PROJECT MANUAL

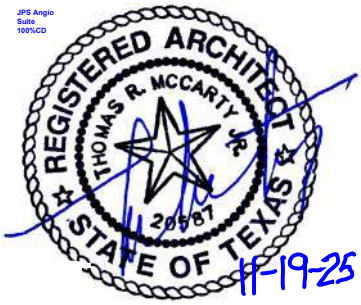
FOR

GENERAL CONSTRUCTION

JPS HEALTH NETWORK

ARTIS ICONO BI-PLANE REPLACEMENT

1500 S. MAIN STREET
FORT WORTH, TEXAS 76104



COMM. NO. 1449
November 19, 2025

Primera Design Associates

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JPS HEALTH NETWORK
ARTIS ICONO BI-PLANE REPLACEMENT

TABLE OF CONTENTS

TABLE OF CONTENTS

— END OF TABLE OF CONTENTS —

SECTION 010100
SUMMARY OF WORK

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Articles and portions of articles of the General Conditions and Supplementary Conditions not amended, supplemented or superseded by these General Requirements (Division 1) shall remain in effect.

1.2 SECTION INCLUDES

A. Definitions
B. Summary of Work
C. Items Furnished by Owner, Installed by Contractor
D. References
E. Texas Accessibility Standards

1.3 DEFINITIONS

A. Whenever in these Contract Documents the following terms, or pronouns used in place of them, are used, the intent and meaning shall be interpreted as follows:

OWNER:	JPS Health Network 1500 South Main Fort Worth, Texas 76104
ARCHITECT:	Primera Design Associates, LLC 318 W Main St, Suite 103 Arlington, TX 76010
MECHANICAL & ELECTRICAL ENGINEERS:	Baird Hampton & Brown Inc. 6300 Ridglea Place, Suite 700 Fort Worth, TX 76116
STRUCTURAL ENGINEERS	Integrity Engineering Services 2102 Roosevelt Dr, Suite A Dalworthington Gardens, TX 76013

1.4 SUMMARY OF WORK

A. In general, the work of this Contract shall include all labor, materials, equipment and services necessary to complete the building construction, revisions and alterations to the existing building and sitework as indicated on the Drawings and described in the Project Manual.

B. Related Work Not a Part of This Contract:

1. Equipment, Furniture, beds, tables, chairs, etc. Shall be coordinated by the Contractor with the Owner.
2. Contractor shall coordinate with Owner's separate Contractor for the provision and installation of computer systems.
3. Contractor shall coordinate with Owner's separate Asbestos Abatement Contractor for the removal of asbestos.

1.5 ITEMS FURNISHED BY OWNER, INSTALLED BY CONTRACTOR

A. Notify Architect ten (10) days prior to time work will be ready for installation of items, or portion of items. Architect will arrange time and location for Contractor to receive items at the site.

B. Contractor shall be responsible for items from time of receipt until date of Owner acceptance.

C. Contractor shall inspect items upon receipt and make written record of any existing damage, or defects. A copy of the written record shall be sent to the Architect.

D. Contractor shall dismantle and disconnect Owner furnished equipment and items, and reassemble and reconnect at new location as well as installing and connecting all new appliances as shown on the Drawings.

1.6 REFERENCES

A. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.

B. Some products, fabrications, and executions are specified throughout the following sections by reference to published specifications or standards. Listed below are typical references followed by the respective abbreviation. Additional references are identified in the Sections for which they apply.
1. American National Standards Institute, Inc. (ANSI).
2. American Society for Testing and Materials (ASTM).
3. Underwriters Laboratories (UL).
4. Factory Mutual (FM).
5. National Fire Protection Association (NFPA).
6. Commercial Standards (CS).
7. Americans with Disabilities Act (ADA).

1.7 TEXAS ACCESSIBILITY STANDARDS

A. The Contractor shall be responsible to construct all aspects of the project in accordance with the Texas Accessibility Standards (TAS) as administered by the Texas Department of Licensing and Regulation (TDLR).

B. The Contractor shall familiarize himself with the requirements and review the Contract Documents and notify the Architect of any discrepancies prior to commencing work on that particular item.

C. The Contractor will notify the Registered Accessibility Specialist (RAS) that reviewed the Drawings, at the appropriate time to allow for inspections of the project prior to Substantial Completion.

D. The Contractor shall notify the Architect and Owner forty-eight (48) hours in advance of inspection.

E. The Contractor shall remedy all deficiencies discovered during the inspection prior to Substantial or Final Completion, as deemed appropriate by the Architect.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

— END OF SECTION —

SECTION 010200
CONTRACT CONSIDERATIONS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Articles and portions of articles of the General Conditions and Supplementary Conditions not amended, supplemented or superseded by these General Requirements (Division 1) shall remain in effect.

1.2 SECTION INCLUDES

A. Allowances
B. Schedule of Values
C. Application for Payment
D. Proposal Request (Changes)
E. Architect's Supplemental Instructions
F. Acceptance of Contract Documents and Requests for Information
G. Coordination
H. Coordination Drawings
I. Cutting and Patching

1.3 ALLOWANCES

A. Contingency Allowance:
   1. Include in the Contract, a stipulated sum price of Fourty Five Thousand Dollars ($45,000) for use upon Owner's instruction.
   2. Contractor's insurance, bonding, overhead and profit shall be included in the base bid.
   3. Funds will be drawn from the Contingency Allowance only by written approval.
   4. At closeout of Contract, funds remaining in Contingency Allowance will be credited to Owner by Change Order.

1.4 SCHEDULE OF VALUES

A. Schedule of Values shall be submitted on AIA Document G703 - Continuation Sheet of Application and Certification for Payment, or electronic media printout.

B. Submit a Schedule of Values to the Architect within twenty (20) calendar days after the date of the Owner-Contractor Agreement. Upon request of the Owner or Architect the Contractor shall furnish additional line item breakdown of the Schedule of Values.

C. Use Table of Contents of Project Manual as basis of format for listing categories of work. Provide a separate line item for material and labor for each category of work.

D. Include separate line items for the following:
   1. Site Mobilization
   2. Bonds / Insurance
   3. Permits / Fees
   4. Supervision / PM
   5. Contractor's Overhead and Profit
   6. Change Orders

1.5 APPLICATION FOR PAYMENT

A. At least ten (10) days before each progress payment falls due, the Contractor shall submit to the Architect a rough-draft, itemized Application for Payment based on the previously approved Schedule Of Values, of 95% of the value of labor and materials incorporated in the Work and of all stable materials suitably stored at the site to and including the last day of the proceeding month, less the aggregate total of all previous payments, provided the aggregate total of all monthly payments shall not exceed 95% of the contract

price. Applications for Payment shall be supported by data substantiating the Contractor's right to payment as the Owner or the Architect may require.

B. Request for payment of stored materials shall be made only for material stored on site, accompanied by invoices showing the quantities of items with dollar amount that equals request of payment. Contractor may not request payment for materials which are stored off site.

C. Contractors shall use whole dollars and no cents for all bookkeeping between Owner and Contractor.

D. The full amount of retainage, plus monies for items to be completed or corrected will be withheld until Final Acceptance and Final Payment.

1.6 CHANGE PROCEDURE

A. Proposal Request: The Architect may issue a Proposal Request (PR) during the course of the Work. A Proposal Request is a description of a change in the Work under Contract such as additional work or revisions to work already completed, work not yet started or work in progress. The Proposal Request is issued to ascertain a mutually accepted lump sum cost adjustment for the Work described, whether add, deduct or no change.

B. The Contractor shall promptly submit to the Architect his completed Proposal, properly itemized and supported by sufficient substantiating data to permit evaluation.

C. The Contractor shall not proceed with the Work described in a Proposal Request until the Proposal has been evaluated, found to be fair and equitable by the Architect, presented to the Owner for approval and authorized in writing or issued in a Change Order. The Contractor, upon issuance of a Proposal Request, shall make every attempt to not install items of work that are affected by the Proposal and will notify the Architect of any and all items that cannot be postponed.

D. Unless agreed otherwise, two (2) weeks shall be allowed for evaluation by the Architect. If in the opinion of the Architect a Proposal is not found to be fair and equitable, the Contractor will reevaluate the cost and no additional cost or time extension will be considered for the time required for the reevaluation.

E. Two (2) weeks will be required to issue authorization to proceed after the Proposal Request is found to be fair and equitable. The Contractor's Proposal must be valid for the four (4) weeks stated above unless agreed otherwise.

F. Change Orders will be prepared by the Architect and issued to the Contractor(s) in the form of AIA Document G701.

1.7 ARCHITECT’S SUPPLEMENTAL INSTRUCTIONS

A. Architect’s Supplemental Instructions are issued for work that is not described in sufficient detail or is generally stated but not specifically described to the extent required for the exact construction of such items. This information shall be issued to the Contractor(s) in the form of Architect’s Supplemental Instructions (ASI) and shall be considered a minor change in the Work.

B. Should the Contractor consider Architect’s Supplemental Instructions an item to be a change in the Contract Documents, he may notify the Architect in writing of the items in dispute and include the actual cost increase or decrease associated with each item.

C. Claims by the Contractor for additional cost, in response to an Architect’s Supplemental Instruction (ASI), must be received by the Architect within twenty (20) days after the posted date on the ASI or claims will not be considered. Proceeding with work described in an ASI. shall constitute waiver of rights to claims.

1.8 ACCEPTANCE OF CONTRACT DOCUMENTS AND REQUESTS FOR INFORMATION

A. The Contractor shall review all the Contract Documents in detail during bidding and interpret them in order to submit his bid. Submission of a bid represents that the bidder accepts the Contract Documents as being sufficiently complete to illustrate the indicated result and he understands the documents and has included all items reasonably inferable as necessary for a complete project. Additional Drawings needed by the Contractor after signing of the Contract shall be the responsibility of the Contractor and shall be considered “Coordination Drawings.” The “Coordination Drawings” for the purpose of this Contract will not be considered the practice of architecture or engineering. However, if the Contractor believes the “Coordination Drawings” represent the practice of architecture or engineering he shall hire and pay for registered architect or engineer to prepare the “Coordination Drawings.”

B. A Request for Information will represent a Request for Interpretation.

C. If after the award of the contract the Contractor wants to confirm his interpretation of the contract

documents is correct, he may use the following procedure to request information. Prior to submitting a written Request for Information (RFI), the Contractor shall call the Architect and review the issue. If it is mutually agreed that the issue needs to have a written confirmation, then the Contractor shall submit an RFI in writing as outlined below.

All Requests for Information (RFIs) shall be submitted with Contractor's proposed solution attached for Architect's review and approval. The Contractor's proposed solution shall represent his interpretation of the Contract Documents and how he plans to accommodate the contract requirements within the contract amount and time.

The RFI shall include:

1. A copy of the portion of the Construction Drawing(s) or specifications involved with the RFI with the question noted on the drawing or specification using "PDF tools."
2. The Contractor shall include his "Coordination Drawing" to illustrate the proposed solution.

D. The Contractor shall plan his work in advance so as to allow the Architect two (2) weeks to review the Contractor's RFI and proposed solution and not affect the contract amount or contract time.

E. All Requests for Information shall be submitted to the Architect in written form conforming to the following:
   1. Each RFI shall be numbered, as for referencing and entering into a log which shall be kept by the Contractor and the Architect.
   2. The RFI log shall be reviewed during each progress meeting.

1.9 COORDINATION

A. Coordinate scheduling, submittals, and Work of the various Sections of specifications to assure efficient and orderly sequence of installation of interdependent construction elements.

B. Verify utility requirement characteristics of operating equipment are compatible with building utilities.

C. Coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable.

D. In finished areas, conceal pipes, ducts, and wiring within the construction.

1.10 COORDINATION DRAWINGS

A. GENERAL

B. The General Contractor shall be responsible for coordination of all Subcontractors' work such as civil, concrete, masonry, architectural, structural, mechanical, fire protection, electrical work, etc. The General Contractor shall prepare coordination drawings as required for the proper coordination of the work. The Contractor shall provide all labor and material required to accommodate the coordination of all trades. The Contractor shall utilize competent draftsmen to prepare the coordination drawings in a clear and fully legible manner acceptable to the Architect. The Contractor shall provide coordination drawings in addition to shop drawings.

C. LAYOUT & COMPOSITE DRAWINGS
   1. LAYOUT DRAWINGS:
      a. Mechanical, Plumbing, Electrical, and Fire Sprinkler Subcontractors, no later than thirty (30) days after award of contract, and sooner if possible, shall prepare and submit to General Contractor layout drawings prepared in AutoCAD and plotted at not less than 1/4" scale, showing all items listed in the following paragraph.
      b. Items to be Shown: Ductwork, hydronic piping and plumbing, registers, grilles, diffusers, switch gear, electric panels, lights, routing of conduits, valves, dampers, fire sprinkler piping, access panels and similar features, as well as locations of other items requiring access for service and maintenance. Show locations and heights of structural members such as beams and joists. Show walls, columns, doors, cabinets and other major architectural and structural features as may be necessary. Note floor-to-floor heights and ceiling heights and height of bottom of structure. All items shall be drawn to scale.
      c. Within five (5) days after receiving layout drawings the General Contractor shall send a CAD disk and reproducible vellum of the Mechanical layout drawings to the Fire Protection, Electrical Subcontractors and other Subcontractors that may be appropriate.
      d. Furthermore, each Subcontractor shall show existing areas outside of the primary remodel area where pipes, conduits, etc. must be run through in order to accomplish the Work of this Project. These areas include areas above, below or adjacent to the primary area. In

cooperation with the General Contractor each Subcontractor shall research all existing elements and carefully plan out proposed routing outside the primary remodel area. The General Contractor shall coordinate the efforts of all Subcontractors and determine the best functional route balanced with the least disruption to the facility. The actual work shall be performed utilizing the “Work Plan Approval Request" and "Outage Request” system outlined in Section 01015.
Return modified CAD file or marked up reproducible to the General Contractor no later than ten (10) days after receipt.

2. COMPOSITE DRAWINGS:
   a. The General Contractor shall prepare a preliminary composite of all layout drawings. Incorporate all the information and routings provided by the Sub-contractors. These drawings are to be prepared in AutoCAD and plotted with different colors for various items.
   b. The General Contractor shall be responsible for coordinating Subcontractors' layout drawings in all areas including areas where no Mechanical work occurs. The General Contractor is to prepare all final composite drawings, large-scale details as well as cross and longitudinal sections, as required to fully delineate all conditions. Give particular attention to the locations, size and clearance dimensions of equipment items, shafts and similar features.
   c. All Affected Contractors shall attend a series of meetings scheduled and administered by the General Contractor for review of the various drafts of the preliminary composite drawings. All Subcontractors must attend the meetings in order to review and resolve any real or apparent interferences or conflicts. The Architect will be available on an hourly basis to attend the meetings, if requested, and his time paid for by the General Contractor. When mutually agreed upon among the General Contractor and Subcontractors, minor changes in duct, pipe or conduit routings that do not affect the intended function may be made in preparing the composite drawings as required to avoid space conflicts.
   d. Items may not be resized or exposed to view without obtaining the Architect's written approval. No changes in any wall or chase locations, ceiling heights, door swings or locations, window or other openings, or other features affecting the function or aesthetic effect of the building will be permitted without the Architect’s approval.
   e. General Contractor shall develop final composite drawings, after all conflicts or interferences are resolved, showing the agreed upon routing, layout and juxtaposition of all items listed under layout drawings.
   f. Each affected Subcontractor shall sign off on final composite drawings indicating each Subcontractor's awareness of, and agreement with, the indicated routings and layouts and their interrelationship with the adjoining or continuous work of the general construction. After the General Contractor and all affected Sub-contractors have signed off, the drawings will become the “Approved Composite Drawings”. Thereafter, no unauthorized deviations will be permitted to the “Approved Composite Drawings”. Any unauthorized work made without knowledge or agreement of the General Contractor will be subject to removal and correction at no additional cost.
   g. General Contractor is to provide and distribute a minimum of two (2) prints of the “Approved Composite Drawings” to each of the affected Subcontractors and Architect for reference and record purposes.
      1) Make similar distribution for revisions to composite drawings.
      2) Arrange and pay for CAD drafting and printing of composite drawings and revised composite drawings.
3. General Contractor shall retain record copies of the final composite drawings as working reference. Compare all shop drawings with the composite drawings, and develop accordingly, prior to submittal to the Architect. Note any revision to the composite drawings that may become necessary during the progress of the work. Record neatly and accurately on record copies. Maintain up-to-date record copies of the composite drawings. Keep one (1) copy available at the site. Utilize the composite drawings and any subsequent changes for development of Project Record Drawings.
4. In all cases, submit drawings in ample time to avoid construction delay. Coordination drawings may lack complete data in certain instances pending receipt of shop drawings. In that instance, provide sufficient space for the affected items. Promptly insert final information on the composite when such data is received.
5. No extra compensation will be paid for relocating any duct, pipe, conduit, or other material installed without proper coordination between all affected contractors. If any Sub-contractor performs work

that is in conflict with the approved composite drawings and necessitates additional work by other Subcontractors and/or the General Contractor, the conflict must be resolved and the additional work performed at no additional cost or time.

6. Show all changes in the scope of work due to revisions formally issued and approved by the Architect on the composite drawings.

1.11 CUTTING, PATCHING AND TOUCH-UP

A. Employ skilled and experienced installers to perform cutting and patching of new and existing work; restore work with new products.

B. Establish elevations, lines, and levels and certify that elevations and locations of the work conform with Contract Documents.

C. Execute fitting and adjustment of products to provide finished installation to comply with specified tolerances and finishes. Fit work tight to adjacent elements. Maintain integrity of wall, ceiling, or floor construction; completely seal voids.

D. Execute cutting and demolition by methods that will prevent damage to other work and will provide proper surfaces to receive installation of repairs and new work.

E. Restore work that has been cut or removed; install new products to provide completed work in accordance with requirements of Contract Documents.

F. Refinish entire surfaces to match adjacent finishes to the nearest intersections. Refinish assemblies entirely.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

— END OF SECTION —

SECTION 01 03 00
ALTERNATES

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Articles and portions of articles of the General Conditions and Supplementary Conditions not amended, supplemented or superseded by these General Requirements (Division 1) shall remain in effect.

1.02 SECTION INCLUDES

A. Documentation of changes to the Contract Sum and/or Contract Time.

B. Owner-Contractor Agreement: Alternates accepted by Owner for incorporation into the work.

1.03 PROCEDURES

A. In the spaces provided on the Proposal Form, Bidders shall state the amounts to be added to or deducted from the Base Bid, if the described alternate bids are accepted. Alternate bids shall include profit, overhead, insurance, bond and similar related items.

B. Alternates will be exercised at the option of the Owner.

C. Modify or adjust affected adjacent work as necessary to completely and fully integrate all accepted alternates.

1.04 DESCRIPTION OF ALTERNATES

1. BID ALTERNATE NO. 1:

Contractor is to provide all the labor and materials for the de-installation, storage and reinstallation of the medical boom.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

— END OF SECTION —

SECTION 01 03 90
MEETINGS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Articles and portions of articles of the General Conditions and Supplementary Conditions not amended, supplemented or superseded by these General Requirements (Division 1) shall remain in effect.

1.02 SECTION INCLUDES

A. Pre-Construction Conference

B. Progress Meetings

1.03 PRE-CONSTRUCTION CONFERENCE

A. Prior to the start of the Work of this Contract, the Contractor, the Architect and the Owner's Representative will meet for the purpose of reviewing schedules, procedures, etc.

B. The location and date of the Pre-Construction Meeting will be scheduled after the Award of Contract to all affected parties.

C. Pre-Construction Conference Agenda shall include at least the following:

1. Introduction of Key Personnel.
2. Dates will be selected for meetings.
3. All required contract forms, bonds and insurance will be reviewed.
4. Schedules and Submittal Process will be reviewed.
5. Use of Site.
6. Review contract procedures.
7. Contractor questions.
8. Review of Testing Laboratory Service requirements.

1.04 PROGRESS MEETINGS

A. Weekly Job Site Progress Meeting Agenda shall include at least the following. Meeting Schedule to be determined after award of contract.

1. Review and comment on previous meeting minutes.
2. Monitor the progress of construction.
3. Review of Requests for Interpretation.
4. Review of any shop drawing issues.
5. Confirm next week meeting date and time.
6. Submit Daily Activity Reports in accordance with the contract requirements.

B. Monthly Job Site Progress Meeting Agenda shall include at least the following:

1. Review and comment on previous meeting minutes.

2. Review Project Schedule: An up-to-date project schedule shall be submitted at each monthly meeting.
3. Review any issues of weather days or anticipated delay days.
4. Review list of construction items to be observed before being covered or completed.
5. Review Pay Request: Submit rough-draft copies of the pay request for review unless notified otherwise by the Architect.
6. Review of Requests for Interpretation.
7. Review status of submittals.
8. Review any coordination issues.
9. Review Record Set of Drawings: Record set of drawings must be kept current with any changes to utilities, partitions, etc.
10. Confirm next month meeting date and time.
11. Submit Daily Activity Reports in accordance with the contract requirements.

C. Except as directed otherwise, Contractor shall prepare minutes of the meetings in a format provided by the Architect and issue to the Architect, Owner and other designated persons, at least twenty-four (24) hours prior to the next scheduled meeting.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

— END OF SECTION —

SECTION 012100

ALLOWANCES

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements governing allowances.

B. Types of allowances include the following:
   1. Lump-sum allowances.

1.2 DEFINITIONS

A. Allowance: A quantity of work or dollar amount included in the Contract, established in lieu of additional requirements, used to defer selection of actual materials and equipment to a later date when direction will be provided to Contractor. If necessary, additional requirements will be issued by Change Order.

1.3 SELECTION AND PURCHASE

A. At the earliest practical date after award of the Contract, advise Architect of the date when final selection, or purchase and delivery, of each product or system described by an allowance must be completed by the Owner to avoid delaying the Work.

B. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.

C. Purchase products and systems selected by Architect from the designated supplier.

1.4 ACTION SUBMITTALS

A. Submit proposals for purchase of products or systems included in allowances in the form specified for Change Orders.

1.5 INFORMATIONAL SUBMITTALS

A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

B. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.

C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.6 LUMP-SUM ALLOWANCES

A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Architect under allowance and shall include taxes, freight, and delivery to Project site.

B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner or selected by Architect under allowance shall be included as part of the Contract Sum and not part of the allowance.

C. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.
   1. If requested by Architect, retain and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed.

1.7 ADJUSTMENT OF ALLOWANCES

A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, required maintenance materials, and similar margins.
   1. Include installation costs in purchase amount only where indicated as part of the allowance.
   2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other markups.
   3. Submit substantiation of a change in scope of Work, if any, claimed in Change Orders related to unit-cost allowances.
   4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.

B. Submit claims for increased costs due to a change in the scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.
   1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of Work has changed from what could have been foreseen from information in the Contract Documents.
   2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES

A. Allowance No. 1: Include the sum of $100,000.00.

END OF SECTION

SECTION 012500

SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

1.2 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents.
   1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
   2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required to meet other Project requirements but may offer advantage to Contractor or Owner.

1.3 ACTION SUBMITTALS

A. Substitution Requests: Submit documentation in PDF electronic format identifying product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
   1. Substitution Request Form: Use form provided in Project Manual.
   2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
      a. Statement indicating why specified product or fabrication or installation method cannot be provided, if applicable.
      b. Coordination of information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
      c. Detailed comparison of significant qualities of proposed substitutions with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes, such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
      d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
      e. Samples, where applicable or requested.
      f. Certificates and qualification data, where applicable or requested.
      g. List of similar installations for completed projects, with project names and addresses as well as names and addresses of architects and owners.
      h. Material test reports from a qualified testing agency, indicating and interpreting test results for compliance with requirements indicated.
      i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
      j. Detailed comparison of Contractor's construction schedule using proposed substitutions 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 date of receipt of purchase order, lack of availability, or delays in delivery.
      k. Cost information, including a proposal of change, if any, in the Contract Sum.
      l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents, except as indicated in substitution request, is compatible with related materials and is appropriate for applications indicated.
      m. 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.
   3. Any substitution request made that is not on required form, is not completely filled in, or does not provide required backup documentation will be rejected without review.

4. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven business days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 business days of receipt of request, or seven business days of receipt of additional information or documentation, whichever is later.
    a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
    b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.4 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.5 PROCEDURES

A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

1.6 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.
    1. 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:
        a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
        b. Substitution request is fully documented and properly submitted.
        c. Requested substitution will not adversely affect Contractor's construction schedule.
        d. Requested substitution has received necessary approvals of authorities having jurisdiction.
        e. Requested substitution is compatible with other portions of the Work.
        f. Requested substitution has been coordinated with other portions of the Work.
        g. Requested substitution provides specified warranty.
        h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: 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.
    1. 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:
        a. 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.
        b. Requested substitution does not require extensive revisions to the Contract Documents.
        c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
        d. Substitution request is fully documented and properly submitted.
        e. Requested substitution will not adversely affect Contractor's construction schedule.
        f. Requested substitution has received necessary approvals of authorities having jurisdiction.
        g. Requested substitution is compatible with other portions of the Work.
        h. Requested substitution has been coordinated with other portions of the Work.
        i. Requested substitution provides specified warranty.
        j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SUBSTITUTION REQUEST FORM

PROJECT: _____ **(After Contract Award)**

TO: _____ _____

NO._____ DATE: _____

Contractor hereby requests acceptance of the following product or system as a substitution in accordance with provisions of Division 01 Section "Substitution Procedures:"

1. SPECIFIED PRODUCT OR SYSTEM

Substitution request for: _____

Specification Section No.: _____Article/ Paragraph: _____

2. REASON FOR SUBSTITUTION REQUEST

SPECIFIED PRODUCT . . .

- ☐ Is no longer available.
- ☐ Is unable to meet project schedule.
- ☐ Is unsuitable for the designated application.
- ☐ Cannot interface with adjacent materials.
- ☐ Is not compatible with adjacent materials.
- ☐ Cannot provide the specified warranty.
- ☐ Cannot be constructed as indicated
- ☐ Cannot be obtained due to one or more of the following:
  - ☐ Strike
  - ☐ Lockout
  - ☐ Bankruptcy of manufacturer or supplier
  - ☐ Similar occurrence (explain below)

PROPOSED PRODUCT . . .

- ☐ Will reduce construction time
- ☐ Will result in cost savings of $ _____to Project
- ☐ Is for supplier's convenience
- ☐ Is for subcontractor's convenience
- ☐ Other: _____ _____

3. SUPPORTING DATA

- ☐ Drawings, specifications, product data, performance data, test data, and any other necessary information to facilitate review of the Substitution Request are attached.
- ☐ Sample is attached.
- ☐ Sample will be sent if requested.

4. QUALITY COMPARISON: Provide all necessary side-by-side comparative data as required to facilitate review of Substitution Request:

	SPECIFIED PRODUCT	PROPOSED PRODUCT
Manufacturer:		
Name / Brand:		
Catalog No.:		
Vendor:		
Variations:		

(Add Additional Sheets If Necessary)

Local Distributor or Supplier: _____

Maintenance Service Available: ☐ Yes ☐ No

Spare Parts Source: _____

Warranty: ☐ Yes ☐ No ____Years

5. PREVIOUS INSTALLATIONS

Identification of at least three similar projects on which proposed substitution was used:

PROJECT #1:_____

Address:_____

Architect:_____

Owner:_____

Contractor:_____

Date Installed: _____

PROJECT #2: _____

Address:_____

Architect:_____

Owner:_____

Contractor:_____

Date Installed: _____

PROJECT #3: _____

Address: _____

Architect: _____

Owner: _____

Contractor: _____

Date Installed: _____

6. EFFECT OF SUBSTITUTION

Proposed substitution affects other work or trades: ☐ No ☐ Yes (if Yes, explain)

_____

_____

Proposed substitution requires dimensional revisions or redesign of architectural, structural, M-E-P, life safety, or other work:

☐ No ☐ Yes (if Yes, attach data explaining revisions)

7. STATEMENT OF CONFORMANCE OF REQUEST TO CONTRACT REQUIREMENTS

Contractor and Subcontractor have investigated the proposed substitution and hereby represent that:

A. They have personally investigated the proposed substitution and believe that it is equal to or superior in all respects to specified product, except as stated above;
B. The proposed substitution is in compliance with applicable codes and ordinances;
C. The proposed substitution will provide same warranty as specified for specified product;
D. They will coordinate the incorporation of the proposed substitution into the Work, and will include modifications to the Work as required to fully integrate the substitution;
E. They have included complete cost data and implications of the substitution (attached);
F. They will pay any redesign fees incurred by the Architect or any of the Architect's consultants, and any special inspection costs incurred by the Owner, caused by the use of this product;
G. They waive all future claims for added cost or time to the Contract related to the substitution, or that become known after substitution is accepted.
H. The Architect's approval, if granted, will be based upon reliance upon data submitted and the opinion, knowledge, information, and belief of the Architect at the time decision is rendered and Addendum is issued; and that Architect's approval therefore is interim in nature and subject to reevaluation and reconsideration as additional data, materials, workmanship, and coordination with other work are observed and reviewed.

Contractor: _____
(Name of Contractor)
Date: _____ By: _____

Subcontractor: _____
(Name of Subcontractor)
Date: _____ By: _____

Note: Unresponsive or incomplete requests will be rejected and returned without review.

8. ARCHITECT'S REVIEW AND ACTION

☐ Substitution is accepted.

☐ Substitution is accepted, with the following comments: _____

_____

☐ Resubmit Substitution Request:

☐ Provide more information in the following areas: _____

_____

- ☐ Provide proposal indicating amount of savings / credit to Owner
- ☐ Bidding Contractor shall sign Bidder's Statement of Conformance
- ☐ Bidding Subcontractor shall sign Bidder's Statement of Conformance

☐ Substitution is not accepted:

- ☐ Substitution Request received too late.
- ☐ Substitution Request received directly from subcontractor or supplier.
- ☐ Substitution Request not submitted in accordance with requirements.
- ☐ Substitution Request Form is not properly executed.
- ☐ Substitution Request does not indicate what item is being proposed.
- ☐ Insufficient information submitted to facilitate proper evaluation.
- ☐ Proposed product does not appear to comply with specified requirements.
- ☐ Proposed product will require substantial revisions to Contract Documents.

By: _____Date: _____

Architect has relied upon the information provided by the Contractor, and makes no claim as to the accuracy, completeness, or validity of such information. If an accepted substitution is later found to be not in compliance with the Contract Documents, Contractor shall provide the specified product.

9. OWNER'S REVIEW AND ACTION

☐ Substitution is accepted.
☐ Substitution is accepted with the following comments: _____
☐ Substitution is not accepted.

By: _____Date:_____
(Owner/Owner's Representative)

END OF FORM

SECTION 012600

CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes 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, on AIA Document G710.

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. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
   2. Within time specified in Proposal Request or 20 days, when not otherwise specified, 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. Quotation Form: Use forms acceptable to Architect.

B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.
   1. Within 7 days after submittal of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
   2. 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.
   3. 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.
   4. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
   5. Include costs of labor and supervision directly attributable to the change.
   6. 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.
   7. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
   8. Proposal Request Form: Use form acceptable to Architect.

C. Do not proceed with changes until receipt of written approval by Architect and Owner.

1.4 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Work Change Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on.

1.5 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
   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

SECTION 012900

PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.3 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.
   1. Coordinate line items in the schedule of values with items required to be indicated as separate activities in 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 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. Owner's name.
      c. Owner's Project number.
      d. Name of Architect.
      e. Architect's Project number.
      f. Contractor's name and address.
      g. Date of submittal.
   2. Arrange schedule of values consistent with format of AIA Document G703.
   3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide multiple line items for principal subcontract amounts in excess of five percent of 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.
      a. Differentiate between items stored on-site and items stored off-site.
   5. Overhead Costs, Proportional Distribution: Include total cost and proportionate share of general overhead and profit for each line item.
   6. Temporary Facilities: Show cost of temporary facilities and other major cost items that are not direct cost of actual work-in-place as separate line items.
   7. Closeout Costs. Include separate line items under Contractor and principal subcontracts for Project closeout requirements in an amount totaling five percent of the Contract Sum and subcontract amount.
   8. Schedule of Values Revisions: Revise the schedule of values when Change Orders or Construction Change Directives result in a change in the Contract Sum. Include at least one separate line item for each Change Order and Construction Change Directive.

1.4 APPLICATIONS FOR PAYMENT

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

B. Payment Application Times: The date for each progress payment is indicated in the Owner/Contractor Agreement. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.
   1. Submit draft copy of Application for Payment seven days prior to due date for review by Architect.

C. Application for Payment Forms: Use AIA Document G702 and AIA Document G703as 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 for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
   3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
   4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.

E. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
   1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment for stored materials.
   2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
   3. Provide summary documentation for stored materials indicating the following:
      a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
      b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
      c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.

F. Transmittal: Submit three signed and notarized PDF copies of each Application for Payment to Architect by email. Include waivers of lien and similar attachments if required in a separate PDF.
   1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.
   1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
   2. When an application shows completion of an item, submit conditional final or full waivers.
   3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
   4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
   5. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.

H. 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. Products list (preliminary if not final).
   5. Submittal schedule (preliminary if not final).
   6. List of Contractor's staff assignments.
   7. List of Contractor's principal consultants.
   8. Copies of building permits.
   9. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
   10. Initial progress report.
   11. Report of preconstruction conference.
   12. Certificates of insurance and insurance policies.
   13. Data needed to acquire Owner's insurance.

I. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
   1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
      a. Complete administrative actions, submittals, and Work preceding this application, as described in Section 017700 "Closeout Procedures."
   2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

J. Retainage: In accordance with Owner-Contractor agreement.

K. Final Payment Application: After completing Project closeout requirements, 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. Certification of completion of final punch list items.
   3. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
   4. Updated final statement, accounting for final changes to the Contract Sum.
   5. AIA Document G706.
   6. AIA Document G706A.
   7. Evidence that claims have been settled.
   8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
   9. Final liquidated damages settlement statement.
   10. Proof that taxes, fees, and similar obligations are paid.
   11. Waivers and releases.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 013100

PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project, including, but not limited to, the following:
   1. Coordination drawings.
   2. RFIs.
   3. Digital project management procedures.
   4. Web-based Project management software package.
   5. Project meetings.

1.2 DEFINITIONS

A. BIM: Building Information Modeling.

B. RFI: Request for Information. Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.3 INFORMATIONAL SUBMITTALS

A. 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. Include the following information in tabular form:
   1. Name, address, telephone number, and email address of entity performing subcontract or supplying products.
   2. Number and title of related Specification Section(s) covered by subcontract.
   3. Drawing number and detail references, as appropriate, covered by subcontract.

B. Key Personnel Names: 15 days prior to starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses, cellular telephone numbers, and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.
   1. Post copies of list in Project meeting room, in temporary field office, in web-based Project software directory, and in prominent location in built facility. Keep list current at all times.

1.4 GENERAL COORDINATION PROCEDURES

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 that depend 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 to ensure maximum performance and accessibility for required maintenance, service, and repair.
   3. Make adequate provisions to accommodate items scheduled for later installation.

B. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities 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.

1.5 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely indicated on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
   1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
      a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
      b. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
      c. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
      d. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
      e. Indicate required installation sequences.
      f. Indicate dimensions shown on Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternative sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Drawing Process: Prepare coordination drawings in the following manner:
   1. Schedule submittal and review of Fire Sprinkler, Plumbing, HVAC, and Electrical Shop Drawings to make required changes prior to preparation of coordination drawings.
   2. Commence routing of coordination drawing files with HVAC Installer, who will provide drawing plan files denoting approved ductwork. HVAC Installer will locate ductwork and piping on a single layer, using orange color. Forward drawings to Plumbing Installer.
   3. Plumbing Installer will locate plumbing and equipment on a single layer, using blue color.
   4. Fire Sprinkler Installer will locate piping and equipment, using red color. Fire Sprinkler Installer shall forward drawing files to Electrical Installer.
   5. Electrical Installer will indicate service and feeder conduit runs and equipment in green color. Electrical Installer shall forward drawing files to Communications and Electronic Safety and Security Installer.
   6. Communications and Electronic Safety and Security Installer will indicate cable trays and cabling runs and equipment in purple color. Communications and Electronic Safety and Security Installer shall forward completed drawing files to Contractor.
   7. Contractor shall perform the final coordination review. As each coordination drawing is completed, Contractor will meet with Architect to review and resolve conflicts on the coordination drawings.

C. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:
   1. File Preparation Format:
      a. Same digital data software program, version, and operating system as original Drawings.
   2. File Submittal Format: Submit or post coordination drawing files using format same as file preparation format.
   3. BIM File Incorporation: Develop and incorporate coordination drawing files into BIM established for Project.
      a. Perform three-dimensional component conflict analysis as part of preparation of coordination drawings. Resolve component conflicts prior to submittal. Indicate where conflict resolution requires modification of design requirements by Architect.
   4. Architect will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files.
      a. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
      b. Contractor shall execute a data licensing agreement in the form of Agreement form acceptable to Owner and Architect.

1.6 REQUEST FOR INFORMATION (RFI)

A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
   1. Architect will return without response those RFIs submitted to Architect by other entities controlled

by Contractor.

2. Coordinate and submit RFIs in a prompt manner to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
   1. Project name.
   2. Owner name.
   3. Owner's Project number.
   4. Name of Architect.
   5. Architect's Project number.
   6. Date.
   7. Name of Contractor.
   8. RFI number, numbered sequentially.
   9. RFI subject.
   10. Specification Section number and title and related paragraphs, as appropriate.
   11. Drawing number and detail references, as appropriate.
   12. Field dimensions and conditions, as appropriate.
   13. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
   14. Contractor's signature.
   15. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
       a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

C. RFI Forms: Software-generated form with substantially the same content as indicated above, acceptable to Architect.
   1. Attachments shall be electronic files in PDF format.

D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
   1. The following Contractor-generated RFIs will be returned without action:
      a. Requests for approval of submittals.
      b. Requests for approval of substitutions.
      c. Requests for approval of Contractor's means and methods.
      d. Requests for coordination information already indicated in the Contract Documents.
      e. Requests for adjustments in the Contract Time or the Contract Sum.
      f. Requests for interpretation of Architect's actions on submittals.
      g. Incomplete RFIs or inaccurately prepared RFIs.
   2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt by Architect of additional information.
   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 Section 012600 "Contract Modification Procedures."
      a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 5 days of receipt of the RFI response.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Software log with not less than the following:
   1. Project name.
   2. Name and address of Contractor.
   3. Name and address of Architect.
   4. RFI number, including RFIs that were returned without action or withdrawn.
   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.

F. 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 three days if Contractor disagrees with response.

1.7 DIGITAL PROJECT MANAGEMENT PROCEDURES

A. Use of Architect's Digital Data Files: Digital data files of Architect's CAD drawings will be provided by Architect for Contractor's use during construction.
   1. Digital data files may be used by Contractor in preparing coordination drawings, Shop Drawings, and Project Record Drawings.
   2. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Contract Drawings.
   3. Contractor shall execute a data licensing agreement in the form of Agreement form acceptable to Owner and Architect.
      a. Subcontractors and other parties granted access by Contractor to Architect's digital data files shall execute a data licensing agreement in the form of Agreement acceptable to Owner and Architect.
   4. The following digital data files will be furnished for each appropriate discipline:
      a. Architectural floor plans.
      b. Reflected ceiling plans.
      c. Structural foundation and framing.
      d. No plumbing, mechanical, electrical, HVAC, or food service.

B. Web-Based Project Management Software Package: Provide, administer, and use web-based Project management software package for purposes of hosting and managing Project communication and documentation until Final Completion.

C. PDF Document Preparation: Where PDFs are required to be submitted to Architect, prepare as follows:
   1. Assemble complete submittal package into a single indexed file, incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
   2. Name file with submittal number or other unique identifier, including revision identifier.
   3. Certifications: Where digitally submitted certificates and certifications are required, provide a digital signature with digital certificate on where indicated.

1.8 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.
   1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times a minimum of seven days prior to meeting.
   2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
   3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.

B. Preconstruction Conference: Architect will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.
   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. 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. Responsibilities and personnel assignments.
      b. Tentative construction schedule.
      c. Critical work sequencing and long lead items.
      d. Designation of key personnel and their duties.
      e. Lines of communications.
      f. Use of web-based Project software.
      g. Procedures for processing field decisions and Change Orders.
      h. Procedures for RFIs.
      i. Procedures for testing and inspecting.
      j. Procedures for processing Applications for Payment.
      k. Distribution of the Contract Documents.
      l. Submittal procedures.
      m. Preparation of Record Documents.
      n. Use of the premises.
      o. Work restrictions.
      p. Working hours.

q. Owner's occupancy requirements.
r. Responsibility for temporary facilities and controls.
s. Procedures for moisture and mold control.
t. Procedures for disruptions and shutdowns.
u. Construction waste management and recycling.
v. Parking availability.
w. Office, work, and storage areas.
x. Equipment deliveries and priorities.
y. First aid.
z. Security.
aa. Progress cleaning.

3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity when required by other Sections and when required for 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:
a. Contract Documents.
b. Options.
c. Related RFIs.
d. Related Change Orders.
e. Purchases.
f. Deliveries.
g. Submittals.
h. Review of mockups.
i. Possible conflicts.
j. Compatibility requirements.
k. Time schedules.
l. Weather limitations.
m. Manufacturer's written instructions.
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 other parties requiring information.
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. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 90 days prior to the scheduled date of Substantial Completion.
1. Conduct the conference to review requirements and responsibilities related to Project closeout.
2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
a. Preparation of Record Documents.

b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
c. Procedures for completing and archiving web-based Project software site data files.
d. Submittal of written warranties.
e. Requirements for preparing operations and maintenance data.
f. Requirements for delivery of material samples, attic stock, and spare parts.
g. Requirements for demonstration and training.
h. Preparation of Contractor's punch list.
i. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
j. Submittal procedures.
k. Owner's partial occupancy requirements.
l. Installation of Owner's furniture, fixtures, and equipment.
m. Responsibility for removing temporary facilities and controls.

4. Minutes: Entity conducting meeting will record and distribute meeting minutes.

E. Progress Meetings: Conduct progress meetings at weekly intervals.
1. Coordinate dates of meetings with preparation of payment requests.
2. 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 meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
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) Status of submittals.
2) Deliveries.
3) Off-site fabrication.
4) Access.
5) Site use.
6) Temporary facilities and controls.
7) Progress cleaning.
8) Quality and work standards.
9) Status of correction of deficient items.
10) Field observations.
11) Status of RFIs.
12) Status of Proposal Requests.
13) Pending changes.
14) Status of Change Orders.
15) Documentation of information for payment requests.
4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
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.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 013200

CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

A. 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. Daily construction reports.
   3. Material location reports.
   4. Site condition reports.
   5. Unusual event reports.

1.2 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction Project. Activities included in a construction schedule consume time and resources.
   1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
   2. Predecessor Activity: An activity that precedes another activity in the network.
   3. Successor Activity: An activity that follows another activity in the network.

B. Cost Loading: The allocation of the schedule of values for completing an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum.

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

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

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

F. Float: The measure of leeway in starting and completing an activity.
   1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
   2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
   3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

G. Resource Loading: The allocation of manpower and equipment necessary for completing an activity as scheduled.

1.3 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:
   1. Working electronic copy of schedule file.
   2. PDF file.

B. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.

C. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

D. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.
   1. Activity Report: List of activities sorted by activity number and then early start date, or actual start date if known.
   2. Logic Report: List of preceding and succeeding activities for each activity, sorted in ascending

order by activity number and then by early start date, or actual start date if known.
3. Total Float Report: List of activities sorted in ascending order of total float.
4. Earnings Report: Compilation of Contractor's total earnings from commencement of the Work until most recent Application for Payment.

E. Construction Schedule Updating Reports: Submit with Applications for Payment.

F. Daily Construction Reports: Submit at weekly intervals.

G. Weekly Reports: Submit brief description of work achieved that week with four photos. Note weather Conditions.

H. Material Location Reports: Submit location report of materials stored off-site at monthly intervals.

I. Site Condition Reports: Submit at time of discovery of differing conditions.

J. Unusual Event Reports: Submit at time of unusual event.

K. Qualification Data: For scheduling consultant.

1.4 QUALITY ASSURANCE

A. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's Construction Schedule, including, but not limited to, the following:
1. Review software limitations and content and format for reports.
2. Verify availability of qualified personnel needed to develop and update schedule.
3. Discuss constraints, including work stages.
4. Review delivery dates for Owner-furnished products.
5. Review schedule for work of Owner's separate contracts.
6. Review submittal requirements and procedures.
7. Review time required for review of submittals and resubmittals.
8. Review requirements for tests and inspections by independent testing and inspecting agencies.
9. Review time required for Project closeout and Owner startup procedures.
10. Review and finalize list of construction activities to be included in schedule.
11. Review procedures for updating schedule.

1.5 COORDINATION

A. Coordinate Contractor's Construction Schedule with the schedule of values, submittal schedule, progress reports, payment requests, and other required schedules and reports.
1. Secure time commitments for performing critical elements of the Work from entities involved.
2. Coordinate each construction activity in the network with other activities, and schedule them in proper sequence.

1.6 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

B. Time Frame: Extend schedule from date established for commencement of the Work 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.

C. Activities: Treat each floor or separate area as a separate numbered activity for each main element of the Work. Comply with the following:
1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
2. Temporary Facilities: Indicate start and completion dates for the following as applicable:
a. Securing of approvals and permits required for performance of the Work.
b. Temporary facilities.
c. Construction of mock-ups, prototypes and samples.
d. Owner interfaces and furnishing of items.
e. Interfaces with Separate Contracts.
f. Regulatory agency approvals.
g. Punch list.
3. Procurement Activities: Include procurement process activities for the following long lead-time

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.

4. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with submittal schedule.
5. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
6. Commissioning Time: Include no fewer than 15 days for commissioning.
7. 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.
8. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and Final Completion.

D. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
   1. Work Restrictions: Show the effect of the following items on the schedule:
      a. Coordination with existing construction.
      b. Limitations of continued occupancies.
      c. Uninterruptible services.
      d. Use-of-premises restrictions.
      e. Seasonal variations.
      f. Environmental control.
   2. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
      a. Subcontract awards.
      b. Submittals.
      c. Purchases.
      d. Mockups.
      e. Fabrication.
      f. Sample testing.
      g. Deliveries.
      h. Installation.
      i. Tests and inspections.
      j. Adjusting.
      k. Curing.
      l. Startup and placement into final use and operation.
      m. Commissioning.
   3. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
      a. Structural completion.
      b. Temporary enclosure and space conditioning.
      c. Permanent space enclosure.
      d. Completion of mechanical installation.
      e. Completion of electrical installation.
      f. Substantial Completion.

E. Cost Correlation: Superimpose a cost correlation timeline, indicating planned and actual costs. On the line, show planned and actual dollar volume of the Work performed as of planned and actual dates used for preparation of payment requests.
   1. See Section 012900 "Payment Procedures" for cost reporting and payment procedures.

F. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
   1. Unresolved issues.
   2. Unanswered Requests for Information.
   3. Rejected or unreturned submittals.
   4. Notations on returned submittals.
   5. Pending modifications affecting the Work and the Contract Time.

G. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week 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. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3. As the Work progresses, indicate Final Completion percentage for each activity.

H. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, equipment required to achieve compliance, and date by which recovery will be accomplished.

I. 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.

1.7 STARTUP CONSTRUCTION SCHEDULE

A. Gantt-Chart Schedule: Submit startup, horizontal, Gantt-chart-type construction schedule within seven days of date established for commencement of the Work.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

1.8 GANTT-CHART SCHEDULE REQUIREMENTS

A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's Construction Schedule within 30 days of date established for commencement of the Work.
1. Base schedule on the startup construction schedule and additional information received since the start of Project.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

1.9 CPM SCHEDULE REQUIREMENTS

A. Prepare network diagrams using AON (activity-on-node) format.

B. Startup Network Diagram: Submit diagram within 14 days of date established for commencement of the Work. Outline significant construction activities for the first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

C. CPM Schedule: Prepare Contractor's Construction Schedule using a time-scaled CPM network analysis diagram for the Work.
1. Develop network diagram in sufficient time to submit CPM schedule, so it can be accepted for use no later than 60 days after date established for commencement of the Work.
   a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates.
2. Conduct educational workshops to train and inform key Project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.
3. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
4. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule to coordinate with the Contract Time.

