing boxes set to maximum, minimum and outlets balanced within 10% of design CFM.

16. With supply system in maximum mode, proportion return inlets, traverse and adjust dampers to design cfm. Re-measure and adjust return inlets within 10% of design cfm. Record all final traverse and static pressure data.

17. With supply system in the maximum mode, adjust minimum outside air damper to design through pitot tube traverse. Measure and record traverse and static pressure.

18. After completion, take total air handling unit static profile and record all final statics, amperage rpm, cfm, etc.

G. KITCHENS

a. Kitchen hoods and dishwasher (condensate) hoods:
   i. Kitchen/Cafeteria ventilation and make-up air systems shall be active in order to properly balance hood.
   ii. Doors intended to be closed during operation shall be closed to properly balance hood.
   iii. Velocities through the filters shall be measured, adjusted and recorded to comply with manufacturer’s recommendation.
   iv. Hood capturing capabilities shall be verified by turning appliances on and providing a smoke test around the perimeter of the hood. The test shall be noted on the TAB report with the outcome indicated along with remarks.

b. Kitchen Space
   i. The perimeter doors around the kitchen shall be tested to verify that excess negative static does not exist through the use of a smoke test. The test shall be noted on the TAB report with the outcome indicated along with remarks.
   ii. The Kitchen averaged static pressure shall be slightly negative approximately in the range between -0.005” to -0.025” water column and recorded on the TAB report with the outcome indicated along with remarks.

H. CONTROL SYSTEMS

1. Verify that control components are installed in accordance with project requirements and functional, including electrical interlocks, damper sequences, air and water resets, fire and freeze stats, temperature/humidity sensors and high and low limit switches.

PART 3 - EXECUTION

3.1 REPORTS

A. Four copies of the final reports shall be submitted on applicable Reporting Forms for review.

B. Each individual final Reporting Form submitted must bear the signature of the person who recorded the data and the signature of the TAB supervisor of the performing firm. Identification
of all types of instruments used and their last dates of calibration will be submitted with the final report.

3.2 GUARANTEE

A. The NEBB certified firm guarantees that all testing and balancing work will be performed in accordance with NEBB standards and procedures and shall provide evidence of their certification for the Engineer or designated Owner’s representative.

END OF SECTION 230593
SECTION 23 07 00 - INSULATION FOR MECHANICAL SYSTEMS

PART 1 - GENERAL

1.1 GENERAL

A. Conditions of the contract and Division I apply to this Division except that any requirements for prior approval of equipment does not apply to this Division. The work under this section consists of furnishing and installing all thermal insulation on ducts, and all other equipment in Division 23 which are indicated to receive insulation. See also Section 23 05 00 for General Requirements applying to this and all other Division 23 sections.

1.2 SUBMITTAL DATA

The following submittal data shall be provided before any installation is made: Name of the Insulation Contractor; a narrative summary of material and method of installation for each system or component to be insulated (i.e. domestic water piping, ductliner, etc.); certified letter of compliance as required hereinafter; and descriptive literature for all material including insulation, covering, jackets, adhesives, etc.

PART 2 - PRODUCTS

2.1 GENERAL INSULATION

All insulation materials shall have composite fire and smoke hazard ratings as tested by procedure ASTM-84, NFPA-255, and UL 723 not exceeding: smoke developed - 50; flame spread - 25; fuel contributed - 50. All components of the insulation (insulation, adhesives, and jackets or facings) shall have been tested as COMPOSITE product and shall bear labels showing the flame spread, smoke-developed, and fuel contributed properties do not exceed 25, 50 and 50 respectively. All insulation accessories (glass cloth, cement, adhesives, mastic, etc.) shall have the same component ratings as listed above. All products and/or their shipping cartons shall have a label affixed, indicating flame, fuel and smoke ratings do not exceed the above requirements. Paper laminate jacket, if used, shall be permanently fire and smoke resistant. Chemicals used for treating paper in jacket laminates shall not be water soluble and shall be unaffected by water and humidity. The use of canvas or other flammable materials is prohibited and any found on the job shall be removed at the Contractor's expense and at no additional cost to the Owner. The insulation and related items specified hereinafter by specific manufacturer's designation is intended to establish a standard of quality and is not intended to exclude equal products of reputable manufacturers. Acceptable manufacturers: Owens Corning, Johns Manville, Knauf, or approved equal.

2.2 DUCT SYSTEMS

A. All metal air conditioning return ducts or ducts exposed/ visible from occupied space shall be lined with thermal and acoustic ductliner, Manville Linacoustic or approved equal, approved by the City of El Paso, 1-1/2 pound per cubic foot density, 1 1/2" thick or equivalent unless otherwise noted on the plans having a thermal conductance of 0.25 BTU/sq. ft./hr./degree F./inch thickness at 75F. mean temperature and with a noise reduction coefficient (NCR) of .20, Underwriters Laboratories Inc. fire hazard classification of flame spread 25, fuel contributed 50 and smoke developed 50 or better.
B. Ductwrap shall be used on all refrigerated and heated ducts installed in concealed areas. Ductwrap shall be Manville Microlite Duct Insulation, 1.0 PCF density, 2" thick with a thermal conductivity equal to .265 at 75 degrees F. Wrap shall have an FSK fiberglass reinforced foil face.

PART 3 - EXECUTION

3.1 DUCT INSULATION

A. Ducts indicated to have internal insulation shall be lined by carefully adhering the liner in a continuous piece to clean, flat metal sheets with quick-tacking rubber base adhesive. The duct shall be formed, with the liner attached, in a sheet brake. The coated side of the liner shall face the air stream, and all exposed edges shall be coated with adhesive. Ducts shall also have the liner additionally secured with mechanical fasteners. Spacing of fasteners shall be on approximately fifteen inches (15") centers, and shall be adhered with manufacturer's recommended adhesive. The insulation shall be held in place with surface anchor washers, speed clips or equal. All projecting ends of fasteners shall be cut off flush with washer.

B. Ductwrap shall be applied in strict accordance with manufacturer's instructions. Wrap shall be continuous with overlapping sections. Fasten and seal overlap joints according to manufacturer's recommendations.

C. Insulation shall be butted tightly at joints and vapor barrier facing shall be overlapped a minimum of two (2") inches. Insulation should be removed from lap prior to stapling. All seams shall be stapled approximately six (6") inches on center with outward clinching staples, then sealed with a foil vapor barrier tape or vapor barrier mastic.

D. Where ducts are over 14" in width, the ductwrap shall be additionally secured to the bottom of rectangular ducts with mechanical fasteners spaced on 18" centers (maximum) to prevent sagging of insulation. Seal penetrations of facing so as to provide a vapor-tight system.

3.2 SHOP DRAWINGS

Data sheets for duct insulation systems. Adhesives, and Fitting and valve covers.

END OF SECTION 22 07 00
SECTION 26 05 00 - COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

Related Documents:
A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-01 Specification sections, apply to work of this section.

Description of Work:
A. This section specified several categories of provisions for electrical work including:
   1. Certain adaptive expansions of requirements specified in Division 01,
   2. General performance requirements within the electrical systems as a whole, and,
   3. General work to be performed as electrical work, because of its close association.

Summary of Electrical Work:
A. Refer to the E-series drawings for graphic representations, schedules and notations showing electrical work.
B. Refer to the Division 26 sections for the primary technical specifications of electrical work.

Coordination of Electrical Work:
A. Refer to the Division 01 sections for general coordination requirements applicable to the entire work. It is recognized that the contract documents are diagrammatic in showing certain physical relationships which must be established within the electrical work, and in its interface with other work including utilities and mechanical work, and that such establishment is the exclusive responsibility of the Contractor.
B. Arrange electrical work in a neat, well organized manner with conduit and similar services running parallel with primary lines of the building construction and with a minimum of 7’0” o.c. where possible.
C. Locate operating and control equipment properly to provide easy access, and arrange entire electrical work with adequate access for operation and maintenance.
D. Advise other trades of openings required in their work for the subsequent move-in of large units of electrical work (equipment).
E. Contractor to identify all electrical circuits that serve the areas where no work will be performed and all existing exterior circuits so that they are re-connected to the corresponding panel.

Coordinating Drawings:
A. For locations where several elements of electrical (or combined mechanical and electrical) work must be sequenced and positioned with precision in order to fit into the available space, prepare coordination drawings (shop drawings) showing the actual physical dimensions (at accurate scale) required for the installation if deemed necessary by Architect or Engineer. Prepare and submit these coordination drawings, if required, prior to purchase-fabrication-installation of any of these elements involved in the coordination.
B. The Drawings and these Specifications are complementary, each one to the other, and what is called for in one shall be as binding as if called for by both. Carefully examine the Drawings and Specifications and report any discrepancies affecting the work to the Architect. The Architect will issue such written instructions or interpretations as may be required.

C. The Electrical Plans are diagrammatic, but shall be followed as closely as actual construction and the work of the other trades will allow. Such minor changes as are necessary to make the electrical work conform to the work of other trades and to the building shall be made without cost to the Owner.

D. Circuits and feeders shall be as shown and no deviations from the indicated outlet-circuit grouping will be permitted, except by permission of the Architect. Branch circuit numbers are for guidance only and need not necessarily conform to the finished job. Actual circuit numbers used shall be recorded on "As-built" drawings.

E. The maximum number of circuits combined in one raceway shall be two. The circuits shown on the plan can be combined but must be shown on the ‘AS BUILT’ drawings.

Quality Assurance and Standards:

A. Refer to Division 01 for general administrative/procedural requirements related to compliance with codes and standards. Specifically, for the work (in addition to standards specified in individual work sections), the following standards are imposed, as applicable to the work in each instance:

   - AWS standards for welding
   - ANSI C 2, National Electrical Safety Code
   - ANSI C 73, Dimensions of Attachment Plugs and Receptacles
   - NECA standards for installation
   - NEMA standards for materials and products.

Laws, Codes and Ordinances:

A. All work and material shall conform to the requirements of O.S.H.A. and all National, and State Laws and ordinances having jurisdiction at the job site. The (N.E.C.) National Electrical Code 2011 Edition, or latest edition being enforced, shall be strictly adhered to; N.E.C. requirements are considered "minimum requirements". Where requirements of the Contract Documents exceed N.E.C., the Contract Document governs. This Contractor shall be licensed to work in the local area.

B. Specialty subcontractor (Fire Alarm, Security Systems, if applicable), shall be duly licensed by the State of Texas to sell, install and service Fire Alarm and Security Systems. All employees shall be duly registered and records maintained as required by applicable State of Texas laws. The Specialty Contractor shall submit a copy of his fire alarm and security systems license at the time of product submittal.

C. The latest A.D.A. requirements governing this project must be adhered to.

D. Secure permits and pay permit and inspection fee as required by local authorities.

E. Upon completion of the work, furnish to the Owner a certificate of final inspection and approval from the electrical inspection bureau having jurisdiction.

F. All electrical systems shall be grounded in strict accordance with the requirements of the National Electrical Code.
G. All electrical requirements must be coordinated with the local electric utility for temporary and permanent service.

**Submittal:**

A. Refer to the Division 01 for general requirements conceding work related and administrative submittal. All descriptive and technical data and shop drawings shall bear signed certification to the effect that they have been carefully examined and found to the correct with respect to dimension, space available, non-interference with other trades and that the equipment complies with all the requirements of these specifications. Where catalog data is submitted, the proposed items shall be clearly "flagged" or otherwise identified, so that no confusion exists. Without the above certification shop drawings and submittal will no be approved.

B. Reproduced copies of product data showing pictures of item to be submitted shall be clear, sharp and show product in detail. Reproduced copies where product picture is not clear or blurred will not be accepted.

C. Submittal shall be separated into the following categories.

1. Lighting Fixtures and Lamps
2. Wiring Devices
3. Switchgear (including Switchboards, Panelboards and Motor Control Centers)
4. Motor/Circuit Disconnects and Transformers
5. Special Systems (including Fire Alarm, P.A., Program/Clock, and Intrusions Alarm), if applicable.

D. Each category shall be separately bound in booklet form; loose sheets or sheets merely stapled together without report/presentation cover or soft-cover will not be accepted.

E. Submittal which are not separated into the above mentioned categories and/or not appropriately bound will not be accepted.

**Temporary Facilities:**

A. Refer to the Division 01 sections for general requirements on temporary facilities. Except for self-contained facilities, connect and terminate electrical temporary facilities at the locations indicated or, if not otherwise indicated, at locations as determined by the Contractor to fulfill project requirements.

B. Do not interrupt or disrupt power service to existing facilities of the Owner or others, except with prearrangement and agreement on time of interruption as needed to make temporary connection for temporary power service.

C. Do not subject electrical facilities (either temporary work or temporary use of permanent work) to higher demand or loading than designed for. Where this conditions present, the electrical subcontractor shall be responsible for obtaining temporary electrical power from the local electric utility. All charges for temporary service shall be borne by the General Contractor under his bid price. Location, size and type for service shall be compatible to job requirements.

D. When temporary electrical service is no longer needed for construction work, remove electrical temporary facilities and temporary provisions of all permanent electrical work. Repair and restore (or replace) work damaged by installation and operation of electrical systems which have been used to provide temporary services, to the condition of new and unused work except for normal wear.
E. Electrical work installed as temporary facilities shall, upon removal, remain property of the Installer.