D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the startup network diagram, prepare a skeleton network to identify probable critical paths.
1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:
   a. Preparation and processing of submittals.
   b. Mobilization and demobilization.
   c. Purchase of materials.

d. Delivery.
e. Fabrication.
f. Utility interruptions.
g. Installation.
h. Work by Owner that may affect or be affected by Contractor's activities.
i. Testing and inspection.
j. Commissioning.
k. Punch list and Final Completion.
l. Activities occurring following Final Completion.

2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.
   a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.
5. Cost- and Resource-Loading of CPM Schedule: Assign cost to construction activities on the CPM schedule. Do not assign costs to submittal activities. Obtain Architect's approval prior to assigning costs to fabrication and delivery activities. Assign costs under main subcontracts for testing and commissioning activities, operation and maintenance manuals, punch list activities, Project record documents, and demonstration and training (if applicable), in the amount of 5 percent of the Contract Sum.
   a. Each activity cost shall reflect an appropriate value subject to approval by Architect.
   b. Total cost assigned to activities shall equal the total Contract Sum.

E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall Project schedule.

F. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:
1. Contractor or subcontractor and the Work or activity.
2. Description of activity.
3. Main events of activity.
4. Immediate preceding and succeeding activities.
5. Early and late start dates.
6. Early and late finish dates.
7. Activity duration in workdays.
8. Total float or slack time.
9. Average size of workforce.
10. Dollar value of activity (coordinated with the schedule of values).

G. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
1. Identification of activities that have changed.
2. Changes in early and late start dates.
3. Changes in early and late finish dates.
4. Changes in activity durations in workdays.
5. Changes in the critical path.
6. Changes in total float or slack time.
7. Changes in the Contract Time.

H. Value Summaries: Prepare two cumulative value lists, sorted by finish dates.
1. In first list, tabulate activity number, early finish date, dollar value, and cumulative dollar value.
2. In second list, tabulate activity number, late finish date, dollar value, and cumulative dollar value.
3. In subsequent issues of both lists, substitute actual finish dates for activities completed as of list date.
4. Prepare list for ease of comparison with payment requests; coordinate timing with progress meetings.
   a. In both value summary lists, tabulate "actual percent complete" and "cumulative value completed" with total at bottom.
   b. Submit value summary printouts one week before each regularly scheduled progress meeting.

1.10 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. List of separate contractors at Project site.
   3. Approximate count of personnel at Project site.
   4. Equipment at Project site.
   5. Material deliveries.
   6. High and low temperatures and general weather conditions, including presence of rain or snow.
   7. Testing and inspection.
   8. Accidents.
   9. Meetings and significant decisions.
   10. Unusual events.
   11. Stoppages, delays, shortages, and losses.
   12. Meter readings and similar recordings.
   13. Emergency procedures.
   14. Orders and requests of authorities having jurisdiction.
   15. Change Orders received and implemented.
   16. Construction Change Directives received and implemented.
   17. Services connected and disconnected.
   18. Equipment or system tests and startups.
   19. Partial completions and occupancies.
   20. Substantial Completions authorized.

B. Material Location Reports: At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site. Indicate the following categories for stored materials:
   1. Material stored prior to previous report and remaining in storage.
   2. Material stored prior to previous report and since removed from storage and installed.
   3. Material stored following previous report and remaining in storage.

C. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

D. Unusual Event Reports: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, responses by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.
   1. Submit unusual event reports directly to Owner within one day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 013233

PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for the following:
   1. Preconstruction photographs.
   2. Periodic construction photographs.
   3. Final Completion construction photographs.
   4. Preconstruction video recordings.
   5. Periodic construction video recordings.

1.2 INFORMATIONAL SUBMITTALS

A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph and video recording. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.

B. Digital Photographs: Submit image files within three days of taking photographs.
   1. Submit photos by uploading to web-based Project management software site. Include copy of key plan indicating each photograph's location and direction.
   2. Identification: Provide the following information with each image description in file metadata tag:
      a. Name of Project.
      b. Name and contact information for photographer.
      c. Name of Architect.
      d. Name of Contractor.
      e. Date photograph was taken.
      f. Description of location, vantage point, and direction.
      g. Unique sequential identifier keyed to accompanying key plan.

C. Video Recordings: Submit video recordings within seven days of recording.
   1. Submit video recordings by uploading to web-based Project management software site. Include copy of key plan indicating each video's location and direction.
   2. Identification: With each submittal, provide the following information in file metadata tag:
      a. Name of Project.
      b. Name and address of photographer.
      c. Name of Architect.
      d. Name of Contractor.
      e. Date video recording was recorded.
      f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.

D. Photographer Qualifications: An individual who has been regularly engaged as a professional photographer of construction projects for not less than three years.

E. Construction Webcam Service Provider: A firm specializing in providing photographic equipment, web-based software, and related services for construction projects, with a record of providing satisfactory services similar to those required for Project.

1.3 FORMATS AND MEDIA

A. Digital Photographs: Provide color images in JPG format, produced by a digital camera with minimum sensor size of 12 megapixels, and at an image resolution of not less than 3200 by 2400 pixels, and with vibration-reduction technology. Use flash in low light levels or backlit conditions.

B. Digital Video Recordings: Provide high-resolution, digital video in MPEG format, produced by a digital camera with minimum sensor resolution of 12 megapixels and capable of recording in full high-definition mode with vibration-reduction technology. Provide supplemental lighting in low light levels or backlit conditions.

C. Digital Images: Submit digital media as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.

D. Metadata: Record accurate date and time and GPS location data from camera.

E. File Names: Name media files with date and sequential numbering suffix.

1.4 CONSTRUCTION PHOTOGRAPHS

A. Photographer: Engage a qualified photographer to take construction photographs.

B. General: Take photographs with maximum depth of field and in focus.
   1. Maintain key plan with each set of construction photographs that identifies each photographic location.

C. Preconstruction Photographs: Before commencement of the Work, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Architect.
   1. Flag excavation areas before taking construction photographs.
   2. Take 20 photographs to show existing conditions adjacent to property before starting the Work.
   3. Take 20 photographs of existing buildings either on or adjoining property, to accurately record physical conditions at start of construction.
   4. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.

D. Periodic Construction Photographs: Take 20 photographs monthly coinciding with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.

E. Time-Lapse Sequence Construction Photographs: Take 20 photographs as indicated, to show status of construction and progress since last photographs were taken.
   1. Frequency: Take photographs monthly, on the same date each month.
   2. Vantage Points: Following suggestions by Architect and Contractor, photographer shall select vantage points. During each of the following construction phases, take not less than two of the required shots from same vantage point each time, to create a time-lapse sequence as follows:
      a. Commencement of the Work, through completion of subgrade construction.
      b. Above-grade structural framing.
      c. Exterior building enclosure.
      d. Interior Work, through date of Substantial Completion.

F. Final Completion Construction Photographs: Take 20 photographs after date of Substantial Completion for submission as Project Record Documents. Architect will inform photographer of desired vantage points.

1.5 CONSTRUCTION VIDEO RECORDINGS

A. Narration: Describe scenes on video recording by audio narration by microphone while video recording is recorded. Include description of items being viewed, recent events, and planned activities. At each change in location, describe vantage point, location, direction (by compass point), and elevation or story of construction.
   1. Confirm date and time at beginning and end of recording.
   2. Begin each video recording with name of Project, Contractor's name, videographer's name, and Project location.

B. Preconstruction Video Recording: Before starting excavation, record video recording of Project site and surrounding properties from different vantage points, as directed by Architect.
   1. Flag excavation areas before recording construction video recordings.
   2. Show existing conditions adjacent to Project site before starting the Work.
   3. Show existing buildings either on or adjoining Project site to accurately record physical conditions at the start of excavation.
   4. Show protection efforts by Contractor.

C. Periodic Construction Video Recordings: Record video recording monthly coinciding with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last video recordings were recorded. Minimum recording time shall be 30 minutes(s).

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 013300

SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Submittal schedule requirements.
2. Administrative and procedural requirements for submittals.

1.2 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

1.3 SUBMITTAL SCHEDULE

A. Submittal Schedule: Submit, as an action submittal, a list of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.
1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
2. Initial Submittal Schedule: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
3. Final Submittal Schedule: Submit concurrently with the first complete submittal of Contractor's construction schedule.
    a. Submit revised submittal schedule as required to reflect changes in current status and timing for submittals.
4. Format: Arrange the following information in a tabular format:
    a. Scheduled date for first submittal.
    b. Specification Section number and title.
    c. Submittal Category: Action; informational.
    d. Name of subcontractor.
    e. Description of the Work covered.
    f. Scheduled date for Architect's final release or approval.
    g. Scheduled dates for purchasing.
    h. Scheduled date of fabrication.
    i. Scheduled dates for installation.
    j. Activity or event number.

1.4 SUBMITTAL FORMATS

A. Submittal Information: Include the following information in each submittal:
1. Project name.
2. Date.
3. Name of Architect.
4. Name of Contractor.
5. Name of firm or entity that prepared submittal.
6. Names of subcontractor, manufacturer, and supplier.
7. Unique submittal number, including revision identifier. Include Specification Section number with sequential alphanumeric identifier and alphanumeric suffix for resubmittals.
8. Category and type of submittal.

9. Submittal purpose and description.
10. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.
11. Drawing number and detail references, as appropriate.
12. Indication of full or partial submittal.
13. Location(s) where product is to be installed, as appropriate.
14. Other necessary identification.
15. Remarks.
16. Signature of transmitter.

B. Options: Identify options requiring selection by Architect.

C. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Architect on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.

D. Submittals Utilizing Web-Based Project Software: Prepare submittals as PDF files or other format indicated by Project management software.

1.5 SUBMITTAL PROCEDURES

A. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
1. Web-Based Project Management Software: Prepare submittals in PDF form, and upload to web- based Project management software website. Enter required data in web-based software site to fully identify submittal.

B. 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. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
4. Coordinate transmittal of submittals for related parts of the Work specified in different Sections, 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.

C. Processing Time: Allow 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. 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.
4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.

D. 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 with approval notation from Architect's action stamp.

E. 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.

F. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

1.6 SUBMITTAL REQUIREMENTS

A. 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 published data are unsuitable 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 catalog cuts.
      b. Manufacturer's product specifications.
      c. Standard color charts.
      d. Statement of compliance with specified referenced standards.
      e. Testing by recognized testing agency.
      f. Application of testing agency labels and seals.
      g. Notation of coordination requirements.
      h. Availability and delivery time information.
   4. For equipment, include the following in addition to the above, as applicable:
      a. Wiring diagrams that show factory-installed wiring.
      b. Printed performance curves.
      c. Operational range diagrams.
      d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
   5. Submit Product Data before Shop Drawings, and before or concurrently with Samples.

B. 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 based on Architect's digital data drawing files is otherwise permitted.
   1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
      a. Identification of products.
      b. Schedules.
      c. Compliance with specified standards.
      d. Notation of coordination requirements.
      e. Notation of dimensions established by field measurement.
      f. Relationship and attachment to adjoining construction clearly indicated.
      g. Seal and signature of professional engineer if specified.
   2. BIM Incorporation: Develop and incorporate Shop Drawing files into BIM established for Project.

C. Samples: Submit Samples for review of type, color, pattern, and texture for a check of these characteristics with other materials.
   1. Transmit Samples that contain multiple, related components, such as accessories together in one submittal package.
   2. Identification: Permanently attach label on unexposed side of Samples that includes the following:
      a. Project name and submittal number.
      b. Generic description of Sample.
      c. Product name and name of manufacturer.
      d. Sample source.
      e. Number and title of applicable Specification Section.
      f. Specification paragraph number and generic name of each item.
   3. Web-Based Project Management Software: Prepare submittals in PDF form, and upload to web- based Project software website. Enter required data in web-based software site to fully identify submittal.
   4. Paper Transmittal: Include paper transmittal, including complete submittal information indicated.
   5. 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.
      a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
      b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
   6. 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.

7. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
   a. Number of Samples: Submit three sets of Samples. Architect will retain two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a project record Sample.

      1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
      2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

D. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
   1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
   2. Manufacturer and product name, and model number if applicable.
   3. Number and name of room or space.
   4. Location within room or space.

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

F. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.

G. Certificates:
   1. Certificates and Certifications Submittals: Submit a 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. Provide a notarized signature where indicated.
   2. Installer Certificates: Submit 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.
   3. Manufacturer Certificates: Submit written statements on manufacturer's letterhead, certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
   4. Material Certificates: Submit written statements on manufacturer's letterhead, certifying that material complies with requirements in the Contract Documents.
   5. Product Certificates: Submit written statements on manufacturer's letterhead, certifying that product complies with requirements in the Contract Documents.
   6. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of AWS B2.1/B2.1M on AWS forms. Include names of firms and personnel certified.

H. Test and Research Reports:
   1. Compatibility Test Reports: Submit 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 substrate preparation and primers required.
   2. Field Test Reports: Submit written reports 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.
   3. Material Test Reports: Submit 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.

4. Preconstruction Test Reports: Submit 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.
5. Product Test Reports: Submit written reports indicating that 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.
6. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
   a. Name of evaluation organization.
   b. Date of evaluation.
   c. Time period when report is in effect.
   d. Product and manufacturers' names.
   e. Description of product.
   f. Test procedures and results.
   g. Limitations of use.

1.7 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
   1. If criteria indicated are insufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF file of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
   1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

C. BIM Incorporation: Incorporate delegated-design drawing and data files into BIM established for Project.
   1. Prepare delegated-design drawings in the following format: Same digital data software program, version, and operating system as original Drawings.

1.8 CONTRACTOR'S REVIEW

A. Action Submittals and Informational Submittals: 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. Contractor's Approval: Indicate Contractor's approval for each submittal with indication in web-based Project management software. Include 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.
   1. Architect will not review submittals received from Contractor that do not have Contractor's review and approval.

1.9 ARCHITECT'S REVIEW

A. Action Submittals: Architect will review each submittal, indicate corrections or revisions required, and return.
   1. Submittals by Web-Based Project Management Software: Architect will indicate, on Project management software website, the appropriate action.

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

C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.

D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

E. Architect will return without review submittals received from sources other than Contractor.

F. Submittals not required by the Contract Documents will be returned by Architect without action.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 013513

HOSPITAL PROJECT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes environmental control specific to occupied medical care facilities.

1.2 PUBLISHED REGULATIONS

A. Abide by published hospital regulations and amendments, including those that may be issued during the Contract. Particular attention is called to regulations pertaining to circulation, noise, sanitation, safety, security, and behavior.

1.3 OWNER'S REPRESENTATIVE

A. Abide by directions of Owner's Representative in matters affecting operation, safety, and security of Hospital, patients, and visitors.

B. Abide by directions of Hospital Fire Marshal in matters pertaining to fire safety and preventative measures.
   1. Immediately implement oral instructions by local Fire Marshal. Confirmation or explanation of oral instructions will be made by Owner by written notice or at next scheduled progress meeting.

C. Instruct personnel employed by Contractor, including sub-contractors and their employees, to abide by published regulations, and directives of Owner's Representative and Fire Marshal.

1.4 ENVIRONMENTAL CONTROLS

A. Noise Control: Execute Work as quietly as practicable to avoid unnecessary disturbance of patients.
   1. Complaints duly registered by Owner of unacceptable noise levels is cause for implementation of special precautions and methods of operation, as directed by Owner, to reduce noises to acceptable levels.
   2. Owner is sole judge of noise level tolerability.
   3. Submit "Noise Schedule" as soon as practicable indicating type of demolition and other noise inducing construction operations showing dates, times, and duration of such work.

B. Temporary Partitions: Provide 1 hour fire rated temporary partitions and door openings.

1.5 PERSONNEL IDENTIFICATION

A. Employees of Contractor and sub-contractors are required to wear Owner approved numbered identification badges while on Hospital premises.
   1. Conspicuously fix identification badges to outer garments above elbow level.
   2. Contractor or subcontractor personnel not complying with this requirement will be denied access to Hospital or will be escorted off premises by Hospital Security Guards.
   3. Refer to Owner’s CRMA safety policy for contractor orientation and badging.

1.6 CONSTRUCTION PERSONNEL PARKING

A. Parking in allowed only in areas designated by Owner. Receive permit or instructions prior to parking on site.

1.7 NORMAL LIMIT OF OPERATIONS

A. Normal limit of operations are confined within Limits of Work Area as designated on Drawings.
   1. Owner will prohibit Hospital employees, patients, and visitors from using these areas.

B. Allow access to Owner, Architect, and other personnel performing work within limits of operation.

1.8 PERIODIC OPERATIONS OUTSIDE LIMITS OF OPERATION

A. Use of certain loading berths, passageways, elevators, and other areas, outside of defined limits of operation will be granted on intermittent basis as required and requested in advance. Owner will judge, and approve in advance, proper time, and extent of such use.

B. Limit requests for use of berths, corridors, elevators, and other spaces to hour-by-hour basis and approved in advance by Owner.

C. Comply with designated travel paths, staging areas, dumpster locations, and other restricted items indicated on Drawings.

1.9 SCHEDULING

A. Schedule arrangements for work which will involve interference with normal Hospital functioning, particularly in occupied patient areas, or adjacent areas, five working days in advance with Owner to provide for minimum of disruption and inconvenience.
   1. Owner will schedule and approve interferences to minimize disruption to normal Hospital functioning.

1.10 WORKING HOURS AND OVERTIME NOTIFICATION

A. Notify Owner and receive permission for work outside of normal daytime working hours either within or outside limits of operation.

B. If in Owner's judgment, any item of work is being unreasonably delayed and interfering with progress of other dependent work through no fault of Owner, overtime work may be ordered at Contractor's expense.

C. Owner may direct Contractor to perform overtime work not originally required by Contract. When overtime work is requested for convenience, additional payment to Contractor will be made for premium time only.

1.11 TORCH-CUTTING AND WELDING PERMITS

A. Welding: Neither welding nor arc-welding will be permitted without appropriate permit from Hospital Fire Marshal.
   1. Hospital has right to stop work at any time if it is determined that unsafe conditions exist.
   2. Correct unsafe conditions as directed by local Fire Marshal and obtain approval of such corrections prior to commencing further work.
   3. Provide electrical power directly from panel box for use by arc-welding equipment. Ascertain that electrical panel has capacity to support welding operations without negative impact on Hospital electrical loads. Do not use Hospital outlets for power sources.
   4. Use of single-phase transformer welding equipment is not permitted.
   5. No welding will be permitted when critical procedures are taking place in adjacent areas; coordinate with Owner.

B. Fire Protection: Keep required exit corridors and passageways clear and unobstructed.
   1. Remove flammable materials to location not closer than 35 feet from welding operations.
   2. Instruct workmen to location of nearest fire alarm.
   3. Completely cover fixed flammable items with fire-resistant blankets.
   4. Replace existing smoke detectors with heat detectors. Fire sprinkler systems shall remain operational throughout Project and heads turned up to deck to meet requirements of Authorities Having Jurisdiction.

1.12 BUILDING PERMIT

A. Obtain building permit and be responsible for securing any necessary inspection fees. Include cost in Contract Sum.

B. Conspicuously display permit at Project site.

PART 2 - PRODUCTS

2.1 EXISTING UNATTACHED EQUIPMENT

A. Existing unattached equipment scheduled for salvage or reuse will be removed from work area by Owner prior to start of construction.

PART 3 - EXECUTION

3.1 EXISTING ATTACHED EQUIPMENT

A. Disconnect and remove existing attached equipment which has been tagged and marked for salvage and reuse by Owner. Remove such equipment in largest possible sections convenient for handling.

B. Disconnect and cap services and utilities serving removed equipment and perform necessary patching.

C. Deliver Owner tagged and marked equipment to designated storage areas within Owner's property.

D. Remove all other equipment not tagged or specified and remove from site. Comply with applicable regulations for disposal of hazardous materials.

3.2 CLEAN-UP

A. Refer to Section 017700 "Closeout Procedures" for additional requirements.

B. Keep premises free from accumulation of waste materials or rubbish. Remove trash daily.

C. Leave existing toilet rooms in clean and sanitary conditions daily.

END OF SECTION

SECTION 013516

ALTERATION PROJECT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes special procedures for alteration work.

1.2 DEFINITIONS

A. Alteration Work: This term includes remodeling, renovation, repair, and maintenance work performed within existing spaces or on existing surfaces as part of the Project.

B. Consolidate: To strengthen loose or deteriorated materials in place.

C. Design Reference Sample: A sample that represents the Architect's prebid selection of work to be matched; it may be existing work or work specially produced for the Project.

D. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

E. Match: To blend with adjacent construction and manifest no apparent difference in material type, species, cut, form, detail, color, grain, texture, or finish; as approved by Architect.

F. Refinish: To remove existing finishes to base material and apply new finish to match original, or as otherwise indicated.

G. Repair: To correct damage and defects, retaining existing materials, features, and finishes. This includes patching, piecing-in, splicing, consolidating, or otherwise reinforcing or upgrading materials.

H. Replace: To remove, duplicate, and reinstall entire item with new material. The original item is the pattern for creating duplicates unless otherwise indicated.

I. Retain: To keep existing items that are not to be removed or dismantled.

J. Strip: To remove existing finish down to base material unless otherwise indicated.

1.3 COORDINATION

A. Alteration Work Subschedule: A construction schedule coordinating the sequencing and scheduling of alteration work for entire Project, including each activity to be performed, and based on Contractor's Construction Schedule. Secure time commitments for performing critical construction activities from separate entities responsible for alteration work.
   1. Schedule construction operations in sequence required to obtain best Work results.
   2. Coordinate sequence of alteration work activities to accommodate the following:
      a. Owner's continuing occupancy of portions of existing building.
      b. Other known work in progress.
      c. Tests and inspections.
   3. Detail sequence of alteration work, with start and end dates.
   4. Utility Services: Indicate how long utility services will be interrupted. Coordinate shutoff, capping, and continuation of utility services.
   5. Use of elevator and stairs.
   6. Equipment Data: List gross loaded weight, axle-load distribution, and wheel-base dimension data for mobile and heavy equipment proposed for use in existing structure. Do not use such equipment without certification from Contractor's professional engineer that the structure can support the imposed loadings without damage.

B. Pedestrian and Vehicular Circulation: Coordinate alteration work with circulation patterns within Project building(s) and site. Some work is near circulation patterns and adjacent to restricted areas. Circulation patterns cannot be closed off entirely and in places can be only temporarily redirected around small areas of work. Access to restricted areas may not be obstructed. Plan and execute the Work accordingly.

1.4 PROJECT MEETINGS FOR ALTERATION WORK

A. Preliminary Conference for Alteration Work: Before starting alteration work, conduct conference at Project site.
   1. Attendees: In addition to representatives of Owner, Architect, and Contractor, testing service representative, specialists, and chemical-cleaner manufacturer(s) shall be represented at the meeting.
   2. Agenda: Discuss items of significance that could affect progress of alteration work, including review of the following:
      a. Alteration Work Subschedule: Discuss and finalize; verify availability of materials, specialists' personnel, equipment, and facilities needed to make progress and avoid delays.
      b. Fire-prevention plan.
      c. Governing regulations.
      d. Areas where existing construction is to remain and the required protection.
      e. Hauling routes.
      f. Sequence of alteration work operations.
      g. Storage, protection, and accounting for salvaged and specially fabricated items.
      h. Existing conditions, staging, and structural loading limitations of areas where materials are stored.
      i. Qualifications of personnel assigned to alteration work and assigned duties.
      j. Requirements for extent and quality of work, tolerances, and required clearances.
      k. Embedded work such as flashings and lintels, special details, collection of waste, protection of occupants and the public, and condition of other construction that affects the Work or will affect the work.
   3. Reporting: Record conference results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from conference.

B. Coordination Meetings: Conduct coordination meetings specifically for alteration work at weekly intervals. Coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
   1. Attendees: In addition to representatives of Owner, Architect, and Contractor, each specialist, supplier, installer, and other entity concerned with progress or involved in planning, coordination, or performance of alteration work activities shall be represented at these meetings. All participants at conference shall be familiar with Project and authorized to conclude matters relating to alteration work.
   2. Agenda: Review and correct or approve minutes of previous coordination meeting. Review other items of significance that could affect progress of alteration work. Include topics for discussion as appropriate to status of Project.
      a. Alteration Work Subschedule: Review progress since last coordination meeting. Determine whether each schedule item is on time, ahead of schedule, or behind schedule. Determine how construction behind schedule will be expedited with retention of quality; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities are completed within the Contract Time.
      b. Schedule Updating: Revise Contractor's Alteration Work Subschedule after each coordination meeting where revisions to schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
      c. Review present and future needs of each entity present, including review items listed in the "Preliminary Conference for Alteration Work" Paragraph in this article and the following:
         1) Interface requirements of alteration work with other Project Work.
         2) Status of submittals for alteration work.
         3) Access to alteration work locations.
         4) Effectiveness of fire-prevention plan.
         5) Quality and work standards of alteration work.
         6) Change Orders for alteration work.
   3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

1.5 INFORMATIONAL SUBMITTALS

A. Alteration Work Subschedule:
   1. Submit alteration work subschedule within seven days of date established for commencement of alteration work.

B. Preconstruction Documentation: Show preexisting conditions of adjoining construction and site improvements that are to remain, including finish surfaces, that might be misconstrued as damage caused by Contractor's alteration work operations.

C. Alteration Work Program: Submit 30 days before work begins.

D. Fire-Prevention Plan: Submit 30 days before work begins.

1.6 QUALITY ASSURANCE

A. Specialist Qualifications: An experienced firm regularly engaged in specialty work similar in nature, materials, design, and extent to alteration work as specified in each Section and that has completed a minimum of five recent projects with a record of successful in-service performance that demonstrates the firm's qualifications to perform this work.
   1. Field Supervisor Qualifications: Full-time supervisors experienced in specialty work similar in nature, material, design, and extent to that indicated for this Project. Supervisors shall be on-site when specialty work begins and during its progress. Supervisors shall not be changed during Project except for causes beyond the control of the specialist firm.

B. Alteration Work Program: Prepare a written plan for alteration work for whole Project, including each phase or process and protection of surrounding materials during operations. Show compliance with indicated methods and procedures specified in this and other Sections. Coordinate this whole-Project alteration work program with specific requirements of programs required in other alteration work Sections.
   1. Dust and Noise Control: Include locations of proposed temporary dust- and noise-control partitions and means of egress from occupied areas coordinated with continuing on-site operations and other known work in progress.
   2. Debris Hauling: Include plans clearly marked to show debris hauling routes, turning radii, and locations and details of temporary protective barriers.

C. Fire-Prevention Plan: Prepare a written plan for preventing fires during the Work, including placement of fire extinguishers, fire blankets, rag buckets, and other fire-control devices during each phase or process. Coordinate plan with Owner's fire-protection equipment and requirements. Include fire-watch personnel's training, duties, and authority to enforce fire safety.

D. Safety and Health Standard: Comply with ANSI/ASSE A10.6.

1.7 STORAGE AND HANDLING OF SALVAGED MATERIALS

A. Salvaged Materials:
   1. Clean loose dirt and debris from salvaged items unless more extensive cleaning is indicated.
   2. Pack or crate items after cleaning; cushion against damage during handling. Label contents of containers.
   3. Store items in a secure area until delivery to Owner.
   4. Transport items to Owner's storage area on-site.
   5. Protect items from damage during transport and storage.

B. Salvaged Materials for Reinstallation:
   1. Repair and clean items for reuse as indicated.
   2. Pack or crate items after cleaning and repairing; cushion against damage during handling. Label contents of containers.
   3. Protect items from damage during transport and storage.
   4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment unless otherwise indicated. Provide connections, supports, and miscellaneous materials to make items functional for use indicated.

C. Existing Materials to Remain: Protect construction indicated to remain against damage and soiling from construction work. Where permitted by Architect, items may be dismantled and taken to a suitable, protected storage location during construction work and reinstalled in their original locations after alteration and other construction work in the vicinity is complete.

D. Storage: Catalog and store items within a weathertight enclosure where they are protected from moisture, weather, condensation, and freezing temperatures.
   1. Identify each item for reinstallation with a nonpermanent mark to document its original location. Indicate original locations on plans, elevations, sections, or photographs by annotating the identifying marks.
   2. Secure stored materials to protect from theft.
   3. Control humidity so that it does not exceed 85 percent. Maintain temperatures 5 deg F (3 deg C) or more above the dew point.

E. Storage Space:
1. Arrange for off-site locations for storage and protection of salvaged material that cannot be stored and protected on-site.

1.8 FIELD CONDITIONS

A. Survey of Existing Conditions: Record existing conditions that affect the Work by use of preconstruction photographs.
1. Comply with requirements specified in Section 013233 "Photographic Documentation."

B. Discrepancies: Notify Architect of discrepancies between existing conditions and Drawings before proceeding with removal and dismantling work.

C. Owner's Removals: Before beginning alteration work, verify in correspondence with Owner that the following items have been removed:
1. .

D. Size Limitations in Existing Spaces: Materials, products, and equipment used for performing the Work and for transporting debris, materials, and products shall be of sizes that clear surfaces within existing spaces, areas, rooms, and openings, including temporary protection, by 12 inches (300 mm)or more.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 PROTECTION

A. Protect persons, motor vehicles, surrounding surfaces of building, building site, plants, and surrounding buildings from harm resulting from alteration work.
1. Use only proven protection methods, appropriate to each area and surface being protected.
2. Provide temporary barricades, barriers, and directional signage to exclude the public from areas where alteration work is being performed.
3. Erect temporary barriers to form and maintain fire-egress routes.
4. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during alteration work.
5. Contain dust and debris generated by alteration work, and prevent it from reaching the public or adjacent surfaces.
6. Provide shoring, bracing, and supports as necessary. Do not overload structural elements.
7. Protect floors and other surfaces along hauling routes from damage, wear, and staining.
8. Provide supplemental sound-control treatment to isolate demolition work from other areas of the building.

B. Temporary Protection of Materials to Remain:
1. Protect existing materials with temporary protections and construction. Do not remove existing materials unless otherwise indicated.
2. Do not attach temporary protection to existing surfaces except as indicated as part of the alteration work program.

C. Comply with each product manufacturer's written instructions for protections and precautions. Protect against adverse effects of products and procedures on people and adjacent materials, components, and vegetation.

D. Utility and Communications Services:
1. Notify Owner, Architect, authorities having jurisdiction, and entities owning or controlling wires, conduits, pipes, and other services affected by alteration work before commencing operations.
2. Disconnect and cap pipes and services as required by authorities having jurisdiction, as required for alteration work.
3. Maintain existing services unless otherwise indicated; keep in service, and protect against damage during operations. Provide temporary services during interruptions to existing utilities.

E. Existing Drains: Prior to the start of work in an area, test drainage system to ensure that it is functioning properly. Notify Architect immediately of inadequate drainage or blockage. Do not begin work in an area until the drainage system is functioning properly.
1. Prevent solids such as adhesive or mortar residue or other debris from entering the drainage system. Clean out drains and drain lines that become sluggish or blocked by sand or other materials resulting from alteration work.
2. Protect drains from pollutants. Block drains or filter out sediments, allowing only clean water to

pass.

F. Existing Roofing: Prior to the start of work in an area, install roofing protection.

3.2 PROTECTION FROM FIRE

A. General: Follow fire-prevention plan and the following:
1. Comply with NFPA 241 requirements unless otherwise indicated. Perform duties titled "Owner's Responsibility for Fire Protection."
2. Remove and keep area free of combustibles, including rubbish, paper, waste, and chemicals, unless necessary for the immediate work.
a. If combustible material cannot be removed, provide fire blankets to cover such materials.

B. Heat-Generating Equipment and Combustible Materials: Comply with the following procedures while performing work with heat-generating equipment or combustible materials, including welding, torch-cutting, soldering, brazing, removing paint with heat, or other operations where open flames or implements using high heat or combustible solvents and chemicals are anticipated:
1. Obtain Owner's approval for operations involving use of open-flame or welding or other high-heat equipment. Notify Owner at least 72 hours before each occurrence, indicating location of such work.
2. As far as practicable, restrict heat-generating equipment to shop areas or outside the building.
3. Do not perform work with heat-generating equipment in or near rooms or in areas where flammable liquids or explosive vapors are present or thought to be present. Use a combustible gas indicator test to ensure that the area is safe.
4. Use fireproof baffles to prevent flames, sparks, hot gases, or other high-temperature material from reaching surrounding combustible material.
5. Prevent the spread of sparks and particles of hot metal through open windows, doors, holes, and cracks in floors, walls, ceilings, roofs, and other openings.
6. Fire Watch: Before working with heat-generating equipment or combustible materials, station personnel to serve as a fire watch at each location where such work is performed. Fire-watch personnel shall have the authority to enforce fire safety. Station fire watch according to NFPA 51B, NFPA 241, and as follows:
a. Train each fire watch in the proper operation of fire-control equipment and alarms.
b. Prohibit fire-watch personnel from other work that would be a distraction from fire-watch duties.
c. Cease work with heat-generating equipment whenever fire-watch personnel are not present.
d. Have fire-watch personnel perform final fire-safety inspection each day beginning no sooner than 30 minutes after conclusion of work to detect hidden or smoldering fires and to ensure that proper fire prevention is maintained.
e. Maintain fire-watch personnel at Project site until two hours after conclusion of daily work.

C. Fire-Control Devices: Provide and maintain fire extinguishers, fire blankets, and rag buckets for disposal of rags with combustible liquids. Maintain each as suitable for the type of fire risk in each work area. Ensure that nearby personnel and the fire-watch personnel are trained in fire-extinguisher and blanket use.

D. Sprinklers: Where sprinkler protection exists and is functional, maintain it without interruption while operations are being performed. If operations are performed close to sprinklers, shield them temporarily with guards.
1. Remove temporary guards at the end of work shifts, whenever operations are paused, and when nearby work is complete.

3.3 PROTECTION DURING APPLICATION OF CHEMICALS

A. Protect motor vehicles, surrounding surfaces of building, building site, plants, and surrounding buildings from harm or spillage resulting from applications of chemicals and adhesives.

B. Cover adjacent surfaces with protective materials that are proven to resist chemicals selected for Project unless chemicals being used will not damage adjacent surfaces as indicated in alteration work program. Use covering materials and masking agents that are waterproof and UV resistant and that will not stain or leave residue on surfaces to which they are applied. Apply protective materials according to manufacturer's written instructions. Do not apply liquid masking agents or adhesives to painted or porous surfaces. When no longer needed, promptly remove protective materials.

C. Do not apply chemicals during winds of sufficient force to spread them to unprotected surfaces.

D. Neutralize alkaline and acid wastes and legally dispose of off Owner's property.

E. Collect and dispose of runoff from chemical operations by legal means and in a manner that prevents soil

contamination, soil erosion, undermining of paving and foundations, damage to landscaping, or water penetration into building interior.

3.4 GENERAL ALTERATION WORK

A. Have specialty work performed only by qualified specialists.

B. Ensure that supervisory personnel are present when work begins and during its progress.

C. Record existing work before each procedure (preconstruction), and record progress during the work. Use digital preconstruction documentation photographs. Comply with requirements in Section 013233 "Photographic Documentation."

D. Perform surveys of Project site as the Work progresses to detect hazards resulting from alterations.

E. Notify Architect of visible changes in the integrity of material or components whether from environmental causes including biological attack, UV degradation, freezing, or thawing or from structural defects including cracks, movement, or distortion.
   1. Do not proceed with the work in question until directed by Architect.

END OF SECTION

SECTION 014000 QUALITY

REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspection 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. Specific quality-assurance and quality-control requirements for individual work results are specified in their respective Specification Sections. Requirements in individual Sections may also cover production of standard products.
   2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
   3. Requirements for Contractor to provide quality-assurance and quality-control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

1.2 DEFINITIONS

A. Experienced: When used with an entity or individual, "experienced," unless otherwise further described, means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

B. Field Quality-Control Tests and Inspections: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

C. 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, assembly, and similar operations.
   1. Use of trade-specific terminology in referring to a Work result does not require that certain construction activities specified apply exclusively to specific trade(s).

D. Mockups: Physical assemblies of portions of the Work constructed to establish the standard by which the Work will be judged. Mockups are not Samples.
   1. Mockups are used for one or more of the following:
      a. Verify selections made under Sample submittals.
      b. Demonstrate aesthetic effects.
      c. Demonstrate the qualities of products and workmanship.
      d. Demonstrate successful installation of interfaces between components and systems.
      e. Perform preconstruction testing to determine system performance.
   2. Product Mockups: Mockups that may include multiple products, materials, or systems specified in a single Section.
   3. In-Place Mockups: Mockups constructed on-site in their actual final location as part of permanent construction.

E. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria. Unless otherwise indicated, copies of reports of tests or inspections performed for other than the Project do not meet this definition.

F. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) according to 29 CFR 1910.7, by a testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

G. Source Quality-Control Tests and Inspections: Tests and inspections that are performed at the source (e.g., plant, mill, factory, or shop).

H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. The term "testing laboratory" has the same meaning as the term "testing agency."

I. 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.

J. 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. Contractor's quality-control services do not include contract administration activities performed by Architect.

1.3 DELEGATED DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
   1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated Design Services Statement: Submit a statement signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

1.4 CONFLICTING REQUIREMENTS

A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements is specified and the standards or requirements establish different or conflicting requirements for minimum quantities or quality levels, inform the Architect regarding the conflict and obtain clarification prior to proceeding with the Work. Refer conflicting requirements that are different, but apparently equal, to Architect for clarification before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified is 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.

1.5 ACTION SUBMITTALS

A. Mockup Shop Drawings:
   1. Include plans, sections, elevations, and details, indicating materials and size of mockup construction.
   2. Indicate manufacturer and model number of individual components.
   3. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

1.6 INFORMATIONAL SUBMITTALS

A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.

B. Qualification Data: For Contractor's quality-control personnel.

C. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility submitted to authorities having jurisdiction before starting work on the following systems:
   1. Primary wind-force-resisting system or a wind-resisting component listed in the Statement of Special Inspections.

D. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

E. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
   1. Specification Section number and title.
   2. Entity responsible for performing tests and inspections.
   3. Description of test and inspection.
   4. Identification of applicable standards.
   5. Identification of test and inspection methods.
   6. Number of tests and inspections required.
   7. Time schedule or time span for tests and inspections.
   8. Requirements for obtaining samples.

9. Unique characteristics of each quality-control service.

F. Reports: Prepare and submit certified written reports and documents as specified.

G. Permits, Licenses, and Certificates: For Owner's record, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents established for compliance with standards and regulations bearing on performance of the Work.

1.7 CONTRACTOR'S QUALITY-CONTROL PLAN

A. Quality-Control Plan, General: Submit quality-control plan within 10 days of commencement of work, and not less than days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities and to coordinate Owner's quality-assurance and quality-control activities. Coordinate with Contractor's Construction Schedule.

B. Quality-Control Personnel Qualifications: Engage qualified personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.
1. Project quality-control manager may also serve as Project superintendent.

C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.

D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:
1. Contractor-performed tests and inspections, including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections. Distinguish source quality-control tests and inspections from field quality-control tests and inspections.
2. Special inspections required by authorities having jurisdiction and indicated on the Statement of Special Inspections.
3. Owner-performed tests and inspections indicated in the Contract Documents, including tests and inspections indicated to be performed by Commissioning Authority.

E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring the Work into compliance with standards of workmanship established by Contract requirements and approved mockups.

F. Monitoring and Documentation: Maintain testing and inspection reports, including log of approved and rejected results. Include Work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming Work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.8 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
1. Date of issue.
2. Project title and number.
3. Name, address, telephone number, and email address of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample-taking and testing and inspection.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, telephone number, and email address of technical representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement of whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, telephone number, and email address of factory-authorized service representative making report.
2. Statement that equipment complies with requirements.
3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
4. Statement of whether conditions, products, and installation will affect warranty.
5. Other required items indicated in individual Specification Sections.

1.9 QUALITY ASSURANCE

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

B. 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. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.

C. 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.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, applying, 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.

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 product that is similar in material, design, and extent to those indicated for this Project.

F. Specialists: Certain Specification Sections require that specific construction activities be performed by entities who are recognized experts in those operations. Specialists will satisfy qualification requirements indicated and engage in the activities indicated.
1. Requirements of authorities having jurisdiction supersede requirements for specialists.

G. Testing and Inspecting Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspection indicated, as documented in accordance with ASTM E329, and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

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

J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following Contractor's responsibilities, including the following:
1. Provide test specimens representative of proposed products and construction.
2. Submit specimens in a timely manner with sufficient time for testing and analyzing results to

prevent delaying the Work.

3. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
4. Build site-assembled test assemblies and mockups, using installers who will perform same tasks for Project.
5. When testing is complete, remove test specimens and test assemblies, and mockups; do not reuse products on Project.
6. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, with copy to Contractor. Interpret tests and inspections, and state in each report whether tested and inspected Work complies with or deviates from the Contract Documents.

K. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
1. Build mockups of size indicated.
2. Build mockups in location indicated or, if not indicated, as directed by Architect.
3. Notify Architect seven days in advance of dates and times when mockups will be constructed.
4. Employ supervisory personnel who will oversee mockup construction. Employ workers who will be employed to perform same tasks during the construction at Project.
5. Demonstrate the proposed range of aesthetic effects and workmanship.
6. Obtain Architect's approval of mockups before starting corresponding Work, fabrication, or construction.
   a. Allow seven days for initial review and each re-review of each mockup.
7. Promptly correct unsatisfactory conditions noted by Architect's preliminary review, to the satisfaction of the Architect, before completion of final mockup.
8. Approval of mockups by the Architect does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
9. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
10. Demolish and remove mockups when directed unless otherwise indicated.

1.10 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspection they are engaged to perform.
2. Costs for retesting and reinspecting construction that replaces or is necessitated by Work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.
1. 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.
2. Engage a qualified testing agency to perform quality-control services.
   a. Contractor will not employ same entity engaged by Owner, unless agreed to in writing by Owner.
3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspection will be performed.
4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
5. Testing and inspection requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

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.

D. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
   1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
   2. Determine the locations 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 duties of Contractor.

E. 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 Section 013300 "Submittal Procedures."

F. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

G. Contractor's Associated Requirements and Services: Cooperate with agencies and representatives 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 inspection. 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 inspection equipment at Project site.

H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality- control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.
   1. Schedule times for tests, inspections, obtaining samples, and similar activities.

I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's Construction Schedule. Update and submit with each Application for Payment.
   1. Schedule Contents: Include tests, inspections, and quality-control services, including Contractor- and Owner-retained services, commissioning activities, and other Project-required services paid for by other entities.
   2. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.11 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Owner will engage a qualified special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:
   1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures, and reviewing the completeness and adequacy of those procedures to perform the Work.
   2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
   3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
   4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
   5. Interpreting tests and inspections, and stating in each report whether tested and inspected Work complies with or deviates from the Contract Documents.
   6. Retesting and reinspecting corrected Work.

PART 2 - PRODUCTS (NOT USED) PART 3

- EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
   1. Date test or inspection was conducted.
   2. Description of the Work tested or inspected.
   3. Date test or inspection results were transmitted to Architect.
   4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's and authorities' having jurisdiction reference during normal working hours.
   1. Submit log at Project closeout as part of Project Record Documents.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspection, 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 or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 017300 "Execution."

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

SECTION 014200

REFERENCES

PART 1 - GENERAL

1.1 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."

D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.

H. "Provide": Furnish and install, complete and ready for the intended use.

I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.2 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
   1. For standards referenced by applicable building codes, comply with dates of standards as listed in building codes.

C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
   1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.3 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 015000

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 USE CHARGES

A. Installation, removal, and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities engaged in the Project to use temporary services and facilities without cost, including, but not limited to, Architect, testing agencies, and authorities having jurisdiction.

B. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use with metering. Provide connections and extensions of services and metering as required for construction operations.

C. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use with metering. Provide connections and extensions of services and metering as required for construction operations.

1.3 INFORMATIONAL SUBMITTALS

A. Site Utilization Plan: Show temporary facilities, temporary utility lines and connections, staging areas, construction site entrances, vehicle circulation, and parking areas for construction personnel.

B. Implementation and Termination Schedule: Within 15 days of date established for commencement of the Work, submit schedule indicating implementation and termination dates of each temporary utility.

C. Project Identification and Temporary Signs: Show fabrication and installation details, including plans, elevations, details, layouts, typestyles, graphic elements, and message content.

D. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.

E. Moisture- and Mold-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage and mold. Describe delivery, handling, storage, installation, and protection provisions for materials subject to water absorption or water damage.
   1. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and requirements for replacing water-damaged Work.
   2. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
   3. Indicate methods to be used to avoid trapping water in finished work.

F. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Include the following:
   1. Locations of dust-control partitions at each phase of work.
   2. HVAC system isolation schematic drawing.
   3. Location of proposed air-filtration system discharge.
   4. Waste-handling procedures.
   5. Other dust-control measures.

G. Noise and Vibration Control Plan: Identify construction activities that may impact the occupancy and use of existing spaces within the building or adjacent existing buildings, whether occupied by others, or occupied by the Owner. Include the following:
   1. Methods used to meet the goals and requirements of the Owner.
   2. Concrete cutting method(s) to be used.
   3. Location of construction devices on the site.
   4. Show compliance with the use and maintenance of quieted construction devices for the duration of the Project.

5. Indicate activities that may disturb building occupants and that are planned to be performed during non-standard working hours as coordinated with the Owner.
6. Indicate locations of sensitive equipment areas or other areas requiring special attention as identified by Owner. Indicate means for complying with Owner's requirements.

1.4 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.

C. Accessible Temporary Egress: Comply with applicable provisions in the United States Access Board's ADA-ABA Accessibility Guidelines and Texas Accessibility Standards (TAS).

1.5 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to 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: Minimum 2-inch (50-mm), 0.148-inch- (3.8-mm-) thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized-steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top rails.

B. Fencing Windscreen Privacy Screen: Polyester fabric scrim with grommets for attachment to chain-link fence, sized to height of fence, in color selected by Architect from manufacturer's standard colors.

C. 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: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:
1. Furniture required for Project-site documents, including file cabinets, plan tables, plan racks, and bookcases.
2. Conference room of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-V ac duplex receptacles, with no fewer than one receptacle on each wall. Furnish room with conference table, chairs, and 4-foot- (1.2-m-) square tack and marker boards.
3. Drinking water and private toilet.
4. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F (20 to 22 deg C).
5. Lighting fixtures capable of maintaining average illumination of 20 fc (215 lx) at desk height.

C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
1. Store combustible materials apart from building.

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, Cooling, and Dehumidifying Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.

PART 3 - EXECUTION

3.1 TEMPORARY FACILITIES, GENERAL

A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
   1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

3.2 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.

3.3 TEMPORARY UTILITY INSTALLATION

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

B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
   1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.

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

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

E. Temporary 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.
   1. Provide temporary dehumidification systems when required to reduce ambient and substrate moisture levels to level required to allow installation or application of finishes and their proper curing or drying.

F. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
   1. Install electric power service overhead unless otherwise indicated.

G. 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.

H. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install one land-based telephone line(s) for each field office.
   1. At each telephone, post a list of important telephone numbers.
      a. Police and fire departments.
      b. Ambulance service.

c. Contractor's home office.
d. Contractor's emergency after-hours telephone number.
e. Architect's office.
f. Engineers' offices.
g. Owner's office.
h. Principal subcontractors' field and home offices.

I. Electronic Communication Service: Provide secure WiFi wireless connection to internet with provisions for access by Architect and Owner.
1. Printer: "All-in-one" unit equipped with printer server, combining color printing, photocopying, scanning, and faxing, or separate units for each of these three functions with wireless connectivity.
2. Internet Service: Broadband modem, router, and ISP, equipped with hardware firewall, providing minimum 10.0 -Mbps upload and 15 -Mbps download speeds at each computer.