F. Replace worn parts of permanent electrical work, where used as temporary facilities prior to the Owner's acceptance and assumed operation. Where lamps of permanent electrical light fixtures have been used for temporary lighting, replace lamps which have burned out or are noticeable dimmed by temporary use.

Products, Electrical Work:

A. Refer to Division 01 sections for general requirements on products, materials and equipment. The following provisions expand or modify the requirement as applicable to electrical work.

B. Prepare the product listing for electrical work, separate from the listing(s) of products for other work. Include listing of each significant item of equipment and material used in work; and indicate the generic name, product name, manufacturer, model number, and related specification section number(s). Material such as conductors, conduit and boxes taken from installer's stock need not be listed.

C. For principal equipment items, list the input/output ratings.

D. Submit list within 30 days of Contract Date.

E. All material shall be new and shall bear the label of the Underwriter's Laboratories, Inc., or be listed under reexamination service. All materials shall be of the best grade and latest pattern of manufacturer as specified. All work shall be performed in a neat, workmanlike manner and shall present a neat mechanical appearance when completed.

F. Provide products which are compatible with other products of the electrical work and with other work requiring interface with the electrical work, including electrical connections and control devices. For exposed electrical work, coordinate colors and finishes with other work.

Electrical Product Substitution:

A. Manufacturer's catalog numbers are specified for the purpose of establishing a standard. Substitutions for electrical equipment, will be permitted, if submitted in writing, 14 days prior to the Bidding Date, for approval by the Architect/Engineer, as being equal to, or better than, the specified items in every respect. Electrical equipment, devices, etc. may have substitutions only in equal appearance, quality and function to, or better than, the specified item. Complete descriptive and technical data shall be submitted on all proposed substitute items, together with the same data on the specified items. Material samples of the proposed substitute item and the specified items shall be submitted for comparison and test if requested by the Architect/Engineer.

B. All requests for substitution of equipment shall be made in writing to the Architect no less than 14 days prior to bidding date, by each individual bidder, with the certification that the "substitute item" is equal in appearance, quality and function or better than the specified item in every detail. The certification shall be signed by the individual holding the Master Electricians' License.

C. If notice of approval has NOT been published by the bid date, the request for substitution is disapproved.
PARTS 2 AND 3 - PRODUCTS AND EXECUTION

Electrical System Identification:

A. Provide engraved plastic laminated nameplates at locations of major units of electrical equipment including panelboards, control centers and similar systems. Additional and specific nameplate requirements appear in other Division 26 Sections.

Cutting and Patching:

A. Comply with the requirements of Division 01 for the cutting and patching of other work to accommodate the installation of electrical work. Except as individually authorized by the Architect/Engineer, cutting and patching of electrical work to accommodate the installation of other work not permitted.

B. Do not cut structural framing, walls, floors, decks and other members intended to withstand stress, except with the Architect's or Engineer's written authorization. Authorization will be granted only where there is no other reasonable method for completing the electrical work, and where the proposed cutting clearly does not materially weaken the structure.

C. Where patching is required to restore other work because of either cutting or other damage inflicted during the installation of electrical work, engage the original Installer to complete the patching of the other work. Restore the other work in every respect, including the elimination of visual defects in exposed finished, and judged by the Architect.

Excavating For Electrical Work:

A. The work of this article is defined to include whatever excavating and backfilling in the same area, including dewatering, flood protection provisions and other temporary facilities. Coordinate the work with other work in the same area, including other underground services (existing and new), landscape development, paving, and floor slab on grade. Coordinate with weather conditions and provide temporary facilities needed for protection and proper performance of excavating and backfilling.

Concrete for Electrical Work:

A. The work of this article is defined to include whatever concrete work in necessary or shown specifically to install the electrical work; but excluding equipment base grouting (see applicable Division 26 sections). Coordinate the work with other work, particularly other concrete work and accessories.

B. Except as otherwise indicated, comply with applicable provisions of Division 03 sections for electrical work concrete, including form work, reinforcement, mix design, materials (If not noted on drawings, use mix designs and materials accepted for Division 03 work where possible), admixtures, accessories (including water stops), placing of wet concrete, finishing, curing, protecting, testing, submittal and other requirements of the concrete work. Refer instances of uncertain applicability to the Architect/Engineer for resolution before proceeding.

Electrical Work Closeout:

A. Refer to the Division 01 sections for general closeout requirements. Upon completion of the work, the various systems operated under load conditions shall be tested for short circuits and grounds in accordance with the method and resistance values outlined in the National Electrical Code and for
load balance on feeders and branch circuits.

B. The complete system shall operate satisfactorily in every respect. Make any repairs or adjustments necessary to this end to the satisfaction of the Architect/Engineer. Furnish all instruments and labor for testing.

C. Coordinate closeout operations with closeout of mechanical systems and other power consuming equipment. Accurately record on "as-built" drawings locations of all conduits which are underground or otherwise concealed. Test run electrical equipment in coordination with test runs of mechanical system. Clean and lubricate operational equipment. Instruct Owner's operating personnel thoroughly in the operation, sequencing, maintenance and safety/emergency provision of the electrical systems. Turn over the operations to the Owner's personnel at the time(s) of substantial completion. Until the time of final acceptance of the total work of the Contract, respond promptly with consultation and services to assist the Owner's personnel with operation of the electrical systems.

D. It shall be the responsibility of this contractor to verify electrical characteristics and horsepower of mechanical equipment supplied at job site with that shown on Drawings. In the event that the Mechanical and/or Plumbing contractor furnish equipment of different horsepower and/or electrical characteristics from that shown on the Drawings, he shall pay ALL costs required to furnish the proper electrical facilities.

Notification of Discrepancies:

A. This Contractor shall study the Drawings and compare the layout of the electrical system, program and clock system, telephone system and integrated communication system to determine that:

1. The system covers the units and is required, from a functional, as well as a Code point of view. No area of coverage has been omitted.
2. The system has the appropriate conductors, pairs or cables in the appropriate raceway, connected to the end devices and interconnections to other systems has been shown. Raceway is of adequate size to contain conductors or cables.
3. The system apparatus required to perform the function has been specified.
4. Discrepancies in description of equipment or materials shown on the Drawings or described in the Specifications are brought to the attention of the Architect/Engineer.

B. This Contractor shall notify the Architect/Engineer 14 WORKING DAYS prior to Bid Opening of any discrepancies he has found. In the event this Contractor fails to notify the Architect/Engineer, it will be assumed any and all discrepancies have been found by this Contractor and he has included sufficient money in his bid to correct them.

Guarantee:

A. The work to be performed shall be guaranteed for a period of one year after final acceptance against faulty workmanship and/or materials, and any failure or trouble due to such causes within the period of guarantee shall be made good upon demand of the Owner and without cost to the owner.

Miscellaneous Items:

A. Miscellaneous items not covered in these specifications shall be as indicated on the drawings, installed and connected in the proper method and as recommended by the manufacturer.

END OF SECTION
SECTION 26 05 03 - EQUIPMENT WIRING CONNECTIONS

PART 1 - GENERAL

Related Documents:

A. Drawings and general provisions of contract, including General and Supplementary Conditions and Division-01 Specification sections, apply to work of this section.

B. This section is a Division-26 basic Materials and Methods section and is part of each Division-26 section referring to electrical connections specified herein.

Description of Work:

A. Extent of electrical connections for equipment indicated by drawings and schedules. Electrical connections are hereby defined to include, but not necessarily be limited to, connections for providing electrical power to equipment.

B. Types of electrical connections specified in this section include the following:

   To motors
   To motor starters
   From motor starters to motors
   To lighting fixtures

C. Motor starters and controls not furnished integrally with equipment are specified in applicable Division-26 sections.

D. Refer to other Division-26 section for junction boxes and disconnect switches required for motors and other electrical units of equipment; not work of this section.

E. Temperature Controls for Heating, Ventilating and Air Conditioning shall be done under Division-23 Specifications.

F. Low voltage thermostat wiring shall be done under Division 23; this Contractor shall furnish empty conduit with pull string only.

G. High voltage (line) thermostat wiring shall be #12 THHN (if applicable), unless otherwise noted on Drawings. Number of conductors to each thermostat shall be as shown on Drawings; as indicated by number of hachure marks. Where no hachure marks are shown, a minimum of 2 conductors shall be assumed. This Contractor shall verify number of conductors required with Division 23 Specifications, Mechanical drawings, Mechanical schedules and equipment wiring diagrams.

Quality Assurance:

A. Comply with applicable portions of NEC as to type of products used and installation of electrical power connections (Terminals and splices), junction boxes, motor starters, and disconnect switches.

B. Comply with applicable portions of NEMA standards pertaining to electrical connections for

EQUIPMENT WIRING CONNECTIONS

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C. Comply with applicable ANSI standards pertaining to products and installation of electrical connections.

D. Provide electrical connection products and materials which have been listed and labeled by the Underwriters Laboratories.

PART 2 - PRODUCTS

Materials and Components:

A. For each electrical connection indicated, provide a complete assembly of materials, including but not necessarily limited to, pressure connectors, terminal (lugs), electrical insulating tape, electrical solder, electrical soldering flux, heat-shrinkable insulating tubing, cable ties, solderless wire nuts, and other items and accessories as need to complete splices and terminations of the type indicated.

Metal Conduit, Tubing and Fittings:

A. Provide metal conduit, tubing and fittings of the types, grades, sizes and weights (wall thicknesses) indicated for each type service. Where types and grades are not indicated, provide proper selection as determined by Installer to fulfill wiring requirements; comply with NEC requirements for raceways. Provide products complying with Division-26 basic materials and methods section "Electrical Raceways", and in accordance with the following listing of metal conduit, tubing and fittings.

- Rigid non-metallic conduit
- Rigid steel conduit
- Rigid metal conduit fittings
- Electrical metallic tubing
- EMT fittings
- Flexible metal conduit
- Flexible metal conduit fittings
- Liquid-tight flexible metal conduit
- Liquid-tight flexible metal conduit fittings
- PVC covered rigid metal conduit
- PVC covered rigid metal conduit fittings

A. Provide full length pull wire in ALL empty conduits to facilitate the future installation of conductors.

Wire, Cable and Connectors:

A. Provide wires, cables and connectors complying with Division-26 basic materials and methods section "Wires and Cables".

B. Unless otherwise indicated, provide wires/conductors for electrical connections which match wires/conductors of wiring supplying power.

C. Provide electrical connectors and terminals as recommended by connector and terminal manufacturer for intended application.
Electrical Connection Accessories:

A. Provide electrical insulating tape, heat-shrinkable insulating tubing and bolts, solder, electrical soldering flux, wire nuts and cable ties as recommended for use by accessories manufacturers for type services indicated.

PART 3 - EXECUTIONS

Installation of Electrical Connections:

A. Install electrical connections as indicated; in accordance with connector manufacturer’s written instructions and with recognized industry practices, and complying with requirements of NEC and NECA’s "Standard of Installation" to ensure that products fulfill requirements.

B. Connect electrical power supply conductors to equipment in accordance with equipment manufacturer's written instructions and wiring diagrams. Wherever possible, mate and match conductors of electrical connection for proper interface between electrical power supplies and installed equipment.

C. Cover splices with electrical insulation equivalent to, or of a higher rating than, insulation on the conductors being spliced.

D. Prepare cables and wires, by cutting and stripping covering, armor, jacket and insulation properly to ensure a uniform and neat appearance where cables and wires are terminated.

E. Trim cables and wires as short as practicable and arrange routing to facilitate inspection, testing and maintenance.

F. Tighten wire-binding connector screws firmly.

G. Provide liquid-tight flexible metal conduit for connection of all motors.

H. Coordinate insulation of electrical connections for equipment with equipment installation.

I. Perform all work in conformance with job requirements, other applicable sections of these specifications, governing Codes and ordinances, and manufacture's instructions.

J. If the Mechanical and/or Plumbing Contractor furnishes equipment with horsepowers or electrical characteristics different from that shown on the drawings, he shall pay all costs required to furnish the proper electrical facilities.

K. Motor starters and motor control devices that are not an integral part of the mechanical equipment
will be turned over to this contractor for installation and connection.

Electrical Equipment Identification:

A. All items of mechanical and electrical equipment shall be identified by the attachment of engraved nameplates constructed from laminated phenolic plastic, at least 3/64” thick, 3-ply, black surfaces and white core. Engraving shall be Roman Gothic, at least 3/8” high appropriately spaced.

B. Nameplates shall be attached by the use of #2 chromium plated, self-tapping, flat head Phillips screws, no rivets or adhesives. Nomenclature on the label shall include the name of the item, its make number, area, space, or equipment served, and other pertinent information. Equipment to be identified with nameplate shall include, but not be limited to, the following:

- Air Conditioning Controls
- Contractors
- Individually Enclosed C.B.’s
- Relays
- Panelboards
- Disconnect Switches
- Motor Control Centers
- Switchboards
- Starters
- Low Voltage Relay Panels

C. Nameplates for panelboards, motor control centers and switchboards shall be furnished and installed at factory by manufacturer of equipment. Refer to respective Division-26 sections for additional nameplate requirements.