3.4 SUPPORT FACILITIES INSTALLATION

A. Comply with the following:
1. Provide construction for temporary field offices, shops, and sheds located within construction area or within 30 feet (9 m) of building lines that is noncombustible in accordance with ASTM E136. Comply with NFPA 241.
2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Temporary Use of Planned Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. 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. Prepare subgrade and install subbase and base for temporary roads and paved areas in accordance with Refer to Civil Engineer’s documents.
3. Recondition base after temporary use, including removing contaminated material, regrading, proofrolling, compacting, and testing.

C. 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.

D. Parking: Provide temporary offsite parking areas for construction personnel.

E. Storage and Staging: Use designated areas of Project site for storage and staging needs.

F. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
2. Remove snow and ice as required to minimize accumulations.

G. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
1. Identification Signs: Provide Project identification signs as indicated on Drawings.
2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
a. Provide temporary, directional signs for construction personnel and visitors.
3. Maintain and touch up signs, so they are legible at all times.

H. 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 progress cleaning requirements in Section 017300 "Execution."

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

J. Temporary Elevator Use: See Division 14 elevator Section for temporary use of new elevators.

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

L. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
   1. Where access to adjacent properties is required in order to affect protection of existing facilities, obtain written permission from adjacent property owner to access property for that purpose.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

C. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

D. 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. Perform control operations lawfully, using materials approved by authorities having jurisdiction.

E. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people 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.

F. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock construction entrances at end of each workday shall be locked at all times with punch pad lock.

G. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

H. Temporary Egress: Provide temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction. Provide signage directing occupants to temporary egress.

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 incomplete, insulate temporary enclosures.

J. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.
   1. Prohibit smoking in construction areas. Comply with additional limits on smoking specified in other Sections.
   2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition in accordance with 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.

3.6 MOISTURE AND MOLD CONTROL

A. Moisture and Mold Protection: Protect stored materials and installed Work in accordance with Moisture and Mold Protection Plan.

B. Exposed Construction Period: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
   1. Protect porous materials from water damage.
   2. Protect stored and installed material from flowing or standing water.
   3. Keep porous and organic materials from coming into prolonged contact with concrete.
   4. Remove standing water from decks.
   5. Keep deck openings covered or dammed.

C. Partially Enclosed Construction Period: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
   1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
   2. Keep interior spaces reasonably clean and protected from water damage.
   3. Periodically collect and remove waste containing cellulose or other organic matter.
   4. Discard or replace water-damaged material.
   5. Do not install material that is wet.
   6. Discard and replace stored or installed material that begins to grow mold.
   7. Perform work in a sequence that allows wet materials adequate time to dry before enclosing the material in gypsum board or other interior finishes.

D. Controlled Construction Period: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
   1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
   2. Use temporary or permanent HVAC system to control humidity within ranges specified for installed and stored materials.
   3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
      a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective and require replacing.
      b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
      c. Remove and replace materials that cannot be completely restored to their manufactured moisture level within 48 hours.

3.7 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.
   1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

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. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
   3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION

SECTION 015719 TEMPORARY

ENVIRONMENTAL CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes:
1. Hospital airborne contaminants control policy and procedures.
2. Ceiling access control of airborne contaminants.

1.2 DEFINITIONS

A. Containment Areas: (Negative Pressurization) As determined by Architect and as shown on the Drawings as Containment Areas. Includes area of construction, adjacent staging and storage areas, and passage areas for contractors, supplies, and waste; includes ceiling spaces above and adjacent to construction.

B. Protection Areas: (Positive Pressurization) As determined by Architect and as shown on the Drawings as Protection Areas. Includes hospital areas adjacent to Containment Area, either occupied or used for passage, as well as areas connected to construction area by mechanical system air intake, exhaust and ductwork.

C. "Minor" ceiling access is defined as visual observation or minor adjustments or other activity that does not disturb dust. Acoustical panels shall be replaced or access panel shall be closed immediately when the contractor leaves the work site.

D. "Major" ceiling access describes any other access not defined as "minor."

E. "Thorough" cleaning of surfaces which become exposed to dust shall be accomplished by the use of either a HEPA-filtered vacuum cleaner or Water Vac with HEPA Filtration on outlet. Note: Wet mop shall not be used since moisture will activate dormant fungus and mold spores in dust.

F. Negative Air Machine: Portable mechanical units to provide a negative air pressure in the Containment Areas, as specified in this Section.

1.3 SYSTEM DESCRIPTION

A. Design Requirements: Owner will establish acceptable, baseline levels of airborne contaminants based on air monitoring of existing conditions prior to start of Work.
1. Aspergillosis and related nosocomial fungal infections are caused through inhalation by immuno-compromised patients of aspergillus spores, or other related spores which can be present in the construction environment. The spores are known to be prolifically present in construction dust, debris, and earthwork excavation dust. Control of construction dust, debris, and excavation dust, as required in this Section, is imperative to help prevent outbreaks of aspergillosis or related nosocomial fungal infections in immuno-compromised patients.
1) Inhalation of aspergillus spores or other fungal spores by immuno-compromised patients can lead to serious complications and death.
2) Aspergillus and other related spores are present in the natural environment and thus are not a risk to healthy construction workers.
3) Construction workers are required to attend an orientation session.
2. Airborne contaminants control is critical in hospital areas. Limit dissemination of airborne contaminants produced by construction-related activities in order to provide protection of immuno-compromised and other patients, staff, diagnostic operations, or sensitive procedures or equipment, from possible undesirable effects of exposure to such contaminants.
a. Dust in ceilings and construction debris contains fungus spores. Conduct construction activities causing disturbance of existing dust, or creating new dust, or other airborne contaminants in tight enclosures cutting off flow of particles into patient areas.
b. Secure ceilings and walls in Protection Areas and other indicated areas. Follow specified procedures if access into ceiling in occupied areas is required.
3. Design system, including containment and disposal procedures, equipment, and related work, to meet specified requirements.

1.4 SUBMITTALS

A. Progress Schedules: Submit work areas and procedure schedules for containment of airborne contaminants. Refer to Section 013100.

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

C. Product Data: Submit manufacturer's literature on:
   1. Vacuum cleaning machines, air compressors, pressure washers, and cleaning related equipment accessories.
   2. Biocide sanitizing fluid, coil cleaning solutions, degreasers, encapsulators.
   3. Duct access doors, access panels.
   4. Labels.

D. Record Drawings: Upon completion of the project, submit one set of red-marked duct layout drawings showing the location of new access holes and openings installed in the duct systems to accommodate the cleaning process.

E. Test Reports: Written results of testing specified in Part 3.

1.5 QUALITY ASSURANCE

A. Air Samples: Owner will provide baseline particle counts and conduct periodic air sampling of areas during construction to monitor effectiveness of containment procedures.

B. Contractor Qualifications: Company specializing in performing Work of this extent and nature with minimum five years experience.

C. Regulatory Requirements: Ensure flammable components comply with applicable portions of local, state, and federal codes, laws, and ordinances for flame spread and smoke developed indices.

1.6 OWNER'S USE OF SPACE

A. Accomplish work with a minimum of interruptions to Owner's operation within the building. Coordinate work with the Owner's Representative.

B. In the event HVAC systems provide space heating the duration of system shut downs must be limited or the contractor shall provide temporary heating systems to ensure room temperatures of at least 50 degrees F. are maintained.

1.7 PROTECTION

A. If work is being done above a lay-in ceiling and if work must be performed while the space below is occupied, provide temporary work surfaces to provide a safe working platform and protect the ceiling and the spaces below from falling objects and materials. Take necessary precautions to protect the people and spaces below from injury due to the contractor's operations.

B. Exercise caution when handling fluids, particularly heating water, in the interstitial space. When working with fluids provide a water-tight barrier beneath the work area to catch and retain spillage before it reaches the ceiling below.

C. Notify the Architect at least 48 hours prior to commencing work in ceiling or interstitial spaces above occupied areas to allow at-risk patients to be relocated or protected.

1.8 COORDINATION OF WORK

A. Submit a cleaning work schedule for each HVAC unit/duct system a minimum of 30 days prior to beginning work. Indicate dates, times and activities for each phase or portion of the work. In addition, describe in detail what systems, fans, and HVAC equipment will be affected (no air flow) and what rooms, spaces or areas will require access. Include procedures proposed for the project.

B. Coordinate work activities with other affected trades and Subcontractors.

C. Do not begin cleaning activities until other construction activities are complete except for Testing, Adjusting, and Balancing (TAB) activities in which case TAB activities shall be performed after acceptance of cleaning activities.

D. Prearrange and pre-schedule with the Architect and Owner's Representative the switching off of any HVAC unit to commence a cleaning operation.

1.9 PRE-INSTALLATION CONFERENCE

A. Conduct pre-installation conference in accordance with Section 013100.

B. Before Work begins, conduct an orientation session including presentation by Owner's Representative for training and instructing construction and related personnel on precautions to be taken. Do not permit workers to access work areas until successfully completing orientation session.

PART 2 - PRODUCTS

2.1 EQUIPMENT

A. Negative Air Machines: Include pre-filters, final filters, HEPA filters and filter static pressure gauges.
1. HEPA filters: 99.97 percent efficient at 0.3 micron particle size.
2. Basis-of-Design Product:
a. Micro Trap MT-2000 Negative Air Filtration Units by Micro-Trap Corporation.

B. Air Pressure Monitor: Differential switch/gauge to monitor differential pressure between construction Containment Area and Protection Area.
1. Install switch/gauge in NEMA rated enclosure.
2. Provide power wiring, transformers, and relays to operate the system.
3. Provide audio-visual alarm that will activate upon sensing pressure differences beyond the range set points.
4. Provide a switch that will enable activation of either audio, visual, or both alarms.
5. Provide a manual reset switch to reset gauge after an alarm condition.
6. Acceptable product and manufacturer, Switch/gauge:
a. Dwyer Model 3000-0 with range of 0 to 0.5 inches of water gauge, and high-low adjustable set points.

C. Vacuum Collection Machine:
1. Portable vacuum cleaning machine designed for duct cleaning mounted on wheels.
2. Filter section with filter bags and final HEPA exhaust filtration.
3. Anti-spark construction, made of non-ferrous material.
4. Fan shall have a minimum of 4,000 CFM 1t 1.5" static pressure.
5. Unit shall maintain a minimum 1" S.P. on duct at all times.

D. Air Compressor:
1. Portable air compressor unit consisting of compressors, tanks, and controls ASME rated.
2. Minimum Capacity: 17 CFM free air at 175 psig.
3. Accessories: Hoses and velocity nozzles.

2.2 MATERIALS

A. Carpet or Mats: Provide carpets or mats at enclosure entrances, vacuumed or changed as often as necessary to prevent accumulation of dust. At Owner's option, provide adhesive faced contamination control mats with disposable sheets in lieu of vacuumed mats. Vacuuming of areas not under negative pressure shall be with a certified HEPA-filtered vacuum.
1. Acceptable product and manufacturer - Adhesive faced contamination control mat:
a. Tacky Mat by Liberty Industries, 133 Commerce Street, East Berlin, CT 06023, 1-800-828-5656.

B. Dust Caps: Block off existing ventilation ducts within construction area. Capping method shall be dust tight and withstand air flow.

C. Portable Enclosures: Sufficient to seal off area tight to ceiling.

D. Temporary Prefabricated Partition for work in Sterile Corridors:
1. Acceptable product and manufacturer:
a. Kontrol Kube by Fiberlock Technologies, Inc., P.O. Box 432, Cambridge, MA, 617-876-8020, including the following:
1) Adjustable Aluminum Frame #6440.
2) Vinyl Enclosure #6442.
3) Wheel Base Platform #6443.
4) Inspection window and pressure differential porthole.
5) Nilfisk GM 80i cfm vacuum device and manometer.

E. Polyethylene: ASTM D210, Minimum thickness: 6 mil, FR treated.

F. Biocide: Copper-8-quinolinolate.
1. Acceptable product and manufacturer: MAG Chemical, Vero Beach, FL.

G. Spray Adhesive:
1. Acceptable product and manufacturer: Ram-Tack Adhesive from Aramsco, 906 Gray Street, Elgin, IL 60120.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before any demolition or construction begins in occupied areas, a complete field review of all airborne contaminant control policies will be conducted. A checklist will be filled out and signed by the Airborne Contaminant Control Nurse and the Contractor, confirming that the area is ready for work to begin.

B. Provide temporary barriers and other controls to control airborne contaminants. Extend barriers above ceilings as required to seal off and contain airborne contaminants.

3.2 GENERAL CEILING ACCESS DIRECTIVES

A. Perform Work in accordance with Section 017300, applicable local standards, and approved shop drawings and work plans.

B. Report to Owner and fill out a ceiling access form. Attach approved work tag to the ceiling access enclosure before work will be allowed to proceed.

C. Work Tag:
1. Attach a completed, approved work tag on the ceiling access enclosure before work can proceed.
2. Remove work tag only after work is done and cleanup completed.
3. Tags issued from Owner's representative shall be returned the same day to the office from which it was issued, after work and cleanup for the day has been completed.

D. Spray top of ceiling panels to be removed, and surrounding affected panels, with fine water mist to settle dust prior to removal.

E. Inform Head Nurse or department manager so that patient room doors near ceiling work will be kept closed while work is in progress.

F. Contact Owner's Representative regarding ceiling access problems.

G. Special Techniques:
1. Provide special control of sources of contaminants and waste as determined by Owner's Representative. Contain waste materials during removal, bagging, wrapping, and chute use.
2. Use wet cleaning methods and HEPA-filtered vacuum cleaners to minimize release of airborne contaminants. Disinfect contaminant and protection areas to effect final cleaning.
3. Perform cleaning of heating, ventilating and air conditioning (HVAC) systems and ductwork.
4. Sealing of Openings: Use duct tape or other impenetrable sealant to seal barrier wall seams, cracks around window and door frames, exhaust system ductwork, pipes, joints, and ducts. Seal penetration of dustproof enclosures on all sides and 360 degrees around penetrating objects.
5. Dust Control: Take appropriate steps throughout the term of the Project to prevent airborne dust due to work under this contract. Apply water wherever practical to settle and hold dust to a minimum, particularly during demolition and moving of materials. Prevent accumulation of standing water or saturation of any materials. Use of chemical palliatives is not permitted without permission of Owner's Representative.
   a. Spray surfaces with water during dust-producing interior demolition activities. Hard surface floors in work area, adjacent hallways and passage areas require vacuuming with HEPA-filtered vacuum cleaners during demolition and construction. Protect adjacent carpeted areas with plastic and plywood, and vacuum with HEPA-filtered vacuum cleaners.
   b. Vacuum walk-off mats at least once daily.
   c. Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent airborne dust from dispersing into atmosphere.

H. Airborne contaminant enclosures or infection control enclosures shall be dust-tight. Immediately remove dust tracked outside of enclosure. Clean areas outside enclosure with HEPA-filtered vacuum or other approved method.

I. Implement the following procedure when construction personnel are required to pass through a Protected Area to enter the Containment Area.
1. Provide air lock entry vestibules in dustproof enclosures when shown on Drawings or required by Owner's Representative.
2. Personnel shall wear protective clothing while passing through the Protective Area. Protective clothing shall be removed in the air lock vestibule prior to entering the Containment Area.
3. When exiting the Containment Area, personnel shall put protective clothing on before reentering the Protected Area.

J. Contractor Personnel: Instruct personnel to refrain from tracking dust into adjacent hospital areas or opening

windows or doors that may allow airborne contaminants into adjacent hospital areas.

K. Exterior Work: Direct exhaust from equipment away from building air intakes. Ensure that filters on building air intakes are operational and protected from excessive amounts of airborne contaminants.

L. Ceiling access panels opened for investigation beyond sealed areas shall be replaced immediately when unattended.
   1. Whenever access panels are opened in occupied areas, for work above ceiling, provide portable enclosure enclosing ladder and seal off opening, fitted tight to ceiling.

M. Provide thorough cleaning of existing, exposed surfaces before start of Owner's room occupancy.

N. Removal of construction barriers and ceiling protection shall be done carefully, possibly outside of normal work hours. Vacuum and clean adjacent surfaces after removal.

O. Perform vacuuming of areas not under negative pressure with a certified, Owner approved, HEPA-filtered vacuum.

3.3 AIRBORNE CONTAMINANT CONTROL ENCLOSURES AND BARRIERS

A. Install dustproof enclosures for work as indicated and when required to protect areas occupied by Owner from dust, debris, and damage.

B. It is the Contractor's responsibility to determine when a dustproof enclosure is required to protect any adjoining area; however, Contractor shall provide a dustproof enclosure where indicated and whenever requested by Owner.

C. Airborne Contaminant Control General Requirements: Floor to structure, air-tight enclosures, and gypsum board barriers, using tape and foam padding.
   1. Keep traffic between Containment Areas and open areas to a minimum. Keep door to areas closed at all times. Transport materials and refuse into an area from an external site without violating patient care areas by transporting in covered containers.
   2. Provide negative pressure in construction areas as specified herein.
      a. Provide adequate forced ventilation of enclosed areas to cure installed materials, to prevent excessive humidity, and to prevent hazardous accumulations of dust fumes, vapors, or gases.

D. Dustproof Enclosures: Full height, noncombustible construction, with minimum 1/2 inch gypsum board both sides, with 3-1/2 inch, R-11 insulation batts to reduce noise. Use 3-inch wide duct tape to tightly seal top, bottom, and seams, to prevent spread of dust to occupied areas, including above ceiling. Secure tape with Ram-Tack spray adhesive.
   1. Enclosure Doors: Four foot minimum width, unless shown otherwise, solid core wood with metal frame and hardware, including closer, tightly weather-stripped to prevent flow of dust. Locate as directed and swing into construction area. Keep enclosures locked outside of working hours. Provide Owner with keys for emergency access.
   2. Install floor mats on both sides of construction entrance prior to starting demolition or construction. Keep inside mat damp to help remove dust and minimize tracking into adjacent clean areas, vacuum mats daily. As an alternative, provide tacky-mats and remove old surface daily.
   3. Obtain Owner's approval of exact location and details of enclosure construction. Precut materials for enclosure in unoccupied areas. No explosive or pneumatic driven fasteners allowed. Provide entrance vestibules as detailed. Provide carpets inside vestibule and inside enclosures at door to vestibule, and keep vacuumed daily.

E. Enclosure outside work area (including spaces above furred ceilings): Whenever work is necessary outside of construction enclosures, the space where work is being performed, including ladders, shall be contained within a full height portable enclosure or with use of pre-fabricated units as specified herein.
   1. Work performed outside construction enclosure, including work in corridors and lobbies, shall be performed outside of normal working hours and shall be schedule in advance with Owner except where specified otherwise.
   2. Storage of construction equipment or material outside the construction enclosure is prohibited.
   3. Immediately clean up dust tracked outside the construction area. Contractor shall provide necessary manpower and equipment (HEPA filtered vacuum, dust mops, brooms, buckets and clean wiping rags) to keep adjacent occupied areas clean at all times.

F. Power and Lighting: Provide sufficient temporary lighting and power ventilating equipment to ensure proper workmanship and safety everywhere.

G. Access Provisions: Provide ramps, stairs, ladders, and similar temporary access elements as reasonably required to perform the work and facilitate its inspection during installation.

H. Where work occurs in occupied areas, provide access opening through existing plaster, or gypsum board

walls, and acoustical ceilings, and to restore walls and ceilings to original condition after work is complete and to ensure dust control within access areas.

1. Provide temporary plywood panels anchored to existing steel ceiling support grid for support of workers crawling above ceiling. Panel thickness shall suit spans between existing steel support.

I. Coordinate and phase remodeling work in certain rooms which serve other rooms with the phasing of the remodeled rooms if required, so that at no time are both rooms simultaneously inoperative. Any downtime necessitated by the remodeling work is to be fully discussed and coordinated with the Owner's Representative in advance of the shutdown.

1. Dust: Generation of significant quantities of airborne dust will not be tolerated. Clean the work area prior to starting work as necessary to minimize existing dust which may become airborne during construction. Provide drop cloths and dust partitions as necessary to contain dust and debris generated by the work.
2. Remove demolition material, dust, and dirt in tightly sealed, covered, rubber tired plastic dump carts. Containers shall be fitted with clean polyethylene covers, completely sealed at perimeter by wire tying or taping. Before leaving area, all containers shall be wiped clean to prevent tracking of dust. Place rugs inside barrier entrance, keep them clean or changed daily. Provide debris chutes if allowed.
3. Hot Processes: Welding and flame cutting which generate smoke shall be scheduled with the Owner's fire detection system deactivated.
4. Use portable vinyl tunnel or a polyethylene enclosure for single ceiling accesses. Enclosure opening shall have a 3-foot overlap of plastic to decrease risk of airborne dust.

J. Portable vinyl tunnel or polyethylene enclosures, if used, shall remain in place until the ceiling is secured (all accesses closed).

1. If access is larger than vinyl tunnel, use a portable polyethylene enclosure also enclosing the ladder. Enclosures opening shall have a 2 foot overlap of plastic to decrease risk of airborne dust.
2. Secure polyethylene enclosures/barriers in place to walls and floor with use of tape. Reinforce seam on ceiling with frame and flat head screws.
3. When accessing pipes, ducts, or other building infrastructure to investigate a condition, use additional procedures including masks, disposable white coveralls, and disposable shoe covers, before going into the access. Afterwards, strip off the additional procedures carefully, turning the coveralls "inside-out," and depositing the mask, coverall, and shoe covers into a plastic trash bag inside the enclosure. Secure (tie-off) plastic trash bag and discard as directed by Owner's Representative. Do not discard within "patient care areas."
4. When Contractor leaves the work site, the access, especially at ceiling, shall either be completely closed or protected by an appropriate barrier.
5. In patient care areas, dismantle the apparatus (tunnel or enclosure) and replace access (ceiling tiles); or complete work of access at the end of each day.
6. Thoroughly clean surfaces which become exposed to dust before leaving the area of construction. Accomplish cleaning by use of either an HEPA-filtered vacuum cleaner.

3.4 ENFORCEMENT AND FINES

A. Owner will monitor aspergillus count in vicinity of project in Protection Areas. Such areas will be located as indicated on Drawings. Whenever safe levels are exceeded, Contractor will be notified to correct conditions immediately to avoid fine and work stoppage described.

1. All work shall be stopped on the project whenever a hazardous airborne contaminant control deficiency exists in occupied areas.
2. Contractor shall take immediate action to correct all deficiencies.

B. Process: Failure to maintain containment areas will result in issuance of written warning; if situation is not corrected within 8 hours of receipt of warning, Owner will have cause to stop the work.

1. Failure of Contractor to correct deficiencies in containment will result in corrective action taken by the Owner and deducting all costs from the Contractor.
2. Ceiling Access: Each breach of ceiling access policy will cost violators $500.00 for each occurrence.

C. The following will be performed by Owner's Representative:

1. Periodic Rounds: A photograph will be taken to document each violation.
2. Contractor and Department information will be extracted from the ceiling work tag.
3. A record of all violations of required ceiling access procedures will be maintained, whether in occupied area or not.

END OF SECTION

SECTION 016000

PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 DEFINITIONS

A. Products: Items obtained 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. Salvaged items or items reused from other projects are not considered new products. Items that are manufactured or fabricated to include recycled content materials are considered new products, unless indicated otherwise.

B. Basis-of-Design Product Specification: A specification in which a single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. Published attributes and characteristics of basis-of-design product establish salient characteristics of products.
   1. Evaluation of Substitution Requests: In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating substitutions of additional manufacturers named in the specification. Manufacturer's published attributes and characteristics of basis-of-design product also establish salient characteristics of products for purposes of evaluating substitutions.

C. Subject to Compliance with Requirements: Where the phrase "Subject to compliance with requirements" introduces a product selection procedure in an individual Specification Section, provide products qualified under the specified product procedure. In the event that a named product or product by a named manufacturer does not meet the other requirements of the specifications, select another named product or product from another named manufacturer that does meet the requirements of the specifications; submit a substitution request, if applicable.

D. Basis-of-Design Product Specification Submittal: An action submittal complying with requirements in Section 013300 "Submittal Procedures."

E. Substitution: Refer to Section 012500 "Substitution Procedures" for definition and limitations on substitutions.

1.3 QUALITY ASSURANCE

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

B. Identification of Products: Except for required labels and operating data, do not attach or imprint manufacturer or product names or trademarks on exposed surfaces of products or equipment that will be exposed to view in occupied spaces or on the exterior.
   1. Labels: Locate required product labels and stamps on a concealed surface, or, where required for observation following installation, on a visually accessible surface that is not conspicuous.
   2. Equipment Nameplates: Provide a permanent nameplate on each item of service- or power-operated equipment. Locate on a visually accessible but inconspicuous surface. Include information essential for operation, including the following:
      a. Name of product and manufacturer.

b. Model and serial number.
c. Capacity.
d. Speed.
e. Ratings.

3. See individual identification Sections in Divisions 21, 22, 23, and 26 for additional equipment identification requirements.

1.4 COORDINATION

A. Modify or adjust affected work as necessary to integrate work of approved substitutions.

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 and vandalism. 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 determine compliance with the Contract Documents and that products are undamaged and properly protected.

C. Storage:
1. Provide a secure location and enclosure at Project site for storage of materials and equipment.
2. Store products to allow for inspection and measurement of quantity or counting of units.
3. Store materials in a manner that will not endanger Project structure.
4. Store products that are subject to damage by the elements under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation and with adequate protection from wind.
5. Protect 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.
8. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

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: Written standard warranty form furnished by individual manufacturer for a particular product and issued in the name of the Owner or endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner and issued in the name of the Owner or endorsed by manufacturer to Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included in the Project Manual, prepare a written document, using indicated form properly executed.
3. See other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, 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 meeting 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. Sole Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Substitutions for Contractor's convenience will be considered unless otherwise indicated.
a. Sole product may be indicated by the phrase "Subject to compliance with requirements, provide the following."
2. Sole Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Substitutions for Contractor's convenience will be considered unless otherwise indicated.
a. Sole manufacturer/source may be indicated by the phrase "Subject to compliance with requirements, provide products by the following."
3. Limited List of Products: Where Specifications include a list of names of both manufacturers and products, provide products by the Basis-of-Design manufacturer or a Substitution Request for one of the products listed that complies with requirements. Substitutions for Contractor's convenience will be considered unless otherwise indicated.
a. Limited list of products may be indicated by the phrase "Subject to compliance with requirements, provide one of the following."
b. Where a Basis-of-Design product is not specified, provide one of the listed products.
4. Limited List of Manufacturers: Where Specifications include a list of manufacturers' names, provide products by the Basis-of-Design manufacturer or a Substitution Request for a product by one of the manufacturers listed that complies with requirements. Substitutions for Contractor's convenience will be considered unless otherwise indicated.
a. Limited list of manufacturers is indicated by the phrase "Subject to compliance with requirements, provide products by one of the following."
b. Where a Basis-of-Design manufacturer is not specified, provide products from one of the listed manufacturers.
5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, provide the specified or indicated product. Drawings and Specifications may additionally indicate sizes, profiles, dimensions, and other characteristics that are based on the product named.
a. For approval of products other than “Basis-of-Design”, comply with requirements in Section 012500 "Substitution Procedures" for substitutions for convenience.

C. Visual Matching Specification: Where Specifications require the phrase "match Architect's sample," provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 012500 "Substitution Procedures" for proposal of product.

D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or a similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01 61 00
HAZARDOUS MATERIALS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Articles and portions of articles of the General Conditions and Supplementary Conditions not amended, supplemented or superseded by these General Requirements (Division 1) shall remain in effect.

1.02 SECTION INCLUDES

A. Documentation of exclusion of Hazardous Materials from the Work, including Asbestos Containing Materials (ACM's) and lead in conjunction with potable water system.

B. Related Sections:

1. Section 01 30 00 - Submittals
2. Section 01 60 00 - Materials and Equipment
3. Section 01 70 00 - Project Close-Out

1.03 REQUIREMENTS

A. As a condition of Final Payment, the Contractor shall submit to the Architect a notarized statement certifying that all materials used in the construction of this Project contain less than 0.10% by weight of asbestos and for which it can be demonstrated that, under reasonably foreseeable job site conditions, will not release asbestos fibers in excess of 0.1 fibers per cubic centimeter. Certification letter shall be dated, shall reference this specific Project, and shall be signed by not less than two (2) officers of the construction company. If the Architect has inadvertently specified an ACM not meeting this condition for use on this Work, it shall be the sole responsibility of the Contractor to discover and to bring to the attention of the Architect any such conflict in the intent of the Contract Documents.

1. The manner of resolution of such a conflict shall be handled as either a Field Order or as a Change Order, as proves appropriate and fair in the sole judgment of the Architect, whose opinion on this matter shall be final.
2. Accreditation by the State of Texas or by EPA shall be required of the inspector representing the Contractor on this matter.

B. The Contractor's statement required by this Section shall specifically warrant against the installation of any of the following during the course of Work.

1. Any friable ACM;
2. Any friable suspected ACM;
3. Any nonfriable ACM that is newly friable; and/or
4. Any thermal system insulation ACM.

C. The Contractor's statement required by this Section shall include the following information.

1. Name of accredited inspector.
2. Signature of accredited inspector.
3. Date of the inspection performed for this purpose.

D. Contractor shall submit to the Architect a letter addressed to the Owner certifying that all materials used in conjunction with potable water systems contain no lead. Certification

letter shall be dated, shall reference this specific project, and shall be signed by not less than two (2) officers of the construction company.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

— END OF SECTION —

SECTION 01 70 00
PROJECT CLOSEOUT

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Articles and portions of articles of the General Conditions and Supplementary Conditions not amended, supplemented or superseded by these General Requirements (Division 1) shall remain in effect.

1.02 SECTION INCLUDES

A. Representative Rooms
B. Substantial Completion
C. Cleaning
D. Record Documents
E. Operation and Maintenance Manuals
F. Warranties
G. Spare Parts and Maintenance Materials
H. Letters of Compliance

1.03 REPRESENTATIVE ROOMS

A. Prior to the Substantial Completion process, the Contractor shall prepare several designated rooms for the Architect's inspection. At each stage of completion, the Contractor shall notify the Architect ten (10) days prior to the date of each inspection.

B. After the rooms are clean and finished to a state of Substantial Completion, the Contractor shall prepare a comprehensive list of items to be completed or corrected for these rooms.

C. First Inspection: The Architect, upon receipt of the list, shall review the representative rooms. When, in the opinion of the Architect, the areas are Substantially Complete, the Architect will verify and amend the Contractor's list for the representative rooms.

D. Second Inspection: When listed items have been completed or corrected, the Architect shall, upon request, inspect the representative rooms for a second time. If the Architect approves the level of completion in these rooms, the remaining Work or portion thereof shall be cleaned and finished to the standard established by the second inspection.

1.04 SUBSTANTIAL COMPLETION

A. After the Work has been cleaned and finished to a state of Substantial Completion, the Contractor shall prepare a list of items to be completed or corrected. The Contractor shall give the Architect ten (10) days' written notice of the date the Work, or a portion of the Work, will be ready for each inspection.

B. First Inspection: Upon receipt of the list of items to be completed or corrected, if the Architect agrees that the level of completeness meets the standards established during the Representative Rooms review, the Architect will inspect the project for compliance with the Contract Documents. The Architect shall verify and amend the Contractor's list. The Architect will designate specific items on the list which must be completed or corrected before the Certificate of Substantial Completion will be issued.

C. If, in the Architect's opinion, the Contractor is not making the proper effort to complete or correct listed items, the Architect may report same to the Owner who will have the option of engaging other contractors to complete the work of the project. Such contractors shall be employed as stipulated in the General Conditions.

D. Second Inspection: When items have been corrected to meet the requirements of Substantial Completion, the Contractor shall notify the Architect to perform a second Substantial Completion inspection. If, in the opinion of the Owner and Architect, the work has been performed in compliance with the Contract Documents, and if documents defined in this Section and in the General Conditions and Supplementary Conditions have been prepared and received by the Owner, the Architect will issue the Certificate of Substantial Completion with the remaining items to be completed or corrected for final acceptance on an attached list.

E. Items to be Completed or Corrected: The list of items attached to the Certificate of Substantial Completion is a guideline of items to be completed or corrected for final acceptance. Items may be added to the list after the date of Substantial Completion as a guide of items to review at final inspection and as a record of the warranty date for those items.

F. Third Inspection: The inspection for final acceptance will made by the Architect only after he has received written notification from the Contractor that he has completed all items on the “list of items to be completed or corrected”. If the items are not all complete the Architect will charge the Owner for all additional trips to the site after the third inspection. The Contractor will reimburse the Owner for this additional cost and the Contract amount will be reduced accordingly by Change Order.

1.05 CLEANING

A. Execute cleaning prior to representative rooms reviews, substantial completion reviews and final inspections.

B. Clean all interior and exterior surfaces exposed to view. Vacuum carpeted and soft surfaces.

C. Clean debris from entire site, roofs, gutters, downspouts, and drainage systems.

D. Clean or replace filters of operating equipment.

E. Remove waste and surplus materials, rubbish, and construction facilities from the site.

F. The Contractor shall turn the work over in clean condition inside and outside. Clean-up shall include removal of smudges, marks, stains, fingerprints, soil, dirt, paint, dust, lint, unnecessary labels, discoloration’s and other foreign materials. Clean all finished surfaces inside and outside of building, such as (but not limited to) walks, drives, curbs, paving, fences, grounds, walls and screens. Slick surfaces shall be left with a clear shine. Remove all temporary facilities and job sign, including surface materials and temporary roads and walkways.

1.06 RECORD DOCUMENTS

A. The Contractor shall provide to the Owner through the Architect complete record documents at the completion of the project which includes the Drawings and Project Manual.

B. The Contractor shall acquire and pay for a set of the Drawings at the beginning of the project to be kept in a safe, neat environment at the site or in the Contractor's office. The Record Set of Drawings and Project Manual will be labeled with neat bold letters “Record Drawings” and “Record Project Manuals”.

C. During the course of performing the work, the Contractor shall neatly record all changes to the Contract Documents on the Record Drawings and Record Project Manual, including but not limited to:

1. All Addendums issued by the Architect.
2. All Change Orders approved by the Owner.
3. All supplementary instructions issued by the Architect in the form of Supplemental Instructions.
4. All answers issued by the Architect in response to "Requests for Interpretation" (RFIs) issued by Contractor that change any Drawing or Specification.
5. All changes by the Contractor of piping routings, duct layouts, electrical equipment placement, circuiting, etc. that deviate from locations shown on the Contract Documents shall be carefully recorded. The Contractor shall show and label all valves with the corresponding tag number.
6. All underground utility locations shall be reviewed with the Architect and consequently recorded on the record drawings.
7. Information regarding final material selections, signage and material colors shall be indicated on Record Drawings.
8. Color Schedule shall be added to the Record Documents.

D. Prior to application for payment each month, the Architect may review the “Record Drawing Prints” and “Project Manual” to verify that any changes during that pay period have been properly recorded. The Contractor shall keep a log on the cover sheet of the Drawings and a log in the front of the Project Manual indicating which Addendums, Change Orders, Supplemental Instructions, RFIs, etc. have been posted, the date they were posted, and by whom they were posted. Failure to record the changes that have occurred in that pay period will be grounds to withhold payment until they are recorded.

E. As part of Project Close-out, the Record Documents shall be submitted to the Architect for review and approval after Substantial Completion and prior to final payment.

F. As part of Project Closeout, the “Record Documents”, both the Record Drawings and the “Record Project Manual” shall be submitted to the Architect for review at Substantial Completion and prior to final payment. The Architect will compare the “Record Documents” to his own Record Set. The Architect will return the “Record Documents” to the Contractor who will promptly correct any deficiencies or discrepancies to the satisfaction of the Architect and replot the appropriate sheets. The Contractor will then submit to the Architect a PDF version on CD and a paper copy of the Record Drawings and the “Record Project Manual”.

G. The Contractor shall show a reasonable sum of money for “Record Documents” as a line item on his schedule of values.

1.06 RECORD DOCUMENTS

A. The Contractor shall provide to the Architect Owner complete record documents at the completion of the project which includes the Drawings and Project Manual.

B. The Contractor shall acquire and pay for a set of the Dawings at the beginning of the project to be kept in a safe, neat environment at the site or in the Contractor's office. The drawings and Project Manual will be labeled with neat bold letters “Record Drawings” and “Record Project Manuals”.

C. During the course of performing the work, the Contractor shall neatly record all changes to the Contract Documents on the Record Drawings and Record Project Manual, including but not limited to:

1. All Addendums issued by the Architect.
2. All Change Orders approved by the Owner.
3. All supplementary instructions issued by the Architect in the form of Supplemental Instructions.

4. All answers issued by the Architect in response to "Requests for Interpretation" (RFIs) issued by Contractor that change any Drawing or Specification.
5. All changes by the Contractor of piping routings, duct layouts, electrical equipment placement, circuiting, etc. that deviate from locations shown on the Contract Documents shall be carefully recorded. The Contractor shall show and label all valves with the corresponding tag number.
6. All underground utility locations shall be reviewed with the Architect and consequently recorded on the record drawings.
7. Information regarding final material selections, signage and material colors shall be indicated on Record Drawings.
8. Color Schedule shall be added to the Record Documents.
9. Refer to Section 02811 and Division 15 and 16 for additional requirements.

D. Prior to application for payment each month, the Architect will review the “Record Drawing Prints” and “Project Manual” to verify that any changes during that pay period have been properly recorded. The Contractor shall keep a log on the cover sheet of the Drawings and a log in the front of the Project Manual indicating which Addendums, Change Orders, Supplemental Instructions, RFIs, etc. have been posted, the date they were posted, and by whom they were posted. Failure to record the changes that have occurred in that pay period will be grounds to withhold payment until they are recorded.

E. As part of Project Close-out, the Record Documents shall be submitted to the Architect for review and approval after Substantial Completion and prior to final payment.

F. As part of Project Closeout, the “Record Documents”, both plotted on paper, and the laminated “Record Project Manual” shall be submitted to the Architect for review after Substantial Completion and prior to final payment. The Architect will compare the “Record Documents” to his own Record Set. The Architect will return the “Record Documents” to the Contractor who will promptly correct any deficiencies or discrepancies to the satisfaction of the Architect and replot the appropriate sheets. The Contractor will then submit to the Architect all electronic Drawing files on a CD, the final record vellums, two (2) sets of black-on-white-bond paper copies, and one (1) marked up copy of the “Record Project Manual”.

H. The Contractor shall show a reasonable sum of money for “Record Documents” as a line item on his schedule of values.

1.07 WARRANTY AND OPERATION AND MAINTENANCE MANUALS

A. Furnish the Owner, through the Architect, two (2) copies of the following:

1. Operating instructions and maintenance recommendations for all work installed in the building, including that installed by General Contractor’s own forces and all work done by sub-contractors.

2. Warranty information for all work installed in the building, including that installed by General Contractor’s own forces and all work done by sub-contractors.

B. One copy of each shall be submitted to the Architect in advance for review. The Contractor shall make corrections required by the Architect and then submit the two (2) final copies of each. These final manuals shall be prepared and transmitted to the Architect for approval so they can be given to the Owner no less than ten (10) days prior to Substantial Completion.

C. Warranty and Operation and Maintenance Manuals shall be submitted in the following form and shall be neatly typewritten and complete.

1. General
   a. Series of 3-ring binders of the same size and color. They shall have a cover sheet with the name of the project, Contractor, and Architect. The cover shall also include the volume number and title. This information will be duplicated on the binding of the 3-ring binder.
   b. Each binder will have a Table of Contents in the front. It will cover information contained in all binders.
   c. Tabbed dividers will be provided between each section of information and shall be visible when project binder cover is opened. All information shall be organized by Specification Section Number with divider between each section. Information will be arranged in a neat, orderly fashion so it may be easily accessed when needed.
   d. Any information submitted which is printed and distributed for multiple products shall clearly indicate product utilized in the project and any and all options provided.

D. Warranty Manual shall include:

1. Division 1 information shall include the following:

   a. Project Directory.
   b. List of sub-contractors and suppliers with address and phone number and trade or material they provided.
   c. Copy of Certificate of Occupancy, inspection approvals from all authorities having jurisdiction and mechanical/electrical test reports. Copies of all inspection tags received over the course of the project shall be included.
   d. Copy of any Letters that may be required by specific specification section.
   e. Copy of Certificate of Substantial Completion and accompanying List of Items to be Corrected or Completed.
   f. Any affidavits required by Contract Documents.
   g. Copy of Texas Accessibility Standards Inspection Report.
   h. Comprehensive Attic Stock Letter – from contractor listing all items of attic stock provided to the Owner in specification section number order.
   i. Contractor’s Warranty Letter.

2. Division 2 through 49.

   a. Provide Warranty Letter from sub-contractors and any manufacturer’s warranty information for products utilized on project.

E. Operation and Maintenance Manual will include:

1. Division 1 information shall include the following:
   a. Project Directory
   b. List of sub-contractors and suppliers with address and phone number and trade or material they provided.

2. Division 2 through 49:
   a. Manufacturer’s Maintenance and Care instructions for each product utilized on project.
   b. Installation Instructions.
   c. Programming instructions.
   d. Sequence of Operation.
   e. Training letter and or recordings
   f. Contractor to complete the attached Plant Operations New Equipment Form which is bound in this Project Manual, page 01700-X for all new equipment provided in the project.

F. The work covered by these manuals will not be inspected for Substantial Completion until Owner has received the manuals described above.

G. Once Final Copies of Warranty and Operation and Maintenance Manuals have been approved by Architect, Contractor shall provide one (1) copy of Operation and Maintenance Manual and one (1) copy of Warranty Manual on CD in electronic PDF format, including all information, in the same form and order approved by Architect

1.08 WARRANTIES

A. Warranties and Certificates: Prior to the final payment, Contractor and subcontractors shall forward to the Architect, copies of warranties and certificates as required by the Contract Documents.

B. The Contractor and each subcontractor shall furnish written warranties, covering their respective work or equipment for a minimum period of one (1) year from the date of acceptance, against defects of material or workmanship at no cost to the Owner. Some work may be specified to be covered under a longer period of warranty. All warranties shall be signed by the responsible Contractor and subcontractor.

C. Wherever defects occur within the time limit of the warranty, if such unsatisfactory condition is due to the use of materials or workmanship which are inferior, defective or not in accordance with the Contract, the Contractor, whenever notified, shall immediately:

1. Place any such warranted work and/or materials in satisfactory condition in every particular.
2. Make good any work or materials, or the equipment or contents of said structures or grounds, which are damaged in fulfilling any such warranty at no cost to the Owner, and to the satisfaction of the Architect.

D. Should the Contractor fail to proceed promptly with the terms of this warranty, the Owner may have such work performed as he may reasonably deem necessary to fulfill the warranty, charging the cost thereof against the Contractor.

1.09 SPARE PARTS AND MAINTENANCE MATERIALS

A. Provide Products, spare parts, maintenance and extra materials in quantities specified in individual specification Sections.

B. Prepare a list of these items and include in the Owner’s Manual.

1.10 LETTERS OF COMPLIANCE

A. Provide letters as specified in the Project Manual.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

PLANT OPERATIONS
NEW EQUIPMENT FORM

Equipment Description:

Serial Number:

Model Number:

Manufacturer:

Building:

Location, where equipment is located:

If known, when was equipment installed:

Who did the initial start-up test:

If known, filter size:

If known, filter size:

If known, belt size:

Anything else that would be helpful on a PM:

10/8/2009

— END OF SECTION —

SECTION 017300

EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work, including, but not limited to, the following:
   1. Construction layout.
   2. Field engineering and surveying.
   3. Installation of the Work.
   4. Cutting and patching.
   5. Progress cleaning.
   6. Starting and adjusting.
   7. Protection of installed construction.
   8. Correction of the Work.

1.2 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of subsequent work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of subsequent work.

1.3 PREINSTALLATION MEETINGS

A. Cutting and Patching Conference: Conduct conference at Project site.
   1. Prior to commencing work requiring cutting and patching, review extent of cutting and patching anticipated and examine procedures for ensuring satisfactory result from cutting and patching work. Inform Architect of scheduled meeting. Require representatives of each entity directly concerned with cutting and patching to attend, including the following:
      a. Contractor's superintendent.
      b. Trade supervisor responsible for cutting operations.
      c. Trade supervisor(s) responsible for patching of each type of substrate.
      d. Mechanical, electrical, and utilities subcontractors' supervisors, to the extent each trade is affected by cutting and patching operations.
   2. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

B. Layout Conference: Conduct conference at Project site.
   1. Prior to establishing layout of new perimeter and structural column grid(s), review building location requirements. Review benchmark, control point, and layout and dimension requirements. Inform Architect of scheduled meeting. Require representatives of each entity directly concerned with Project layout to attend, including the following:
      a. Contractor's superintendent.
      b. Professional surveyor responsible for performing Project surveying and layout.
      c. Professional surveyor responsible for performing site survey serving as basis for Project design.
   2. Review meanings and intent of dimensions, notes, terms, graphic symbols, and other layout information indicated on the Drawings.
   3. Review requirements for including layouts on Shop Drawings and other submittals.
   4. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For land surveyor.

B. Certified Surveys: Submit two copies signed by land surveyor.

C. Certificates: Submit certificate signed by land surveyor, certifying that location and elevation of improvements comply with requirements.

D. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:
   1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
   2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
   3. Products: List products to be used for patching and firms or entities that will perform patching work.
   4. Dates: Indicate when cutting and patching will be performed.

E. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

1.5 CLOSEOUT SUBMITTALS

A. Final Property Survey: Submit 10 copies showing the Work performed and record survey data.

1.6 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
   1. Structural Elements: When cutting and patching structural elements, or when encountering the need for cutting and patching of elements whose structural function is not known, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
   2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
   3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
   4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

C. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of specified products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
   1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials. Use materials that are not considered hazardous.

C. 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 EXAMINATION

A. Existing Conditions: 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. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, gas service piping, and water-service piping; underground electrical services; and other utilities.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, 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. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:

1. Description of the Work, including Specification Section number and paragraph, and Drawing sheet number and detail, where applicable.
2. List of detrimental conditions, including substrates.
3. List of unacceptable installation tolerances.
4. Recommended corrections.

D. 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 local utility 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.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect in accordance with requirements in Section 013100 "Project Management and Coordination."

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 and existing conditions. If discrepancies are discovered, notify Architect promptly.

B. Engage a land surveyor experienced in laying out the Work, using the following accepted surveying practices:

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
2. Establish limits on use of Project site.
3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
4. Inform installers of lines and levels to which they must comply.
5. Check the location, level and plumb, of every major element as the Work progresses.
6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil

placement, utility slopes, and rim and invert elevations.

D. 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.

E. 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. Identification: Owner will identify existing benchmarks, control points, and property corners.

B. 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.
1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

C. 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.
2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

D. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.

E. Final Property Survey: Engage a land surveyor to prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.
1. Show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.
2. Recording: At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

3.5 INSTALLATION

A. 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.
4. Maintain minimum headroom clearance of 96 inches (2440 mm) in occupied spaces and 90 inches (2300 mm) in unoccupied spaces, unless otherwise indicated on Drawings.

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 satisfactory results as judged by Architect. 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 of type expected for Project.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on-site and placement in permanent locations.

F. Tools and Equipment: Select tools or equipment that minimize production of excessive noise levels.

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

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions with manufacturer.
   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.

I. Joints: Make joints of uniform width. Where joint locations in exposed Work are not indicated, arrange joints for the best visual effect, as judged by Architect. Fit exposed connections together to form hairline joints.

3.6 CUTTING AND PATCHING

A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
   1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

C. Temporary Support: Provide temporary support of Work to be cut.

D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

E. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
   1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
   2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
   3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
   4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
   5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
   6. Proceed with patching after construction operations requiring cutting are complete.

F. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as practicable, as judged by Architect. Provide materials and comply with installation requirements specified in other Sections, where applicable.
   1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
   2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
      a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
      b. Restore damaged pipe covering to its original condition.
   3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with

new materials, if necessary, to achieve uniform color and appearance.

a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch, corner to corner of wall and edge to edge of ceiling. Provide additional coats until patch blends with adjacent surfaces.

4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.

G. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 PROGRESS CLEANING

A. Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven days during normal weather or three 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.
a. Use containers intended for holding waste materials of type to be stored.
4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.

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: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 015000 "Temporary Facilities and Controls."