D. Air washer and exhaust fan disconnect switches shall have engraved nameplates, screwed to the outside cover of disconnect, with mechanical designation and room number served by the unit, (i.e., "EF-1, GYM-101"). Room numbers shall be those finally selected by the Owner; not necessarily those shown on the Contract Documents.

E. Complete all identification cards (directories) for switches, starters, and other devices in all distribution, lighting and applicable panelboards and similar pieces of equipment, on a typewriter in a neat manner and insert the card in the card holder behind a piece of clear plastic. Where the card size is insufficient for the proper identification of all circuits, the index shall be made on a large sheet of paper of proper proportion, and then photo-reduced to fit the card holder.

F. Remote light switches and all control and equipment switches (i.e., exhaust fans, etc.) shall be identified by ENGRAVING the switchplate and NOT by micarta nameplate. Plates shall be stainless steel as hereinafter specified. Engraving shall be 3/16” Roman gothic, and shall be filled with black enamel. Nomenclature shall include the area, control, or equipment served.
EQUIPMENT WIRING CONNECTIONS
SECTION 26 05 19 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

Related Documents:
A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-01 Specifications sections apply to work of this section.

Description of Work:
A. The extent of electrical cable and electrical wire work is indicated by drawings and schedules.
B. The applications for cable, wire and connectors required on the project as follows:
   - Power and lighting distribution circuitry
   - Equipment connections and control circuitry
   - Fire Alarm System circuitry
   - Public Address circuitry
   - Program and Clock circuitry

Quality Assurance:
A. Comply with National Electrical Code (NFPA 70), latest edition, as applicable to construction and installation of electrical cable, wire and connectors.
B. Provide electrical cable, wire and connectors which have been listed and labeled by Underwriters Laboratories.
C. Comply with applicable portions of NEMA/Insulated Power Cable Engineers Association standards pertaining to materials, construction and testing wire cable.
D. Comply with applicable portions of ANSI/ASTM standards pertaining to construction of wire and cable.
E. Comply with applicable portions of IEEE standards pertaining to construction of wire and cable.

Submittal:
A. Submit manufacturer's data on electrical cable, wire and connectors when requested by the Engineer and/or Architect. Refer to Section 26 05 00 for additional requirement on product data submittal.

PART 2 PRODUCTS

Cable, Wire and Connectors:
A. Except as otherwise indicated, provide cable, wire and connectors of manufacturer standard
materials, as indicated by published product information; designed and constructed as recommended by the manufacturer, and as required for the installation.

WIRE:

B. Provide factory-fabricated wire of the size, rating, materials and type as indicated for each service. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements and with NEC Standards. Select from only the following types, materials, conductor configurations, insulations, and covering:

UL Type: THW
UL Type: THHN/THWN (dual rated)
UL Type: THWN

Material: Copper

Conductors: Solid (AWG 20 to 10 only)
Conductors: Concentric-lay-stranded (standard flexibility)

CABLE:

A. Provide factory-fabricated cable of sizes, ratings, materials and jacketing/sheathing as indicated for each type service. Where not indicated, provide proper selection as determined by installer to comply with installation requirements and with NEC Standards.

B. Conductors #6 AWG and larger shall by type THW or THWN. Conductors #8 and smaller shall be type THHN/THWN. Except that #14 AWG for class 2 remote control and signal circuits may be commercial fixture wire type RF-2 or TF. Conductors shall be 98% conductivity, copper. Insulation types THW, THHN/THWN #2 AWG and smaller, for the purpose of this specification shall have a capacity of the same size wire with 60 degrees Celsius insulation.

C. All wire on this project shall be new, unused, in good condition and shall be delivered in standard coils, packages and reels. Samples of all wire shall be submitted by the Contractor when so requested by the Owner's duly authorized representative for the purpose of determining acceptability of the wire. Wire which has been rejected by the Owner or Owner's representative shall not be used again. Such rejected wire shall be removed from the Owner's premises forthwith. Decision as to the quality of the wire furnished and the acceptance of such wire shall be made by the Owner's duly authorized representative.

D. No conductor smaller than #12 wires shall be used for lighting purposes. In the case of "homeruns", no conductor smaller than a #10 wire shall be used for runs over 50 feet in length on 120v circuits.
E. The sizing of all wire, except remote-control wire, shall be accomplished in the case of both feeder and branch circuits by conforming to the following provisions:

F. The voltage drop in the case of 120/208 volts shall not exceed 3.0% at maximum load and 80.0% power factor. Service and feeder shall not exceed 1.0% voltage drop at maximum load and 85% power factor, iron conduit only considered.

G. Conductors of #10 and smaller sizes of wire shall be solid members unless otherwise specifically called for on the plans. Conductors #8 and larger sizes of wire shall be stranded conductors unless otherwise specifically called for on the plans. The color of the wire shall be selected to conform to all instances to the following table:

COLOR-PHASE TABLE FOR WIRE

<table>
<thead>
<tr>
<th>208 VOLT SYSTEM</th>
<th>480 VOLT SYSTEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neutral White</td>
<td>Neutral Grey</td>
</tr>
<tr>
<td>Phase A Black</td>
<td>Phase A Brown</td>
</tr>
<tr>
<td>Phase B Red</td>
<td>Phase B Orange</td>
</tr>
<tr>
<td>Phase C Blue</td>
<td>Phase C Yellow</td>
</tr>
<tr>
<td>Grounding Conductor - Green</td>
<td>Grounding Conductor - Green</td>
</tr>
</tbody>
</table>

H. Should tape be used for color coding, it shall cover not less than 6” of conductor within enclosure wherever possible. Color coding shall be with tape such as that manufactured by the Minnesota Mining and Manufacturing Company for this purpose.

I. Remote-control wires, other than Class-2 Remote Control and Signal circuits, shall be no smaller than #14 conductors. Control wires shall be run in separate conduits.

J. Lighting fixtures shall not be used for raceways for circuit other than parallel wiring of fixtures.

K. When leaving a metal raceway or conduit in a cabinet, box, switch enclosure, control enclosure or any other like member, conductors shall be protected by means of insulated bushings or end fittings.

L. Conductors may be run in multiple size 1/0 to 500 MCM inclusive, provided all multiple conductors are the same size, length and type of insulation. Not more than three conductors may be run in multiple, and they shall be so arranged and terminated as to insure equal division of the total current between all conductors involved. Where multiple connections are contemplated, approval of the Owner's duly representative must be obtained before installation is made.

Connectors:
A. Provide factory-fabricated, metal compression type connectors of sizes, rating, materials, types and classes as indicated for each service. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements and NEC standards. NO SET SCREW CONNECTORS OR COUPLINGS ALLOWED.