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 ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.8 STARTING AND ADJUSTING

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

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

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: Comply with qualification requirements in Section 014000 "Quality

Requirements."

3.9 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.

3.10 CORRECTION OF THE WORK

A. Repair or remove and replace damaged, defective, or nonconforming Work. Restore damaged substrates and finishes.
   1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

B. Repair Work previously completed and subsequently damaged during construction period. Repair to like-new condition.

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

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

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

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

END OF SECTION

SECTION 017700

CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for Contract closeout, including, but not limited to, the following:
   1. Substantial Completion procedures.
   2. Final completion procedures.
   3. Warranties.
   4. Final cleaning.

1.2 DEFINITIONS

A. List of Incomplete Items: Contractor-prepared list of items to be completed or corrected, prepared for the Architect's use prior to Architect's inspection, to determine if the Work is substantially complete.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of cleaning agent.

B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.4 CLOSEOUT SUBMITTALS

A. Certificates of Release: From authorities having jurisdiction.

B. Certificate of Insurance: For continuing coverage.

C. Field Report: For pest-control inspection.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items required by other Sections.

1.6 CLOSEOUT PROCEDURES

A. Prior to the Substantial Completion process, the Contractor shall prepare several designated rooms for the Architect's inspection. At each stage of completion, the Contractor shall notify the Architect ten (10) days prior to the date of each inspection.

B. After the rooms are clean and finished to a state of Substantial Completion, the Contractor shall prepare a comprehensive list of items to be completed or corrected for these rooms.

C. First Inspection: The Architect, upon receipt of the list, shall review the representative rooms. When, in the opinion of the Architect, the areas are Substantially Complete, the Architect will verify and amend the Contractor's list for the representative rooms.

D. Second Inspection: When listed items have been completed or corrected, the Architect shall, upon request, inspect the representative rooms for a second time. If the Architect approves the level of completion in these rooms, the remaining Work or portion thereof shall be cleaned and finished to the standard established by the second inspection.

1.7 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's "punch list"), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
   1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction, permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
   2. Submit closeout submittals specified in other Division 01 Sections, including Project Record Documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
   3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
   4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number.
      a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Owner's signature for receipt of submittals.
   5. Submit testing, adjusting, and balancing records.
   6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
   1. Advise Owner of pending insurance changeover requirements.
   2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
   3. Complete startup and testing of systems and equipment.
   4. Perform preventive maintenance on equipment used prior to Substantial Completion.
   5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 017900 "Demonstration and Training."
   6. Advise Owner of changeover in utility services.
   7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
   8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
   9. Complete final cleaning requirements.
   10. Touch up paint and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. 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. Request reinspection 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.

1.8 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining Final Completion, complete the following:
   1. Submit a final Application for Payment in accordance with Section 012900 "Payment Procedures."
   2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
   3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
   4. Submit pest-control final inspection report.
   5. Submit Final Completion photographic documentation.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. 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. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.9 LIST OF INCOMPLETE ITEMS

A. Organization 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, listed by room or space number.
   2. Organize items applying to each space by major element, including categories for ceilings, individual walls, floors, equipment, and building systems.
   3. Include the following information at the top of each page:
      a. Project name.
      b. Date.
      c. Name of Architect.
      d. Name of Contractor.
      e. Page number.
   4. Submit list of incomplete items in the following format:
      a. Web-Based Project Software Upload: Utilize software feature for creating and updating list of incomplete items (punch list).

1.10 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where warranties are indicated to commence on dates other than date of Substantial Completion, or when delay in submittal of warranties might limit Owner's rights under warranty.

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

C. Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
   1. Submit by uploading to web-based project software site.

D. 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: Perform 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 designated portion of Project:
      a. Clean Project site 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 not planted, mulched, or paved to a smooth, even-textured surface.
d. Remove tools, construction equipment, machinery, and surplus material from Project site.
e. Remove snow and ice to provide safe access to building.
f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
g. Remove debris and surface dust from limited-access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
h. Clean flooring, removing debris, dirt, and staining; clean according to manufacturer's recommendations.
i. Vacuum and mop concrete.
j. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
k. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
l. Remove labels that are not permanent.
m. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
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 ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.
q. Clean luminaires, lamps, globes, and reflectors to function with full efficiency.
r. Clean strainers.
s. Leave Project clean and ready for occupancy.

C. Pest Control: Comply with pest control requirements in Section 015000 "Temporary Facilities and Controls." Prepare written report.

D. Construction Waste Disposal: Comply with waste-disposal requirements in Section 015000 "Temporary Facilities and Controls."

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations required by Section 017300 "Execution" before requesting inspection for determination of Substantial Completion.

END OF SECTION

SECTION 017823

OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
   1. Operation and maintenance documentation directory manuals.
   2. Emergency manuals.
   3. Systems and equipment operation manuals.
   4. Systems and equipment maintenance manuals.
   5. Product maintenance manuals.

1.2 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.3 CLOSEOUT SUBMITTALS

A. Submit operation and maintenance manuals indicated. Provide content for each manual as specified in individual Specification Sections, and as reviewed and approved at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
   1. Architect will comment on whether content of operation and maintenance submittals is acceptable.
   2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Format: Submit operation and maintenance manuals in the following format:
   1. Submit by uploading to web-based project software site. Enable reviewer comments on draft submittals.

C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Architect will comment on whether general scope and content of manual are acceptable.

D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect will return copy with comments.
   1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.

E. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

1.4 FORMAT OF OPERATION AND MAINTENANCE MANUALS

A. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
   1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
   2. File Names and Bookmarks: Bookmark individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

1.5 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. Organization of Manuals: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

B. Title Page: 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 and contact information for Contractor.
6. Name and contact information for Architect.
7. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
8. 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.
1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

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

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

1.6 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY MANUAL

A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals. List items and their location to facilitate ready access to desired information. Include the following:
1. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
2. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
3. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

1.7 EMERGENCY MANUALS

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

C. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
1. Fire.
2. Flood.
3. Gas leak.
4. Water leak.
5. Power failure.
6. Water outage.
7. System, subsystem, or equipment failure.
8. Chemical release or spill.

D. 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.

E. Emergency Procedures: Include the following, as applicable:
1. Instructions on stopping.

2. Shutdown instructions for each type of emergency.
3. Operating instructions for conditions outside normal operating limits.
4. Required sequences for electric or electronic systems.
5. Special operating instructions and procedures.

1.8 SYSTEMS AND EQUIPMENT OPERATION MANUALS

A. Systems and Equipment Operation Manual: Assemble a complete set of data indicating operation of each system, subsystem, and piece of equipment not part of a system. Include information required for daily operation and management, operating standards, and routine and special operating procedures.
1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

B. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
2. Performance and design criteria if Contractor has delegated design responsibility.
3. Operating standards.
4. Operating procedures.
5. Operating logs.
6. Wiring diagrams.
7. Control diagrams.
8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

C. Descriptions: Include the following:
1. Product name and model number. Use designations for products indicated on Contract Documents.
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.

D. Operating Procedures: Include the following, as applicable:
1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

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

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

1.9 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Systems and Equipment Maintenance Manuals: Assemble a complete set of data indicating maintenance of each system, subsystem, and piece of equipment not part of a system. Include manufacturers' maintenance documentation, preventive maintenance procedures and frequency, repair procedures, wiring and systems diagrams, lists of spare parts, and warranty information.
1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

B. 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 warranties and bonds as described below.

C. 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 and drawing or schedule designation or identifier where applicable.

D. Manufacturers' Maintenance Documentation: Include the following information for each component part or piece of equipment:
   1. Standard maintenance instructions and bulletins; 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.
      a. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
   2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
   3. Identification and nomenclature of parts and components.
   4. List of items recommended to be stocked as spare parts.

E. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
   1. Test and inspection instructions.
   2. Troubleshooting guide.
   3. Precautions against improper maintenance.
   4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
   5. Aligning, adjusting, and checking instructions.
   6. Demonstration and training video recording, if available.

F. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
   1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
   2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

G. 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.

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

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

J. 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 maintenance manuals.

1.10 PRODUCT MAINTENANCE MANUALS

A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

B. 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.

C. 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 and drawing or schedule designation or identifier where applicable.

D. Product Information: Include the following, as applicable:
   1. Product name and model number.
   2. Manufacturer's name.
   3. Color, pattern, and texture.
   4. Material and chemical composition.
   5. Reordering information for specially manufactured products.

E. Maintenance Procedures: Include manufacturer's written recommendations and the following:
   1. Inspection procedures.
   2. Types of cleaning agents to be used and methods of cleaning.
   3. List of cleaning agents and methods of cleaning detrimental to product.
   4. Schedule for routine cleaning and maintenance.
   5. Repair instructions.

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

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

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 017839

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for Project Record Documents, including the following:
   1. Record Drawings.
   2. Record specifications.
   3. Record Product Data.
   4. Miscellaneous record submittals.

1.2 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:
   1. Number of Copies: Submit one set(s) of marked-up record prints.

B. Record Specifications: Submit annotated PDF electronic files of Project's Specifications, including addenda and Contract modifications.

C. Record Product Data: Submit annotated PDF electronic files and directories of each submittal.
   1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

D. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit annotated PDF electronic files and directories of each submittal.

E. Reports: Submit written report indicating items incorporated into Project Record Documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.

1.3 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
   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 provide information for preparation of corresponding 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. Accurately record information in an acceptable drawing technique.
      c. Record data as soon as possible after obtaining it.
      d. Record and check the markup before enclosing concealed installations.
      e. Cross-reference record prints to corresponding photographic documentation.
   2. Content: Types of items requiring marking include, but are not limited to, the following:
      a. Dimensional changes to Drawings.
      b. Revisions to details shown on Drawings.
      c. Depths of foundations.
      d. Locations and depths of underground utilities.
      e. Revisions to routing of piping and conduits.
      f. Revisions to electrical circuitry.
      g. Actual equipment locations.
      h. Duct size and routing.
      i. Locations of concealed internal utilities.
      j. Changes made by Change Order or Construction Change Directive.
      k. Changes made following Architect's written orders.
      l. Details not on the original Contract Drawings.
      m. Field records for variable and concealed conditions.

n. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
4. Mark record prints with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:
1. Format: Same digital data software program, version, and operating system as for the original Contract Drawings.
2. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
3. Refer instances of uncertainty to Architect for resolution.
4. Architect will furnish Contractor with one set of digital data files of the Contract Drawings for use in recording information.
a. See Section 013100 "Project Management and Coordination" for requirements related to use of Architect's digital data files.
b. Architect will provide data file layer information. Record markups in separate layers.

C. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize record prints into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Format: Annotated PDF electronic file with comment function enabled.
3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
4. Identification: As follows:
a. Project name.
b. Date.
c. Designation "PROJECT RECORD DRAWINGS."
d. Name of Architect.
e. Name of Contractor.

1.4 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. For each principal product, indicate whether Record Product Data has been submitted in operation and maintenance manuals instead of submitted as Record Product Data.
5. Note related Change Orders, Record Product Data, and Record Drawings where applicable.

B. Format: Submit record specifications as annotated PDF electronic file.

1.5 RECORD PRODUCT DATA

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

B. 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.

C. Format: Submit Record Product Data as annotated PDF electronic file.
1. Include Record Product Data directory organized by Specification Section number and title, electronically linked to each item of Record Product Data.

1.6 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.

B. Format: Submit miscellaneous record submittals as PDF electronic file.
1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

1.7 MAINTENANCE OF RECORD DOCUMENTS

A. Maintenance of Record Documents: Store Record Documents 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.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 017900

DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
   1. Instruction in operation and maintenance of systems, subsystems, and equipment.
   2. Demonstration and training video recordings.

1.2 INFORMATIONAL SUBMITTALS

A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
   1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.

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

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

1.3 CLOSEOUT SUBMITTALS

A. Demonstration and Training Video Recordings: Submit two copies within seven days of end of each training module.
   1. Identification: On each copy, provide an applied label with the following information:
      a. Name of Project.
      b. Name and address of videographer.
      c. Name of Architect.
      d. Name of Contractor.
      e. Date of video recording.
   2. Transcript: Prepared and bound in format matching operation and maintenance manuals. Mark appropriate identification on front and spine of each binder. Include a cover sheet with same label information as the corresponding video recording. Include name of Project and date of video recording on each page.
   3. At completion of training, submit complete training manual(s) for Owner's use prepared in same PDF file format required for operation and maintenance manuals specified in Section 017823 "Operation and Maintenance Data."

1.4 QUALITY ASSURANCE

A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.

B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 014000 "Quality Requirements," experienced in operation and maintenance procedures and training.

C. Videographer Qualifications: A professional videographer who is experienced photographing demonstration and training events similar to those required.

D. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to demonstration and training including, but not limited to, the following:
   1. Inspect and discuss locations and other facilities required for instruction.
   2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
   3. Review required content of instruction.

4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.5 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.

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

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

1.6 INSTRUCTION PROGRAM

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

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

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
   a. System, subsystem, and equipment descriptions.
   b. Performance and design criteria if Contractor is delegated design responsibility.
   c. Operating standards.
   d. Regulatory requirements.
   e. Equipment function.
   f. Operating characteristics.
   g. Limiting conditions.
   h. Performance curves.
2. Documentation: Review the following items in detail:
   a. Emergency manuals.
   b. Systems and equipment operation manuals.
   c. Systems and equipment maintenance manuals.
   d. Product maintenance manuals.
   e. Project Record Documents.
   f. Identification systems.
   g. Warranties and bonds.
   h. Maintenance service agreements and similar continuing commitments.
3. Emergencies: Include the following, as applicable:
   a. Instructions on meaning of warnings, trouble indications, and error messages.
   b. Instructions on stopping.
   c. Shutdown instructions for each type of emergency.
   d. Operating instructions for conditions outside of normal operating limits.
   e. Sequences for electric or electronic systems.
   f. Special operating instructions and procedures.
4. Operations: Include the following, as applicable:
   a. Startup procedures.
   b. Equipment or system break-in procedures.
   c. Routine and normal operating instructions.
   d. Regulation and control procedures.
   e. Control sequences.
   f. Safety procedures.
   g. Instructions on stopping.
   h. Normal shutdown instructions.
   i. Operating procedures for emergencies.
   j. Operating procedures for system, subsystem, or equipment failure.
   k. Seasonal and weekend operating instructions.
   l. Required sequences for electric or electronic systems.
   m. Special operating instructions and procedures.

5. Adjustments: Include the following:
   a. Alignments.
   b. Checking adjustments.
   c. Noise and vibration adjustments.
   d. Economy and efficiency adjustments.
6. Troubleshooting: Include the following:
   a. Diagnostic instructions.
   b. Test and inspection procedures.
7. Maintenance: Include the following:
   a. Inspection procedures.
   b. Types of cleaning agents to be used and methods of cleaning.
   c. List of cleaning agents and methods of cleaning detrimental to product.
   d. Procedures for routine cleaning.
   e. Procedures for preventive maintenance.
   f. Procedures for routine maintenance.
   g. Instruction on use of special tools.
8. Repairs: Include the following:
   a. Diagnosis instructions.
   b. Repair instructions.
   c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
   d. Instructions for identifying parts and components.
   e. Review of spare parts needed for operation and maintenance.

1.7 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 017823 "Operation and Maintenance Data."

B. Set up instructional equipment at instruction location.

1.8 INSTRUCTION

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

B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
   1. Owner will furnish an instructor to describe Owner's operational philosophy.
   2. Owner will furnish Contractor with names and positions of participants.

C. Scheduling: Provide instruction at mutually agreed-on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
   1. Schedule training with Owner, through Architect, with at least seven days' advance notice.

D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.

E. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of an oral performance-based test.

F. Cleanup: Collect used and leftover educational materials and remove from Project site. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

1.9 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

A. General: Engage a qualified commercial videographer to record demonstration and training video recordings. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.
   1. At beginning of each training module, record each chart containing learning objective and lesson outline.

B. Digital Video Recordings: Provide high-resolution, digital video in MPEG format, produced by a digital camera with minimum sensor resolution of 12 megapixels and capable of recording in full HD mode.
   1. Submit video recordings on CD-ROM or thumb drive.
   2. File Hierarchy: Organize folder structure and file locations according to Project Manual table of contents. Provide complete screen-based menu.
   3. File Names: Utilize file names based on name of equipment generally described in video segment, as identified in Project specifications.
   4. Contractor and Installer Contact File: Using appropriate software, create a file for inclusion on the equipment demonstration and training recording that describes the following for each Contractor involved on the Project, arranged according to Project Manual table of contents:
      a. Name of Contractor/Installer.
      b. Business address.
      c. Business phone number.
      d. Point of contact.
      e. Email address.

C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to adequately cover area of demonstration and training. Display continuous running time.
   1. Film training session(s) in segments not to exceed 15 minutes.
      a. Produce segments to present a single significant piece of equipment per segment.
      b. Organize segments with multiple pieces of equipment to follow order of Project Manual table of contents.
      c. Where a training session on a particular piece of equipment exceeds 15 minutes, stop filming and pause training session. Begin training session again upon commencement of new filming segment.

D. Light Levels: Verify light levels are adequate to properly light equipment. Verify equipment markings are clearly visible prior to recording.
   1. Furnish additional portable lighting as required.

E. Narration: Describe scenes on video recording by audio narration by microphone while video recording is recorded. Include description of items being viewed.

F. Transcript: Provide a transcript of the narration. Display images and running time captured from videotape opposite the corresponding narration segment.

G. Preproduced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

PART 2 - PRODUCTS

PART 3 - EXECUTION

END OF SECTION

SECTION 02 41 20
ASBESTOS ABATEMENT COORDINATION

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including "General Conditions and Supplementary General Conditions and Division I Specification Sections", apply to the work of this Section.

1.02 SUMMARY

A. The Contractor shall supply all labor, materials, and equipment necessary to coordinate the work of the Owner's separate Asbestos Abatement Contractor into the work of this contract.

B. The Owner has employed LCA Environmental, Inc. to prepare a survey of any Asbestos within the areas of the building affected by this project. LCA has prepared Asbestos Abatement bid documents and will be soliciting proposals for the abatement simultaneously with the bidding of this project. Furthermore, LCA will provide review of the work of the Owner's separate Asbestos Abatement Contractor.

C. The Owner intends to, but is not obligated to, contract with one of the following firms for the asbestos abatement:

1. Cactus Sytems, Inc.
   222 W. Exchange Ave.
   Suite 106
   Fort Worth, Texas 76106
   (817) 626-4791

2. HP EnviroVision
   460 South Belt Line Road
   Suite 430
   Irving, Texas 75060
   (972) 399-0068
   Contact: Mr. Thomas Palet

D. Pre-Construction Conference for Asbestos Abatement Coordination:

1. The Contractor shall attend a pre-construction conference prior to the start of work. The Conference will be conducted at the project site, or as otherwise directed by the Owner's Representative. The attendees will consist of the following:
   a. The Owner's Contractor.
   b. The Asbestos Abatement Contractor and his supervisory personnel who will provide on-site direction of the abatement activities.
   c. Representatives of Owner and/or its Representatives.
2. The purpose of this conference is to review responsibilities and personnel assignments, to coordinate the location of each containment, decontamination system, temporary facilities, and to establish a working understanding among the parties of the abatement that is to be performed.

1.03 SCHEDULE

A. The Contractor will be required to include the time for the asbestos abatement in the calendar days stated in his proposal.

B. The Contractor shall include in his construction schedule line items for the asbestos abatement work.

1.04 COORDINATION OF THE ASBESTOS ABATEMENT WORK

A. The Contractor will be responsible for the coordination of the asbestos abatement work into the work of this Project.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

— END OF SECTION —

SECTION 02 41 21
WORK AT EXISTING FACILITY

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Articles and portions of articles of the General Conditions and Supplementary Conditions not amended, supplemented or superseded by these General Requirements (Division 1) shall remain in effect.

1.02 SECTION INCLUDES

A. Furnish all labor, materials, services, equipment, and appliances required in connection with the work at existing facility as indicated on the Drawings and as described herein.

1. Scheduling of Construction
2. Control of Dust, Odor, Vibration and Other Contaminants/Irritants
3. Safety and Security
4. Existing Conditions
5. Use of Existing Facility

1.03 GENERAL

A. The Owner is obligated by Joint Commission to comply with Hospital Accreditation Standards. The Contractor will execute the work in a manner that will allow the Owner to comply with these standards.

B. The intent is to minimize the impact of the construction activities on the occupied areas of the building or impact on Owner's operations as outlined in Paragraph 1.04 below.

C. The Contractor shall meet with the Owner as needed to assure compliance with these standards. The Contractor shall provide labor, materials, equipment, etc. as required to assure compliance.

D. The Contractor will respond to the Owner immediately, and in any case within sixty (60) minutes, if the Owner determines that the Construction activity is impacting or potentially could impact patient care in occupied areas of the building. If the Contractor does not respond immediately, the Owner will perform corrective measures and the cost, as determined by the Owner, will be deducted from the Contract amount by Change Order.

E. The Owner’s designated representative for matters related to this Section will be determined at the Pre-Construction conference.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Temporary Partitions

1. Temporary Partitions: 1/2" Thick gypsum board attached to metal framing. Tape joints as required to maintain dustproof barrier.
2. Framing: Metal stud framing as required.
3. Doors: 1-3/4" Thick wood doors, in acceptable frames, to provide access as required. Provide hardware as appropriate to lock the construction area and coordinate with Owner’s existing keying system so they can have access to the

area after hours. Provide exit devices on doors in special conditions when necessary to maintain life safety. Doors must be gasketed and self-closing.

PART 3 – EXECUTION

3.01 SCHEDULING OF CONSTRUCTION

A. Existing facilities must function at all times during construction activities and the Contractor shall do whatever is necessary to assure continuous operation as outlined below.

B. The Owner will vacate the designated areas at the appropriate time. All other adjacent areas will remain occupied and must remain in operation.

C. The Owner reserves seven (7) days to vacate prior to commencement of each phase. The Contractor may resume work earlier if notified by the Owner that the moving process is complete.

D. Work Plan and Outage Request: All work that could impact the Owner's facilities and operation, including mechanical, plumbing, and electrical systems, must be scheduled with the Owner in order to minimize the impact on the Owner's facility and operations.

1. The Contractor shall submit a “Work Plan Approval Request” form for all work to be performed outside the designated construction area at least two (2) weeks in advance of the proposed portion of work. Refer to the form at the end of this Section.
2. The Contractor shall submit an “Outage Request” form at least two (2) weeks in advance of the proposed outage. Refer to the form at the end of this Section.
3. The Contractor shall research in detail each piece of work or system to be affected and present the proposed plan of accomplishing the “work” without impacting the Owner's facilities and operations to the Owner for review and approval along with the work plan or outage request.
4. The Contractor shall provide and install temporary wiring, lighting, ductwork, spot coolers, etc. as necessary to facilitate the continued operation of the facility and remove such temporary measures at the conclusion of the work.
5. The Contractor shall perform the work so that only a small area will be out of use at any one time and all work completed within any given small area before commencing with the next small area. The intent is to minimize the impact to the facility.
6. The Contractor will perform work at night or on weekends if necessary to allow the facility to continue to operate.

3.02 CONTROL OF DUST, ODOR, VIBRATION AND OTHER CONTAMINANTS / IRRITANTS

A. Whenever work occurs adjacent to the occupied areas, the work shall be separated from the occupied areas by means of temporary dustproof partitions. Dustproof partitions shall be constructed using materials listed under Part 2. Partitions shall be sealed to walls, floor, and extend to deck above. Temporary partitions at small satellite projects outside of the primary area may stop at ceiling and not extend to deck in cases when approved by the Owner in advance and only when conditions will still allow the control of dust, odor, etc.

B. All penetrations into the construction area must be sealed and windows closed.

C. The Contractor shall provide doors into the construction area through the temporary partition as required. The locations must be approved by the Owner based on access to the area. If an existing door is used as an entrance to the construction area, the

Contractor will equip the door with appropriate hardware. If the existing door is scheduled to remain it shall be returned to its original condition. Entrances through temporary partitions into the construction area must have dampened walk-off mats both inside and outside of the construction area.

D. Debris removal from the construction area must be completed by a predetermined route at times approved by the Owner. Debris shall be transported in clean carts with tight-fitting covers. The Contractor shall follow each cart to assure the route is perpetually clean.

E. Construction activities required in occupied areas outside of the primary construction area must be performed with a mini-enclosure around the work area.

F. Any dust tracked into occupied areas must be removed immediately. Cleaning in occupied areas shall be done with HEPA-filtered vacuum cleaners.

G. All supply air ductwork to the construction area, and all return air and exhaust air ductwork from the construction area shall be identified, and addressed as required, to prevent dust, odors, fumes and other contaminants from being transferred to occupied areas of the facility. All supply air outlets and all return air inlets and/or ducts serving the construction area should be capped. The respective air handling unit(s) and return air fan(s) should be re-balanced (re-sheaved) as required to maintain existing airflows to all other areas served by the same unit(s), without adversely affecting the intended space pressure differentials. Where it is not feasible to cap all the existing air outlets and inlets due to the duct system layout or unit minimum airflow requirements, the flow of air will be allowed into and out of the construction area, provided all openings are protected with HEPA filters. In any case, it is imperative that all areas adjacent to the construction areas have space pressure differentials maintained. All supply air, outside air, return air and exhaust ducts running through the construction area shall be sealed air-tight.

H. Negative pressure must be maintained within the project site at all times by the use of negative air fan units fitted with high-efficiency particulate air (HEPA) filters. Alarms must be in use so that any loss of negative pressure to the construction site can be known immediately to those outside the site. In small remote areas of work negative air pressure may not be required, but the intent to eliminate the spread of dust and other contaminates including odors must be met at all times in all locations. Normal filters may be used in lieu of HEPA filters only where the discharge will be directly to the exterior of the building and does not create a nuisance as judged by the Owner.

I. The Contractor shall take all precautions necessary to ensure that no dust, odors, fumes or other contaminants generated as a result of any construction activities are drawn into any air intakes into occupied areas.

J. The Contractor shall take all precautions necessary to minimize the noise and vibration that is generated on the jobsite and could potentially be transferred to the building structure or to other spaces within the facility. All work hours must be pre-approved by the Owner so that he can confirm that activities in surrounding adjacent areas will not be adversely affected by the anticipated noise and/or vibration that may be generated by the planned construction activities.

K. Provide temporary 2 x 4 lay-in ceilings in areas as required to provide the Owner a suitable temporary access to areas as necessary for the Owner to continue to operate. Temporary ceilings shall include lighting and air conditioning.

L. If the Contractor releases and/or allows water, sewage, objectionable substances, contaminants or other such materials into the facility, the Contractor shall respond immediately to clean up and restore the area to its previous condition. When required by the Owner, the Contractor shall employ, at the Contractor’s expense, a third-party agency

selected by the Owner to inspect the area to determine if it is acceptable to reoccupy. The third party agency will be determined at the Pre-Construction Conference.

M. Contractor shall remove temporary finishes and other temporary construction after its temporary use, as required to install the permanent finish or other work.

3.03 SAFETY OF OWNER'S OCCUPANTS AND SECURITY

A. Maintain exits as required by all Authorities Having Jurisdiction. Exit paths, including corridor, stairs, etc., shall be left fully functional with temporary safeguards, lighting, etc. at end of each work day. If stairs are part of the work, only one (1) flight of stairs shall be worked on at a time.

B. Provide signs at construction entrances, and other locations as necessary to protect occupants of the facility. Wording shall be approved by the Owner in advance.

C. Comply with Owner's requirements for use of open flame. Obtain a burn permit or other approval from the Owner before using any open flame.

D. Contractor shall have a copy of the MSDS sheet for each product used. It shall be kept readily available for review with Owner if needed. The Contractor shall provide a copy of each MSDS sheet to the Owner for review and approval before bringing the product on site. No products should be used that could cause an objectionable odor as determined by the Owner.

E. No use of tobacco products is allowed in the building. The use of tobacco products will be allowed outside the building, within a designated location.

F. No consumption of alcoholic beverages or illegal drugs of any kind will be permitted on premises. Any person caught must be removed from the premises.

3.04 EXISTING CONDITIONS

A. It is the intent of the contract documents that the Contractor inspects the job site prior to bidding and be familiar with all existing conditions. COST OF THE WORK REQUIRED TO ACCOMMODATE THE EXISTING CONDITIONS SHALL BE INCLUDED IN THE BID PROPOSAL.

B. Protect existing building as required from damage, moisture and dust. Provide materials as required to protect existing building finishes and equipment. At completion of Contract, existing building items shall be restored, by means of repair or replacement, to previous condition or better.

C. Any item whether shown on the drawings or not, that must remain in order for the facility to operate properly, but whose location is in conflict with the new construction, shall be removed, relocated and reconnected as necessary to accommodate the new work at no additional cost. Furthermore, the Contractor shall be responsible to research and determine the appropriate way and method to relocate and reconnect the item. The Contractor shall submit his solution to the Architect for approval. The Contractor alone will be responsible for the cost of the work shown, indicated or reasonably inferred as being necessary to produce the indicated results.

D. Coordinate the work with the Mechanical and Electrical Divisions of the specifications. Determine which items and equipment are to remain, which are to be relocated and/or removed, and perform all work consistent with the indicated final result.

E. Prior to construction, inspect all areas adjacent to the proposed "work" including route to construction area; prepare a photographic record of existing damaged conditions and

their locations, including, but not limited to: walls, ceilings, floors, doors, etc. As part of the work, all items shall be restored to its previous condition or damaged items not represented by photographic record that are within the areas effected by construction, shall be repaired to "like new" condition.

F. Existing floors shall be leveled in accordance with Section 03 54 00 - Self Leveling Underlayment.

G. In existing rooms and spaces where work is being done, the existing finishes adjacent to the new or remodeled work shall be cleaned or refinished to "like new" condition to the nearest inside corner or as indicated on Drawings.

H. In locations where demolition and or remodel work is being done, unfinished surfaces resulting from such work shall be refinished to match existing adjacent finishes.

3.05 USE OF EXISTING FACILITY

A. All material shall be stored within the building in the area under construction or in a designated storage area on site.

B. All construction traffic, deliveries, etc. shall be limited to routes and times allowed by the Owner in order to reduce the affect of the construction on the operation of the facility.

C. Contractors will be required to wear an Owner-approved badge when working at the facility in areas outside of the designated construction area.

D. Toilets: The Contractor shall NOT use the existing toilets in the facility.

E. Elevators: The Contractor shall NOT use the elevators in the existing facility.

JPS HEALTH NETWORK
ARTIS ICONO BI-PLANE REPLACEMENT

WORK PLAN APPROVAL REQUEST

REQUEST NO._____

Date submitted to Owner:_____ Approval needed by date:_____

Proposed date and time to start work Date:_____Time:_____A.M. / P.M.

Duration of work:_____

Location of work (room names, numbers, wing no., etc. or attach drawing if necessary):

_____

_____

Area affected (room names, numbers, wing no., etc. or attach drawing if necessary):

_____

_____

Utility system affected (attach "Outage Request" form):

_____

_____

Description of work:_____

_____

_____

_____

_____

Potential impact to facilities and operation:_____

_____

_____

_____

_____

Proposed plan to accomplishing the work and not impact facilities and operations:

_____

_____

_____

_____

General Contractor Signature:_____ Date:_____

Owner Comments: ☐ Approved ☐ Approved as Noted ☐ Correct and Resubmit

_____

_____

_____

_____

Owner's signature:_____ Date:_____

JPS HEALTH NETWORK
ARTIS ICONO BI-PLANE REPLACEMENT

OUTAGE REQUEST

REQUEST NO._____

Date submitted to Owner:_____ Approval needed by date:_____

Proposed date and time to start work Date:_____Time:_____A.M. / P.M.

Duration of work:_____

Utility system affected:_____

Location of work (room names, numbers, wing no., etc. or attach drawing if necessary):

Area affected (room names, numbers, wing no., etc. or attach drawing if necessary):

Description of work:_____

Potential impact to facilities and operation:_____

Proposed plan to accomplishing the work and not impact facilities and operations:

General Contractor signature:_____ Date:_____

Owner Comments: ☐ Approved ☐ Approved as Noted ☐ Correct and Resubmit

Owner's signature:_____ Date:_____

— END OF SECTION —

SECTION 035416

HYDRAULIC CEMENT UNDERLAYMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Polymer-modified, self-leveling, hydraulic cement underlayment for application below interior floor coverings.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include plans indicating substrates, locations, and average depths of underlayment based on survey of substrate conditions.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Installer who is approved by manufacturer for application of underlayment products required for this Project.

1.4 FIELD CONDITIONS

A. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature, ventilation, ambient temperature and humidity, and other conditions affecting underlayment performance.
1. Place hydraulic cement underlayments only when ambient temperature and temperature of substrates are between 50 and 80 deg F (10 and 27 deg C).

PART 2 - PRODUCTS

2.1 HYDRAULIC CEMENT UNDERLAYMENTS

A. Hydraulic Cement Underlayment: Polymer-modified, self-leveling, hydraulic cement product that can be applied in minimum uniform thickness of 1/4 inch (6 mm) and that can be feathered at edges to match adjacent floor elevations.
1. Products Subject to compliance with requirements, provide by the following:
a. ARDEX; K-15 Self-Leveling Underlayment Concrete.

B. Cement Binder: ASTM C 150/C 150M, portland cement, or hydraulic or blended hydraulic cement as defined by ASTM C 219.

C. Compressive Strength: Not less than 4000 psi (27.6 MPa) at 28 days when tested according to ASTM C 109/C 109M.

D. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3 to 6 mm); or coarse sand as recommended by underlayment manufacturer.
1. Provide aggregate when recommended in writing by underlayment manufacturer for underlayment thickness required.

E. Water: Potable and at a temperature of not more than 70 deg F (21 deg C).

F. Primer: Product of underlayment manufacturer recommended in writing for substrate, conditions, and application indicated.

G. Surface Sealer: Designed to reduce porosity as recommended by manufacturer for type of floor covering to be applied to underlayment.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for conditions affecting performance of the Work.

B. Proceed with application only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Prepare and clean substrate according to manufacturer's written instructions.
   1. Treat nonmoving substrate cracks according to manufacturer's written instructions to prevent cracks from telegraphing (reflecting) through underlayment.
   2. Fill substrate voids to prevent underlayment from leaking.

B. Concrete Substrates: Mechanically remove, according to manufacturer's written instructions, laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants that might impair underlayment bond.

   1. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft. (18.6 sq. m), and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
      a. Anhydrous Calcium Chloride Test, ASTM F1869: Proceed with installation only after substrates do not exceed a maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/100 sq. m) in 24 hours.
      b. Relative Humidity Test: Using in situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 85 percent relative humidity level measurement, or as recommended by hydraulic cement underlayment manufacturer.

C. Adhesion Tests: After substrate preparation, test substrate for adhesion with underlayment according to manufacturer's written instructions.

3.3 APPLICATION

A. General: Mix and apply underlayment components according to manufacturer's written instructions.
   1. Close areas to traffic during underlayment application and for time period after application recommended in writing by manufacturer.
   2. Coordinate application of components to provide optimum adhesion to substrate and between coats.
   3. At substrate expansion, isolation, and other moving joints, allow joint of same width to continue through underlayment.

B. Apply underlayment to produce uniform, level surface.
   1. Apply a final layer without aggregate to product surface.
   2. Feather edges to match adjacent floor elevations.

C. Cure underlayment according to manufacturer's written instructions. Prevent contamination during application and curing processes.

D. Do not install floor coverings over underlayment until after time period recommended in writing by underlayment manufacturer.

E. Apply surface sealer at rate recommended by manufacturer.

F. Remove and replace underlayment areas that evidence lack of bond with substrate, including areas that emit a "hollow" sound when tapped.

3.4 PROTECTION

A. Protect underlayment from concentrated and rolling loads for remainder of construction period.

END OF SECTION

SECTION 06 10 00
ROUGH CARPENTRY

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

A. Rough carpentry work including sheathing, wall and roof framing, built up structural truss members, roof sheathing, blocking, shoring, roof curbs, and wood furring.

B. Related Sections:

1. Section 06 61 16 - Solid Polymer Fabrication
2. Division 8 - Openings
3. Division 10 - Specialties

1.03 INDUSTRY STANDARDS

A. References: Some products and execution are specified in this Section by reference to published specifications or standards of the following with respective abbreviations used:

1. American Plywood Association (APA)
2. American Wood Preservers Association (AWPA)
3. American Society for Testing and Materials (ASTM)
4. Southern Pine Inspection Bureau (SPIB)
5. Underwriters Laboratories (UL)
6. U.S. Product Standards (USPS)
7. Western Wood Products Association (WWPA)

1.04 COORDINATION

A. Coordinate locating of nailers, furring, grounds and similar supports for other trades so that installation of finish work may be properly executed. Before starting installation of supports, carefully check Drawings to ensure locating of supports.

1.05 PRODUCT HANDLING

A. Protect materials from weather when delivered to site, immediately place under cover and adequately protect from weather. Do not store or erect kiln-dried material in wet or damp portions of building or in areas where masonry, drywall or similar work is to be executed until such work has been completed and has become reasonably dry.

PART 2 – PRODUCTS

2.01 LUMBER MATERIALS

A. Moisture Content of Lumber: Maximum moisture content for lumber products shall be 19% on air dried stock, and 15% maximum on kiln-dried (KD) stock.

B. Dressing Lumber: Surface lumber four sides (S4S) unless specified otherwise for particular products.

C. Framing Lumber: Various materials for framing shall be of sizes shown and shall conform to Grading Standards of SPIB and WWPA.

D. Species and Grades of Lumber:

1. For structural wood framing see notes on Drawings.
2. Furring, Ground, Blocking, Wood Bucks and Wood Nailers: SPIB grade marked No. 2 Grade Southern Yellow Pine, S4S, or may be WWPA grade marked Standard Grade Douglas Fir.

2.02 SHEET MATERIALS

A. Plywood Materials: Softwood plywood shall conform to requirements of U.S. Product Standard PS 1-74, Construction and Industrial. All plywood used for sheathing, used as back up to roofing membrane or which has any edge or surface permanently exposed to weather shall be "exterior" type. Plywood shall be APA-rated sheathing of American manufacture.

2.03 LUMBER TREATMENT

A. Fire-Retardant Treated Wood Products: Fire-retardant treated wood products shall be pressure-impregnated with fire-retardant chemicals and shall bear the Underwriter's Laboratories label indicating a flame spread not exceeding 25 with no evidence of significant progressive combustion when tested for thirty (30) minutes in accordance with "Methods of Testing for Surface Burning Characteristics of Building Materials" ASTM E84.

1. Moisture Content: Materials shall be dried after treatment to an average moisture content of 19%.
2. Locations: All lumber and plywood used for blocking, nailers, bracing, etc. above ceilings, within a part of interior partitions, and framing.

2.04 ROUGH HARDWARE

A. Anchors, bolts, screws and spikes shall be of proper types and sizes to support the work and to draw the members into place and hold them securely. Bolt heads and nuts bearing on wood shall have standard washers.

B. Explosive or powder-driven fasteners may be used.

C. Metal fasteners to secure wood grounds and blocking to masonry and concrete shall be of the type best suited to the conditions and spaced not more than 16" o.c. Wood plugs and nailing blocks are not acceptable.

D. Nails shall be of the sizes and types intended for the particular use.

E. Rough hardware exposed to the weather or embedded in exterior masonry and concrete walls or slabs shall be galvanized.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Framing:

1. General:

a. Members shall be properly framed, closely fitted, accurately set and rigidly secured in place. Shims shall not be used for leveling on wood or metal bearings, but slate or tile shims may be used for leveling on masonry and concrete.
b. All framing shall be closely fitted, accurately set to the required lines and levels, and securely spiked and bolted in place. Provide all bracing required to obtain rigid structures.

B. Wood Grounds:

1. Location: Install permanent and temporary wood grounds as indicated for proper execution of work of all trades. Remove temporary grounds when they are no longer required.
2. Fastening: Except as otherwise required for special locations, form grounds of kiln-dried southern yellow pine, 1-1/2" wide and of thickness to properly align related items of work. Securely fasten grounds into position by means of powder-actuated fasteners, annealed wire, nails, brads, bolts or other methods that will provide maximum results.
3. Coordination: Coordinate locations, sizes and fastenings of grounds with work of other trades. When grounds are to provide backing for fastening of grilles, fixture, louvers and similar items of work, exercise care in installation of grounds to provide for correct installation of those other items.

C. Wood Blocking:

1. Location: Install all wood blocking as required to provide anchorage for other materials. Form to shapes and sizes as indicated or as may be required to accomplish particular installation. Form blocking of sizes shown or of minimum 2" thick material.
2. Steel: Blocking in conjunction with steel work shall be bolted to steel with bolts, washers and nuts, countersunk where required.
3. Anchorage: Wedge, anchor and align blocking to provide rigid and secure installation of both blocking and other related work. Where bolt sizes and spacing are not specifically called out, use not less than 3/8" bolts at 48" o.c. staggered.
4. Roofing: Form blocking in conjunction with roofs to shapes as detailed. Anchor with countersunk bolts, washers and nuts.

D. Wood Furring:

1. Location: Provide all free-standing, suspended, solid-anchored and other types of wood furring as required for receipt, alignment and complete installation of various types of finishing materials.
2. Spacing: Space furring members as required. Provide headers and other nailing members within furring framework. Install with faces true to line and plumb, using wood shims as necessary.
3. Fastening: Install furring into position by whatever means required to provide secure, rigid and correct installation. When necessary, use nailing plugs, powder-actuated anchors, toggle bolts, washers and nuts, nails and similar fastenings.

E. Shoring: Provide shoring where required and brace and maintain it until permanent construction is completed.

3.02 CLEANING

A. At completion of work, remove all excess materials and all debris resulting from operations of work of this Section. Leave entire work in neat, clean condition.

— END OF SECTION —

SECTION 078413

PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Penetrations in fire-resistance-rated walls.
2. Penetrations in horizontal assemblies.
3. Penetrations in smoke barriers.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.
1. Engineering Judgments: Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping system, submit illustration, with modifications marked, approved by penetration firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Obtain approval of authorities having jurisdiction prior to submittal.

1.4 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each penetration firestopping system, for tests performed by a qualified testing agency.

1.5 CLOSEOUT SUBMITTALS

A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by firestopping manufacturer.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not install penetration firestopping system when ambient or substrate temperatures are outside limits permitted by penetration firestopping system manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.

B. Install and cure penetration firestopping materials per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.8 COORDINATION

A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping systems can be installed according to specified firestopping system design.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping systems.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics:
1. Perform penetration firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.

2. Test per testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:
    a. Penetration firestopping systems shall bear classification marking of a qualified testing agency.
        1) UL in its "Fire Resistance Directory."
        2) Intertek Group in its "Directory of Listed Building Products."
        3) FM Global in its "Building Materials Approval Guide."

2.2 PENETRATION FIRESTOPPING SYSTEMS

A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any. Provide firestopping, including products specified in Section 078443 "Joint Firestopping," by same manufacturer as products of this section regardless of installer. All firestopping products within this section shall be of one manufacturer.
    1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
        a. Specified Technologies Inc.
        b. 3M Fire Protection Products.
        c. A/D Fire Protection Systems Inc.
        d. GCP Applied Technologies Inc.
        e. Hilti, Inc.
        f. Johns Manville.
        g. Nelson Firestop Products.
        h. RectorSeal Corporation.
        i. Tremco, Inc.; Tremco Fire Protection Systems Group.
        j. USG Corporation.

B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).
    1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.

C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).
    1. F-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated.
    2. T-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.
    3. W-Rating: Provide penetration firestopping systems showing no evidence of water leakage when tested according to UL 1479.

D. Penetrations in Smoke Barriers: Penetration firestopping systems with ratings determined per UL 1479, based on testing at a positive pressure differential of 0.30-inch wg (74.7 Pa).
    1. L-Rating: Not exceeding 5.0 cfm/sq. ft. (0.025 cu. m/s per sq. m) of penetration opening at and no more than 50-cfm (0.024-cu. m/s) cumulative total for any 100 sq. ft. (9.3 sq. m) at both ambient and elevated temperatures.

E. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E 84.

F. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.
    1. Permanent forming/damming/backing materials.
    2. Substrate primers.
    3. Collars.
    4. Steel sleeves.

2.3 FILL MATERIALS

A. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.

B. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

C. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced intumescent elastomeric sheet bonded to galvanized-steel sheet.

D. Intumescent Putties: Nonhardening, water-resistant, intumescent putties containing no solvents or inorganic fibers.

E. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

F. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.

G. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.

H. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

I. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants.

2.4 MIXING

A. Penetration Firestopping Materials: For those products requiring mixing before application, comply with penetration firestopping system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.

B. Ensure penetration firestopping products are coordinated and compatible with one another, with the substrates forming openings, and with penetrating items.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning: Before installing penetration firestopping systems, clean out openings immediately to comply with manufacturer's written instructions and with the following requirements:
   1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping materials.
   2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping materials. Remove loose particles remaining from cleaning operation.
   3. Remove laitance and form-release agents from concrete.

B. Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

3.3 INSTALLATION

A. General: Install penetration firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications.

B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings.
   1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.

C. Install fill materials by proven techniques to produce the following results:
   1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.
   2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
   3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

A. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches (76 mm) high and with minimum 0.375-inch (9.5-mm) strokes.
   1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 feet (4.57 m) from end of wall and at intervals not exceeding 30 feet (9.14 m).

B. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of penetration firestopping system edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
   1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
   2. Contractor's name, address, and phone number.
   3. Designation of applicable testing and inspecting agency.
   4. Date of installation.
   5. Manufacturer's name.
   6. Installer's name.

3.5 FIELD QUALITY CONTROL

A. Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E 2174.

B. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.

C. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTION

A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping system manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping material and install new materials to produce systems complying with specified requirements.

3.7 PENETRATION FIRESTOPPING SCHEDULE

A. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHEZ.

B. Where Intertek ETL SEMKO-listed systems are indicated, they refer to design numbers in Intertek ETL SEMKO's "Directory of Listed Building Products" under "Firestop Systems."

C. Where FM Global-approved systems are indicated, they refer to design numbers listed in FM Global's "Building Materials Approval Guide" under "Wall and Floor Penetration Fire Stops."

D. Refer to Drawings.

END OF SECTION

SECTION 078443

JOINT FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Joints in or between fire-resistance-rated constructions.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Product Schedule: For each joint firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing agency.
1. Engineering Judgments: Where Project conditions require modification to a qualified testing agency's illustration for a particular joint firestopping system condition, submit illustration, with modifications marked, approved by joint firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

1.4 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each joint firestopping system, for tests performed by a qualified testing agency.

1.5 CLOSEOUT SUBMITTALS

A. Installer Certificates: From Installer indicating that joint firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by firestopping manufacturer.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not install joint firestopping systems when ambient or substrate temperatures are outside limits permitted by joint firestopping system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Install and cure joint firestopping systems per manufacturer's written instructions using natural means of ventilation or, where this is inadequate, forced-air circulation.

1.8 COORDINATION

A. Coordinate construction of joints to ensure that joint firestopping systems can be installed according to specified firestopping system design.

B. Coordinate sizing of joints to accommodate joint firestopping systems.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics:
1. Perform joint firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
2. Test per testing standards referenced in "Joint Firestopping Systems" Article. Provide rated systems complying with the following requirements:
a. Joint firestopping systems shall bear classification marking of a qualified testing agency.
1) UL in its "Fire Resistance Directory."
2) Intertek Group in its "Directory of Listed Building Products."

2.2 JOINT FIRESTOPPING SYSTEMS

A. Joint Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which joint firestopping systems are installed. Joint firestopping systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases. Provide firestopping, including products specified in Section 078413 "Penetration Firestopping," by same manufacturer as products of this section regardless of installer. All firestopping products within this section shall be of one manufacturer.

B. Joints in or between Fire-Resistance-Rated Construction: Provide joint firestopping systems with ratings determined per ASTM E 1966 or UL 2079.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Specified Technologies Inc.
      b. Hilti, Inc.
      c. RectorSeal Corporation.
      d. Tremco, Inc.; Tremco Fire Protection Systems Group
      e. USG Corporation.
   2. Basis-of-Design Product: Specified Technologies, Inc.; SpecSeal SIL300.

C. Exposed Joint Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

D. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install elastomeric fill materials and to maintain ratings required. Use only components specified by joint firestopping system manufacturer and approved by the qualified testing agency for conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning: Before installing fire-resistive joint systems, clean joints immediately to comply with fire-resistive joint system manufacturer's written instructions and the following requirements:
   1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of elastomeric fill materials or compromise fire-resistive rating.
   2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with elastomeric fill materials. Remove loose particles remaining from cleaning operation.
   3. Remove laitance and form-release agents from concrete.

B. Prime substrates where recommended in writing by joint firestopping system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

3.3 INSTALLATION

A. General: Install fire-resistive joint systems to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming materials and other accessories of types required to support elastomeric fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
   1. After installing elastomeric fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint system.

C. Install elastomeric fill materials for fire-resistive joint systems by proven techniques to produce the following results:
   1. Elastomeric fill voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.

2. Apply elastomeric fill materials so they contact and adhere to substrates formed by joints.
3. For elastomeric fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

A. Joint Identification: Identify joint firestopping systems with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of joint edge so labels are visible to anyone seeking to remove or joint firestopping system. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
1. The words "Warning - Joint Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Designation of applicable testing agency.
4. Date of installation.
5. Manufacturer's name.
6. Installer's name.

3.5 FIELD QUALITY CONTROL

A. Inspecting Agency: Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E 2393.

B. Where deficiencies are found or joint firestopping systems are damaged or removed due to testing, repair or replace joint firestopping systems so they comply with requirements.

C. Proceed with enclosing joint firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTION

A. Clean off excess elastomeric fill materials adjacent to joints as the Work progresses by methods and with cleaning materials that are approved in writing by joint firestopping system manufacturers and that do not damage materials in which joints occur.

B. Provide final protection and maintain conditions during and after installation that ensure joint firestopping systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated fire-resistive joint systems immediately and install new materials to produce fire-resistive joint systems complying with specified requirements.

3.7 JOINT FIRESTOPPING SYSTEM SCHEDULE

A. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHBN or Category XHDG.

3.8 FIRE-RESISTIVE JOINT SYSTEM SCHEDULE

A. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHBN or Category XHDG.

A. Where Intertek ETL SEMKO-listed systems are indicated, they refer to design numbers in Intertek ETL SEMKO's "Directory of Listed Building Products" under product category Firestop Systems.

3.9 FIRE-RESISTIVE JOINT SYSTEMS

A. Refer to Drawings.

END OF SECTION

SECTION 079200 JOINT

SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Urethane joint sealants.
2. Mildew-resistant joint sealants.
3. Butyl joint sealants.
4. Latex joint sealants.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each joint-sealant product.

B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

C. Joint-Sealant Schedule: Include the following information:
1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

1.4 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each kind of joint sealant, for tests performed by manufacturer and witnessed by a qualified testing agency.

B. Preconstruction Laboratory Test Reports: From sealant manufacturer, indicating the following:
1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
2. Interpretation of test results and written recommendations for primers and substrate preparation are needed for adhesion.

C. Preconstruction Field-Adhesion-Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified in "Preconstruction Testing" Article.

D. Field-Adhesion-Test Reports: For each sealant application tested.

E. Sample Warranties: For special warranties.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

B. Product Testing: Test joint sealants using a qualified testing agency.
1. Testing Agency Qualifications: Qualified according to ASTM C 1021 to conduct the testing indicated.

C. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

1.6 PRECONSTRUCTION TESTING

A. Preconstruction Laboratory Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.
1. Adhesion Testing: Use ASTM C 794 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.

2. Compatibility Testing: Use ASTM C 1087 to determine sealant compatibility when in contact with glazing and gasket materials.
3. Stain Testing: Use ASTM C 1248 to determine stain potential of sealant when in contact with masonry substrates.
4. Submit manufacturer's recommended number of pieces of each type of material, including joint substrates, joint-sealant backings, and miscellaneous materials.
5. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
6. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures, including use of specially formulated primers.
7. Testing will not be required if joint-sealant manufacturers submit data that are based on previous testing, not older than 24 months, of sealant products for adhesion to, staining of, and compatibility with joint substrates and other materials matching those submitted.

B. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates as follows:
1. Locate test joints where indicated on Project or, if not indicated, as directed by Architect.
2. Conduct field tests for each kind of sealant and joint substrate.
3. Notify Architect seven days in advance of dates and times when test joints will be erected.
4. Arrange for tests to take place with joint-sealant manufacturer's technical representative present.
   a. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1.1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
      1) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
5. Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
6. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

1.7 FIELD CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:
1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F (5 deg C).
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.8 WARRANTY

A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
1. Warranty Period: Two years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
1. Warranty Period: From date of Substantial Completion.
   a. Urethane Sealants: 10 years.
   b. Silicone Sealants: 20 years.

C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
2. Disintegration of joint substrates from causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 URETHANE JOINT SEALANTS

A. Urethane, S, NS, 25, NT: Single-component, nonsag, nontraffic-use, plus 25 percent and minus 25 percent movement capability, urethane joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.
1. Products: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. BASF Aktiengesellschaft; MasterSeal TX1 (VOC: 36 g/L).
b. C.R. Laurence Co, Inc.; CRL M64 (VOC: 9 g/L).
c. Pecora Corporation; DynaTrol I-XL (VOC: <100 g/L).
d. Sika Corporation Industry Products; Sikaflex Textured Sealant.
e. Tremco Inc., Tremco CS&W Group; Vulkem 116 (49 g/L).

B. Urethane, S, P, 25, T, NT: Single-component, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type S, Grade P, Class 25, Uses T and NT.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. BASF Aktiengesellschaft; MasterSeal SL 1 (VOC: 104 g/L).
b. Pecora Corporation; Urexpan NR-201 (VOC: <50 g/L).
c. Sika Corporation Industry Products; Sikaflex 1c SL (VOC: 40 g/L).

2.3 MILDEW-RESISTANT JOINT SEALANTS

A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.

B. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. C.R. Laurence Co, Inc.; CRL 33S Silicone (VOC: 30 g/L).
b. Dow Corning Corporation; 786 Silicone Sealant (VOC: 33 g/L).
c. GE Construction Sealants; Momentive Performance Materials Inc.; SCS1700 Sanitary (VOC: 20 g/L).
d. Pecora Corporation; Pecora 898NST (VOC: 50 g/L).
e. Sika Corporation Industry Products; Sikasil GP (VOC: 29 g/L).
f. Soudal Accumetric; Silirub RTV1 (VOC: 30 g/L).
g. Tremco Inc., Tremco CS&W Group; Tremsil 200 (VOC: 1 g/L).

2.4 BUTYL JOINT SEALANTS

A. Butyl-Rubber-Based Joint Sealants: ASTM C 1311.
1. Products: Subject to compliance with requirements, provide one of the following:
a. C.R. Laurence Co, Inc.; CRL 777 Butyl Rubber (VOC: 240 g/L)..
b. Pecora Corporation; BC-158 (VOC: <250 g/L).
c. Tremco Inc., Tremco CS&W Group; Butyl Sealant (VOC: 232 g/L)

2.5 LATEX JOINT SEALANTS

A. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. C.R. Laurence Co, Inc.; CRL 321 (VOC: 22 g/L).
b. Pecora Corporation; AC-20 (VOC: 20 g/L).
c. Tremco Incorporated; Tremflex 834 (VOC: 31 g/L).

2.6 JOINT-SEALANT BACKING

A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Alcot Plastics Ltd.; Alcot Plastics Backer Rod.
      b. BASF Aktiengesellschaft; MasterSeal 920.

B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.7 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
   1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
   2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
      a. Concrete.
      b. Masonry.
   3. Remove laitance and form-release agents from concrete.
   4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
      a. Metal.
      b. Glass.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
   1. Do not leave gaps between ends of sealant backings.
   2. Do not stretch, twist, puncture, or tear sealant backings.
   3. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
   1. Place sealants so they directly contact and fully wet joint substrates.
   2. Completely fill recesses in each joint configuration.
   3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
   1. Remove excess sealant from surfaces adjacent to joints.
   2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
   3. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.
   4. Provide flush joint profile at locations indicated on Drawings according to Figure 8B in ASTM C 1193.
   5. Provide recessed joint configuration of recess depth and at locations indicated on Drawings according to Figure 8C in ASTM C 1193.
      a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

3.4 FIELD QUALITY CONTROL

A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
   1. Extent of Testing: Test completed and cured sealant joints as follows:
      a. Perform 10tests for the first 1000 feet (300 m)of joint length for each kind of sealant and joint substrate.
      b. Perform one test for each 1000 feet (300 m)of joint length thereafter or one test per each floor per elevation.
   2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
      a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
   3. Inspect tested joints and report on the following:
      a. Whether sealants filled joint cavities and are free of voids.
      b. Whether sealant dimensions and configurations comply with specified requirements.
      c. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion complies with sealant manufacturer's field-adhesion hand-pull test criteria.
   4. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant material, sealant configuration, and sealant dimensions.
   5. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.

B. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or

noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.5 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.6 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.7 JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application: Interior joints in horizontal traffic surfaces.
   1. Joint Locations:
      a. Isolation joints in cast-in-place concrete slabs.
      b. Other joints as indicated on Drawings.
   2. Joint Sealant: Urethane, S, P, 25, T, NT.
   3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

B. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces.
   1. Joint Locations:
      a. Control and expansion joints on exposed interior surfaces of exterior walls.
      b. Vertical joints on exposed surfaces of walls and partitions.
      c. Other joints as indicated on Drawings.
   2. Joint Sealant: Urethane, S, NS, 25, NT.
   3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

C. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces not subject to significant movement.
   1. Joint Locations:
      a. Control joints on exposed interior surfaces of exterior walls.
      b. Perimeter joints between interior wall surfaces and frames of interior doors and windows.
      c. Other joints as indicated on Drawings.
   2. Joint Sealant: Acrylic latex.
   3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

D. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.
   1. Joint Locations:
      a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
      b. Other joints as indicated on Drawings.
   2. Joint Sealant: Silicone, mildew resistant, acid curing, S, NS, 25, NT.
   3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

E. Joint-Sealant Application: Concealed mastics.
   1. Joint Locations:
      a. Aluminum thresholds.
      b. Sill plates.
      c. Other joints as indicated on Drawings.
   2. Joint Sealant: Butyl-rubber based.
   3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION

SECTION 079219

ACOUSTICAL JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes acoustical joint sealants.

1.2 ACTION SUBMITTALS

A. Product Data: For each acoustical joint sealant.

B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

C. Acoustical-Joint-Sealant Schedule: Include the following information:
1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

1.3 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each kind of acoustical joint sealant, for tests performed by manufacturer and witnessed by a qualified testing agency.

B. Sample Warranties: For special warranties.

1.4 COORDINATION

A. Ensure joint sealant products are coordinated and compatible with the non-metallic plumbing piping system and the fire sprinkler piping system.

1.5 WARRANTY

A. Special Installer's Warranty: Installer agrees to repair or replace acoustical joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
1. Warranty Period: Two years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer agrees to furnish acoustical joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Provide acoustical joint-sealant products that effectively reduce airborne sound transmission through perimeter joints and openings in building construction, as demonstrated by testing representative assemblies according to ASTM E 90.

2.2 ACOUSTICAL JOINT SEALANTS

A. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex acoustical sealant complying with ASTM C 834.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
a. Franklin International; Titebond GREENchoice Professional Acoustical Smoke & Sound Sealant.
b. GE Construction Sealants; Momentive Performance Materials Inc.
c. Grabber Construction Products.
d. Hilti, Inc.
e. OSI Sealants; Henkel Corporation.
f. Pecora Corporation; Pecora AIS-919 Acoustical and Insulation Latex Sealant.
g. United States Gypsum Company; SHEETROCK Acoustical Sealant

2. Colors of Exposed Acoustical Joint Sealants: As selected by Architect from manufacturer's full range of colors.

2.3 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by acoustical-joint-sealant manufacturer where required for adhesion of sealant to joint substrates.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive acoustical joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing acoustical joint sealants to comply with joint-sealant manufacturer's written instructions.

B. Joint Priming: Prime joint substrates where recommended by acoustical-joint-sealant manufacturer. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF ACOUSTICAL JOINT SEALANTS

A. Comply with acoustical joint-sealant manufacturer's written installation instructions unless more stringent requirements apply.

B. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical joint sealant. Install acoustical joint sealants at both faces of partitions, at perimeters, and through penetrations. Comply with ASTM C 919, ASTM C 1193, and manufacturer's written recommendations for closing off sound-flanking paths around or through assemblies, including sealing partitions to underside of floor slabs above acoustical ceilings.

C. Acoustical Ceiling Areas: Apply acoustical joint sealant at perimeter edge moldings of acoustical ceiling areas in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.

3.4 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of acoustical joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect acoustical joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated acoustical joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION

SECTION 083113 ACCESS

DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes access doors and frames for walls and ceilings.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Product Schedule: For access doors and frames.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing and inspecting agency.
   1. Fire-Rated Door Inspector: Submit documentation of compliance with NFPA 80, section 5.2.3.1.

1.4 CLOSEOUT SUBMITTALS

A. Record Documents: For fire-rated doors, list of applicable room name and number in which access door is located.

1.5 QUALITY ASSURANCE

A. Fire-Rated Door Inspector Qualifications: Inspector for field quality control inspections of fire-rated door assemblies shall meet the qualifications set forth in NFPA 80, section 5.2.3.1 and the following:
   1. Door and Hardware Institute Fire and Egress Door Assembly Inspector (FDAI) certification.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Rated Access Doors and Frames: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, according to NFPA 252 or UL 10B.

2.2 ACCESS DOORS AND FRAMES

A. Flush Access Doors with Concealed Flanges:
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Acudor Products, Inc.
      b. Babcock-Davis.
      c. J. L. Industries; a division of Activar Construction Products Group.
      d. Karp Associates, Inc.
      e. Larsen's Manufacturing Company.
      f. Milcor Inc.
      g. Nystrom, Inc.
   2. Description: Face of door flush with frame; with concealed flange for gypsum board installation and concealed hinge.
   3. Locations: Wall and ceiling.
   4. Door Size: As indicated.
   5. Uncoated Steel Sheet for Door: Nominal 0.060 inch (1.52 mm), 16 gage, factory primed.
   6. Stainless Steel Sheet for Door: Nominal 0.062 inch (1.59 mm), 16 gage, ASTM A480/A480M No. 4 finish.
   7. Frame Material: Same material and thickness as door.
   8. Latch and Lock: Cam latch, screwdriver operated.

B. Recessed Access Doors with Concealed Flanges :
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Acudor Products, Inc.
      b. Babcock-Davis.

c. Bauco Access Panel Solutions Inc.
d. J. L. Industries; a division of Activar Construction Products Group.
e. Karp Associates, Inc.
f. Larsen's Manufacturing Company.
g. Milcor Inc.
h. Nystrom, Inc.

2. Description: Door face recessed 5/8 inch (16 mm) for gypsum board infill; with concealed flange for gypsum board installation and concealed hinge.
3. Locations: Ceiling.
4. Door Size: As indicated.
5. Uncoated Steel Sheet for Door: Nominal 0.060 inch (1.52 mm), 16 gage, factory primed.
6. Stainless Steel Sheet for Door: Nominal 0.062 inch (1.59 mm), 16 gage, ASTM A480/A480M No. 4 finish.
7. Latch and Lock: Cam latch, screwdriver operated.

2.3 FIRE-RATED ACCESS DOORS AND FRAMES

A. Fire-Rated, Flush Access Doors with Concealed Flanges:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. Acudor Products, Inc.
b. Babcock-Davis.
c. J. L. Industries; a division of Activar Construction Products Group.
d. Karp Associates, Inc.
e. Larsen's Manufacturing Company.
f. Milcor Inc.
g. Nystrom, Inc.
2. Description: Door face flush with frame, with a core of mineral-fiber insulation enclosed in sheet metal; with concealed flange for gypsum board installation, self-closing door, and concealed hinge.
3. Locations: Wall.
4. Door Size: As indicated.
5. Fire-Resistance Rating: Not less than that of adjacent construction.
6. Temperature-Rise Rating: 450 deg F (250 deg C) at the end of 30 minutes.
7. Uncoated Steel Sheet for Door: Nominal 0.036 inch (0.91 mm), 20 gage, factory primed.
8. Frame Material: Same material, thickness, and finish as door.
9. Latch and Lock: Self-closing, self-latching door hardware, operated by knurled-knob.

2.4 MATERIALS

A. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

B. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A879/A879M, with cold-rolled steel sheet substrate complying with ASTM A1008/A1008M, Commercial Steel (CS), exposed.

C. Stainless Steel Sheet, Strip, Plate, and Flat Bars: ASTM A666, Type 304. Remove tool and die marks and stretch lines, or blend into finish.

D. Frame Anchors: Same material as door face.

E. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A153/A153M or ASTM F2329.

2.5 FABRICATION

A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.

B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish mounting holes, attachment devices and fasteners of type required to secure access doors to types of supports indicated.
1. For concealed flanges with drywall bead, provide edge trim for gypsum panels securely attached to perimeter of frames.

D. Latch and Lock Hardware:
1. Quantity: Furnish number of latches and locks required to hold doors tightly closed.

2.6 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Painted Finishes: Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
   1. Factory Primed: Apply manufacturer's standard, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.

E. Stainless Steel Finishes:
   1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
   2. Polished Finish: ASTM A480/A480M No. 4 finish. Grind and polish surfaces to produce uniform finish, free of cross scratches.
   3. Run grain of directional finishes with long dimension of each piece.
      a. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's written instructions for installing access doors and frames.

3.3 FIELD QUALITY CONTROL

A. Inspection Agency: Owner will engage a qualified inspector to perform inspections and to furnish reports to Architect.

B. Inspections:
   1. Fire-Rated Door Inspections: Inspect each fire-rated access door in accordance with NFPA 80, section 5.2.

C. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.

D. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.

E. Prepare and submit separate inspection report for each fire-rated access door indicating compliance with each item listed in NFPA 80.

3.4 ADJUSTING

A. Adjust doors and hardware, after installation, for proper operation.

3.5 SCHEDULE

A. Provide access doors where indicated and in the following locations:
   1. Access required by code.
   2. Access required for servicing operable, adjustable, or resettable fire suppression, plumbing, mechanical, electrical, life safety, security, and communication systems.

B. Sizes: Provide the following unless noted otherwise:
   1. Ceilings and Soffits: 24 inches by 24 inches minimum.
   2. Toilet Rooms: 12 inches by 12 inches minimum at each fixture chase wall.

C. Materials:
   1. Uncoated steel sheet unless noted otherwise.

2. Stainless Steel:
   a. Toilet rooms, locker rooms, operating rooms, sterile rooms.
   b. Walls scheduled to receive tile finish, epoxy paint, or FRP panels.

END OF SECTION

SECTION 092216

NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Non-load-bearing steel framing systems for interior partitions.
2. Suspension systems for interior ceilings and soffits.
3. Grid suspension systems for gypsum board ceilings.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Span and Deflection Design Criteria: Provide height to load deflection charts showing studs supplied conform to deflection limit scheduled and allowed per ASTM C 754.
1. Mark on chart(s) showing all major partitions scheduled conformance with criteria.
2. Submit manufacturer's certification of stud size, thickness, and spacing complying with performance requirements and selections made by architect are correct for application shown.

1.3 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of code-compliance certification for studs and tracks.

B. Evaluation Reports: For firestop tracks post-installed anchors and power-actuated fasteners, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

1.4 QUALITY ASSURANCE

A. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Certified Steel Stud Association, the Steel Framing Industry Association or the Steel Stud Manufacturers Association.

1.5 SEQUENCING

A. Coordinate placement of concealed internal wall reinforcement, such as backing plates, for items to be attached to metal support systems.

B. Coordinate installation of ceiling and soffit suspension systems with installation of overhead structural assemblies to ensure that inserts and other provisions for anchorage to building structure have been installed to receive ceiling hangers that will develop their full strength and at spacing required to support ceilings.

C. Furnish concrete inserts, and other devices indicated, to other trades for installation well in advance of time needed for coordination with other construction.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling as required by AISI S202 "Code of Standard Practice."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Design framing systems in accordance with AISI S220, "North American Specification for the Design of Cold-Formed Steel Framing - Nonstructural Members" and ASTM C645, Section 10, unless otherwise indicated.

B. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 119 by an independent testing agency.

C. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated on Drawings, according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

D. Horizontal Deflection:
1. Minimum Base-Metal Thickness: 25 gage unless indicated otherwise on Drawings or below.
2. Interior Metal Stud/Gypsum Board Assemblies, Typical Locations: Withstand lateral loading (air pressure) of 5 psf with deflection limit not more than L/240 of partition height.
3. Interior Metal Stud/Gypsum Board Assemblies at Atriums, Lobbies, Service Corridors, Exit Corridors, Elevator Lobbies, Vertical Shafts, and walls receiving plaster veneer: Withstand lateral loading (air pressure) of 7.5 psf with deflection limit not more than L/360 of partition height.
4. Interior Metal Stud/Gypsum Board Assemblies at Locations with Ceramic Tile or Other Hard Surface Finishes: Withstand typical lateral loading (air pressure) with deflection limit not more than L/360 of partition height, minimum 22 gage studs at 16 inches on center.
5. Where wall mounted equipment, woodwork, and casework items are indicated or elsewhere as shown on Drawings, provide minimum 16 gage studs.
6. Where bumper or guard rails are indicated, provide minimum 0.033 inches (22-gage) thick studs.
7. At jambs of openings provide two minimum 20 gage studs.
8. Ceilings: At ceilings using mold-mildew resistant gypsum framing to be 16 inches o.c. for 5/8 inch gypsum.
9. Refer to Division 05 for stud framing which is exposed to wind loads and for studs carrying heavy vertical loads, such as, cement plaster, manufactured stone masonry, stone tile thicker than 3/4 inch, etc.

2.2 FRAMING SYSTEMS

A. Framing Members, General: Comply with AISI S220 and ASTM C645 for conditions indicated.
1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
2. Protective Coating: Comply with AISI S220 and ASTM A 653/A 653M, G40 (Z120) or coating with equivalent corrosion resistance of ASTM A653/A653M, G40 (Z120), hot-dip galvanized unless otherwise indicated. ,
   a. Coating roll-formed from steel complying with mechanical and chemical requirements of ASTM A1003 with a zinc-based coating.
   b. Coatings shall demonstrate equivalent corrosion resistance with an evaluation report acceptable to authorities having jurisdiction

B. Studs and Tracks: AISI S220 and ASTM C 645, Section 10
1. Steel Studs and Tracks:
   a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      1) CEMCO.
      2) ClarkDietrich
      3) Custom Stud.
      4) MarinoWARE.
      5) MBA Building Supplies.
      6) MRI Steel Framing, LLC.
      7) Phillips Manufacturing Co.
      8) SCAFCO Steel Stud Company.
      9) Steel Network, Inc. (The).
      10) Telling Industries
   b. Minimum Base-Metal Thickness: As required by performance requirements for horizontal deflection .
   c. Depth: As indicated on Drawings .

C. Slip-Type Head Joints: Where studs are continuous from floor to structure above, provide one of the following:
1. Deflection Track: Steel sheet top track manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
   a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      1) Blazeframe Industries.
      2) CEMCO; California Expanded Metal Products Co.

3) ClarkDietrich Building Systems.
4) MarinoWARE.
5) MBA Building Supplies.
6) Metal-Lite.
7) Perfect Wall, Inc.
8) SCAFCO Steel Stud Company.
9) Steel Network, Inc. (The).
10) Telling Industries.

D. Firestop Tracks: Top track manufactured to allow partition heads to expand and contract with movement of structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. Blazeframe Industries.
b. CEMCO; California Expanded Metal Products Co.
c. ClarkDietrich Building Systems.
d. Fire Trak Corp.
e. MarinoWARE.
f. Metal-Lite.
g. Perfect Wall, Inc.
h. SCAFCO Steel Stud Company.
i. Steel Network, Inc. (The).

E. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. ClarkDietrich Building Systems.
b. MarinoWARE.
c. MRI Steel Framing, LLC.
d. SCAFCO Steel Stud Company.
2. Minimum Base-Metal Thickness: 0.0179 inch (0.455 mm).

F. Cold-Rolled Channel Bridging: Steel, 0.0538-inch (1.367-mm) minimum base-metal thickness, with minimum 1/2-inch- (13-mm-) wide flanges.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. ClarkDietrich Building Systems.
b. MarinoWARE.
c. MRI Steel Framing, LLC.
d. SCAFCO Steel Stud Company
2. Depth: As indicated on Drawings.
3. Clip Angle: Not less than 1-1/2 by 1-1/2 inches (38 by 38 mm), 0.068-inch- (1.72-mm-) thick, galvanized steel.

G. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. ClarkDietrich Building Systems.
b. MarinoWARE.
c. MRI Steel Framing, LLC.
d. SCAFCO Steel Stud Company
2. Minimum Base-Metal Thickness: 0.0179 inch (0.455 mm).
3. Depth: 7/8 inch (22.2 mm).

H. Resilient Furring Channels: 1/2-inch- (13-mm-) deep, steel sheet members designed to reduce sound transmission.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. ClarkDietrich Building Systems.
b. MarinoWARE.
c. MRI Steel Framing, LLC.
d. SCAFCO Steel Stud Company
2. Configuration: Asymmetrical.

I. Cold-Rolled Furring Channels: 0.053-inch (1.34-mm) uncoated-steel thickness, with minimum 1/2-inch- (13-mm-) wide flanges.
   1. Depth: 3/4 inch (19 mm).
   2. Furring Brackets: Adjustable, corrugated-edge-type steel sheet with minimum uncoated-steel thickness of 0.0329 inch (0.8 mm).
   3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- (1.59-mm-) diameter wire, or double strand of 0.048-inch- (1.21-mm-) diameter wire

J. Partial Wall Framing Connection: Connector designed to support out-of-plane loading of cantilevered partial wall systems that are unsupported at the top track.
   1. ClarkDietrich Pony Wall or comparable product.
   2. Minimum Base-Steel Thickness: 0.0966 inch (2.45 mm).

2.3 SUSPENSION SYSTEMS

A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- (1.59-mm-) diameter wire, or double strand of 0.048-inch- (1.21-mm-) diameter wire.

B. Hanger Attachments to Concrete:
   1. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01 as appropriate for the substrate.
      a. Uses: Securing hangers to structure.
      b. Type: Torque-controlled, expansion anchor.
      c. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, unless otherwise indicated.
      d. Material for Exterior or Interior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).
   2. Power-Actuated Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

C. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch (4.12 mm) in diameter.

D. Flat Hangers: Steel sheet, 1 by 3/16 inch (25 by 5 mm) by length indicated.

E. Carrying Channels (Main Runners): Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.0538 inch (1.367 mm) and minimum 1/2-inch- (13-mm-) wide flanges.
   1. Depth: As indicated on Drawings.

F. Furring Channels (Furring Members):
   1. Cold-Rolled Channels: 0.0538-inch (1.367-mm) uncoated-steel thickness, with minimum 1/2-inch- (13-mm-) wide flanges, 3/4 inch (19 mm) deep.
   2. Steel Studs and Tracks: AISI S220 and ASTM C 645.
      a. Minimum Base-Metal Thickness: 0.0179 inch (0.455 mm).
      b. Depth: 1-5/8 inches (41 mm).
   3. Embossed Steel Studs and Tracks: ASTM C 645.
      a. Minimum Base-Metal Thickness: As indicated on Drawings.
      b. Depth: As indicated on Drawings.
   4. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch (22 mm) deep.
      a. Minimum Base-Metal Thickness: 0.0179 inch (0.455 mm).
   5. Resilient Furring Channels: 1/2-inch- (13-mm-) deep members designed to reduce sound transmission.
      a. Configuration: Asymmetrical.

G. Grid Suspension System for Gypsum Board Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Armstrong World Industries, Inc.
      b. ROCKWOOL International (formerly Chicago Metallic Corporation).
      c. United States Gypsum Company.

2.4 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards.
   1. Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

B. Isolation Strip at Exterior Walls: Provide one of the following:
   1. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch (3.2 mm) thick, in width to suit steel stud size.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.
   1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

B. Coordination with Sprayed Fire-Resistive Materials:
   1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling tracks to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches (610 mm) o.c.
   2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that are required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

3.3 INSTALLATION, GENERAL

A. Installation Standard: ASTM C 754.
   1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.

B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.

C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

D. Install bracing at terminations in assemblies.

E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.4 INSTALLING FRAMED ASSEMBLIES

A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
   1. Single-Layer Application: As required by horizontal deflection performance requirements unless otherwise indicated.
   2. Multilayer Application: As required by horizontal deflection performance requirements unless otherwise indicated.
   3. Tile Backing Panels: As required by horizontal deflection performance requirements unless otherwise indicated.

B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

C. Install studs so flanges within framing system point in same direction.

D. Install tracks at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.
   1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.

2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure to jamb studs.
   a. Install two studs at each jamb unless otherwise indicated.
   b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch (13-mm) clearance from jamb stud to allow for installation of control joint in finished assembly.
   c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
   a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.
5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
6. Curved Partitions:
   a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
   b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs 6 inches (150 mm) o.c.

E. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch (3 mm) from the plane formed by faces of adjacent framing.

3.5 INSTALLING CEILING SUSPENSION SYSTEMS

A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
1. Hangers: 48 inches (1219 mm) o.c.
2. Carrying Channels (Main Runners): 48 inches (1219 mm) o.c.
3. Furring Channels (Furring Members): 16 inches (406 mm) o.c.

B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

C. Suspend hangers from building structure as follows:
1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
   a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
   a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
5. Do not attach hangers to steel roof deck.
6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
8. Do not connect or suspend steel framing from ducts, pipes, or conduit.

D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.

E. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

F. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet (3 mm in

3.6 m) measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION

SECTION 092900

GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Interior gypsum board.

B. Related Requirements:
1. Section 134900 "Radiation Protection" for lead-lined gypsum board.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 QUALITY ASSURANCE

A. Mockups: Build mockups of at least 100 sq. ft. (9 sq. m) in surface area to demonstrate aesthetic effects and to set quality standards for materials and execution.
1. Build mockups for the following:
a. Each level of gypsum board finish indicated for use in exposed locations.
2. Apply or install final decoration indicated, including painting and wallcoverings, on exposed surfaces for review of mockups.
3. Simulate finished lighting conditions for review of mockups.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.4 DELIVERY, STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.5 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.

B. Do not install panels that are wet, moisture damaged, and mold damaged.
1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

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 agency.

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. Gypsum Board, Type X: ASTM C 1396/C 1396M.
1. Products: Subject to compliance with requirements, provide one of the following:
a. American Gypsum; 5/8 inch FireBloc Type X Gypsum Wallboard.
b. CertainTeed Corporation; Type X Gypsum Board.
c. Continental Building Products, LLC; Firecheck Type X.
d. Georgia-Pacific Building Products; ToughRock Fireguard X Gypsum Board.
e. National Gypsum Company; Gold Bond Brand Fire-Shield Gypsum Board.
f. PABCO Gypsum; Flame Curb Type X.
g. United States Gypsum Company; USG Sheetrock Brand Firecode X Gypsum Panels.
2. Thickness: 5/8 inch (15.9 mm).
3. Long Edges: Tapered.

B. Abuse-Resistant Gypsum Board: ASTM C 1396/C 1396M gypsum board, tested according to ASTM C 1629/C 1629M.
1. Products: Subject to compliance with requirements, provide one of the following:
a. American Gypsum; 5/8" M-Bloc AR Type X with Mold & Moisture Resistance.
b. CertainTeed Corporation; AirRenew Extreme Abuse.
c. Continental Building Products, Protecta AR 100 Type X with Mold Defense.
d. Georgia-Pacific Building Products; ToughRock Fireguard X Abuse-Resistant Gypsum Board.
e. National Gypsum Company; eXP Interior Extreme AR.
f. PABCO Gypsum; Abuse Curb.
g. United States Gypsum Company;USG Sheetrock Brand Mold Tough Abuse-Resistant Firecode X.
2. Core:5/8 inch (15.9 mm), Type X.
3. Surface Abrasion: ASTM C 1629/C 1629M, meets or exceeds Level 1 requirements.
4. Indentation: ASTM C 1629/C 1629M, meets or exceeds Level 1 requirements.
5. Soft-Body Impact: ASTM C 1629/C 1629M, meets or exceeds Level 1 requirements.
6. Long Edges: Tapered.
7. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.4 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.
1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
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.

B. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Fry Reglet Corp.
b. Gordon, Inc.
c. Pittcon Industries.
2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B 221 (ASTM B 221M), Alloy 6063-T5.
3. Finish: Corrosion-resistant primer compatible with joint compound and finish materials specified.

2.5 JOINT TREATMENT MATERIALS

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

B. Joint Tape:
1. Interior Gypsum Board: Paper.

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 drying-type, all-purpose compound.
      a. Use setting-type compound for installing paper-faced metal trim accessories.
   3. Fill Coat: For second coat, use drying-type, all-purpose compound.
   4. Finish Coat: For third coat, use drying-type, all-purpose compound.

2.6 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.

B. 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 (0.84 to 2.84 mm) thick.

C. 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.

D. Electrical Box Pads: Putty Pads: Moldable non-curing one component, intumescent, fire-rated material for through-penetration fire stop systems and sound attenuation systems; self-adhering; 1/8-inch thick minimum.

E. Acoustical Sealant: Refer to Section 079219 “Acoustical Joint Sealants.”

F. Thermal Insulation: As specified in Section 098116 “Acoustical Blanket Insulation.”

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

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

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ELECTRICAL BOX PADS FOR SMOKE / FIRE-RATED AND STC-RATED WALLS

A. Prior to installing wallboards, install electrical box pads in accordance with manufacturer’s written instructions.

B. Overlap front edge of box so that pad will be compressed around edges of box as gypsum panels are installed.

3.3 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

B. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.

C. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

D. Form control and expansion joints with space between edges of adjoining gypsum panels.

E. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
   1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. (0.7 sq. m) in area.
   2. Fit gypsum panels around ducts, pipes, and conduits.

3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- (6.4- to 9.5-mm-) wide joints to install sealant.

F. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) 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.

G. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

H. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written instructions for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

I. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.4 APPLYING INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:
1. Type X: Vertical surfaces unless otherwise indicated.

B. Single-Layer Application:
1. On partitions/walls, apply gypsum panels vertically (parallel to framing)unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.
2. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Multilayer Application:
1. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
2. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

3.5 INSTALLING TRIM ACCESSORIES

A. General: 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.

B. Control Joints: Install control joints at locations indicated on Drawings according to ASTM C 840 and in specific locations approved by Architect for visual effect.

C. Interior Trim: Install in the following locations:
1. Cornerbead: Use at outside corners unless otherwise indicated.
2. Bullnose Bead: Use where indicated.
3. LC-Bead: Use at exposed panel edges.
4. L-Bead: Use where indicated.
5. U-Bead: Use where indicated.

D. Aluminum Trim: Install in locations indicated on Drawings.

3.6 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

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

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

D. 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: Where indicated on Drawings.
   3. Level 3: Where indicated on Drawings.
   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."

3.7 RATED PARTITION IDENTIFICATION

A. At fire-rated wall and smoke partition assemblies, provide an identification of wall rating in 4-inch high stenciled block letters in red paint. Space identifications 12 feet on center maximum, 4 feet from corners maximum, above ceiling. Provide identification on both sides of wall.

B. Partition Identification Text: Apply the following, as applicable:
   1. WARNING: SMOKE PARTITION – PROPERLY SEAL ALL OPENINGS.
   2. WARNING: 1-HOUR SMOKE BARRIER – PROPERLY SEAL ALL OPENINGS.
   3. WARNING: 1-HOUR FIRE PARTITION – PROPERLY SEAL ALL OPENINGS.
   4. WARNING: 1-HOUR FIRE BARRIER – PROPERLY SEAL ALL OPENINGS.
   5. WARNING: 2-HOUR FIRE WALL – PROPERLY SEAL ALL OPENINGS.
   6. WARNING: 2-HOUR FIRE BARRIER – PROPERLY SEAL ALL OPENINGS.

C. Refer to Section 099123 "Interior Painting" for painting requirements.
   1. Use interior semi-gloss, latex, low VOC paint.

3.8 PROTECTION

A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

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

C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
   1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
   2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION

SECTION 096516

RESILIENT SHEET FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Unbacked vinyl sheet flooring.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For each type of resilient sheet flooring.
1. Include sheet flooring layouts, locations of seams, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
2. Show details of special patterns.

C. Samples for Verification: For each type of resilient sheet flooring, in manufacturer's standard size, but not less than 6-by-9-inch (150-by-230-mm) sections of each color, texture, and pattern required.
1. For heat-welding bead, manufacturer's standard-size Samples, but not less than 9 inches (230 mm) long, of each color required.

D. Product Schedule: For resilient sheet flooring.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of resilient sheet flooring to include in maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Resilient Sheet Flooring: Furnish not less than 10 linear feet (3 linear m) for every 500 linear feet (150 linear m) or fraction thereof, in roll form and in full roll width for each type, color, and pattern of flooring installed.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are competent in techniques required by manufacturer for resilient sheet flooring installation and seaming method indicated.
1. Engage an installer who employs workers for this Project who are trained or certified by resilient sheet flooring manufacturer for installation techniques required.

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
1. Coordinate mockups in this Section with mockups specified in other Sections.
a. Size: Minimum 100 sq. ft. (9.3 sq. m) for each type, color, and pattern in locations indicated.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store resilient sheet flooring and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C). Store rolls upright.

1.8 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 85 deg F (29 deg C), in spaces to receive resilient sheet flooring during the following periods:
   1. 48 hours before installation.
   2. During installation.
   3. 48 hours after installation.

B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).

C. Close spaces to traffic during resilient sheet flooring installation.

D. Close spaces to traffic for 48 hours after resilient sheet flooring installation.

E. Install resilient sheet flooring after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For resilient sheet flooring, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
   1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

2.2 UNBACKED VINYL SHEET FLOORING

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Armstrong World Industries, Inc.
   2. Gerflor.
   3. Johnsonite; a Tarkett company.
   4. Mannington Mills, Inc.
   5. Shaw Contract Group; a Berkshire Hathaway company.

B. Basis-of-Design Product: As scheduled.

C. Product Standard: ASTM F 1913.

D. Thickness: 0.080 inch (2.0 mm).

E. Sheet Width: As standard with manufacturer.

F. Seamless-Installation Method: Heat welded.

G. Colors and Patterns: As scheduled.

2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by resilient sheet flooring manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by flooring and adhesive manufacturers to suit resilient sheet flooring and substrate conditions indicated.

C. Seamless-Installation Accessories:
   1. Heat-Welding Bead: Manufacturer's solid-strand product for heat welding seams.
      a. Colors: As scheduled.

D. Integral-Flash-Cove-Base Accessories:
   1. Cove Strip: 1-inch (25-mm) radius provided or approved by resilient sheet flooring manufacturer.
   2. Cap Strip: Square metal, vinyl, or rubber cap provided or approved by resilient sheet flooring manufacturer.
   3. Corners: Metal inside and outside corners and end stops provided or approved by resilient sheet flooring manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
   1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient sheet flooring.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to resilient sheet flooring manufacturer's written instructions to ensure adhesion of resilient sheet flooring.

B. Concrete Substrates: Prepare according to ASTM F 710.
   1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
   2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by resilient sheet flooring manufacturer. Do not use solvents.
   3. Alkalinity and Adhesion Testing: Perform tests recommended by resilient sheet flooring manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
   4. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft. (18.6 sq. m), and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
      a. Anhydrous Calcium Chloride Test: ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
      b. Relative Humidity Test: Using in-situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install resilient sheet flooring until materials are the same temperature as space where they are to be installed.
   1. At least 48 hours in advance of installation, move flooring and installation materials into spaces where they will be installed.

E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient sheet flooring.

3.3 RESILIENT SHEET FLOORING INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient sheet flooring.

B. Unroll resilient sheet flooring and allow it to stabilize before cutting and fitting.

C. Lay out resilient sheet flooring as follows:
   1. Maintain uniformity of flooring direction.
   2. Minimize number of seams; place seams in inconspicuous and low-traffic areas, at least 6 inches (152 mm) away from parallel joints in flooring substrates.
   3. Match edges of flooring for color shading at seams.
   4. Avoid cross seams.

D. Scribe and cut resilient sheet flooring to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

E. Extend resilient sheet flooring into toe spaces, door reveals, closets, and similar openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on resilient sheet flooring as marked on substrates. Use chalk or other nonpermanent marking device.

G. Install resilient sheet flooring on covers for telephone and electrical ducts and similar items in installation areas. Maintain overall continuity of color and pattern between pieces of flooring installed on covers and adjoining flooring. Tightly adhere flooring edges to substrates that abut covers and to cover perimeters.

H. Adhere resilient sheet flooring to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

I. Seamless Installation:
   1. Heat-Welded Seams: Comply with ASTM F 1516. Rout joints and heat weld with welding bead to fuse sections permanently into a seamless flooring installation. Prepare, weld, and finish seams to produce surfaces flush with adjoining flooring surfaces.

J. Integral-Flash-Cove Base: Cove resilient sheet flooring 6 inches (152 mm) up vertical surfaces. Support flooring at horizontal and vertical junction with cove strip. Butt at top against cap strip.
   1. Install metal corners at inside and outside corners.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting resilient sheet flooring.

B. Perform the following operations immediately after completing resilient sheet flooring installation:
   1. Remove adhesive and other blemishes from surfaces.
   2. Sweep and vacuum surfaces thoroughly.
   3. Damp-mop surfaces to remove marks and soil.

C. Protect resilient sheet flooring from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Cover resilient sheet flooring until Substantial Completion.

END OF SECTION

SECTION 099123

INTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 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. Indicate VOC content.

B. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.
   1. Submit Samples on rigid backing, 8 inches (200 mm) square.
   2. Apply coats on Samples in steps to show each coat required for system.
   3. Label each coat of each Sample.
   4. Label each Sample for location and application area.

C. Product List: Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Paint: 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

1.5 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. (9 sq. m).
      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.
   3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
   4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).
   1. Maintain containers in clean condition, free of foreign materials and residue.
   2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Behr Process Corporation.
   2. PPG Architectural Coatings.
   3. Sherwin-Williams Company (The).

2.2 PAINT, GENERAL

A. 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.

B. Colors: As scheduled.

2.3 SOURCE QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:
   1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
   2. Testing agency will perform tests for compliance with product requirements.
   3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 - EXECUTION

3.1 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. Gypsum Board: 12 percent.

C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

D. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

E. Proceed with coating application only after unsatisfactory conditions have been corrected.
   1. Application of coating indicates acceptance of surfaces and conditions.

3.2 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.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
   1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer.

E. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

F. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 SURFACE PREPARATION OF PREVIOUSLY COATED SURFACES

A. General:
   1. Remove cracked and deteriorated sealants and calking.
   2. Remove chalk deposits and loose, blistered, peeling, scaling, or crazed finish to bare base material or sound substrate by scraping and sanding.
   3. Wash surfaces with solution of TSP to remove wax, oil, grease, and other foreign material; rinse, and allow to dry. Exercise caution that TSP solution does not soften existing coating.
   4. Abrade glossy surfaces by sanding or wiping with liquid de-glosser.
   5. Remove mildew as specified above.
   6. Test compatibility of existing coatings by applying new coating to small, inconspicuous area. If new coatings lift or blister existing coatings, request recommendation from Architect.
   7. Apply specified primer to surfaces scheduled to receive coatings.

B. Gypsum Wallboard:
   1. Fill cracks and voids with spackling compound.
   2. Apply primer over bare surfaces and newly applied texture coatings.

C. Metal:
   1. Remove rust from surfaces to bare metal in accordance with SP3 "Power Tool Cleaning".
   2. Exercise care not to remove galvanizing.
   3. Complete preparation as specified for new work.

3.4 APPLICATION

A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
   1. Use applicators and techniques suited for paint and substrate indicated.
   2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
   3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
   4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
   5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. 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.

E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
   1. Paint the following work where exposed in equipment rooms:
      a. Equipment, including panelboards and switch gear.
      b. Uninsulated metal piping.
      c. Uninsulated plastic piping.
      d. Pipe hangers and supports.
      e. Metal conduit.
      f. Plastic conduit.
      g. Tanks that do not have factory-applied final finishes.
      h. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
   2. Paint the following work where exposed in occupied spaces:
      a. Equipment, including panelboards.
      b. Uninsulated metal piping.
      c. Uninsulated plastic piping.
      d. Pipe hangers and supports.
      e. Metal conduit.
      f. Plastic conduit.
      g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
      h. Other items as directed by Architect.
   3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

F. Rated Wall Assemblies Identification:
   1. Identify fire-rated wall assemblies with stenciled lettering on wall surface above ceiling line.
   2. Provide stenciled block letters in red to identify each rated wall assembly.
   3. Refer to Section 0929000 "Gypsum Board" and Life Safety Legend on Code Compliance Plan.

3.5 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
   1. Contractor shall touch up and restore painted surfaces damaged by testing.
   2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.6 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. 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.

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

3.7 INTERIOR PAINTING SCHEDULE

A. Gypsum Board, Flat Latex-Based Acrylic Finish: 2 finish coats over a primer.
   1. Sherwin-Williams:
      a. Primer: Roller applied latex texturing compound, ProMar 200 Zero VOC Interior Latex Primer, B28W2600.
      b. Second Coat: PorMar 200 Zero VOC Interior Latex Flat, B30-2600 Series 1.6 mils DFT.

c. Third Coat: Same as second coat.

B. Gypsum Board, Semi-Gloss, Epoxy, Low VOC: 2 finish coats over a primer.
1. Sherwin-Williams:
a. Primer: ProMar 200 Zero VOC Interior Latex Primer, B28W2600.
b. Second Coat: Pre-Catalyzed Water Based Epoxy Semi-Gloss, K46-150 Series, 1.5 mils DFT.
c. Third Coat: Same as second coat.

C. Gypsum Board, Semi-Gloss, Low Odor: 2 finish coats over a primer.
1. Sherwin-Williams:
a. Primer: ProMar 200 Zero VOC Interior Latex Primer, B28W2600.
b. Second Coat: PorMar 200 Zero VOC Interior Latex Semi-Gloss, B31-2600 Series 1.6 mils DFT.
c. Third Coat: Same as second coat.

D. Gypsum Board, Eggshell, Low Odor: 2 finish coats over a primer.
1. Sherwin-Williams:
a. Primer: ProMar 200 Zero VOC Interior Latex Primer, B28W2600.
b. Second Coat: PorMar 200 Zero VOC Interior Latex Eg-Shel, B20-2600 Series 1.7 mils DFT.
c. Third Coat: Same as second coat.
2. Sherwin-Williams: Alternate for Health Care
a. Primer: Roller applied latex texturing compound, ProMar 200 Zero VOC Interior Latex Primer, B28W2600.
b. Second Coat: Roller Applied – Paint Shield Interior Latex Eg-Shel Microbicidal Paint Coating, EPA Reg.#64695-1, D12W51 1.8 mils DFT.
c. Third Coat: Same as second coat.

E. Ferrous Metal, Epoxy, Semi-Gloss, Low VOC: 2 finish coats over a primer. Wherever wall surfaces are scheduled to receive epoxy paint, paint doors and frames within the wall with epoxy.
1. Sherwin-Williams:
a. Primer: Pro Industrial Pro-Cryl Universal Primer, B66-310 Series 2.0 - 4.0 mils DFT.
b. Second Coat: Water Based Catalyzed Epoxy, B70-200 Series, 3.0 mils DFT.
c. Third Coat: Same as second coat.

END OF SECTION

SECTION 09 96 00
HIGH PERFORMANCE COATINGS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

A. Surface preparation and finishing of walls and ceilings where scheduled on the Drawings as "epoxy paint".

B. Related Sections: Section 09 90 00 – Painting and Coating

1.03 SYSTEM DESCRIPTION

A. Finish Materials: Conform to applicable code for flame/fuel/smoke rating requirements.

B. Code Approval: Materials shall be approved by adopted local codes for type of application.

1.04 SUBMITTALS

A. Samples: Two (2) samples 9" x 11" of each color scheduled.

B. Product Data: Manufacturer's literature including application instructions, material composition, test data, etc. for material being considered.