B. No splices or taps shall be made in any conductors except in outlet boxes, pullboxes, panelboard boxes, manholes, splice boxes or other exposed locations. All taps and splices shall be made with solderless connections and insulated in a manner providing an effective insulation equal to that of the adjoining wire. Any splice or tap shall be made only on such conductors as are a component part of a single circuit.

PART 3 EXECUTION

Installer:

A. Install electrical cables, wires and connectors as indicated, in compliance with the manufacturer's written instructions, applicable requirements of the NEC and NECA's "Standard of Installation", and in accordance with recognized industry practices.

B. Coordinate cable and wire installation work with electrical raceway and equipment installation work, as necessary for proper interface. Prior to pulling cables or conductors into raceways, inspect interiors of raceways; remove burrs, dirt and construction debris.

C. Pull conductors together where more than one is being installed in a raceway. Care shall be exercised while installing wire in conduits so as not to injure conductor insulation. Bending radius of insulated wire or cable shall not exceed manufacturer's recommended values.

D. Use pulling compound or lubricant, when necessary; compound must not deteriorate conductor and insulation, and shall be U.L. listed.

E. Use pulling means, including fish tape, cable or rope which can not damage the raceway. Maximum pulling tension of any wire or cable shall not exceed manufacturer's recommended values.

F. Keep conductor splices to a minimum. Splices shall not be permitted except in junction boxes, outlet boxes or as previously listed in this section. Splices must be accessible.

H. Install splices and taps which have mechanical strength and insulation rating equivalent-or-better than conductor.

I. Use splice and tap conductors which are compatible with the conductor material.

J. Provide nylon pull wire for every empty raceway to facilitate the future installation of wires.

Field Quality Control:

A. Prior to energization, test cable and wire for continuity of circuitry and also for short circuits. Correct malfunction when detected.

B. Subsequent to wire and cable hook-ups, energize circuitry and demonstrate functioning in
accordance with requirements.

END OF SECTION
SECTION 26 05 33 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

Related Documents:

A. Drawings and general provisions of Contract, including General and Supplementary Condition and Division-01 Specification Sections, apply to work of this section.

B. This section is a Division-26 Basic Materials and Methods Section, and is part of each Division-26 section making reference to electrical raceways specified herein.

Description of Work:

A. The extent of raceways is indicated by drawings and schedules.

B. The types of raceways in this section include the following:

- Electrical metallic tubing
- Flexible metal conduit
- Intermediate metal conduit
- Liquid-Tight flexible metal
- Rigid metal conduit
- Underground plastic utilities duct

Quality Assurance:

B. Comply with applicable portions of NEMA standards pertaining to raceways.

C. Comply with applicable portions of UL safety standards pertaining to electrical raceway systems; and provide products and components which have been UL-listed and labeled.

D. Comply with NEC requirements as applicable to construction and installation of raceway systems.

Submittal:

A. Submit manufacturer's data on electrical raceways when requested by Engineer and/or Architect. Refer to Section 26 05 00 for additional requirements of product data submittal.

Product Delivery, Storage and Handling:

A. Provide color-coded end cap thread protectors on exposed threads of metal conduit.

B. Handle conduit and tubing carefully to prevent bending and end-damage, and to avoid scoring finish.

C. Store pipe and tubing inside and protect from weather. When necessary to store outdoors, elevate well above grade and enclose with durable watertight wrapping.
PART 2 - PRODUCTS

Materials and Components:

A. For each electrical raceway system indicated, provide assembly of conduit, tubing or duct and fittings including but not necessarily limited to connectors, couplings, offsets, elbows, strap, bushings, expansion joints, hangers and other components and accessories as needed for a complete system.

B. Each length of rigid conduit shall have both ends threaded. The extremities shall be reamed to remove all burrs and sharp edges. Each length of conduit shall be marked with the name and trademark of the manufacturer and the stamp of approval of the Underwriters Laboratories, Inc.

C. Each length of conduit shall be provided with one coupling attached and the threads of the end of the conduits having no coupling shall be protected by use of suitable thread protectors. All couplings and other fittings such as bends or elbows shall be protected against corrosion in the same manner in which the conduit itself is protected. All bends for conduit of 1-1/4" or larger shall either be factory manufactured elbows or be made by the use of a bending machine meeting the approval of the Owner's duly authorized representative. Under no circumstances shall any bend be installed if the conduit from which it is fabricated is injured in any manner in the course of, or by, the bending process. The radius of the curve of the inner edge of any field bend shall not be less than the recommendation of the National Electrical Code. Under no circumstances shall the internal cross section area of any conduit be appreciably reduced by any bending process.

D. EMT connectors and couplings shall be of the watertight threaded compression type, having steel gland nuts. Indenter or threadless type fittings are prohibited. NO SET SCREW CONNECTORS OR COUPLINGS ALLOWED.

E. Conduits 1/2" and 3/4" trade size may be installed in concrete slabs, or near to the center of the slab as possible.

F. Conduits installed in direct contact with the earth, except where PVC is indicated and/or specified shall be rigid galvanized steel, field spirally wrapped (half-lapped) with one layer of 1" wide 3M Scotchrap #50 plastic tape with a 50% overlap, including all joints or couplings, or shall be coated with a bonded, 20 mil minimum thickness PVC, permanently fused at the factory, Pittsburgh Standard Co., "Plasti-Bond", or approved equal. At Contractor's option PVC externally coated rigid steel conduit may be used without spiral wrap.

G. On all circuit conduits, 1/2" to 6", this contractor shall use O.S. Electrical Manufacturing Co. Type IBC-L-BC insulated conduit bushings for all conductors #6 and up where they enter or leave the cabinet box.
H. Where thin wall conduit is terminated into cabinet, junction box, outlet box, pull box, auxiliary gutter, etc., the conduit shall be secured with a nylon insulated throat compression type box connector. All thin wall conduit couplings shall be compression type only.

I. Ground clamps shall be provided on conduits stubbed up into the motor control center, panel board or switchboard and all conduits connected to the ground bus.

**Metal Conduit, Tubing and Fittings:**

A. Provide metal conduit, tubing and fittings of types, grades, sizes and weights (wall thickness) for each service indicated. Where types and grades are not indicated, provide proper selection determined by Installer to fulfill wiring requirements and comply with applicable portions of NEC for raceways.

B. Rigid Steel Conduit: FS WW-C0581 and ANSI C80.1.


E. Rigid Metal Conduit Fittings: FS W-F-408, types, kinds and styles as indicated.

F. EMT: FS WW-C 563 and ANSI C80.3.

G. EMT Fittings: FS W-F-408; types, classes and kinds as indicated.

H. Flexible Metal Conduit: FS WW-C-566, Type II, zinc coated steel. Aluminum, Type I, not acceptable.

I. Flexible Metal Conduit Fittings: FS WW-F-406; Types 1, Class 1

**STYLE A**

A. Liquid-tight Flexible Metal Conduit: Provide liquid-tight flexible metal conduit; constructed of single strip, flexible, continuous, interlocked and double-wrapped steel; galvanized inside and outside; coat with liquid-tight jacket of flexible polyvinyl chloride (PVC). SHALL NOT be used for outdoor installations.

B. Liquid-tight Flexible Metal Conduit Fittings: FS W-F-406; Type 1, Class 3, Style G.

C. Non-metallic Conduit, Ducts and Fittings:

D. Provide non-metallic conduit, ducts and fittings of types, sizes and weights (wall thicknesses) for each service allowed. Where types are not indicated, provide proper selection determined by the Installer to fulfill the wiring requirements and comply with applicable portions of NEC for raceways.

E. PVC Conduit and tubing Fittings: NEMA stds. No. TC 2 PVC Schedule 40 minimum.

G. Liquid-tight Flexible Nonmetallic Conduit: Not Permitted.

PART 3 - EXECUTION

Installation:

A. Install electrical raceways where indicated, in accordance with manufacturer's written instruction, applicable requirements of NEC and NECA "Standard of Installation" and complying with recognized industry practices.

B. Coordinate with other work including metal and concrete deck work, as necessary to interface installation of electrical raceways and components.

C. Conduit shall be provided for all wiring circuits as indicated. Material shall be exposed or concealed as required by the Drawings. Exposed conduit shall be run straight and true to building lines. All conduits shall be rigidly supported by means of straps or hangers best suited for work. If ceiling support system is adequate, one 3/4" maximum conduit may be supported by a Caddy clip to hanger wire. Multiple runs of conduits shall be racked on trapeze hangers. All support materials shall be rust-proof. Perforated tape or wire shall not be used. DO NOT USE WIRE TO SUPPORT OR ANCHOR ANY CONDUIT.

D. All ends of the conduit shall be properly reamed to remove rough edges and whenever a conduit enters a box or other fitting, it shall be securely fastened by the use of a locknut inside and outside of the box or fittings. An approve bushing shall be installed on the ends of all conduit in such a manner as to protect the wire from abrasion. The Contractor shall so lay out and install the conduit systems as to avoid all other services or systems, the proximity of which may prove injurious to the conduit or conductors which it confines. All conduit systems except those otherwise specifically shown to the contrary, shall be concealed in the building construction.

E. The contractor shall run all conduits in a manner satisfactory to the Owner's duly representative. On exposed systems, support shall be provided at intervals of 6 feet. On concealed circuits, support shall be provided at intervals of no more than 8 feet. No feeder conduit run shall be longer than 80 feet between junction boxes, cabinets or circuit interrupting devices unless there are no direction changes and only a straight-in-line pull of wire is involved. In such straight-in-line runs between junction boxes, cabinets or circuit interrupting devices, a run not to exceed 100 feet in length may be made.

F. Boxes shall be square and flush with finished surfaces and suitable anchored in place.

G. Conduit installation shall be in strict accordance with the NEC and best current practice. Conduit system shall be complete from pull to point to pull point before wire is pulled in it. Upon completion of installation of raceways, inspect interiors of raceways; remove burrs, dirt and construction debris.

H. Conduit crushed or otherwise deformed shall not be installed and shall be removed from the job site without delay.
I. Conduit runs shall be sealed after installation to prevent accumulation of water, dirt and other foreign materials. Conduit in which such accumulation of water, dirt and other foreign materials occur shall be cleaned to the satisfaction of the Owner's representative or replaced.

J. Conduit crossing expansion joints shall be provided with suitable expansion fitting. Exposed conduits below the five (5) foot level shall be galvanized rigid conduit.

K. Conduits exposed on room or other exterior (outdoor) locations, not in direct contact with earth, shall be galvanized rigid steel or IMC.

L. EMT Steel tube may be used in sizes up to and including 2” in all interior work, except that it SHALL NOT be used in concrete, underground, underfloor, in any damp or outdoor locations, or in any location where there is a likelihood of mechanical injury.

M. Provide liquid-tight flexible metal conduit for all motor connections. Liquid tight flexible metal conduit SHALL NOT be used for outdoor installations.

N. Flexible metal conduit shall be used ONLY for tap connections to lay-in lighting fixtures and in accordance with NEC Article 410-117 (c).

O. Conduits routed above the acoustical "lay-in" ceilings shall be anchored to the building structure and not on the ceiling. Wire shall not be used to anchor boxes to structure. Junction boxes shall be installed on the structural members. Flexible metal conduits extended down to light fixtures from junction boxes shall not exceed 6 ft. length and be in accordance with NEC Article 410-117 (c). Flexible metal conduit shall be strapped and/or supported such that it not lay atop acoustical lay-in ceiling tile.

P. The Contractor shall so lay out and install conduit runs as to avoid close proximity to hot water pipes. In no case shall a conduit be run within 3” of such pipes, except where crossings are unavoidable and then the conduit shall be kept at least 1” from the covering on the pipe crossed. Wherever possible, install horizontal raceway runs and above water and steam piping.

Q. The Contractor shall furnish and install a full length nylon pull cord in EVERY empty conduit installed hereunder to facilitate the future installation of wires. Identify each terminus of pull wire and linen tags and with complete information as to service and location of terminus of the cord.

R. Steel conduit may be embedded in concrete providing the outside diameter does not exceed 1/3 the thickness of the concrete lab, wall or beam is located entirely within the center third of the member and the lateral spacing of conduits is not less than 3 diameters.

S. Non-metallic conduit or duct may be used for underground branch circuits, underground feeders or underground service conduits only. Non-metallic conduit when installed outside of building foundation shall be buried 24” below ground. When non-metallic conduit is extended underneath building foundation concrete encasement is not required and conduit shall be buried 18” below foundation. BEFORE STUBBING UP, ADAPT TO GALVANIZED RIGID ELBOWS. Elbows
shall be wrapped as indicated under MATERIALS AND COMPONENTS.

T. Non-metallic conduit is not permitted above grade or finished floor.

U. Contractor shall furnish and install a ground bonding conductor as required by NEC. This Contractor shall size the ground conductor as per NEC Art. 250 taking voltage drop into consideration. The addition of the grounding conductor may require an increase in conduit size and conduit fill shall be computed using the appropriate NEC tables. This Contractor shall submit recalculated branch, feeder or service conduit, taking the additional ground conductor into account, to the Engineer for approval.

V. All non-metallic conduit or duct runs, whether shown on the Drawings or not, shall have a ground bonding conductor, size as noted and/or as required by the NEC. The bond or equipment served shall be grounded to a grounding conductor to provide a good return path to service panel.