C. Certification of compliance with adopted local codes.

1.05 ENVIRONMENTAL REQUIREMENTS

A. Store and apply materials in environmental conditions required by manufacturer's instructions.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Glazed Paint Manufacturers:

1. The Sherwin Williams Co.
2. Glidden Co.
3. Benjamin Moore & Co.
4. Tnemec Company, Inc.

B. Source: Provide all products from one manufacturer unless noted specifically otherwise.

C. Coatings: Ready mixed, except field catalyzed coatings, of good flow and brushing properties, capable of drying or curing free of streaks or sags.

D. Accessory Materials:

1. All materials required to achieve the finishes specified.
2. All required ladders, scaffolding, drop cloths, masking, scrapers, tools, sandpaper, dusters, cleaning solvents and other items required to perform work and achieve results herein specified.

PART 3 – EXECUTION

3.01 EXAMINATION AND PREPARATION

A. Verify that substrate conditions are ready to receive work.

B. Measure moisture content of porous surfaces using an electronic moisture meter.

C. Correct minor defects and clean surfaces which affect work of this Section.

D. Gypsum Board Surfaces: Latex fill minor defects. Spot prime defects after repair.

E. Galvanized Surfaces: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.

F. Concrete Surfaces:

1. Remove foreign matter. Remove oil and grease with a solution of tri-sodium phosphate, rinse well and allow to dry.
2. For Epoxy Sealer, remove laitance by acid etching. Apply liberally, rinse thoroughly by scrubbing with fresh water and allow to dry. Fill cracks and voids by repainting or other approved methods.

G. Uncoated Ferrous Surfaces: Remove scale by wire brushing or sandblasting; wash clean with solvent. Apply treatment of phosphoric acid solution. Prime paint after repairs.

H. Shop Primed Steel Surfaces: Sand and scrape to remove loose primer and rust, feather edges; clean surfaces with solvent. Prime bare steel surfaces.

I. Interior Wood Items: Wipe surface clean; seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats.

J. Time Between Surface Preparation and Painting: Apply a coat of specified first coat material as soon as practical after surface preparation has been completed, but in any event, prior to any deterioration of prepared surface.

K. All surface preparation shall be in accordance with the manufacturer's directions.

3.02 COLORS

A. Architect will prepare a schedule of colors.

B. Mix finish materials accurately to obtain the colors scheduled.

3.03 APPLICATION

A. Mix and thin materials in accordance with the manufacturers printed instructions.

B. Apply materials at specified film thickness by method recommended by the manufacturer.

C. Allow each coat to dry thoroughly before recoating.

D. Vary color slightly for each successive coat.

E. Cut in edges clean and sharp where work joins other materials or colors.

F. Make finish coats smooth, uniform in color, and free of brush marks, laps, runs, dry, spray, overspray and skipped or missed areas.

3.04 INSPECTION

A. Request acceptance of each coat before applying succeeding coats.

B. Touch-up and repair all work that is not acceptable to the Architect and request final acceptance.

3.05 PAINTING SCHEDULE

A. Gypsum Wallboard:

1. Primer: (1) Coat: Resuflor Aqua 3462G
2. Two (2) Coats: Resuflor 3552W
3. Grout: Resuflor Aqua 3462G
4. Topcoat: Resutile 4685W

B. Tinting: Add tinting color in accordance with manufacturer's instructions to match scheduled colors.

3.06 CLEANING

A. Remove paint splatters from surfaces not scheduled for paintings.

B. Repair any damage to coating or surfaces caused by painting or cleaning operations.

C. Remove debris from job site and leave storage areas clean.

— END OF SECTION —

SECTION 10 00 00
MISCELLANEOUS SPECIALTIES

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

A. Furnishing and installation of miscellaneous specialty items including, but not limited to, the following:

1. Fire Extinguisher Cabinets
2. Fire Extinguishers
3. Corner Guards

B. Related Sections: 06 10 00 - Rough Carpentry

1.03 SUBMITTALS

A. Shop Drawings: Indicate component locations, dimensions, details of attachments, anchors, etc.

B. Product Data: Provide data on products, specified accessories, mechanical characteristics and manufacturer's installation instructions.

C. Operating and Maintenance Instructions: Include relevant instructions including information for complete operating and maintenance instructions for all equipment in Operation and Maintenance Manuals.

1.04 QUALITY ASSURANCE

A. All equipment shall be installed and placed in complete operation by trained, competent personnel licensed or certified by the equipment manufacturer.

PART 2 – PRODUCTS

2.01 FIRE EXTINGUISHER CABINETS

A. Manufacturer: Larsen's Manufacturing Co., Architectural Series, or approved substitution.

1. Type “A”, Model No. 2409-6R-SS – Semi-recessed, with recessed handle
2. Type “B”, Model No. 2409-R2-SS – Fully recessed, with recessed handle.

B. Description: Stainless steel recessed cabinets with solid doors with vertical red die-cut lettering “FIRE EXTINGUISHER”.

C. Schedule: Use fully recessed cabinets at all locations, unless restricted by wall thickness, in which case semi-recessed will be allowed. At locations as noted on the Drawings.

2.02 FIRE EXTINGUISHERS

A. Manufacturer: Larsen's Manufacturing Co., MP Series, Model MP-10, multi-purpose dry chemical fire extinguisher, U.L. Rating 4A-80B:C or approved substitution.

B. Schedule: Provide one (1) fire extinguisher for each fire extinguisher cabinet and surface-mounted fire extinguisher with wall-mounted bracket at locations shown on the Drawings.

2.03 CORNER GUARDS

A. Manufacturer: Pawling Corporation, Standard Product Division or approved substitution.

B. Corner Guards:

1. CG-10 / TC-10 with 1/4" radius and 3" wings.
2. CG-11, modify each corner guard to have one (1) 3" wing and one (1) 2" wing, with modified closure caps. Filler strip to match corner guards.

C. Colors: Custom colors as selected by Architect.

D. Locations: As shown on the Drawings.

E. All corner guards shall be custom heights to extend from top of base to bottom of ceiling. Note the base varies in height. Provide closure cap at top and bottom of all guards.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Install all items in accordance with manufacturer's printed instruction and approved Shop Drawings.

B. Fire Extinguishers and Cabinets: Install fire extinguisher cabinets at locations indicated on the Drawings, plumb, level, in correct plane and securely anchored to the wall. Flanges of recessed cabinets shall fit snugly over wall surfaces or covering. Mount cabinet at height for the handle to be at 54” a.f.f. Install one (1) fire extinguisher in each cabinet.

— END OF SECTION —

SECTION 11 70 00
HEALTHCARE EQUIPMENT

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

A. The Contractor shall provide all work required including mechanical and electrical work necessary to incorporate the medical equipment into the project as outlined on the Drawings.

B. The Owner intends to employee Steris, and others to provide and install the new medical equipment for the project.

C. Related Sections:

1. Division 22 – Plumbing **OR** Division 23 - HVAC
2. Division 16 - Electrical

D. Pre-Construction Conferences

1. The successful bidder shall attend Pre-construction Conferences prior to the start of work. The Conference will be conducted at the project site, or as otherwise directed by the Owner's Representative. The attendees will consist of the following:
   a. The General Contractor,
   b. The Equipment Supplier(s) and their supervisory personnel who will provide on-site installation.
   c. Representatives of the Owner.
   d. The Architect and Engineer.
2. The purpose of this conference is to review responsibilities and personnel assignments and to coordinate the final location and requirements of each item, and to establish a working understanding among the parties of the equipment system that is to be installed.

1.03 SCHEDULE

A. The Contractor will be required to include the time for the installation of medical equipment in the calendar days stated in his schedule.

B. The Contractor shall include in his construction schedule line items for the medical equipment work.

1.04 COORDINATION OF THE MEDICAL EQUIPMENT WORK

A. The Contractor will be responsible for the proper inclusion of the medical equipment work into the work of this project.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

— END OF SECTION —

stryker®

FLEXiS

Pre-Installation Manual

Table of Contents

1

Warnings and Cautions

In this manual, the terms and definitions below apply.

- **Warning:** Possible injury to the patient or user.
- **Caution:** Possible damage to the equipment.
- **Note:** More information to clarify the instructions.

 Dangerous voltage. Refer all servicing to approved personnel.

1.1 Warnings

1. Caution must be exercised when lifting heavy objects to avoid serious injury or damage to equipment. Use of proper lifting equipment and technique is required.
2. Energized electrical circuits can cause grievous injury or death. Make sure that all personnel who work around energized circuits correctly follow lock out/tag out safety procedures.

1.2 Cautions

1. All Stryker-supplied equipment is to be stored in a clean, dry environment prior to installation. Failing to comply with this requirement may lead to damage of equipment and possible failure of life support components.

2

Product Symbol Definition

These symbols are intended to refer the user to important operating and maintenance (service) instructions in the literature accompanying the product.

An exclamation mark within a triangle is intended to alert the user of warnings and cautions.

A lightning bolt indicates the presence of hazardous voltage. Refer all service to authorized personnel.

Temperature Limits

Alternating Current

Protective Earth Ground

Humidity Limits

Equipotentiality

Pressure Limits

Usage tips and useful information.

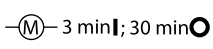
Denotes a load limit.

Complies to European Community Directive 93-42-EEC.

EDS
(29AZ)

Indicates the product is compliant "Medical Electrical Equipment with Respect to Electrical Shock, Fire, and Mechanical Hazard only in accordance with CAN/CSA C22.2 No601.1.

The date the equipment was manufactured.

	Device Manufacturer
	Product/Part Number
	Product/Serial Number
	Lot or Batch Number
	European Representative
	For U.S. audience only - Caution: Federal Law (USA) restricts this device to sale by or on the order of a physician.
	Quantity
	Item only available in the US.
	Denotes Class 1 and Type B Equipment. Class 1 Equipment: equipment in which the protection against electric shock does not rely on Basic Insulation only, but includes an additional safety precaution in such a way that means are provided for the connection of Accessible Conductive Parts to Protective (ground) Conductor in the fixed wiring of the installation in such a way that Accessible Conductive Parts cannot become Live in the event of a failure of the Basic Insulation. According to EN ISO 11197 and EN60601-1, 1990 including amendments 1 and 2. Type B Equipment: equipment providing a particular degree of protection against electric shock, particularly regarding allowable leakage current, and reliability of the protective earth connection (if present).
	In accordance with European Community Directive 2002/96/EC on Waste Electrical and Electronic Equipment, this symbol indicates that the product must not be disposed of as unsorted municipal waste but should be collected separately. **Note: The device does not contain any hazardous materials. Legal regulations may include specifications regarding the disposal of this product. We request that you contact Stryker when you plan to withdraw this device from service for discard.**
	This symbol represents the motor duty cycle, or the amount of time an articulating service head can be operated (3 minutes) and then must rest (30 minutes) before being operated again.
	Tipping Hazard

	Double-Stacking is Prohibited
	Do not use a forklift with this packaging or equipment.
	Contents are fragile
IP2X	Rating for protection against harmful ingress of water or particulate matter.
	On
	Off
	Emergency Stop
	China RoHS
Made in USA	Made in USA
	Non-Sterile
	Fuse Rating

3

Scope

This Pre-Installation Guide describes the requirements for assembling and installing components used in the support of Stryker ceiling-mounted boom assemblies, prior to installation of the components. These requirements include all services to be routed to and/or through the boom, such as medical gases, electrical, video, data, etc. This goes for both the single and tandem mounts and also applies to the EDS boom system. This guide does not describe the installation of the boom.

4

Hospital/Contractor Responsibilities

⚠ **Warning:** Responsibility for proper design of support structure lies entirely with the hospital/contractor and is not covered through warranty by Stryker. Improperly designed support structure may result in poor performance or damage to equipment and possible injury to user. Warranty service charges related to inadequate support structure design shall be at the customer's expense.

Stryker will not review or approve customer support structures. This is the responsibility of the customer's architect and designated structural engineer. Any visit by Stryker personnel to view the steelwork is purely to review its positioning against reflected ceiling plans.

4.1 Delivery and Storage

1. Accept delivery of Stryker crates and equipment to the proper room before installation date.
2. All Stryker-supplied equipment is to be stored in a secure, clean, temperature controlled, dry environment prior to installation. Failing to comply with this requirement may lead to damage of equipment, possible failure of life support components, theft and damage.
3. Remove and dispose of pallets, boxes, and trash upon completion of installation.

4.2 Drawings and Information

1. The hospital must supply Stryker with up to date drawings in .dwg format (CAD) including but not limited to:
   - Room layout plans (current and proposed)
   - Electrical services drawings
   - Mechanical services drawings
   - Elevation drawings
   - Structural steel (support structure) drawings
   - Ceiling drawings
2. The hospital must ensure that Stryker is notified of all revisions and changes to drawings prior to and during the scope of the project.

4.3 Ceiling Access

A 24" x 24" (610mm x 610mm) minimum access panel must be installed in the ceiling within 18" (457mm) of the Stryker-supplied Mounting (Interface) Plate to allow connection of electrical and data cables during final installation. In this instance, an access panel is

defined as an opening in the ceiling near the fixture that allows for servicing the equipment. The access panel must be separate from the hole where the equipment is hung and it must have a door for future serviceability.

A hole matching the Stryker-supplied mounting plate is required to provide easy access to risers and electrical junction boxes during installation of boom assembly. The hole size should match the outline of the plate, round for single mounts (*see Support Structure, page 14*) and rectagular for tandem mounts (*see Bottom View of a Tandem Boom Site, page 15*), and should be aligned with the center of the Mounting (Interface) Plate. This hole will be concealed by a Stryker-supplied cover; therefore, it is important not to exceed the specified hole size. Make certain no objects interfere with this space.

5

Stryker Responsibility

1. Provide the hospital or designated contractor with Stryker rough in drawings including elevation and room configuration drawings for Stryker-supplied equipment.
2. Advise the hospital of a proposed time-frame for installation of Stryker-supplied infrastructure.
3. Check in with hospital personnel and/or contractor to announce arrival.
4. Run and terminate all Stryker-supplied audio visual cables required for Stryker equipment.
5. Install booms.
6. Inspect all installed booms for quality assurance.

Stryker Provides the Following:

- **Mounting (Interface) Plate**

- **Copper Cap for Vacuum Riser (Negative Flow)**

- **Air Pressure Regulator**

- **Gas Risers with Check Valves (Positive Flow)**

- **Mounting Bracket**

6

Structural Responsibility

6.1 Super Structure/Mounting Support

⚠ **Warning:** Responsibility for proper design of support structure lies entirely with the hospital/contractor and is not covered through warranty by Stryker. Improperly designed support structure may result in poor performance or damage to equipment and possible injury to user. Warranty service charges related to inadequate support structure design shall be at the customer's expense.

Stryker will not review or approve customer support structures. This is the responsibility of the customer's architect and designated structural engineer. Any visit by Stryker personnel to view the steelwork is purely to review its positioning against reflected ceiling plans.

1. Design and install the support structure to:
   - Support (Stryker-supplied) weight and moment loads of each equipment piece.
   - Satisfy all applicable regulations including, but not limited to, building and electrical codes.
2. Install Stryker-supplied Mounting (Interface) Plate at the bottom of each support structure and 3" (76mm) above the finished ceiling in accordance with the recommended method. This must be installed prior to Stryker's on-site arrival for installation.

   Note: For installations in seismic zones, such as California, which must adhere to OSHPD regulations, install the Stryker-supplied mounting (Interface) Plate 2.75" +/- .4" (70mm+/- 10mm) above the finished ceiling.
3. Ensure Stryker equipment and infrastructure is not impeded by the design of the support structure.
4. Attach a Stryker-supplied support bracket for gas check valves (risers) and attach to support structure within 18" (457mm) of the center of each boom's Stryker-supplied Mounting (Interface) Plate. The support bracket must be accessible from the access panel.
5. Install a 24" x 24" (610mm x 610mm) access panel directly adjacent to each mounting point for installation, maintenance and future service.

Note: The support structure must be designed and installed in such a way that does not allow obstruction of or interference with the six 5/8-11 UNC (M16) tapped holes located adjacent to the inner diameter of the Mounting (Interface) Plate as well as the 6.09" (155mm) diameter center hole and the four (M4) ceiling cover holes (*see Support Structure, page 14*).

6.2 Support Structure Design Considerations

The support structure must be designed and fabricated to adequately support the loads specified for each application and to conform to all applicable regulations. Figure 1 is only an example of how all of the required components tie in with the hospital-supplied structure. The structure can vary significantly based on load, interstitial space, obstructions, local building codes, etc.

1. Position the support structure according to the room layout provided by Stryker.

   ⚠ **Warning:** The maximum allowed deflection of the ceiling plate under maximum load is 1˚.

2. The Stryker-supplied Mounting (Interface) Plate must be level within 0.25” (6.4mm). The bottom of the Mounting (Interface) Plate must be 3” (76mm) above the finished ceiling. Allow enough space to route cables and hoses to be run out of the boom.

   ⚠ **Warning:**

   - Responsibility for proper design of support structure lies entirely with the hospital/contractor and is not covered through warranty by Stryker. Improperly designed support structure may result in poor performance and/or damage to equipment as well as possible injury to user. Service charges related to inadequate support structure design shall be at the customer’s expense.
   - Caution must be exercised when lifting heavy object to avoid serious bodily injury or damage to equipment.

Note:

- **For installations in seismic zones, such as California, which must adhere to OSHPD regulations, install the Stryker-supplied mounting (Interface) Plate 2.75” +/- .4” (70mm+/- 10mm) above the finished ceiling.**
- **The ceiling cover holes and boom flange mounting holes, located in the plate’s Clear Zone, cannot be impeded (*see Stryker-Supplied Single Mounting (Interface) Plate, page 16* and *see Stryker-Supplied Tandem Mounting (Interface) Plate, page 17*).**
- **Use of bolt-together, pre-fabricated structural members is highly discouraged and is considered an unacceptable solution for the support structure design. This approach will generally allow considerable flexing of the structure resulting in poor performance of boom assembly and possible equipment damage.**

Data shown in the table below applies to the highest capacity model with the highest rotational moment. It is recommended that all support structures be designed around the heaviest model for both increased safety margin and to allow flexibility for future product upgrades.

Single Mount: 1000 lbs (454 kg)

Tandem Mount: 2800 lbs (1270 kg)

For seismic anchorage calculations and drawings for more detailed structural requirements and information, *see 10 Seismic Calculations Single, page 40*.

Note: Please make certain your structural and/or mechanical engineer includes side bracing in the design of the above ceiling structures to ensure the structure will remain level.

6.3 Site Preparation

Prior to the installation of the boom assembly, the interstitial space must be prepared to accept the pre-installation components. The medical gas delivery system, electrical circuits, and the Stryker-supplied Mounting (Interface) Plate must be installed prior to the Stryker equipment installation. Stryker assumes all work has been performed in accordance with all applicable regulations including, but not limited to, local electrical and building codes as well as NEC, NFPA, and CGA.

The support structure shown is for reference only. The design and manufacture of the support structure is the hospital's responsibility, and is not covered by the Stryker warranty.

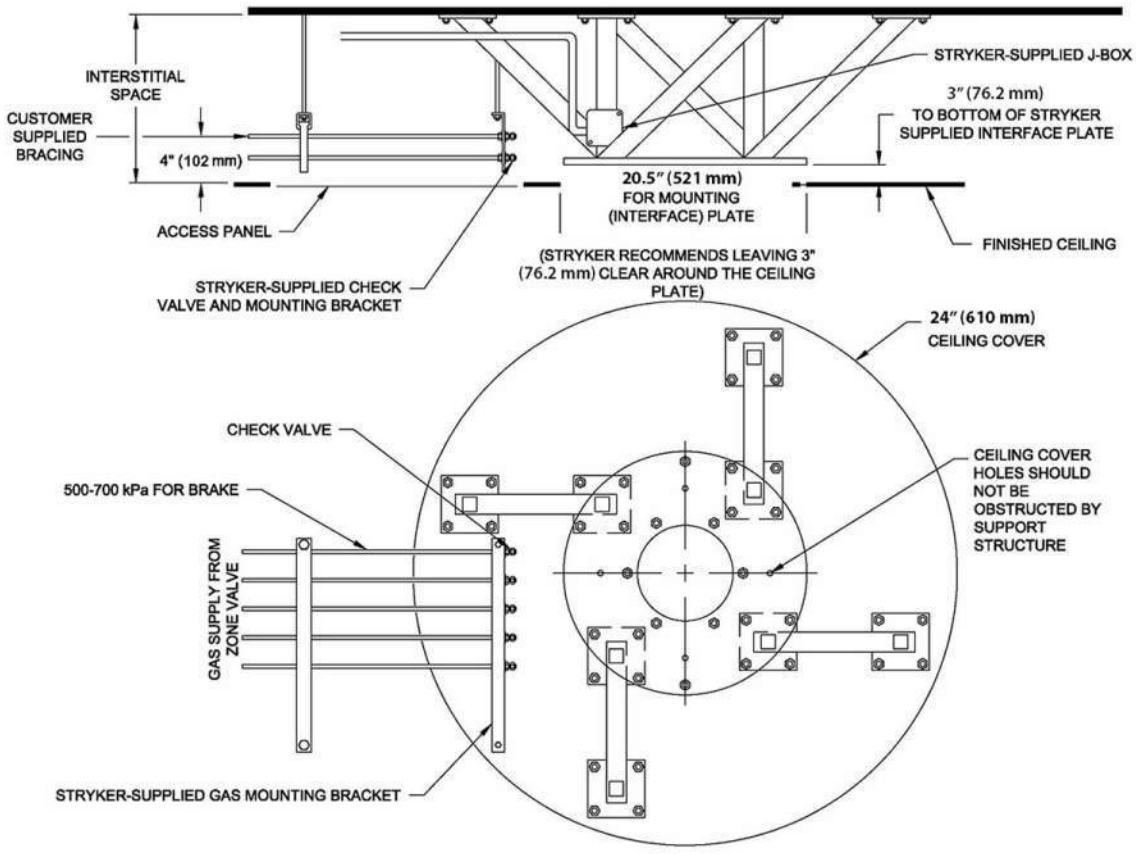


Figure 1. Support Structure

Note: For installations in seismic zones, such as California, which must adhere to OSHPD regulations, install the Stryker-supplied mounting (Interface) Plate 2.75" +/– .4" (70mm+/- 10mm) above the finished ceiling.

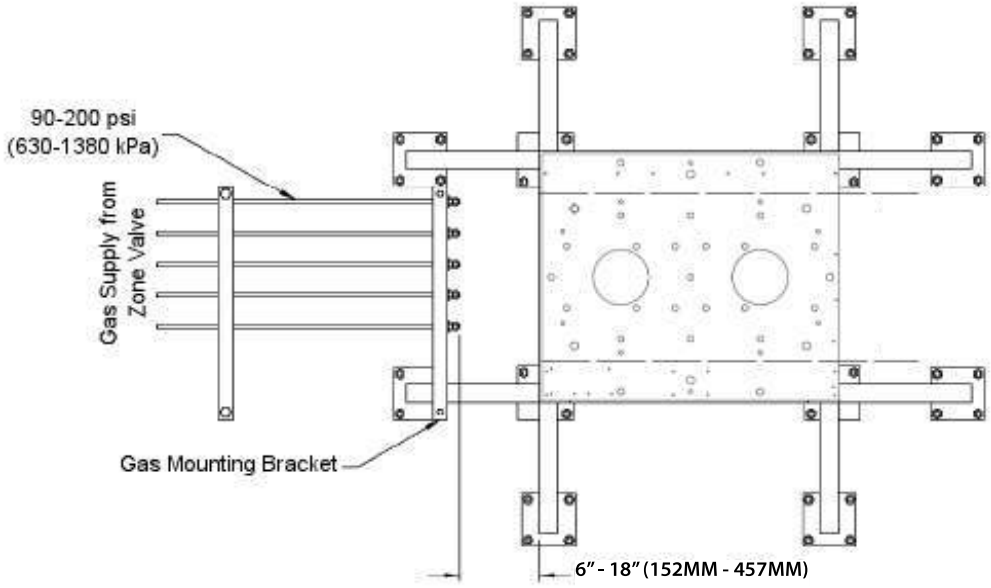
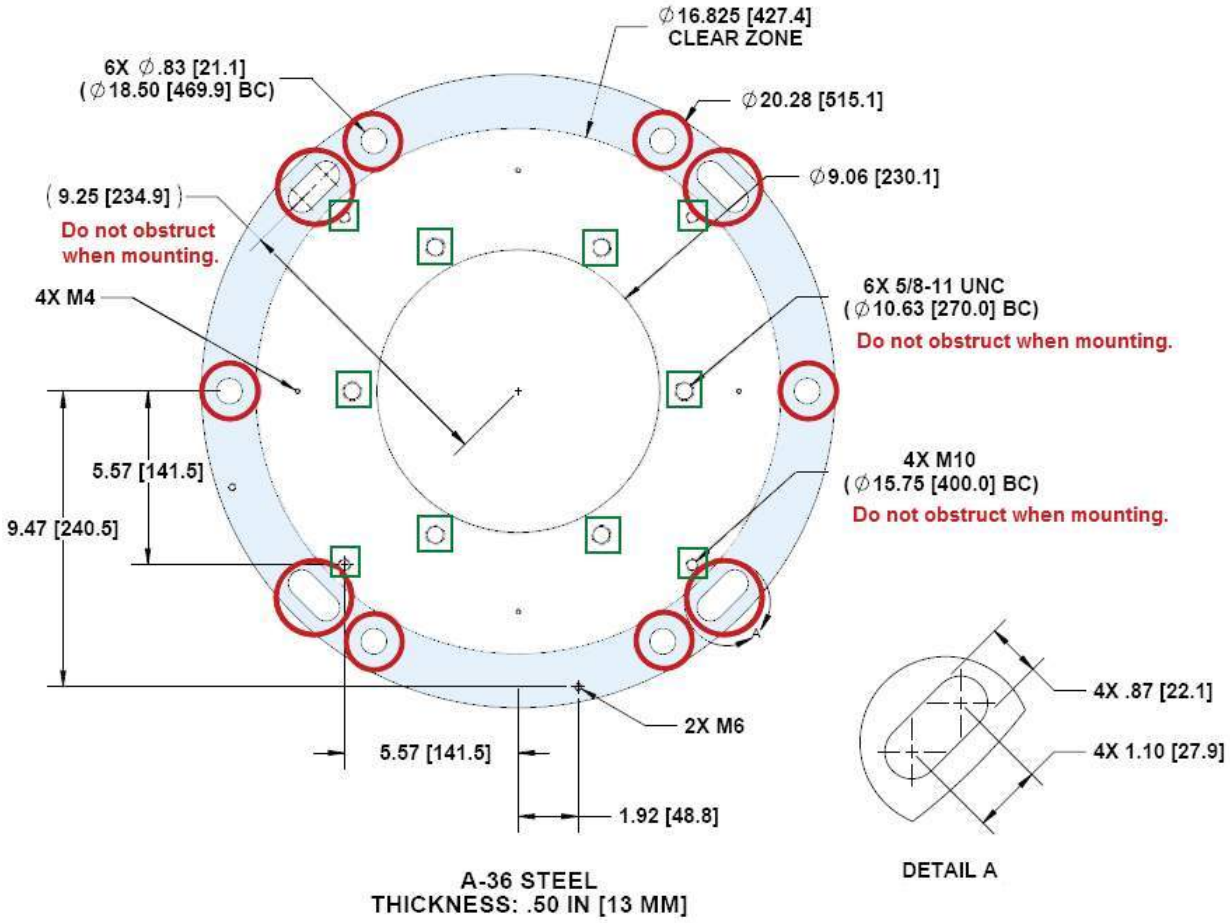


Figure 2. Bottom View of a Tandem Boom Site

6.3.1 Stryker Mounting (Interface) Plate (Stryker-Supplied)

The Stryker-supplied Mounting Plate is the primary surface for boom assembly. It is the responsibility of the customer/contractor to install the plate, as it is considered part of the structure. The mounting plate MUST be installed by the hospital/contractor prior to the installation start date.

Note: When using the Common Plate (*see Stryker-Supplied Single Mounting (Interface) Plate, page 16* and *see Stryker-Supplied Tandem Mounting (Interface) Plate, page 17*), the bottom must be recessed 3" (76mm), +/- 1/4" (6.4mm) above the finished ceiling.



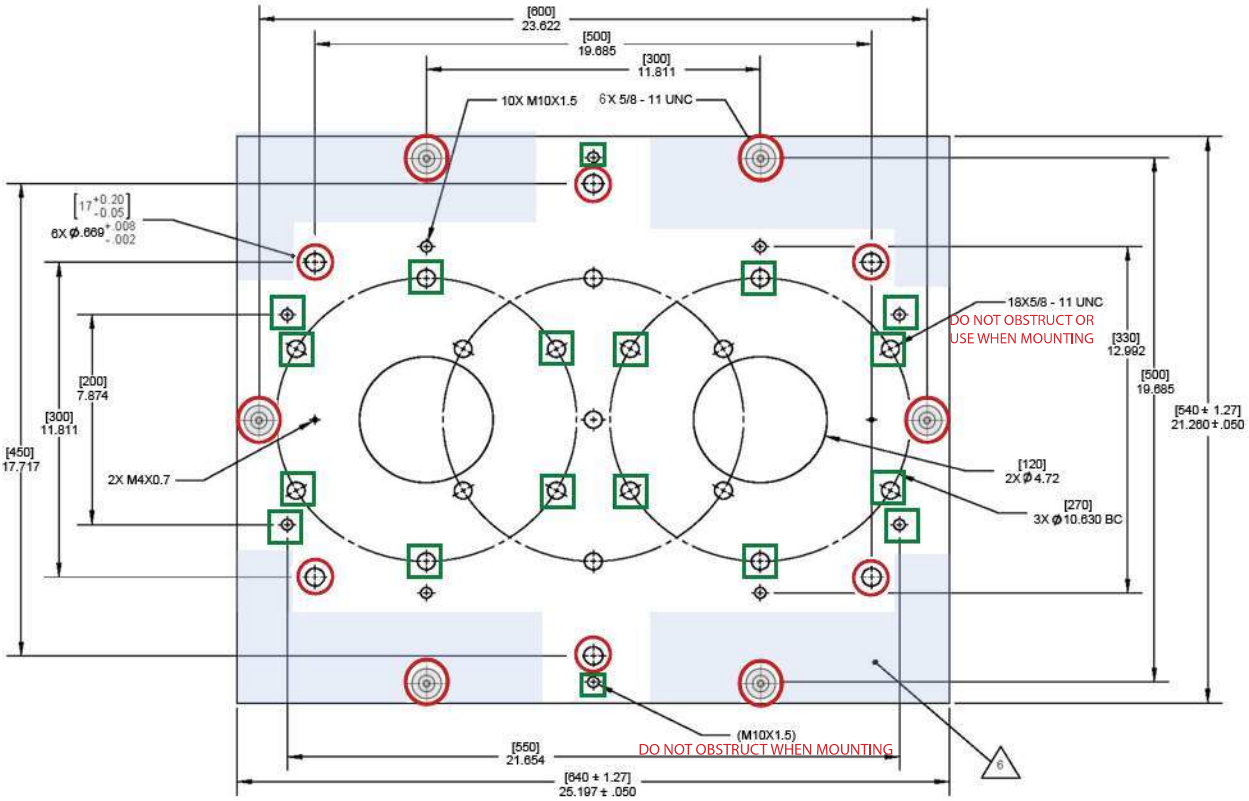
(Material: Steel, 0.5" (12.7mm) thick, approximately 40 lb [18 kg])

Figure 3. Stryker-Supplied Single Mounting (Interface) Plate

Note:

- **All squares denote Stryker-only threaded holes. Circles are acceptable mounting holes for the contractor. Areas shaded in blue are acceptable welding points.**
- **The single-mount ceiling cover is round with a diameter of 24" (610mm) and a depth of 8" (203mm).**
- **For ICU installations of a single mounted boom and an OSC600 single-mount, the Stryker-supplied Mounting (Interface) Plate is 0.75" (19mm) thick and weighs approximately 52lbs (23.6 kg).**

6.3.2 Stryker Tandem Mounting (Interface) Plate (Stryker-Supplied)



(Material: Steel, 0.75" (19mm) thick, approximately 90 lb [40.8 kg])

Figure 4. Stryker-Supplied Tandem Mounting (Interface) Plate

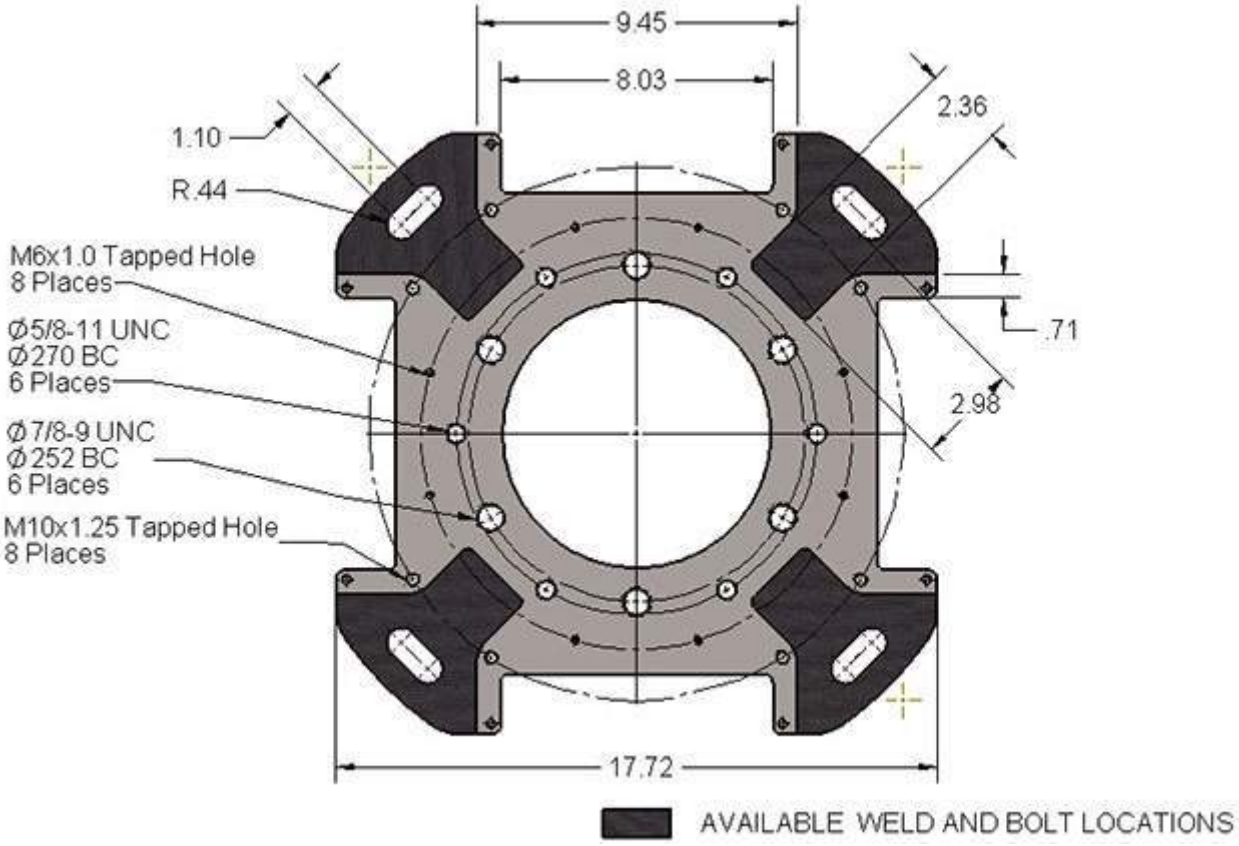
Note: All squares denote Stryker-only holes. All circles denote optional contractor holes. Areas shaded in blue are acceptable for welding.

Note: The Stryker-supplied ceiling covers for the tandem plate have the following dimensions:

- **Standard Tandem Ceiling cover - 27.5" x 27.5" x 6" (700 mm x 700 mm x 150 mm)**
- **Ceiling cover, Tandem Low, Blade - 25" x 32" x 3" (636mm X 812mm x 75mm)**
- **Ceiling cover, Tandem Std, Blade - 25.4" x 32" x 6" (644mm X 820mm x 150mm)**
- **Ceiling cover, Tandem Flexmove, Blade - 25.6" x 32.5" x 7.9" (650mm X 826mm x 200mm)**

The ceiling cover hole should match the outline of the plate.

6.3.3 Stryker Single Mounting Common Plate (Stryker-Supplied)



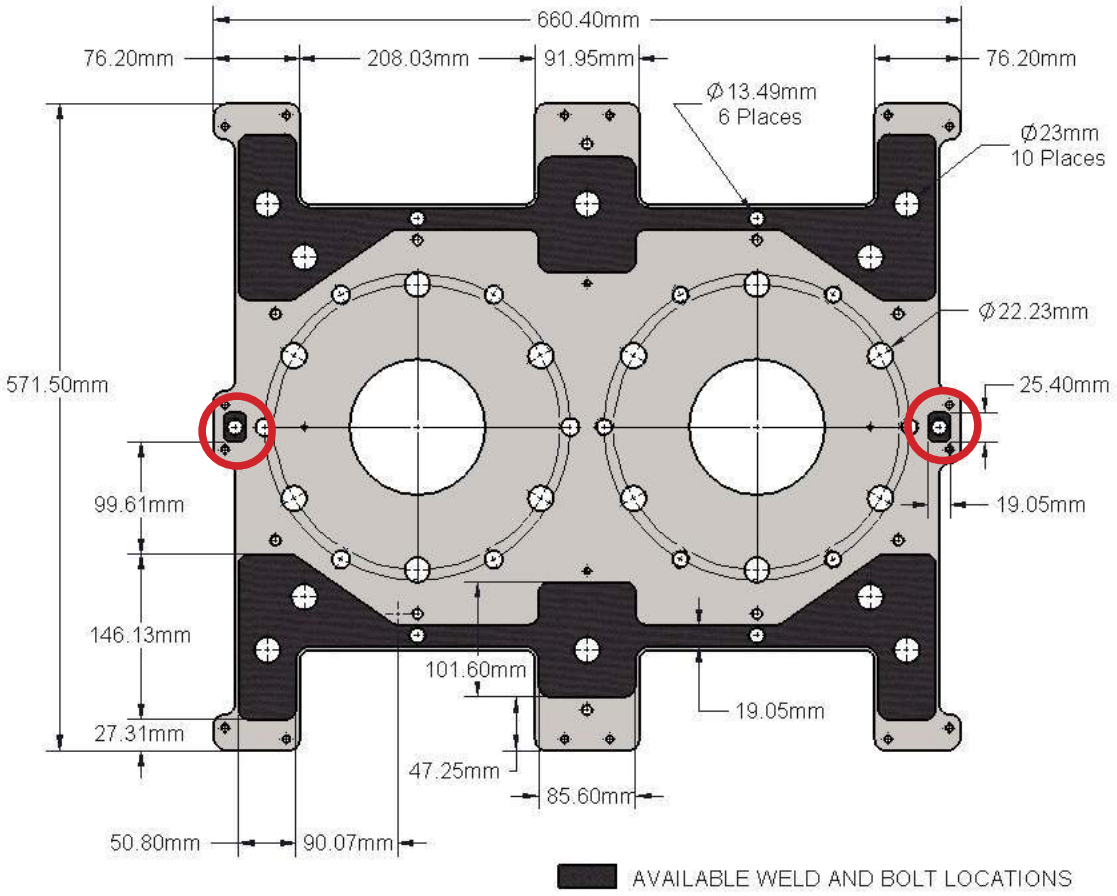
(Material: Steel, 1" (25.4mm) thick, approximately 52 lb [23.6 kg])

Figure 5. Single Common Plate (PN P29282)
(Material: Steel, 1" (25.4mm) thick, approximately 52 lb [23.6 kg])

Note:

- **Light shaded areas denote Stryker-only threaded holes. Dark shaded areas are acceptable mounting holes for the contractor. Dark shaded areas are also acceptable for welding.**
- **When using the Common Plate, the bottom must be recessed 3" +/- .25" (76mm +/-6.4mm) above the finished ceiling.**

6.3.4 Stryker Tandem Mounting Common Plate (Stryker-Supplied)



(Material: Steel, 1.00" (25.4mm) thick, approximately 114 lb [51.7 kg])

Figure 6. Tandem Common Plate (PN P29280)

⚠ **Caution:** Ensure that the tandem structure is mounted in the proper orientation by referring to the Equipment Configuration Drawings specifically related to the project.

Note:

- **Light shaded areas denote Stryker-only threaded holes. Dark shaded areas, including the two smaller ones (circled in red in figure 6), are acceptable mounting holes for the contractor. Dark shaded areas are also acceptable for welding.**
- **When using the Common Plate, the bottom must be recessed 3", +/- .25" (76mm +/-6.4mm) above the finished ceiling.**

7

Electrical Responsibility

7.1 Electrical and Audio Visual Infrastructure (Prior to Stryker Installation)

1. Install appropriate conduit, as shown in the Conduit Schedule on the CAD drawings.
2. Install contractor-supplied UL-rated junction box within 18” (457mm) of center of each Stryker-supplied Mounting (Interface) Plate. Please select a location adjacent to the access panel for serviceability and ease of installation.
3. Ensure capacity of electrical infrastructure is capable of meeting the requirements as specified by Stryker for the project.
4. Connect all high-voltage electrical connections. Ensure all power is live at time of installation.

7.2 Electrical

All electrical hard wiring must be completed by a hospital contracted certified electrician.

1. Hospital contracted electrician must be available for final electrical wiring of Stryker equipment during the Stryker installation.
2. All electrical services must be routed in accordance with all applicable regulations including but not limited to, local building and electrical codes, to electrical junction boxes (J-boxes). Junction boxes must have knockouts sufficient to accommodate 0.86” (22mm) conduit.
3. Circuit breakers are not provided in this unit. FLEXiS System circuits must be connected to correctly rated and protected branch circuits that are protected by double-pole breakers.

   Warning: Energized electrical circuits can cause severe injury or death. Ensure that all personnel working around energized circuits have been trained in and are following proper lock out/tag out and other applicable safety procedures.

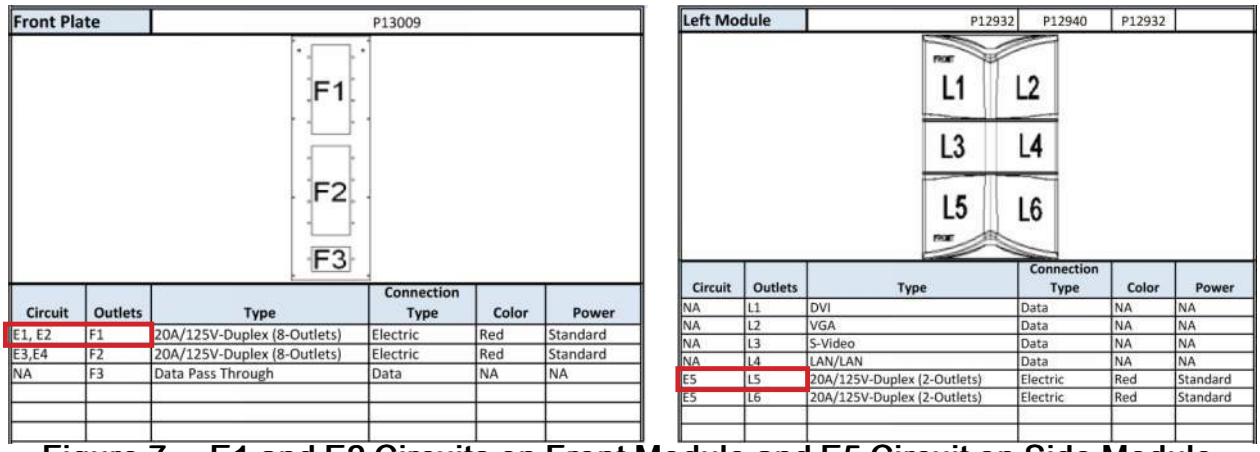
   Note:

   - **For Hong Kong installations where electrical outlets are connected to branch circuits rated at a higher amperage than the outlets themselves, BS1363 requires all electrical plugs to be equipped with a fuse equal to or less than the amperage rating of the outlet. In this case, ensure all equipment being connected to electrical outlets contains properly fused plugs.**
   - **5 and 10 ampere fuse kits are available as part numbers 0682400420 (5 amp) and 0682400421 (10 amp), if required by local electrical code. The fuse kit is intended to be mounted in a junction box that is 4” (102mm) square and 1.5” (38mm) deep.**

4. Wiring must be #12 AWG minimum for branch circuits up to 20A and #10 AWG for 30A branch circuits.
5. Prior to wiring each FLEXiS System, locate the site-specific Stryker elevation drawings for the unit.

   Note: Refer to the drawings for specific amperage.

6. Refer to the section labeled “Outlet Connections Schedule” on the elevation drawing. Review each of the four subsections of the supply unit, front plate, right module, back plate, and left module. If the connection type indicated is “electric” then the corresponding circuit numbers and required branch circuit ratings should be observed and followed. The indicated voltage rating is the maximum rather than the nominal (e.g., 125 VAC corresponds to a nominal of 110VAC—see the following figure).



Circuit	Outlets	Type	Connection Type	Color	Power
E1, E2	F1	20A/125V-Duplex (8-Outlets)	Electric	Red	Standard
E3,E4	F2	20A/125V-Duplex (8-Outlets)	Electric	Red	Standard
NA	F3	Data Pass Through	Data	NA	NA

Circuit	Outlets	Type	Connection Type	Color	Power
NA	L1	DVI	Data	NA	NA
NA	L2	VGA	Data	NA	NA
NA	L3	S-Video	Data	NA	NA
NA	L4	LAN/LAN	Data	NA	NA
E5	L5	20A/125V-Duplex (2-Outlets)	Electric	Red	Standard
E5	L6	20A/125V-Duplex (2-Outlets)	Electric	Red	Standard

Figure 7. E1 and E2 Circuits on Front Module and E5 Circuit on Side Module

7. The circuit number indicated is specific to one circuit wire set.

   ⚠ **Caution:** Take care to correctly connect the specific circuit to the properly rated branch circuit to prevent potential damage to the FLEXiS System.

8. Each conduit contains wires that are sequentially labeled (e.g., E1, E2, E3, etc.) and correspond to the specific circuit (see the following figure for illustration).

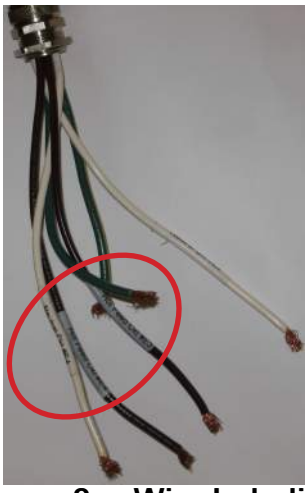


Figure 8. Wire Labeling Locations

9. The hospital contractor shall ensure hospital electrical infrastructure is capable of meeting recommended requirements. If not, do not proceed.
10. A separate 20A circuit is required for electric lift motor (articulating arm systems only).
11. Before Stryker arrives on-site pull wire as necessary for each assembly, leaving adequate length for termination with customer-supplied wiring from service head assembly.
12. When no motor is involved (OSC400 or OSC600), the electropneumatic brake circuit draws approximately 0.5A. The electropneumatic brake for an MMP200 can operate on the 20A circuit for the electric lift motor.
13. Connect boom electrical power to junction box during Stryker installation.
14. During Stryker installation, perform final electrical hard wiring testing and validation for all electrical cables and power outlets, including those on the Stryker-supplied booms.

⚠ **Warning:** Ensure all wiring is properly connected to prevent a fire.

7.3 Isolated Power

1. This product does not include an isolation transformer. If the FLEXiS Service Head is purchased with isolated circuits, it is the responsibility of the customer to supply and install an appropriate isolating transformer or equivalent as well as any other equipment required for the isolated power system, such as a line isolation monitor. Installation of this equipment must be done according to all applicable laws and regulations.
2. Isolated power applies to electrical outlets only, not electric Lift Motor.
3. Isolated power will be indicated in the Electrical Outlet Schedule.

7.4 Video and Data Conduit Requirements

1. All conduits will have insulated bushings.

2. Conduit size and routing will be specified in Stryker rough-in drawings and on the conduit schedule on the CAD drawings.
3. Stryker cable installation only covers cable pulls less than 50’ (15.24m).
4. Any cable runs outside of the Operating Room or over 50’ (15.4m), unless other wise specified, are the responsibility of the Hospital/Contractor to source, supply, pull and install.
5. All conduits must have pull strings in place.
6. All hard conduit must be terminated within 18” (457mm) of the center of the mount.
7. For plenum rated spaces a 8” x 8” x 4” (203 x 203 x 102mm) J-box with flexible conduit to the center of the mount is required.

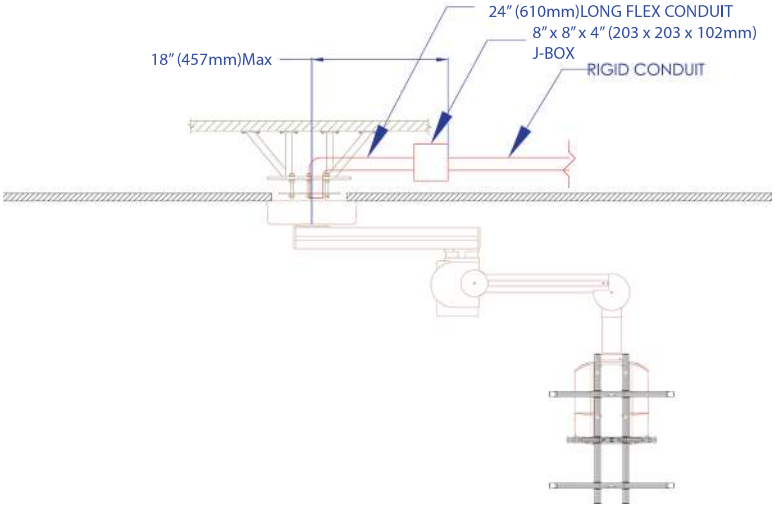


Figure 9. Conduit Requirements for Plenum Rated Specs

8

Medical Gas Responsibility

⚠ **Caution:** Hospital supply pressure on any medical gas, including the brake system, should not exceed 200 psi.

8.1 Gas Part Descriptions

Gas Riser with Check Valve (Stryker-supplied)

Note: Gas Risers are only available in the U.S. and Canada.

Interface between hospital-supplied medical gases and service head gas delivery hoses. Gas risers with check valves are Stryker-supplied and have connectors as per local medical gas standards. Each riser is keyed to specific gas type by means of a DISS style connection. The vacuum and WAGD riser will have a copper cap in lieu of a check valve (see the following figure).

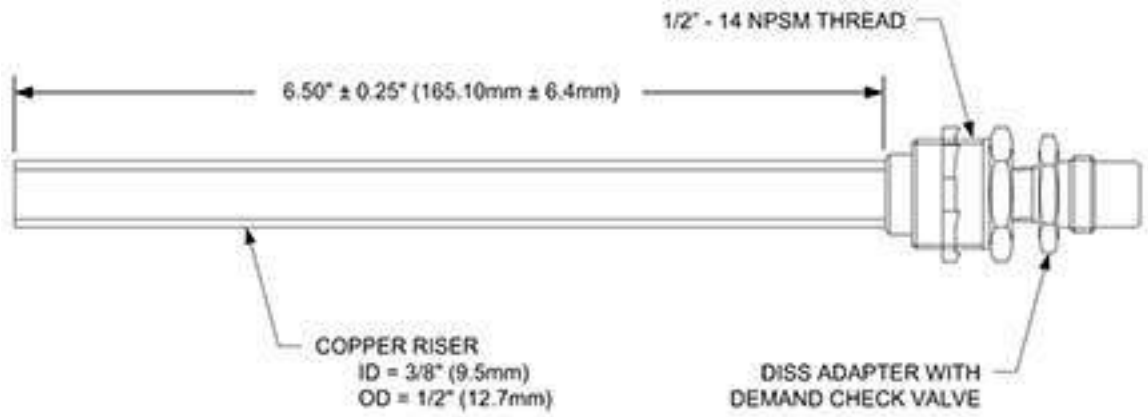


Figure 10. Stryker-supplied Gas Riser with Check Valve

Gas Riser with Check Valve Mounting Bracket (Stryker-supplied)

Bracket that supports check valve and brake regulator assembly (see the following figure).

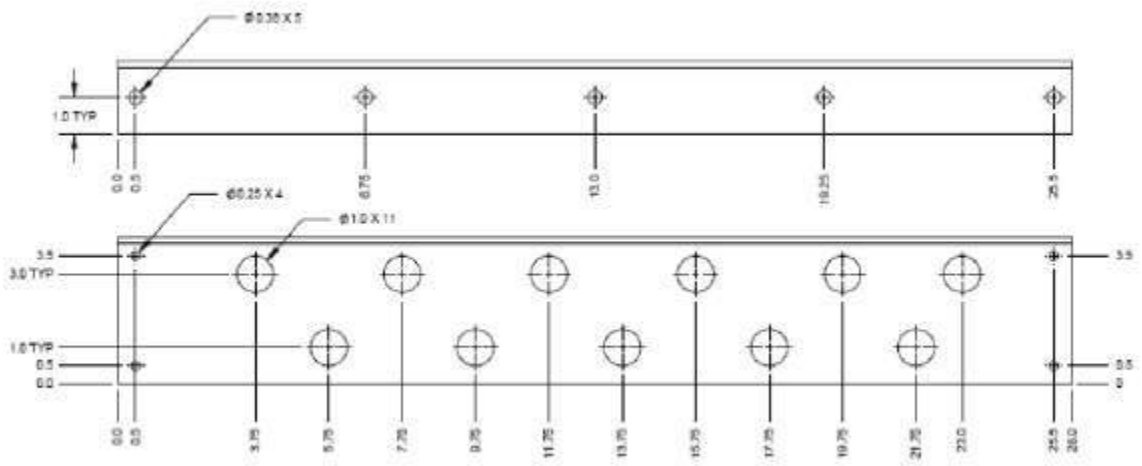


Figure 11. Stryker-supplied Gas Riser with Check Valve Mounting Bracket

Brake Kit

Air pressure regulator, tubing and fittings necessary for controlling braking and boom rotational movement. Stryker-supplied brake system regulator must be mounted with 18” (457mm) of center of the Stryker Mounting (Interface) Plate.

Figure 12. Nitrogen Application

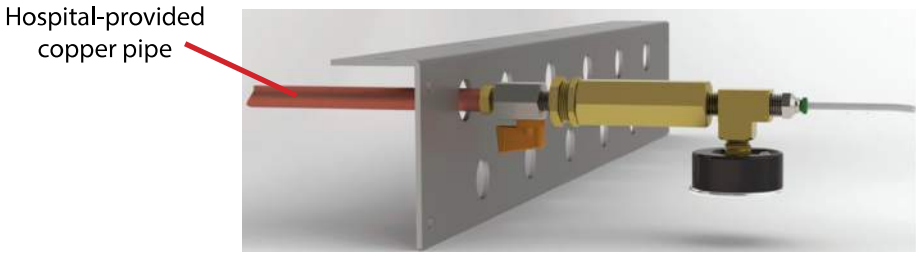


Figure 13. Compressed Air Application

8.2 Med Gas Site Preparations

1. Install gas lines conforming to local gas standards and NFPA99.
2. Purge gas lines prior to installation of brake regulator.

3. Install a minimum of one zone valve per room on the Nitrogen line (or compressed air) dedicated to the boom brakes.

> ⚠ **Caution:**
> - Brake regulator is not intended to be used as a shutoff for the zone valve.
> - It is not recommended to connect WAGD lines to the medical-surgical vacuum system.
> Per NFPA99, flammable and nonflammable gasses are known to be incompatible with some seals and piping using in medical-surgical vacuum systems. If WAGD is to be included as part of the medical-surgical vacuum system, it should be recognized that this activity might cause deterioration of the vacuum system.

Note:

- **Although not recommended, if WAGD is included as part of the medical-surgical vacuum system, the source must comply with NFPA99 section 5.1.3.8.1.2 and a large WAGD hose must be specified in the Stryker booms.**
- **For Passive AGSS systems in Canada, the exhaust flow for a passive AGSS system connected to a Stryker outlet must meet a minimum flow rate of 25 liters per minute at all scavenging points.**
- **Special care should be taken when installing gas risers to the hospital gas lines to ensure the proper riser is connected to the proper gas line. Ensure labeling matches at each connection.**
- **Per NFPA99, this requirement applies to ICU and Exam rooms, as well as Operating Rooms.**

4. Install gas risers with check valves and brake regulator prior to Stryker installation. Please select locations adjacent to the access panel for serviceability and ease of installation. The gauge on the break regulator must be visible and within arm's reach.
5. Attach gas hoses from boom to gas risers with check valves during Stryker installation.
6. Attach gas hoses from boom to brake regulator.

Note: Every gas listed on the gas schedule, from the site specific Stryker drawings, requires a med gas riser. For example, if two vacuums are required then two vacuum risers are required.

8.3 Gas and Air Lines

1. **U.S. and Canada only** - All gas lines must be terminated with (Stryker-supplied) gas risers with check valves and appropriate connectors for interfacing with hoses on boom. The check valves must be attached to a gas mounting bracket, which must be within 18" (457 mm) from the center of each boom Mounting (Interface) Plate to allow for termination with gas hoses in the Stryker boom.
2. Install manifold bracket from ceiling, within 18" (457 mm) of the center of the mounting plate and accessible from the access panel, using contractor-supplied hardware.
   a. Feed rear most gas riser with check valve through manifold bracket. Thread included jam nut onto riser body from backside of bracket and tighten.

b. Solder riser “pigtail” (3/8” [9.5mm] copper tubing) to existing gas line giving careful attention to matching riser type with correct gas type.
c. Attach boom line to gas risers with check valves.
d. Repeat steps a-c for all remaining gas lines, working from rear to front.
e. All gas lines must be cleaned/blown down free of debris prior to connecting gas hoses from the Stryker mounted boom.
f. Ensure that all gas lines are properly labeled by gas type per NFPA 99 (for U.S. only) or appropriate local codes or standards, such as ISO 7396-1.
g. For nitrogen applications, mount the nitrogen DISS to the mounting bracket. For compressed air applications, mount a .25” (6.35mm) male NPT fitting to the mounting bracket and thread the regulator assembly onto the fitting. If space does not allow the regulator to be installed as packaged, a 90° elbow fitting can be purchased/installed to allow for the assembly to accommodate tight space. If necessary for a Classic Service Head, mount regulator assembly to Manifold Bracket, and attach Y-fitting with hose, as shown in Figure 8.2.
h. Make certain regulator gauge face is visible and unobstructed.

8.3.1 For Classic Service Heads

1. Connect compressed air supply to regulator assembly inlet.
   a. Ensure the pipe is purged and a blow down test is conducted prior to installing brake regulator.
   b. Brake regulator is not to be used as a shutoff valve.

> ⚠ **Caution:**
> - Teflon or other types of plumbing tape SHALL NOT be used around the threads of the pipe leading up to the regulator. Only use an oxygen safe pipe joint compound which conforms to NFPA99 (U.S. only), section 5.1.10.4 on the male pipe that threads into the female port.
> - Special care should be paid to ensure cross-threading does not occur when installing the brake regulators. If cross-threading occurs, IMMEDIATELY replace this regulator as leaks are likely.

   c. Prior to pressurizing the boom brake system ensure the regulator is set to 0 psi by adjusting the regulator knob in a counter-clockwise direction until it cannot be adjusted any further.
   d. To continue, *see 8.3.4 For Both Nitrogen and Compressed Air , page 29*.

8.3.2 Nitrogen Supplied Brake Systems

1. Mount the nitrogen riser to the manifold bracket as detailed above in Steps a-c.

> ⚠ **Caution:** Regulator material is aluminum and should not be connected until all hot work is complete.

Note: The brake regulator is pre-adjusted to provide 80 -5/+10 psi, therefore no adjustments to the regulator should be needed.

2. Install the brake regulator in the same manner in which the gas hoses are installed. Thread the DISS connector from the regulator onto the nitrogen riser installed from Step 1 above.

3. Install the Teflon hose into the outlet of the brake regulator by pressing fully into the quick-connect fitting.

Figure 14. Nitrogen Brake Regulator Assembled to Bracket and Riser

4. If the regulator and riser assembly cannot be mounted in the allotted space, Stryker can provide a 900 elbow fitting which increases the regulator mounting options. To install the elbow fitting, thread the female DISS locking nut from the elbow fitting onto the riser. Then attach the regulator to the elbow fitting by threading the female DISS locking nut onto the male DISS on the elbow.

Figure 15. 900 Elbow Fitting

5. To continue, *see 8.3.4 For Both Nitrogen and Compressed Air , page 29*.

8.3.3 Compressed Air Supplied Brake Systems

Note: Stryker does not supply the 1/4 NPT fitting to connect the brake regulator to the supply line.

1. Connect compressed air supply to regulator assembly inlet.
   a. Ensure the pipe is purged and a blow down test is conducted prior to installing brake regulator.
   b. Thread copper pipe fitting onto compressed air regulator at the ball valve inlet.
   c. To continue, *see 8.3.4 For Both Nitrogen and Compressed Air , page 29*.

⚠ **Caution:**

- Take care when applying Teflon or other types of plumbing tape around the threads of the pipe leading up to the regulator. Only use an oxygen safe pipe joint compound which conforms to NFPA99 (U.S. only), section 5.1.10.4 on the male pipe that threads into the female port.
- Special care should be paid to ensure cross-threading does not occur when installing the brake regulators. If cross-threading occurs, IMMEDIATELY replace this regulator as leaks are likely.

8.3.4 For Both Nitrogen and Compressed Air

1. Lines must be pressurized at time of installing for brake testing.
2. Provide Stryker with standing leak test and blow down verification.

   Note: U.S. only - NFPA 5.1.10.4 Threaded Joints. Threaded joints in medical gas and vacuum distribution piping shall meet the following requirements: 1) Be limited to connections to pressure/vacuum indicators, alarm devices, check valves, and source equipment, 2) Be tapered pipe threads complying with ASME B1.20.1, Pipe Threads, General Purpose, Inch, 3) Be made up of polytetrafluoroethylene (such as Teflon) tape or other thread sealant recommended for oxygen service, with the sealant applied to the male threads only

3. Connect the brake tube to regulator, and Y-fitting to the opposite end of the brake tube (*see Nitrogen Application, page 25* and *see Compressed Air Application, page 25*).
4. Ensure that all gas lines are properly labeled according to all applicable regulatory requirements. All gas lines must be labeled to indicate gas type.
5. Test all gas lines to ensure sufficient airflow and pressure/vacuum per NFPA 99 (U. S. only) or other appropriate local code or standard, such as ISO 5359. Ensure that pressurized air for boom brakes is 125-200 psi (862-1380 kPa).

⚠ **Warning:** A final check must be performed to confirm that all gas lines have been connected to the correct, corresponding supply lines.

MMP-200 = EQ Boom
Long Flange =
Spreader tube (bottom tandem)

9

Common Configurations

9.1 Single Configurations

Specification for Non High-Seismic Zone (Regular Flange)									
Model	**Arm-set Lengt-h (mm)**	**Weight (Incl. Payload)**		**Maximum Payload**		**CGx**		**Cgy**	
MMP-200	1800	269 kg	(594 lbs)	150 kg	(331 lbs)	129 cm	(50.9 in)	95 cm	(37.3 in)
	2000	275 kg	(606 lbs)	150 kg	(331 lbs)	144 cm	(56.7 in)	93 cm	(36.7 in)
OSC-400	1000	383 kg	(843 lbs)	320 kg	(705 lbs)	91 cm	(36.0 in)	159 cm	(62.7 in)
	1200	341 kg	(752 lbs)	265 kg	(584 lbs)	104 cm	(40.8 in)	165 cm	(64.9 in)
	1400	300 kg	(660 lbs)	220 kg	(485 lbs)	117 cm	(46.1 in)	158 cm	(62.4 in)
	1600	263 kg	(579 lbs)	180 kg	(397 lbs)	129 cm	(50.7 in)	150 cm	(59.2 in)
	1800	236 kg	(521 lbs)	150 kg	(331 lbs)	139 cm	(54.9 in)	143 cm	(56.1 in)
	2000	219 kg	(484 lbs)	130 kg	(287 lbs)	149 cm	(58.6 in)	136 cm	(53.5 in)
OSC-600	1000	640 kg	(1410 lbs)	551 kg	(1215 lbs)	92 cm	(36.3 in)	141 cm	(55.5 in)
	1200	561 kg	(1236 lbs)	448 kg	(988 lbs)	104 cm	(41.1 in)	156 cm	(61.5 in)
	1400	489 kg	(1079 lbs)	371 kg	(818 lbs)	118 cm	(46.3 in)	150 cm	(59.2 in)

	1600	433 kg	(954 lbs)	313 kg	(690 lbs)	130 cm	(51.1 in)	144 cm	(56.8 in)
	1800	392 kg	(865 lbs)	263 kg	(580 lbs)	141 cm	(55.5 in)	137 cm	(54.1 in)
	2000	358 kg	(789 lbs)	223 kg	(492 lbs)	150 cm	(59.0 in)	130 cm	(51.2 in)

Specification for Non High-Seismic Zone (Long Flange)									
Model	**Arm-set Lengt-h (mm)**	**Weight (Incl. Payload)**		**Maximum Payload**		**CGx**		**Cgy**	
MMP-200	1800	274 kg	(604 lbs)	150 kg	(331 lbs)	127 cm	(50.0 in)	107 cm	(42.0 in)
	2000	279 kg	(616 lbs)	150 kg	(331 lbs)	142 cm	(55.8 in)	105 cm	(41.4 in)
OSC-400	1000	384 kg	(846 lbs)	320 kg	(705 lbs)	91 cm	(35.9 in)	163 cm	(64.1 in)
	1200	342 kg	(755 lbs)	265 kg	(584 lbs)	103 cm	(40.7 in)	168 cm	(66.3 in)
	1400	301 kg	(663 lbs)	220 kg	(485 lbs)	117 cm	(46.0 in)	162 cm	(63.7 in)
	1600	264 kg	(582 lbs)	180 kg	(397 lbs)	128 cm	(50.5 in)	154 cm	(60.6 in)
	1800	237 kg	(523 lbs)	150 kg	(331 lbs)	139 cm	(54.7 in)	146 cm	(57.4 in)
	2000	220 kg	(486 lbs)	130 kg	(287 lbs)	148 cm	(58.3 in)	139 cm	(54.8 in)
OSC-600	1000	640 kg	(1410 lbs)	551 kg	(1215 lbs)	92 cm	(36.3 in)	157 cm	(61.9 in)
	1200	561 kg	(1236 lbs)	448 kg	(988 lbs)	104 cm	(41.1 in)	172 cm	(67.7 in)
	1400	489 kg	(1079 lbs)	371 kg	(818 lbs)	118 cm	(46.3 in)	166 cm	(65.3 in)

Specification for Non High-Seismic Zone (Long Flange)									
Model	**Arm-set Lengt-h (mm)**	**Weight (Incl. Payload)**		**Maximum Payload**		**CGx**		**Cgy**	
	1600	437 kg	(963 lbs)	313 kg	(690 lbs)	130 cm	(51.1 in)	160 cm	(62.9 in)
	1800	392 kg	(865 lbs)	263 kg	(580 lbs)	141 cm	(55.5 in)	152 cm	(59.9 in)
	2000	358 kg	(789 lbs)	223 kg	(492 lbs)	150 cm	(59.0 in)	145 cm	(57.1 in)

Specification for High-Seismic Zone (Regular Flange)									
Model	**Arm-set Lengt-h (mm)**	**Weight (Incl. Payload)**		**Maximum Payload**		**CGx**		**Cgy**	
MMP-200	1800	269 kg	(594 lbs)	150 kg	(331 lbs)	129 cm	(50.9 in)	95 cm	(37.3 in)
	2000	275 kg	(606 lbs)	150 kg	(331 lbs)	144 cm	(56.7 in)	93 cm	(36.7 in)
OSC-400	1000	383 kg	(843 lbs)	320 kg	(705 lbs)	91 cm	(36.0 in)	159 cm	(62.7 in)
	1200	341 kg	(752 lbs)	265 kg	(584 lbs)	104 cm	(40.8 in)	165 cm	(64.9 in)
	1400	300 kg	(660 lbs)	220 kg	(485 lbs)	117 cm	(46.1 in)	158 cm	(62.4 in)
	1600	263 kg	(579 lbs)	180 kg	(397 lbs)	129 cm	(50.7 in)	150 cm	(59.2 in)
	1800	236 kg	(521 lbs)	150 kg	(331 lbs)	139 cm	(54.9 in)	143 cm	(56.1 in)
	2000	219 kg	(484 lbs)	130 kg	(287 lbs)	149 cm	(58.6 in)	136 cm	(53.5 in)
OSC-600	1000	400 kg	(882 lbs)	316 kg	(697 lbs)	89 cm	(34.9 in)	131 cm	(51.5 in)

	1200	378 kg	(834 lbs)	270 kg	(595 lbs)	98 cm	(38.7 in)	143 cm	(56.2 in)
	1400	378 kg	(832 lbs)	264 kg	(582 lbs)	113 cm	(44.4 in)	141 cm	(55.3 in)
	1600	377 kg	(831 lbs)	258 kg	(569 lbs)	127 cm	(50.0 in)	138 cm	(54.5 in)
	1800	378 kg	(832 lbs)	253 kg	(558 lbs)	141 cm	(55.5 in)	136 cm	(53.6 in)
	2000	353 kg	(778 lbs)	223 kg	(492 lbs)	152 cm	(59.7 in)	130 cm	(51.2 in)

Specification for High-Seismic Zone (Long Flange)									
Model	**Arm-set Lengt-h (mm)**	**Weight (Incl. Payload)**		**Maximum Payload**		**CGx**		**Cgy**	
MMP-200	1800	274 kg	(604 lbs)	150 kg	(331 lbs)	127 cm	(50.0 in)	107 cm	(42.0 in)
	2000	279 kg	(616 lbs)	150 kg	(331 lbs)	142 cm	(55.8 in)	105 cm	(41.4 in)
OSC-400	1000	384 kg	(846 lbs)	320 kg	(705 lbs)	91 cm	(35.9 in)	163 cm	(64.1 in)
	1200	342 kg	(755 lbs)	265 kg	(584 lbs)	103 cm	(40.7 in)	168 cm	(66.3 in)
	1400	301 kg	(663 lbs)	220 kg	(485 lbs)	117 cm	(45.9 in)	162 cm	(63.7 in)
	1600	298 kg	(656 lbs)	180 kg	(397 lbs)	128 cm	(50.5 in)	154 cm	(60.6 in)
	1800	264 kg	(582 lbs)	150 kg	(331 lbs)	139 cm	(54.7 in)	146 cm	(57.4 in)
	2000	220 kg	(486 lbs)	130 kg	(287 lbs)	148 cm	(58.3 in)	139 cm	(54.8 in)
OSC-600	1000	405 kg	(892 lbs)	316 kg	(697 lbs)	88 cm	(34.5 in)	146 cm	(57.5 in)

	1200	383 kg	(844 lbs)	270 kg	(595 lbs)	97 cm	(38.2 in)	158 cm	(62.1 in)
	1400	382 kg	(843 lbs)	264 kg	(582 lbs)	111 cm	(43.9 in)	156 cm	(61.2 in)
	1600	382 kg	(842 lbs)	258 kg	(569 lbs)	125 cm	(49.4 in)	153 cm	(60.4 in)
	1800	382 kg	(843 lbs)	253 kg	(558 lbs)	139 cm	(54.9 in)	151 cm	(59.4 in)
	2000	358 kg	(789 lbs)	223 kg	(492 lbs)	150 cm	(59.0 in)	145 cm	(57.1 in)

* Long Flange is 1 inch +/- longer than Regular Flange for OSC 400 boom. Long Flange is 2 inches +/- longer than Regular Flange for OSC 600 and MMP boom.

** Where applicable, Arm Angle for High Seismic Zones is a minimum angle at which the armset has to be placed to ensure product safety in the field when installed in areas susceptible to high seismic activity.

9.2 Tandem Configurations

Mount 1	Mount 2	Weight	X	Y
TANDEM				
OSC400	OSC400	1688 lbs (766 kg)	35.9" (91.2 cm)	62.2" (158 cm)
	OSC600	1704 lbs (773 kg)	41.1" (104.4 cm)	58.3" (148.1 cm)
	SINGLE HALOGEN	957 lbs (434 kg)	40.8" (103.7 cm)	59.6" (151.3 cm)
	DUAL HALOGEN	1023 lbs (464 kg)	40.5" (103 cm)	58.7" (149 cm)
	TRIPLE HALOGEN	1090 lbs (494 kg)	40.5" (103 cm)	58.1" (147.6 cm)
	SINGLE LED	975 lbs (442 kg)	40.3" (102.4 cm)	61" (154.8 cm)
	DUAL LED	1048 lbs (475 kg)	40.6" (103.1 cm)	62.1" (157.7 cm)
	TRIPLE LED	1126 lbs (511 kg)	41.5" (105.3 cm)	63" (160 cm)

Mount 1	Mount 2	Weight	X	Y
TANDEM				
	SINGLE FLAT PANEL ARM	1028 lbs (466 kg)	39.1" (99.2 cm)	59.1" (150.2 cm)
	DUAL FLAT PANEL ARM	1058 lbs (480 kg)	39.1" (99.2 cm)	59.5" (151.2 cm)
	SINGLE HYBRID	1006 lbs (456 kg)	43.5" (110.4 cm)	60.8" (154.4 cm)
	DUAL HYBRID	1112 lbs (504 kg)	46.5" (118 cm)	61.8" (157 cm)
OSC600	OSC600	1720 lbs (780 kg)	46.3" (117.6 cm)	54.4" (138.2 cm)
	SINGLE HALOGEN	973 lbs (441 kg)	50.1" (127.1 cm)	52.7" (133.9 cm)
	DUAL HALOGEN	1039 lbs (471 kg)	49.2" (124.9 cm)	52.3" (132.7 cm)
	TRIPLE HALOGEN	1106 lbs (502 kg)	48.6" (123.5 cm)	52.1" (132.3 cm)
	SINGLE LED	991 lbs (450 kg)	49.4" (125.4 cm)	54.2" (137.7 cm)
	DUAL LED	1064 lbs (483 kg)	49" (124.5 cm)	55.8" (141.7 cm)
	TRIPLE LED	1142 lbs (518 kg)	49.3" (125.3 cm)	57.1" (145.1 cm)
	SINGLE FLAT PANEL ARM	1044 lbs (474 kg)	47.7" (121.1 cm)	52.7" (134 cm)
	DUAL FLAT PANEL ARM	1074 lbs (487 kg)	47.4" (120.5 cm)	53.3" (135.4 cm)
	SINGLE HYBRID	1022 lbs (464 kg)	52.2" (132.6 cm)	54.2" (137.7 cm)
	DUAL HYBRID	1128 lbs (512 kg)	54.3' (138 cm)	55.9" (142 cm)
MMP200	OSC400	1459 lbs (662 kg)	43.3" (110 cm)	57" (144.7 cm)

Mount 1	Mount 2	Weight	X	Y
TANDEM				
	OSC600	1475 lbs (669 kg)	49.2" (125 cm)	52.5" (133.4 cm)
	MMP200	1230 lbs (558 kg)	55.8" (141.7 cm)	49.8" (126.5 cm)
	SINGLE HALOGEN	728 lbs (330 kg)	57.2" (145.4 cm)	48.3" (122.6 cm)
	DUAL HALOGEN	794 lbs (360 kg)	55.5" (140.9 cm)	48" (122 cm)
	TRIPLE HALOGEN	861 lbs (391 kg)	54.3" (137.8 cm)	48.1" (122.3 cm)
	SINGLE LED	746 lbs (338 kg)	56.1" (142.6 cm)	50.4" (127.9 cm)
	DUAL LED	819 lbs (371 kg)	55.1" (139.9 cm)	52.7" (134 cm)
	TRIPLE LED	897 lbs (407 kg)	54.9" (139.5 cm)	54.7" (138.9 cm)
	SINGLE FLAT PANEL ARM	799 lbs (362 kg)	53.5" (135.9 cm)	48.7" (123.7 cm)
	DUAL FLAT PANEL ARM	829 lbs (376 kg)	53" (134.5 cm)	49.6" (126 cm)
	SINGLE HYBRID	777 lbs (352 kg)	59.6" (151.3 cm)	50.5" (128.3 cm)
	DUAL HYBRID	883 lbs (401 kg)	61.4" (156 cm)	53.1" (134.9 cm)
SINGLE FLAT PANEL ARM	SINGLE FLAT PANEL ARM	368 lbs (167 kg)	31" (78.7 cm)	45" (114.3 cm)
	DUAL FLAT PANEL ARM	398 lbs (181 kg)	31.6" (80.3 cm)	47.2" (119.8 cm)
	SINGLE HYBRID	346 lbs (157 kg)	43.2" (109.8 cm)	48.8" (124.1 cm)
	DUAL HYBRID	452 lbs (205 kg)	50.7" (128.8 cm)	54.3" (137.9 cm)

Mount 1	Mount 2	Weight	X	Y
TANDEM				
DUAL FLAT PANEL ARM	SINGLE HALOGEN	327 lbs (148 kg)	36.3" (92.3 cm)	45.9" (116.6 cm)
	DUAL HALOGEN	393 lbs (178 kg)	36.3" (92.3 cm)	45.8" (116.4 cm)
	TRIPLE HALOGEN	460 lbs (209 kg)	36.8" (93.6 cm)	46.3" (117.7 cm)
	SINGLE LED	345 lbs (156 kg)	35" (89 cm)	50.5" (128.3 cm)
	DUAL LED	418 lbs (190 kg)	36.7" (93.1 cm)	55.1" (140.1 cm)
	TRIPLE LED	496 lbs (225 kg)	39.3" (99.8 cm)	58.3" (148.1 cm)
	DUAL FLAT PANEL ARM	428 lbs (194 kg)	33" (83.8 cm)	49" (124.5 cm)
	SINGLE HYBRID	376 lbs (171 kg)	43.9" (111.5 cm)	50.8" (129.1 cm)
	DUAL HYBRID	482 lbs (219 kg)	50.8" (128.9 cm)	55.5" (141 cm)
SINGLE HALOGEN	SINGLE HALOGEN	226 lbs (103 kg)	37" (94 cm)	40" (101.6 cm)
	DUAL HALOGEN	292 lbs (132 kg)	36.8" (93.5 cm)	41.2" (104.7 cm)
	TRIPLE HALOGEN	359 lbs (163 kg)	37.4" (95 cm)	42.7" (108.6 cm)
	SINGLE FLAT PANEL ARM	297 lbs (135 kg)	31.8" (80.7 cm)	43.1" (109.5 cm)
	SINGLE HYBRID	275 lbs (125 kg)	47.2" (120 cm)	47.8" (121.4 cm)
	DUAL HYBRID	381 lbs (173 kg)	55" (139.6 cm)	54.6" (138.7 cm)
DUAL HALOGEN	DUAL HALOGEN	358 lbs (162 kg)	39" (99.1 cm)	42" (106.7 cm)

Mount 1	Mount 2	Weight	X	Y
TANDEM				
	TRIPLE HALOGEN	425 lbs (193 kg)	39.2" (99.5 cm)	43.2" (109.6 cm)
	SINGLE FLAT PANEL ARM	363 lbs (165 kg)	34.9" (88.5 cm)	43.5" (110.5 cm)
	SINGLE HYBRID	341 lbs (155 kg)	47.5" (120.7 cm)	47.3" (120.2 cm)
	DUAL HYBRID	447 lbs (203 kg)	54.1" (137.3 cm)	53.2" (135.2 cm)
TRIPLE HALOGEN	TRIPLE HALOGEN	492 lbs (223 kg)	41" (104.1 cm)	44" (111.8 cm)
	SINGLE FLAT PANEL ARM	430 lbs (195 kg)	37.6" (95.6 cm)	44.4" (112.8 cm)
	SINGLE HYBRID	408 lbs (185 kg)	48.4" (122.9 cm)	47.7" (121.2 cm)
	DUAL HYBRID	514 lbs (233 kg)	53.9" (136.8 cm)	52.7" (133.9 cm)
SINGLE LED	SINGLE LED	262 lbs (119 kg)	34.4" (87.4 cm)	53" (134.6 cm)
	DUAL LED	335 lbs (152 kg)	36.6 (92.9 cm)	58.2" (147.9 cm)
	TRIPLE LED	413 lbs (187 kg)	39.7" (100.9 cm)	61.5" (156.1 cm)
	SINGLE FLAT PANEL ARM	315 lbs (143 kg)	31.4" (79.6 cm)	48.3" (122.7 cm)
	SINGLE HYBRID	293 lbs (133 kg)	45.8" (116.4 cm)	53.1" (134.9 cm)
	DUAL HYBRID	399 lbs (181 kg)	53.6" (136.1 cm)	58.2" (147.8 cm)
DUAL LED	DUAL LED	408 lbs (185 kg)	40.2" (102.1 cm)	61.6" (156.5 cm)
	TRIPLE LED	486 lbs (220 kg)	42.3" (107.5 cm)	63.8" (162.1 cm)

Mount 1	Mount 2	Weight	X	Y
TANDEM				
	SINGLE FLAT PANEL ARM	388 lbs (176 kg)	36.2" (91.9 cm)	53.7" (136.4 cm)
	SINGLE HYBRID	366 lbs (166 kg)	48" (122 cm)	57.9" (147.1 cm)
	DUAL HYBRID	472 lbs (214 kg)	54.1" (137.4 cm)	61.1" (155.2 cm)
TRIPLE LED	TRIPLE LED	564 lbs (256 kg)	45.6" (115.8 cm)	65.4" (166.1 cm)
	SINGLE FLAT PANEL ARM	466 lbs (211 kg)	41.2" (104.5 cm)	57.3" (145.7 cm)
	SINGLE HYBRID	444 lbs (201 kg)	51.2" (130.1 cm)	60.9" (154.8 cm)
	DUAL HYBRID	550 lbs (249 kg)	55.8" (141.7 cm)	63.1" (160.3 cm)
SINGLE HYBRID	SINGLE HYBRID	324 lbs (147 kg)	56.3" (143 cm)	53.2" (135.1 cm)
	DUAL HYBRID	430 lbs (195 kg)	60.9" (154.7 cm)	57.9" (147 cm)
DUAL HYBRID	DUAL HYBRID	536 lbs (243 kg)	66.2" (168.1 cm)	60.7" (154.2 cm)

10

Seismic Calculations Single

EASE — EQUIPMENT ANCHORAGE & SEISMIC ENGINEERING
www.EquipmentAnchorage.com

STRYKER COMMUNICATIONS

ARTICULATING BOOM (MMP-200)

DES. J. ROBERSON
JOB NO. 11-1510
DATE 1/18/16
SHEET 1 OF 3 SHEETS

SEISMIC ANCHORAGE

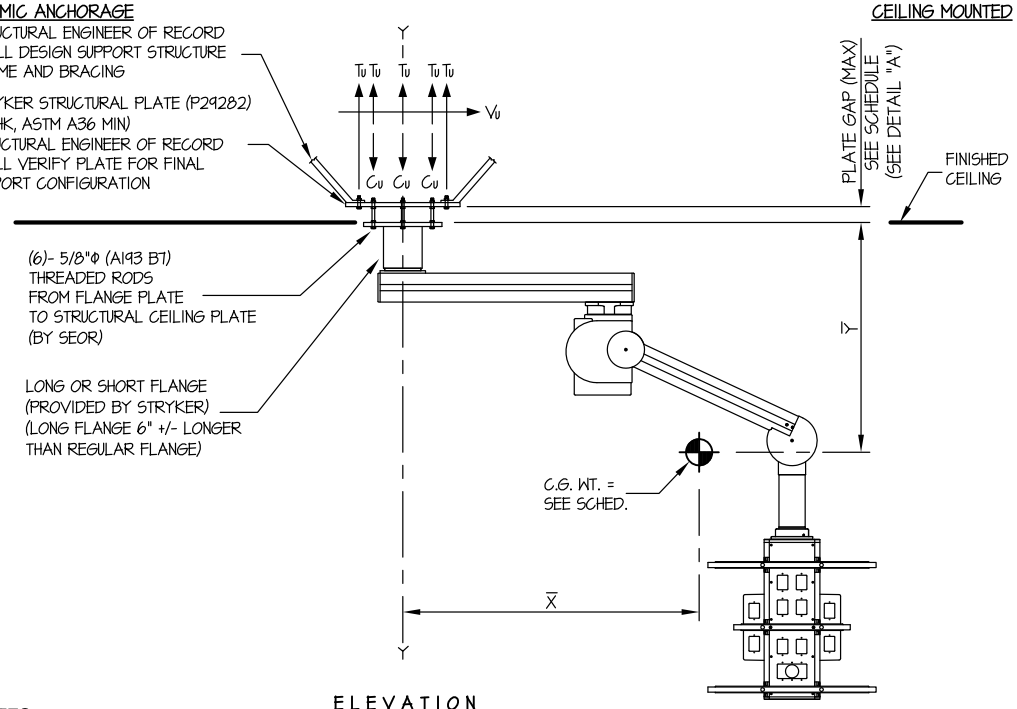
STRUCTURAL ENGINEER OF RECORD SHALL DESIGN SUPPORT STRUCTURE FRAME AND BRACING

STRYKER STRUCTURAL PLATE (P29282) (1" THK, ASTM A36 MIN) STRUCTURAL ENGINEER OF RECORD SHALL VERIFY PLATE FOR FINAL SUPPORT CONFIGURATION

(6)- 5/8"Φ (A193 B7) THREADED RODS FROM FLANGE PLATE TO STRUCTURAL CEILING PLATE (BY SEOR)

LONG OR SHORT FLANGE (PROVIDED BY STRYKER) (LONG FLANGE 6" +/- LONGER THAN REGULAR FLANGE)

CEILING MOUNTED



ELEVATION

NOTES:

1. **FORCES ARE DETERMINED PER 2013 CALIFORNIA BUILDING CODE AND ASCE 7-10.**
   STRENGTH DESIGN IS USED. (S_{DS} = 2.00, a_p = 2.5, I_p = 2.5, R_p = 2.5, z/h ≤ 1)

   HORIZONTAL FORCE (E_h) = 3.60 W_p
   VERTICAL FORCE (E_v) = 0.40 W_p
2. CENTER OF GRAVITY (C.G.) AND WEIGHT ARE THE GOVERNING PARAMETERS FOR DESIGN. THESE CALCULATIONS ENCOMPASS ALL WEIGHTS UP TO THE MAXIMUM WEIGHT SHOWN.
3. STRUCTURAL ENGINEER OF RECORD (SEOR) FOR THE BUILDING SHALL PROVIDE SUPPORT STRUCTURE DESIGNED TO SUPPORT WEIGHTS AND FORCES SHOWN IN COMBINATION WITH ALL OTHER LOADS THAT MAY BE PRESENT.
4. CALCULATIONS BASED ON WORST CASE OF ASSUMED DROP TUBE OF 450mm LONG.

REGISTERED PROFESSIONAL ENGINEER
JONATHAN ROBERSON
No. 4197
EXP. 6-30-2016
1/18/16
STRUCTURAL
STATE OF CALIFORNIA

NOT FOR CONSTRUCTION

STRYKER COMMUNICATIONS

ARTICULATING BOOM (MMP-200)

DES. J. ROBERSON
JOB NO. 11-1510
DATE 1/18/16
SHEET 2 OF 3 SHEETS

SEISMIC ANCHORAGE — CEILING MOUNTED

REGULAR FLANGE

MODEL	GAP	TOTAL LOAD (LB.)	$\bar{X}$ (in.)	$\bar{Y}$ (in.)	Tu (lb.)	Cu (lb.)	Vu (lb.)	MOMENT (Mxx) (IN-LB)	MOMENT (Myy) (IN-LB)
800mm/1000mm	5	593	50.9	37.3	8,824	8,617	482	138,594	4,008
1000mm/1000nn	4.75	606.3	56.7	36.7	9,261	9,049	504	145,516	4,465

NOTES: 1) TOTAL LOAD IS MAXIMUM WEIGHT OF EQUIPMENT AND CONTENTS ADDRESSED BY THIS CALCULATION
2) $\bar{Y}$ IS MEASURED FROM CG TO TOP OF FLANGE PLATE.

LONG FLANGE

MODEL	GAP	TOTAL LOAD (LB.)	$\bar{X}$ (in.)	$\bar{Y}$ (in.)	Tu (lb.)	Cu (lb.)	Vu (lb.)	MOMENT (Mxx) (IN-LB)	MOMENT (Myy) (IN-LB)
800mm/1000mm	4.75	604.1	50.0	42.0	9,542	9,331	486	150,027	3,938
* 1000mm/1000nn	4.50	615.1	55.8	41.4	9,952	9,737	507	156,536	4,394

NOTES: 1) TOTAL LOAD IS MAXIMUM WEIGHT OF EQUIPMENT AND CONTENTS ADDRESSED BY THIS CALCULATION
2) $\bar{Y}$ IS MEASURED FROM CG TO TOP OF FLANGE PLATE.
3) * THIS MODEL IS REPRESENTED IN THE CALCULATION PROVIDED

EASE

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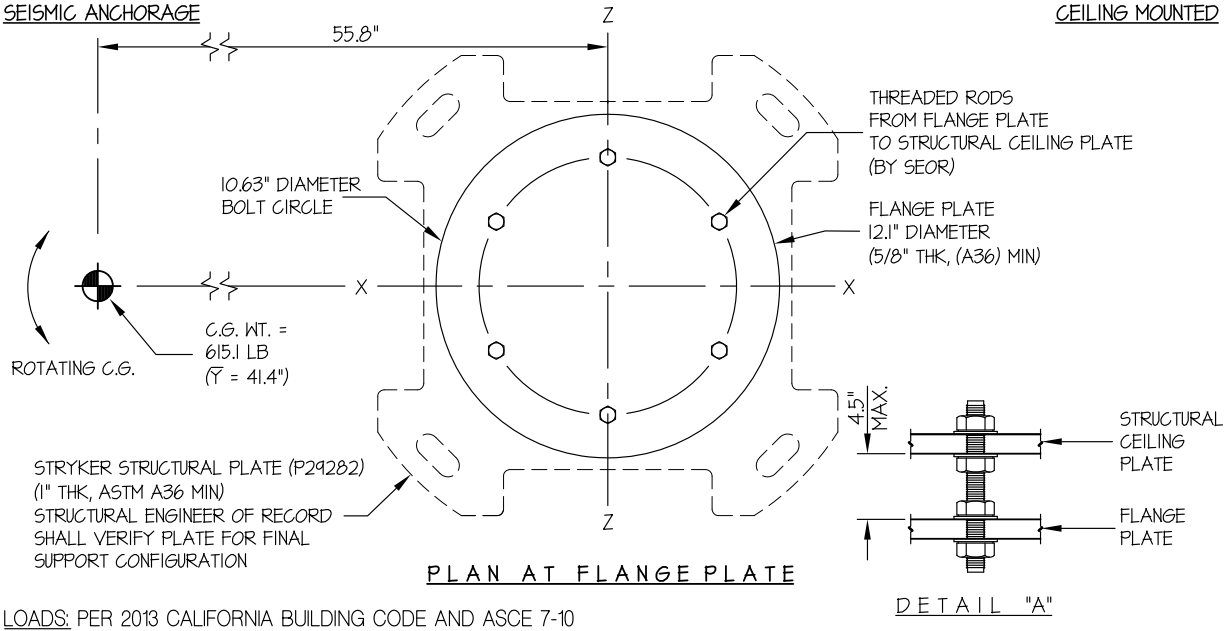
STRYKER COMMUNICATIONS

ARTICULATING BOOM (MMP-200)

DES.	J. ROBERSON
JOB NO.	11-1510
DATE	1/18/16

SHEET 3 OF 3 SHEETS

SEISMIC ANCHORAGE — CEILING MOUNTED



PLAN AT FLANGE PLATE

DETAIL "A"

LOADS: PER 2013 CALIFORNIA BUILDING CODE AND ASCE 7-10
STRENGTH DESIGN IS USED (S_{DS} = 2.00, a_p = 2.5, I_p = 1.5, R_p = 2.5, z/h ≤ 1.0)

WEIGHT = 615.1 LB
HORIZONTAL FORCE (E_h) = 3.60W_p = 2214 LB
VERTICAL FORCE (E_v) = 0.40W_p = 246 LB

BOLT FORCES:

TENSION (T)

$$T_U = \frac{156536"\#(5.315")}{85} + \frac{1.2(615.1\#) + 246\#}{6 \text{ BOLTS}} = 9952 \text{ LB/BOLT (MAX)}$$

COMPRESSION (C)

$$C_U = \frac{156536"\#(5.315")}{85} - \frac{(615.1\#)(0.9) - 246\#}{6 \text{ BOLTS}} = 9737 \text{ LB/BOLT (MAX)}$$

SHEAR (V)

$$V_U = \frac{2214\#}{6 \text{ BOLTS}} + \frac{(4394"\#)(5.315")}{169} = 507 \text{ LB/BOLT (MAX)}$$

(PER AISC J3.7, LESS THAN 20% STRESS)

BENDING (M)

M_U = 507#(3.625"/2) = 919"-#

COMBINED STRESS CHECK:

COMPRESSION: $\frac{C}{C_{STR}} + \frac{8}{9}\left(\frac{M}{M_{STR}}\right)$ = 0.91 < 1.00 ∴ OK

TENSION: $\frac{T}{T_{STR}} + \frac{8}{9}\left(\frac{M}{M_{STR}}\right)$ = 0.82 < 1.00 ∴ OK

MOMENTS:

M_{XX} = 2214#(45.9") + (1.2(615.1#) + 246#)55.80" = 156,536"#
M_{ZZ} = 2214#(45.9") + (1.2(615.1#) + 246#)55.80" = 156,536"#
M_{YY} = 78.75#(55.8") = 4394"#

NOTE: Unit is free to rotate around Y-Y axis. Braking system releases with applied load of 19.69 lb at cg location. Calculation uses 78.75# for a safety factor of 4.