W. This contractor shall be responsible for sealing all new conduit penetrations, through new and existing walls, ceiling or floors. The seal shall be acceptable to Architect/Engineer and maintain the integrity of the wall, ceiling or floor fire rating. 3M brand fire barrier caulk #CP-25 and putty #303 are considered acceptable for this purpose.

X. All roof penetrations shall be done using "portal-plus" pre-molded flexible boot flashing.

END OF SECTION
SECTION 26 05 34 - OUTLET, JUNCTION AND PULL BOXES

PART 1 - GENERAL

Related Documents:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-01 Specification sections, apply to work of this section.

B. This section is a Division-26 Basic Materials and Methods section, and is a part of each Division-26 section making reference to electrical wiring boxes and fittings specified herein.

Description of Work:

A. Extent of electrical box and electrical fitting work is indicated by drawings and in schedules.

B. The types of electrical box and electrical fitting work is indicated by drawings and in schedules.

C. The types of electrical boxes and fittings in this section include the following:

- Outlet boxes
- Junction boxes
- Pullboxes
- Conduit bodies
- Bushings
- Locknuts

Quality Assurance:

A. Comply with NEC as applicable to construction and installation of electrical boxes and fittings.

B. Provide electrical boxes and fittings which have been UL listed and labeled.

C. Comply with ANSI C134.1 (NEMA Standards Pub. No. OS 1) as applicable to sheet-steel outlets boxes, device boxes, covers and box supports.

PART 2 - PRODUCTS

Fabricated Materials:

A. Provide galvanized flat rolled sheet steel interior outlet wiring boxes of types, shapes and sizes including box depths to suit each respective location and installation; construct with stamped knockouts in back and sides and with threaded screw holes with corrosion-resistant screws for securing box covers and wiring devices.

B. Provide outlet box accessories as required for each installation, including mounting brackets, wallboard hangers, extension rings, fixture studs, cable clamps and metal straps for supporting outlet boxes which are compatible with outlet boxes being used and fulfilling requirements of individual wiring situations. Choice of accessories is Installer's option.
C. In standard partitions and suspended ceilings four inch octagonal boxes shall be 2-1/8" deep:

Appleton #40D1/2 (Universal 54171-1/2), 4" Oct. x 2-1/8" Deep, four 1/2" K.O.'s in sides, five 1/2" K.O.'s in top.

Appleton #40DSPL (Universal 54171 SPL), 4" oct. x 2-1/8" Deep, two 1/2" K.O.'s and two 3/4" K.O.'s in sides, three 1/2" K.O.'s and two 3/4" K.O.'s in top.


D. In standard partitions and suspended ceilings where conduits of greater size than 3/4" are employed boxes shall be 4" square, 1-1/2" deep:

Appleton #4SD1 (Universal 53171-1) 4" Sq. x 2-1/8" Deep, Eight 1" K.O.'s in sides, three 1/2" & two 3/4" K.O.'s in top.

E. In thin partitions measuring 3-1/2" or less, boxes shall be 4" square, 1-1/2" deep:

F. All wall or bracket outlets using octagon boxes shall be equipped with 3/8" no-bolt fixture stud.

G. Switch and outlet boxes shall use the same size boxes as specified above. Provide boxes with the appropriate covers and with required "raise" to finish flush with surface.

H. The following requirements shall apply to exposed as well as concealed conduit systems. When "gang" arrangements of outlets are employed 2-3/4" deep "gang" boxes shall be used. These "gang" boxes shall have dimensions which are not smaller than those shown in the following table.

<table>
<thead>
<tr>
<th>NUMBER IN GANG</th>
<th>SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>4 - 1/2&quot; x 8 -5/8&quot;</td>
</tr>
<tr>
<td>4</td>
<td>4 - 1/2&quot; x 10 -1/2&quot;</td>
</tr>
<tr>
<td>5</td>
<td>4 - 1/2&quot; x 12 -1/4&quot;</td>
</tr>
<tr>
<td>6</td>
<td>4 - 1/2&quot; x 14&quot;</td>
</tr>
<tr>
<td>7</td>
<td>4 - 1/2&quot; x 16&quot;</td>
</tr>
<tr>
<td>8</td>
<td>4 - 1/2&quot; x 17 -3/4&quot;</td>
</tr>
</tbody>
</table>

I. Where "gang" boxes are located in woodwork or in wooden partitions, the depth of the boxes shall be reduced to 1 - 3/4".

J. Provide corrosion-resistant cast metal weatherproof outlet wiring boxes of types, shapes and sizes, including depth of boxes with threaded conduit ends, cast metal face plates with spring-hinged waterproof caps suitably configured for each application, including face plate gaskets and corrosion-resistant fasteners.
K. Provide galvanized code gauge sheet steel junction and pull boxes with screw-on covers; of types, shapes and sizes to suit each respective location and installation; with welded seams and equipped with stainless steel nuts, bolts, screws and washers. Outdoor pullboxes shall be cast iron NEMA 4.

L. Provide galvanized cast-metal conduit bodies of types, shapes and sizes, to suite respective locations and installation, construct with threaded-conduit-entrance ends, removable covers and corrosion-resistant screws.

M. Provide corrosion-resistant punched-steel box knockout closures, conduit locknuts, conduit bushings, and offset connectors of types and sizes to suit respective uses and/or installation. Provide conduit bushings and connectors as specified under Section 26 05 33 Raceway and boxes for Electrical System.

PART 3 - EXECUTION

Installation of Boxes and Fittings:

A. Install electrical boxes and fittings where indicated, complying with manufacturer written instructions, applicable requirements of NEC and NECA's "Standard of Installation" and in compliance with recognized industry practices to ensure that products fulfill requirements.

B. Coordinate installation of electrical boxes and fittings with wire/cable and raceway installation work.

C. Special Systems Junction Boxes shall be painted in the following color scheme for easier identification during construction and inspections (if applicable):

- Red - Fire Alarm System
- Blue - P.A. System
- Yellow - Program and clock System

D. Provide weatherproof outlets for interior and exterior locations exposed to weather or moisture. Provide knockout closures to cap unused knockout holes where blanks have been removed.

E. Install boxes and conduit bodies so as to ensure ready accessibility of electrical wiring. Avoid using round boxes where conduit must enter box through side of box which would result in difficult and insecure connections when fastened with locknut or bushing on rounded surface. Fasten boxes rigidly to substrates or structural surfaces to which attached or solidly embed electrical boxes in concrete or masonry. Wire shall not be used to anchor boxes to structure. Provide electrical connections for installed boxes.

F. All j-boxes must be clearly labeled, including circuit number, panel number and room in which it originates.

END OF SECTION