BOLT GROUP PROPERTIES:

I_{x-x} = 85 $in.^4$
I_{z-z} = 85 $in.^4$
I_{y-y} = 169 $in.^4$

BOLT PROPERTIES:

F_y = 105 ksi : F_U = 125 KSI, d = .527" Φ = 0.90
$Z = d^3/6 = (.527)^3/6$ = .0244 $in.^3$
A = 0.2181 $in.^2$, A_b = 0.307 $in.^2$
r = 0.1318 in.
KL/r = 1.2(3.625")/0.1318 = 33.0
M_n = 105 ksi (.0244$in.^3$) = 2562"-#

$M_{STR} = \Phi M_n$ = 0.90(2562"-#) = 2306"-#
T_{STR} = 21,585 lb. (AISC Eq J3-2)
C_{STR} = 17,430 lb. (AISC Eq E3-1)

EASE

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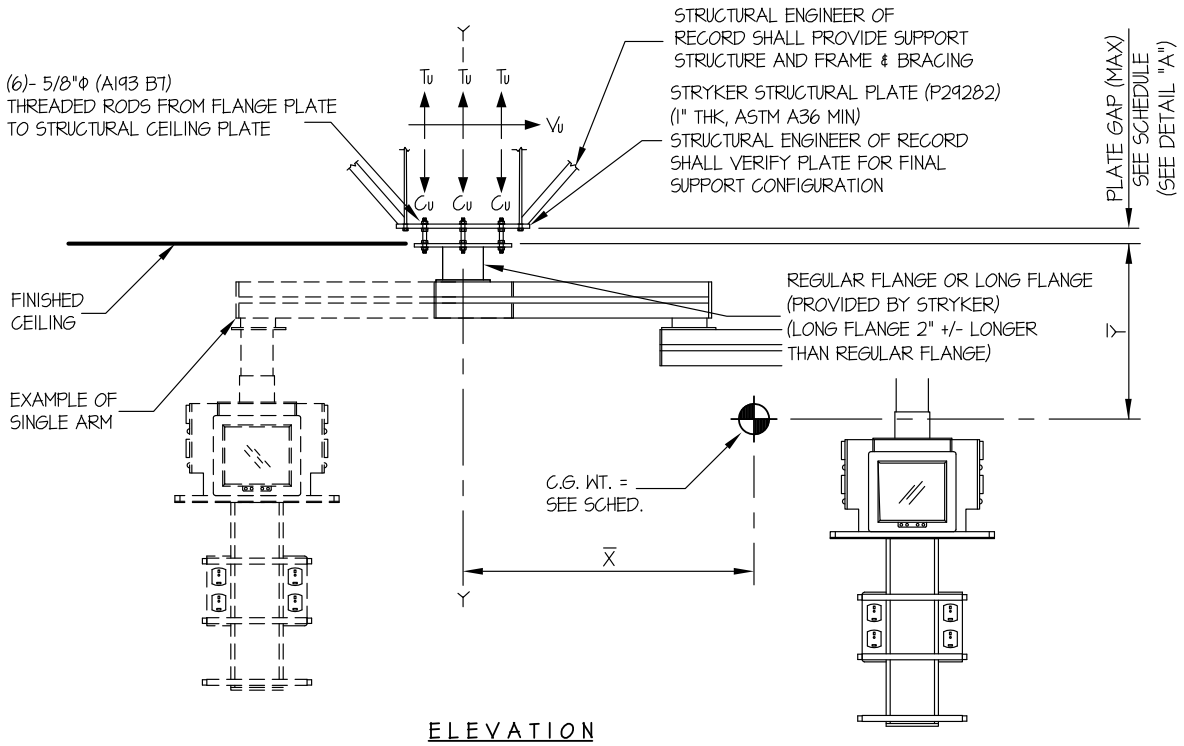
STRYKER COMMUNICATIONS

400 SERIES SERVICE ARM

DES.	J. ROBERSON
JOB NO.	11-1510
DATE	1/29/16

SHEET 1 OF 4 SHEETS

SEISMIC ANCHORAGE — CEILING MOUNTED



ELEVATION

NOTES:

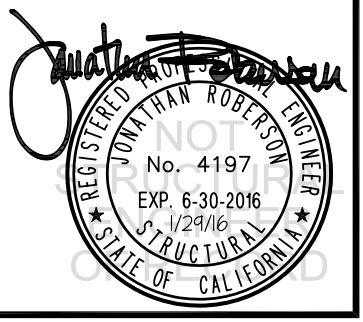
1. **FORCES ARE DETERMINED PER 2013 CALIFORNIA BUILDING CODE AND ASCE 7-10.**
   STRENGTH DESIGN IS USED. (S_{DS} = 2.00, a_p = 2.5, I_p = 1.5, R_p = 2.5, z/h ≤ 1)

   HORIZONTAL FORCE (E_h) = 3.60 W_p
   VERTICAL FORCE (E_v) = 0.40 W_p

2. CENTER OF GRAVITY (C.G.) AND WEIGHT ARE THE GOVERNING PARAMETERS FOR DESIGN. THESE CALCULTAIONS ENCOMPASS ALL WEIGHTS UP TO THE MAXIMUM WEIGHT SHOWN.

3. STRUCTURAL ENGINEER OF RECORD (SEOR) FOR THE BUILDING SHALL PROVIDE SUPPORT STRUCTURE DESIGNED TO SUPPORT WEIGHTS AND FORCES SHOWN IN COMBINATION WITH ALL OTHER LOADS THAT MAY BE PRESENT.

4. CALCULATIONS BASED ON WORST CASE OF ASSUMED DROP TUBE OF 1200mm LONG.



NOT STRUCTURALLY CONSIDERED

STRYKER COMMUNICATIONS

400 SERIES SERVICE ARM

DES. J. ROBERSON
JOB NO. 11-1510
DATE 1/29/16
SHEET 2 OF 4 SHEETS

SEISMIC ANCHORAGE — CEILING MOUNTED

REGULAR FLANGE

	MODEL (ARM LENGTH)	PLATE GAP (in.)	TOTAL LOAD (LB.)	$\bar{X}$ (in.)	$\bar{Y}$ (in.)	Tu (lb.)	Cu (lb.)	Vu (lb.)	MOMENT (Mxx) (IN-LB)	MOMENT (Myy) (IN-LB)
*	DOUBLE ARM (600 mm / 600 mm)	2.50	751.8	40.8	64.9	14,674	14,411	560	231,473	3,460
	DOUBLE ARM (600 mm / 800 mm)	3.25	661.4	46.1	62.4	13,002	12,771	520	205,118	3,909
	DOUBLE ARM (800 mm / 600 mm)	3.50	654.8	46.2	62.1	12,354	12,125	516	194,776	3,918
	DOUBLE ARM (800 mm / 800 mm)	4.00	579.8	50.7	59.3	11,200	10,997	483	176,640	4,299
	DOUBLE ARM (800 mm / 1000 mm)	4.50	520.3	54.6	56.2	10,253	10,071	458	161,760	4,630
	DOUBLE ARM (1000 mm / 800 mm)	4.50	520.3	54.9	56.1	10,269	10,087	459	162,010	4,656
	DOUBLE ARM (1000 mm / 1000 mm)	4.75	482.8	58.6	53.5	9,708	9,539	446	153,190	4,969
	SINGLE ARM (1000 mm)	2.25	844.4	36.0	62.8	15,063	14,767	602	237,289	3,053

NOTES: 1) TOTAL LOAD IS MAXIMUM WEIGHT OF EQUIPMENT AND CONTENTS ADDRESSED BY THIS CALCULATION
2) $\bar{Y}$ IS MEASURED FROM CG TO TOP OF FLANGE PLATE.
3) * THIS MODEL IS REPRESENTED IN THE CALCULATION PROVIDED

LONG FLANGE

	MODEL (ARM LENGTH)	PLATE GAP (in.)	TOTAL LOAD (LB.)	$\bar{X}$ (in.)	$\bar{Y}$ (in.)	Tu (lb.)	Cu (lb.)	Vu (lb.)	MOMENT (Mxx) (IN-LB)	MOMENT (Myy) (IN-LB)
*	DOUBLE ARM (600 mm / 600 mm)	2.50	754.0	40.7	66.3	14,948	14,684	561	235,840	3,451
	DOUBLE ARM (600 mm / 800 mm)	3.00	663.6	45.9	63.7	13,187	12,955	521	208,061	3,892
	DOUBLE ARM (800 mm / 600 mm)	3.25	657.0	46.0	63.5	13,071	12,841	517	206,228	3,901
	DOUBLE ARM (800 mm / 800 mm)	3.75	582.0	50.5	60.6	11,526	11,322	484	181,849	4,282
	DOUBLE ARM (800 mm / 1000 mm)	4.50	522.5	54.4	57.5	10,275	10,092	459	162,100	4,613
	DOUBLE ARM (1000 mm / 800 mm)	4.50	522.5	54.7	57.4	10,279	10,096	459	162,163	4,639
	DOUBLE ARM (1000 mm / 1000 mm)	4.75	485.0	58.3	54.8	9,460	9,290	446	149,215	4,944
	SINGLE ARM (1000 mm)	2.00	846.6	35.9	64.1	15,865	15,569	604	250,114	3,044

NOTES: 1) TOTAL LOAD IS MAXIMUM WEIGHT OF EQUIPMENT AND CONTENTS ADDRESSED BY THIS CALCULATION
2) $\bar{Y}$ IS MEASURED FROM CG TO TOP OF FLANGE PLATE.
3) * THIS MODEL IS REPRESENTED IN THE CALCULATION PROVIDED

EASE

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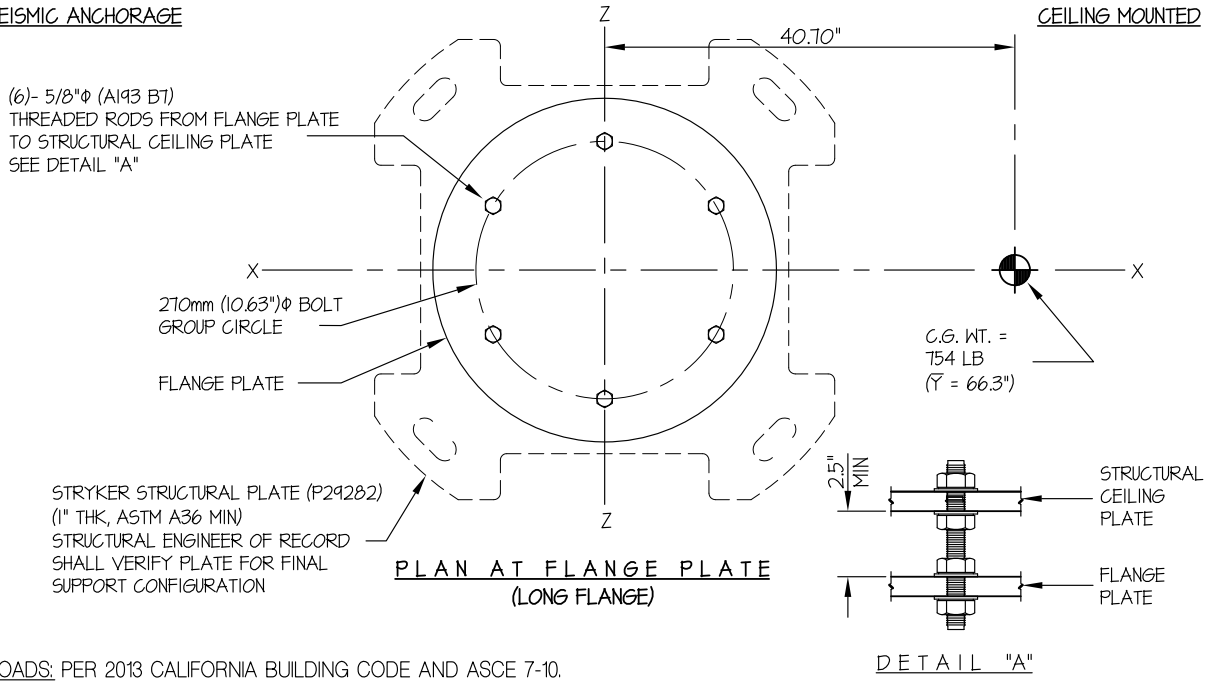
STRYKER COMMUNICATIONS

400 SERIES SERVICE ARM

DES. J. ROBERSON
JOB NO. 11-1510
DATE 1/29/16

SHEET 3 OF 4 SHEETS

SEISMIC ANCHORAGE — CEILING MOUNTED



PLAN AT FLANGE PLATE
(LONG FLANGE)

DETAIL "A"

LOADS: PER 2013 CALIFORNIA BUILDING CODE AND ASCE 7-10.
STRENGTH DESIGN IS USED (S_{DS} = 2.00, a_p = 2.5, I_p = 1.5, R_p = 2.5, z/h ≤ 1)

WEIGHT = 754 LB
HORIZONTAL FORCE (E_h) = $3.60W_p$ = 2714 LB
VERTICAL FORCE (E_v) = $0.40W_p$ = 302 LB

BOLT FORCES:

TENSION (T)

$$T_u = \frac{235840"\#(5.315")}{85} + \frac{1.2(754\#) + 302\#}{6 \text{ BOLTS}} = 14{,}948 \text{ LB/BOLT (MAX)}$$

COMPRESSION (C)

$$C_u = \frac{235840"\#(5.315")}{85} - \frac{754\#(0.9) - 302\#}{6 \text{ BOLTS}} = 14{,}684 \text{ LB/BOLT (MAX)}$$

SHEAR (V)

$$V_u = \frac{2714\#}{6 \text{ BOLTS}} + \frac{3451\#(5.315")}{169} = 561 \text{ LB/BOLT (MAX)}$$

(PER AISC J3.7, LESS THAN 20% STRESS)

BENDING (M)

M_u = 561#(1.625"/2) = 456"-#

COMBINED STRESS CHECK:

COMPRESSION: $\frac{C}{C_{STR}} + \frac{8}{9}\left(\frac{M}{M_{STR}}\right)$ = 0.91 < 1.00 ∴ OK

TENSION: $\frac{T}{T_{STR}} + \frac{8}{9}\left(\frac{M}{M_{STR}}\right)$ = 0.87 < 1.00 ∴ OK

MOMENTS:

M_{XX} = 2714#(68.8") + (1.2(754.0#) + 302#)40.70" = 235,840"#
M_{ZZ} = 2714#(68.8") + (1.2(754.0#) + 302#)40.70" = 235,840"#
M_{YY} = 84.8#(40.7") = 3451#

NOTE: Unit is free to rotate around Y-Y axis. Braking system releases with applied load of 21.2 lb at cg location. Calculation uses 84.8# for a safety factor of 4.

BOLT GROUP PROPERTIES:

$I_{x\text{-}x}$ = 85 in.^{4}
$I_{z\text{-}z}$ = 85 in.^{4}
$I_{y\text{-}y}$ = 169 in.^{4}

BOLT PROPERTIES:

F_y = 105 ksi : Fu = 125 d_r = 0.5270" : Φ = 0.90
$Z = d^3/6 = (0.5270)^3/6$ = 0.0244 in.^{3}
A_g= 0.2181 in.^{2}, A_b= 0.307 in.^{2}
r = 0.1318 in.
KL/r = 1.2(1.625")/0.1318 = 14.8
M_n = 105 ksi (0.0244^3) = 2562"-#
$M_{STR} = \Phi M_n$ = 0.9(2562"-#)= 2306"-#
T_{STR} = 21,586 lb. (AISC Eq J3-2)
C_{STR} = 19,923 lb. (AISC Eq E3-1)

EASE

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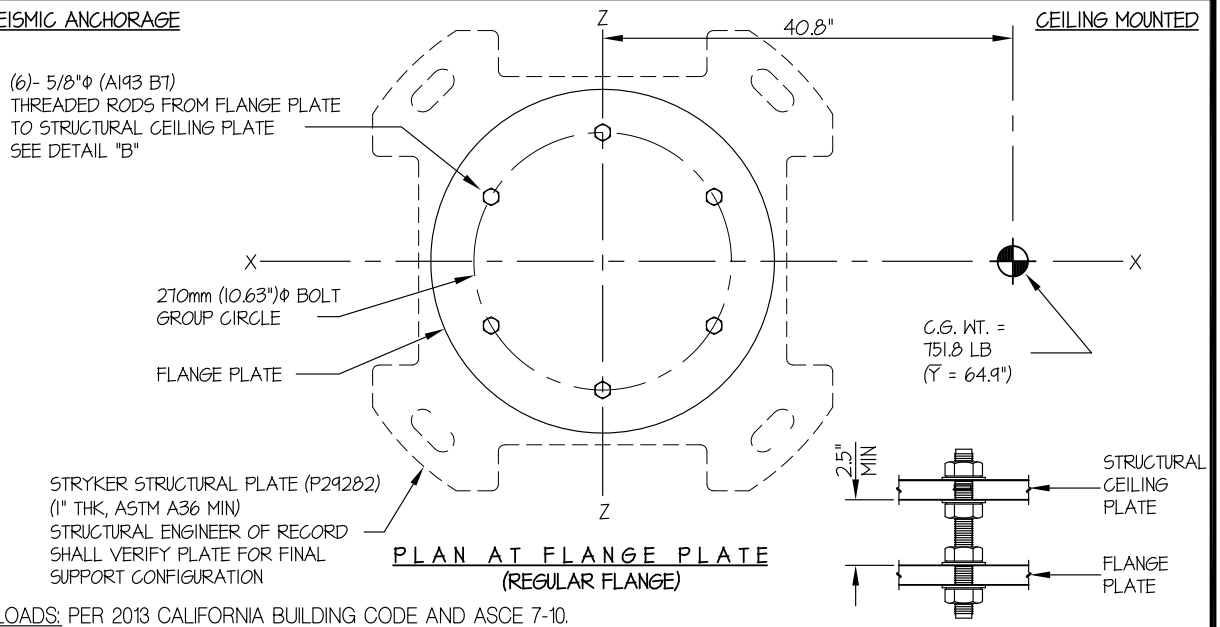
400 SERIES SERVICE ARM

DES. J. ROBERSON
JOB NO. 11-1510
DATE 1/29/16

SHEET 4 OF 4 SHEETS

SEISMIC ANCHORAGE

CEILING MOUNTED



PLAN AT FLANGE PLATE
(REGULAR FLANGE)

DETAIL "B"

LOADS: PER 2013 CALIFORNIA BUILDING CODE AND ASCE 7-10.
STRENGTH DESIGN IS USED (S_{DS} = 2.00, a_p = 2.5, I_p = 1.5, R_p = 2.5, z/h ≤ 1)

WEIGHT = 751.8 LB
HORIZONTAL FORCE (E_h) = 3.60W_p = 2706 LB
VERTICAL FORCE (E_v) = 0.40W_p = 301 LB

BOLT FORCES:

TENSION (T)

$$T_u = \frac{231473"\#(5.315")}{85} + \frac{1.2(751.8\#) + 301\#}{6 \text{ BOLTS}} = 14{,}674 \text{ LB/BOLT (MAX)}$$

COMPRESSION (C)

$$C_u = \frac{231473"\#(5.315")}{85} - \frac{0.9(751.8\#) - 301\#}{6 \text{ BOLTS}} = 14{,}411 \text{ LB/BOLT (MAX)}$$

SHEAR (V)

$$V_u = \frac{2706\#}{6 \text{ BOLTS}} + \frac{3460\#(5.315")}{169} = 560 \text{ LB/BOLT (MAX)}$$

(PER AISC J3.7, LESS THAN 20% STRESS)

BENDING (M)

M_u = 560#(1.625"/2) = 455"-#

COMBINED STRESS CHECK:

COMPRESSION: $\frac{C}{C_{STR}} + \frac{8}{9}\left(\frac{M}{M_{STR}}\right)$ = 0.90 < 1.00 ∴ OK

TENSION: $\frac{T}{T_{STR}} + \frac{8}{9}\left(\frac{M}{M_{STR}}\right)$ = 0.86 < 1.00 ∴ OK

MOMENTS:

M_{XX} = 2706#(67.4") + (1.2(751.8#) + 301#)40.8" = 231,473"#
M_{ZZ} = 2706#(67.4") + (1.2(751.8#) + 301#)40.8" = 231,473"#
M_{YY} = 84.8#(40.8") = 3460#

NOTE: Unit is free to rotate around Y-Y axis. Braking system releases with applied load of 21.2 lb at cg location. Calculation uses 84.8# for a safety factor of 4.

BOLT GROUP PROPERTIES:

I_{x-x} = 85 in.^{4}
I_{z-z} = 85 in.^{4}
I_{y-y} = 169 in.^{4}

BOLT PROPERTIES:

F_y = 105 ksi : F_U = 125 KSI, d = .527" Φ = 0.90
$Z = d^3/6 = (.527)^3/6 = .0244$ in.^{3}
A_g = 0.2181 in.^{2}, A_b = 0.307 in.^{2}
r = 0.1318 in.
KL/r = 1.2(1.625")/0.1318 = 14.8
M_n = 105 ksi (.0244in.^{3}) = 2562"-#

$M_{STR} = \phi M_n$ = 0.90(2562"-#) = 2306"-#
T_{STR} = 21,585 lb. (AISC Eq J3-2)
C_{STR} = 19,923 lb. (AISC Eq E3-1)

BOLT SPECS: 5/8"φ (A193-B7) THREADED ROD
φT = 10,354 LB/BOLT (TENSION)
φV = 5384 LB/BOLT (SHEAR)

EASE

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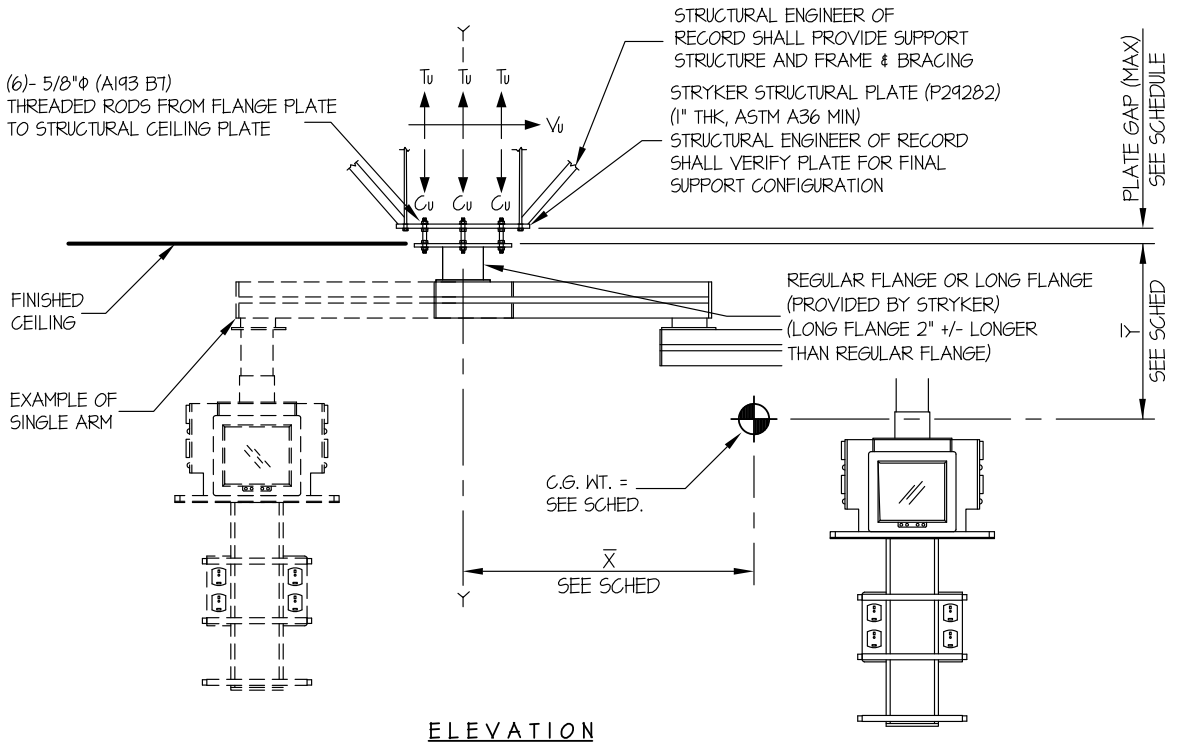
STRYKER COMMUNICATIONS

600 SERIES SERVICE ARM

DES.	J. ROBERSON
JOB NO.	11-1510
DATE	1/29/16

SHEET 1 OF 4 SHEETS

SEISMIC ANCHORAGE — CEILING MOUNTED



ELEVATION

NOTES:

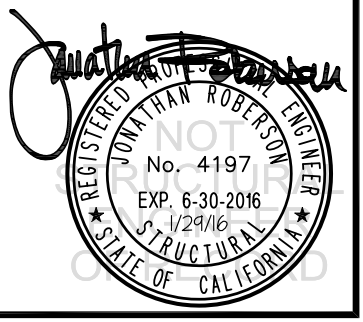
1. **FORCES ARE DETERMINED PER 2013 CALIFORNIA BUILDING CODE AND ASCE 7-10.**
   STRENGTH DESIGN IS USED. (S_{DS} = 1.90, a_p = 2.5, I_p = 1.5, R_p = 2.5, z/h ≤ 1)

   HORIZONTAL FORCE (E_h) = 3.42 W_p
   VERTICAL FORCE (E_v) = 0.38 W_p

2. CENTER OF GRAVITY (C.G.) AND WEIGHT ARE THE GOVERNING PARAMETERS FOR DESIGN. THESE CALCULATIONS ENCOMPASS ALL WEIGHTS UP TO THE MAXIMUM WEIGHT SHOWN.

3. STRUCTURAL ENGINEER OF RECORD (SEOR) FOR THE BUILDING SHALL PROVIDE SUPPORT STRUCTURE DESIGNED TO SUPPORT WEIGHTS AND FORCES SHOWN IN COMBINATION WITH ALL OTHER LOADS THAT MAY BE PRESENT.

4. CALCULATIONS BASED ON WORST CASE OF ASSUMED DROP TUBE OF 1000mm LONG.



NOT STRUCTURALLY CONSIDERED

STRYKER COMMUNICATIONS

600 SERIES SERVICE ARM

DES. J. ROBERSON
JOB NO. 11-1510
DATE 1/29/16
SHEET 2 OF 4 SHEETS

SEISMIC ANCHORAGE — CEILING MOUNTED

REGULAR FLANGE

	MODELS	GAP	TOTAL LOAD (LB.)	$\bar{X}$ (in.)	$\bar{Y}$ (in.)	Tu (lb.)	Cu (lb.)	Vu (lb.)	MOMENT (Mxx) (IN-LB)	MOMENT (Myy) (IN-LB)
	DOUBLE ARM (600 mm / 600 mm)	2.75	833.3	38.7	56.2	13,873	13,582	571	218,974	3,048
	DOUBLE ARM (600 mm / 800 mm)	2.5	833.3	44.4	55.3	14,137	13,845	585	223,203	3,497
	DOUBLE ARM (600 mm / 1000 mm)	2.5	831.1	50.0	54.5	14,414	14,123	597	227,660	3,938
	DOUBLE ARM (800 mm / 600 mm)	2.5	833.3	44.6	55.2	14,135	13,844	585	223,181	3,512
*	DOUBLE ARM (800 mm / 800 mm)	2.5	831.1	50.2	54.3	14,395	14,104	598	227,354	3,953
	DOUBLE ARM (800 mm / 1000 mm)	2.25	833.3	55.6	53.6	14,710	14,418	612	232,395	4,379
	DOUBLE ARM (1000 mm / 800 mm)	2.25	833.3	55.8	53.4	14,691	14,399	613	232,089	4,394
	DOUBLE ARM (1000 mm / 1000 mm)	2.75	778.2	59.7	51.2	13,734	13,462	591	216,982	4,701
	SINGLE ARM (1000 mm)	2.75	881.8	34.9	51.5	13,466	13,157	589	212,239	2,748

NOTES: 1) TOTAL LOAD IS MAXIMUM WEIGHT OF EQUIPMENT AND CONTENTS ADDRESSED BY THIS CALCULATION
2) $\bar{Y}$ IS MEASURED FROM CG TO TOP OF FLANGE PLATE.
3) * THIS MODEL IS REPRESENTED IN THE CALCULATION PROVIDED

LONG FLANGE

	MODELS	GAP	TOTAL LOAD (LB.)	$\bar{X}$ (in.)	$\bar{Y}$ (in.)	Tu (lb.)	Cu (lb.)	Vu (lb.)	MOMENT (Mxx) (IN-LB)	MOMENT (Myy) (IN-LB)
	DOUBLE ARM (600 mm / 600 mm)	2.25	844.4	38.2	62.1	14,988	14,693	576	236,812	3,008
	DOUBLE ARM (600 mm / 800 mm)	2.25	842.2	43.9	61.3	15,276	14,981	588	241,439	3,457
	DOUBLE ARM (600 mm / 1000 mm)	2	842.2	49.4	60.4	15,526	15,231	602	245,446	3,890
	DOUBLE ARM (800 mm / 600 mm)	2.25	842.2	44.1	61.1	15,257	14,962	589	241,129	3,473
	DOUBLE ARM (800 mm / 800 mm)	2	842.2	49.5	60.3	15,516	15,222	602	245,291	3,898
	DOUBLE ARM (800 mm / 1000 mm)	2	842.2	54.9	59.5	15,821	15,526	616	250,172	4,323
*	DOUBLE ARM (1000 mm / 800 mm)	2	842.2	55.2	59.4	15,828	15,533	616	250,283	4,347
	DOUBLE ARM (1000 mm / 1000 mm)	2.25	789.3	59.0	57.1	14,784	14,508	596	233,768	4,646
	SINGLE ARM (1000 mm)	2.50	892.9	34.5	57.5	14,695	14,382	594	231,902	2,717

NOTES: 1) TOTAL LOAD IS MAXIMUM WEIGHT OF EQUIPMENT AND CONTENTS ADDRESSED BY THIS CALCULATION
2) $\bar{Y}$ IS MEASURED FROM CG TO TOP OF FLANGE PLATE.
3) * THIS MODEL IS REPRESENTED IN THE CALCULATION PROVIDED

EASE

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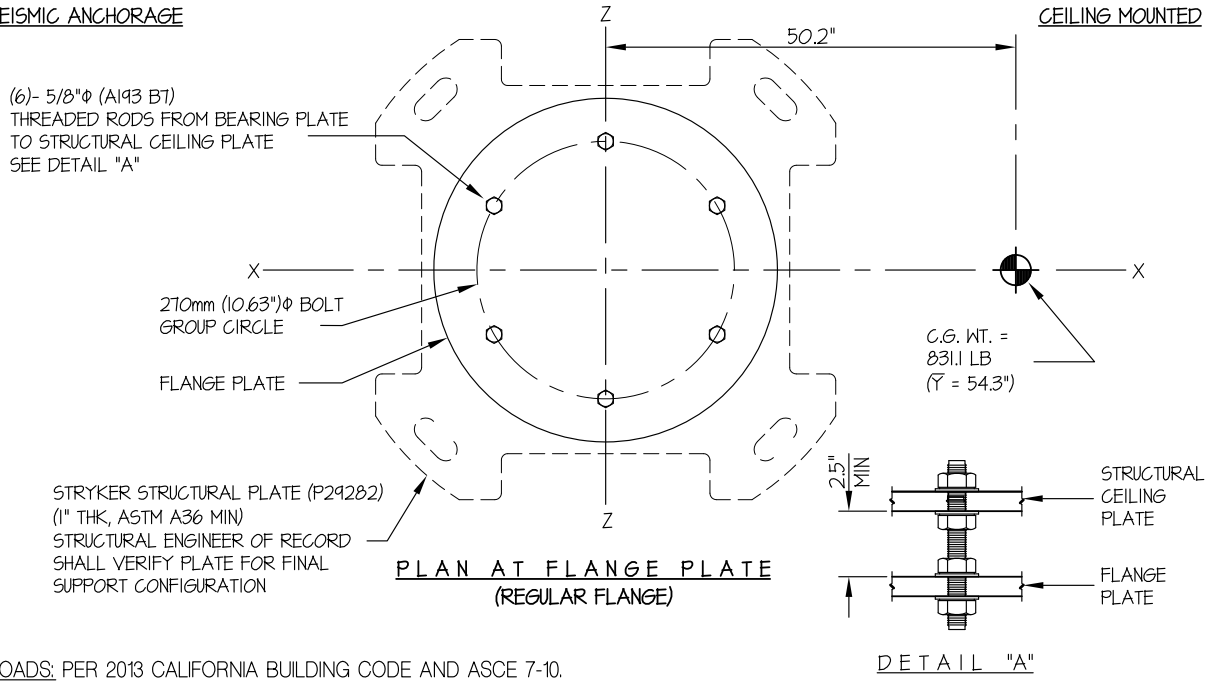
STRYKER COMMUNICATIONS

600 SERIES SERVICE ARM

DES. J. ROBERSON
JOB NO. 11-1510
DATE 1/29/16

SHEET 3 OF 4 SHEETS

SEISMIC ANCHORAGE — CEILING MOUNTED



PLAN AT FLANGE PLATE
(REGULAR FLANGE)

DETAIL "A"

LOADS: PER 2013 CALIFORNIA BUILDING CODE AND ASCE 7-10.
STRENGTH DESIGN IS USED (S_{DS} = 1.90, a_p = 2.5, I_p = 1.5, R_p = 2.5, z/h ≤ 1)

WEIGHT = 831.1 LB
HORIZONTAL FORCE (E_h) = 3.42W_p = 2842 LB
VERTICAL FORCE (E_v) = 0.38W_p = 316 LB

BOLT FORCES:

TENSION (T)

$$T_u = \frac{227354"\#(5.315")}{85} + \frac{1.2(831.1\#) + 316\#}{6 \text{ BOLTS}} = 14{,}395 \text{ LB/BOLT (MAX)}$$

COMPRESSION (C)

$$C_u = \frac{227354"\#(5.315")}{85} - \frac{0.9(831.1\#) - 316\#}{6 \text{ BOLTS}} = 14{,}104 \text{ LB/BOLT (MAX)}$$

SHEAR (V)

$$V_u = \frac{2842\#}{6 \text{ BOLTS}} + \frac{3953\#(5.315")}{169} = 598 \text{ LB/BOLT (MAX)}$$

(PER AISC J3.7, LESS THAN 20% STRESS)

BENDING (M)

M_u = 598#(1.625"/2) = 486" -#

COMBINED STRESS CHECK:

COMPRESSION: $\frac{C}{C_{STR}} + \frac{8}{9}\left(\frac{M}{M_{STR}}\right)$ = 0.90 < 1.00 ∴ OK

TENSION: $\frac{T}{T_{STR}} + \frac{8}{9}\left(\frac{M}{M_{STR}}\right)$ = 0.85 < 1.00 ∴ OK

MOMENTS:

M_{XX} = 2842#(56.8") + (1.2(831.1#) + 316#)50.2" = 227,354"#
M_{ZZ} = 2842#(56.8") + (1.2(831.1#) + 316#)50.2" = 227,354"#
M_{YY} = 84.8#(50.2") = 3953#

NOTE: Unit is free to rotate around Y-Y axis. Braking system releases with applied load of 21.2 lb at cg location. Calculation uses 84.8# for a safety factor of 4.

BOLT GROUP PROPERTIES:

I_{x-x} = 85 in.^{4}
I_{z-z} = 85 in.^{4}
I_{y-y} = 169 in.^{4}

BOLT PROPERTIES:

F_y = 105 ksi : Fu = 125 d_r = 0.5270" : Φ = 0.90
Z = $d^3/6$ = $(0.5270)^3/6$ = 0.0244 in.^{3}
A_g= 0.2181 in.^{2}, A_b= 0.307 in.^{2}
r = 0.1318 in.
KL/r = 1.2(1.625")/0.1318 = 14.8
M_n = 105 ksi (0.0244^3) = 2562"-#
M_{STR} = ΦM_n = 0.9(2562"-#)= 2306"-#
T_{STR} = 21,586 lb. (AISC Eq J3-2)
C_{STR} = 19,923 lb. (AISC Eq E3-1)

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600 SERIES SERVICE ARM

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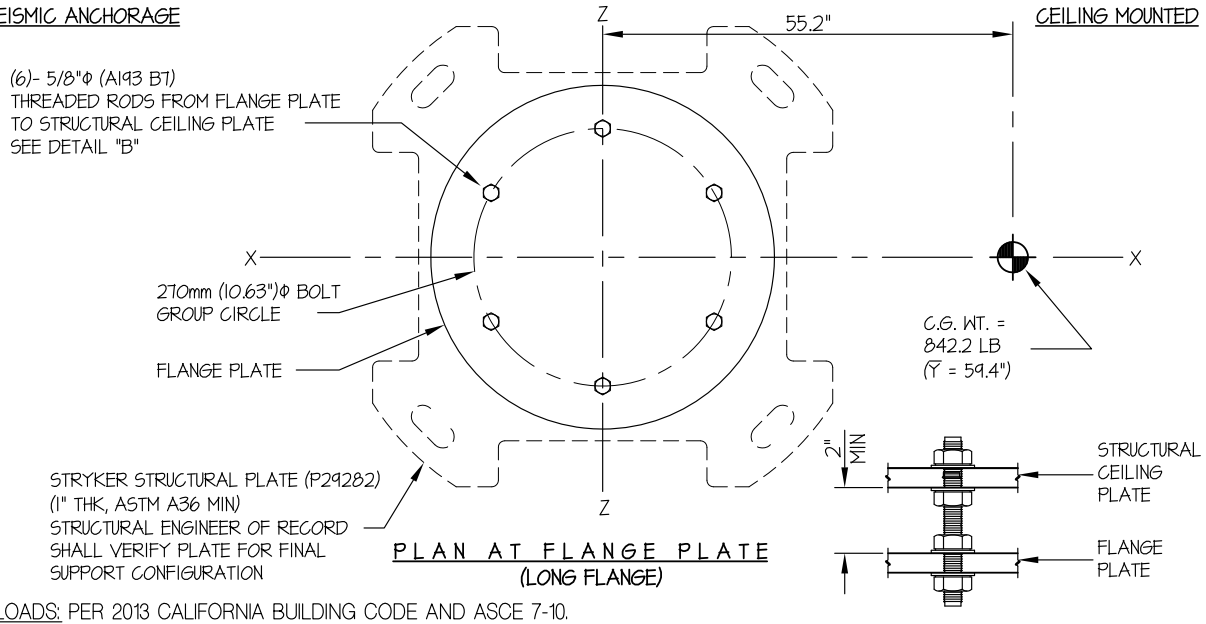
DATE 1/29/16

SHEET 4 OF 4 SHEETS

SEISMIC ANCHORAGE

CEILING MOUNTED



PLAN AT FLANGE PLATE
(LONG FLANGE)

DETAIL "B"

LOADS: PER 2013 CALIFORNIA BUILDING CODE AND ASCE 7-10.
STRENGTH DESIGN IS USED (S_{DS} = 2.00, a_p = 2.5, I_p = 1.5, R_p = 2.5, z/h ≤ 1)

WEIGHT = 842.2 LB
HORIZONTAL FORCE (E_h) = 3.42W_p = 2880 LB
VERTICAL FORCE (E_v) = 0.38W_p = 320 LB

BOLT FORCES:

TENSION (T)

$$T_u = \frac{250283"\#(5.315")}{85} + \frac{1.2(842.2\#) + 320\#}{6 \text{ BOLTS}} = 15{,}828 \text{ LB/BOLT (MAX)}$$

COMPRESSION (C)

$$C_u = \frac{250283"\#(5.315")}{85} - \frac{0.9(842.2\#) - 320\#}{6 \text{ BOLTS}} = 15{,}533 \text{ LB/BOLT (MAX)}$$

SHEAR (V)

$$V_u = \frac{2880\#}{6 \text{ BOLTS}} + \frac{4347\#(5.315\#)}{169} = 616 \text{ LB/BOLT (MAX)}$$

(PER AISC J3.7, LESS THAN 20% STRESS)

BENDING (M)

M_u = 616#(1.125"/2) = 347"-#

COMBINED STRESS CHECK:

COMPRESSION: $\frac{C}{C_{STR}} + \frac{8}{9}\left(\frac{M}{M_{STR}}\right)$ = 0.90 < 1.00 ∴ OK

TENSION: $\frac{T}{T_{STR}} + \frac{8}{9}\left(\frac{M}{M_{STR}}\right)$ = 0.87 < 1.00 ∴ OK

MOMENTS:

M_{XX} = 2880#(61.4") + (1.2(842.2#) + 320#)55.2# = 250,283"#
M_{ZZ} = 2880#(61.4") + (1.2(842.2#) + 320#)55.2# = 250,283"#
M_{YY} = 84.8#(55.2") = 4347#

NOTE: Unit is free to rotate around Y-Y axis. Braking system releases with applied load of 21.2 lb at cg location. Calculation uses 84.8# for a safety factor of 4.

BOLT GROUP PROPERTIES:

I_{x-x} = 85 in.^{4}
I_{z-z} = 85 in.^{4}
I_{y-y} = 169 in.^{4}

BOLT PROPERTIES:

F_y = 105 ksi ; F_u = 125 KSI, d = .527" Φ = 0.90
$Z = d^3/6 = (.527)^3/6 = .0244$ in.^{3}
A_g = 0.2181 in.^{2}, A_b = 0.307 in.^{2}
r = 0.1318 in.
KL/r = 1.2(1.125")/0.1318 = 10.2
M_n = 105 ksi (.0244in.^{3}) = 2562"-#

$M_{STR} = \phi M_n$ = 0.90(2562"-#) = 2306"-#
T_{STR} = 21,585 lb. (AISC Eq J3-2)
C_{STR} = 20,277 lb. (AISC Eq E3-1)

BOLT SPECS: 5/8"ϕ (A193-B7) THREADED ROD
ϕT = 10,354 LB/BOLT (TENSION)
ϕV = 5384 LB/BOLT (SHEAR)

11

Seismic Calculations Tandem

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Chino Hills, CA. 91709
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Office of Statewide Health Planning and Development

ANCHORAGE PRE-APPROVAL

OPA-1237-10

THIS PRE- APPROVAL CONFORMS TO THE 2010 CALIFORNIA BUILDING CODE

Equipment Manufacturer: Stryker Communications

Equipment Type: Tandem Mount

GENERAL NOTES

1. FORCES PER ASCE 7-05 SECTION 13.3.1, EQUATIONS 13.3-1, 13.3-2 & 13.3-3, WHERE S_{DS} = 2.00, a_p = 2.5, I_p = 1.5, R_p = 2.5, $z/h \leq 1.0$
2. THIS PRE-APPROVAL CONFORMS TO THE 2010 CALIFORNIA BUILDING CODE.
3. THE DETAILS IN THIS PRE-APPROVAL MAY BE USED AT ANY LOCATION IN THE STATE OF CALIFORNIA, WHERE SDS IS NOT GREATER THAN 2.00.
4. ALL ANCHOR FORCES SHOWN ON THE DRAWINGS ARE FACTORED LOADS THAT SHALL BE USED FOR STRENGTH DESIGN.
5. THIS PRE-APPROVAL COVERS ONLY THE ANCHORAGE OF THE UNIT TO A SUPPORT STRUCTURE ABOVE BY OTHERS .

RESPONSIBILITIES OF THE STRUCTURAL ENGINEER OF RECORD OF THE BUILDING

6. THE SEOR SHALL ALSO VERIFY THE ADEQUACY OF THE STRUCTURES (SUCH AS WALLS AND FLOORS) WHICH SUPPORT THE UNITS FOR THE LOADS IMPOSED ON THEM BY THE UNITS AS WELL AS ALL OTHER LOADS.
7. PROVIDE SUPPORTING STRUCTURE REQUIRED TO SUPPORT WEIGHTS AND FORCES SHOWN, IN ADDITION TO ALL OTHER LOADS.
8. VERIFY THAT THE INSTALLATION IS IN CONFORMANCE WITH THE 2010 CBC AND WITH THE DETAILS SHOWN IN THIS PRE-APPROVAL. VERIFY THAT THE ACTUAL EQUIPMENT'S WEIGHT, CG LOCATION, ANCHOR LOCATIONS, ANCHOR DETAILS AND THE MATERIAL AND GAGE OF THE UNIT WHERE ATTACHMENTS ARE MADE AGREE WITH THE INFORMATION SHOWN ON THE PRE-APPROVAL DOCUMENTS.
9. VERIFY THAT THE COMBINATION OF S_{DS} & z/h RESULT IN SEISMIC FORCES (E_h , E_v) THAT ARE NOT GREATER THAN THE VALUES ON THE DETAILS.

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JONATHAN ROBERSON
No. 4197
EXP. 6-30-2014
3/25/13
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Office of Statewide Health Planning and Development
OPA-1237-10
Pre-approval Program Manager:
Anthony R. Pike
(916) 440-8470
Reviewed By: Anthony R. Pike 3/25/13

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STRYKER COMMUNICATIONS

TANDEM MOUNT

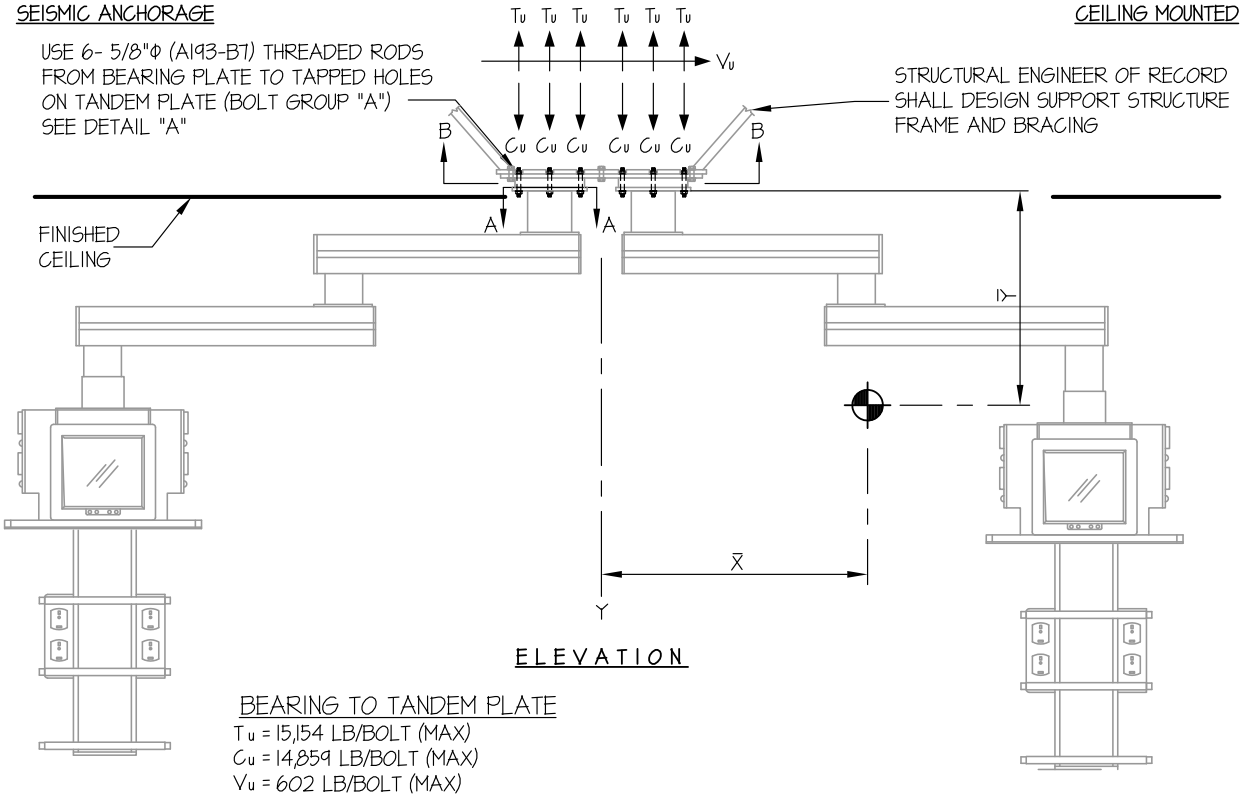
DES. J. ROBERSON
JOB NO. 11-1106
DATE 3/25/13
SHEET 2 OF 7 SHEETS

SEISMIC ANCHORAGE

USE 6- 5/8"Φ (A193-B7) THREADED RODS FROM BEARING PLATE TO TAPPED HOLES ON TANDEM PLATE (BOLT GROUP "A") SEE DETAIL "A"

CEILING MOUNTED

STRUCTURAL ENGINEER OF RECORD SHALL DESIGN SUPPORT STRUCTURE FRAME AND BRACING



ELEVATION

BEARING TO TANDEM PLATE
Tu = 15,154 LB/BOLT (MAX)
Cu = 14,859 LB/BOLT (MAX)
Vu = 602 LB/BOLT (MAX)

NOTES:

1. ANCHORAGE DESIGN PER 2010 CALIFORNIA BUILDING CODE AND ASCE 7-05 STRENGTH DESIGN IS USED.
   HORIZONTAL FORCE (E_h) = 3.60 W_p (S_{DS} = 2.00, a_p = 2.5, I_p = 1.5, R_p = 2.5, z/h ≤ 1.0)
   VERTICAL FORCE (E_v) = 0.40 W_p
2. CENTER OF GRAVITY (C.G.) WEIGHT IS A MAXIMUM. THIS PRE-APPROVAL ENCOMPASSES ALL WEIGHTS UP TO THE MAXIMUM WEIGHT SHOWN.
3. STRUCTURAL ENGINEER OF RECORD FOR THE BUILDING SHALL PROVIDE SUPPORT STRUCTURE DESIGNED TO SUPPORT WEIGHTS AND FORCES SHOWN, IN ADDITION TO ALL OTHER LOADS.
4. SEE GENERAL NOTES: SHEET 1.

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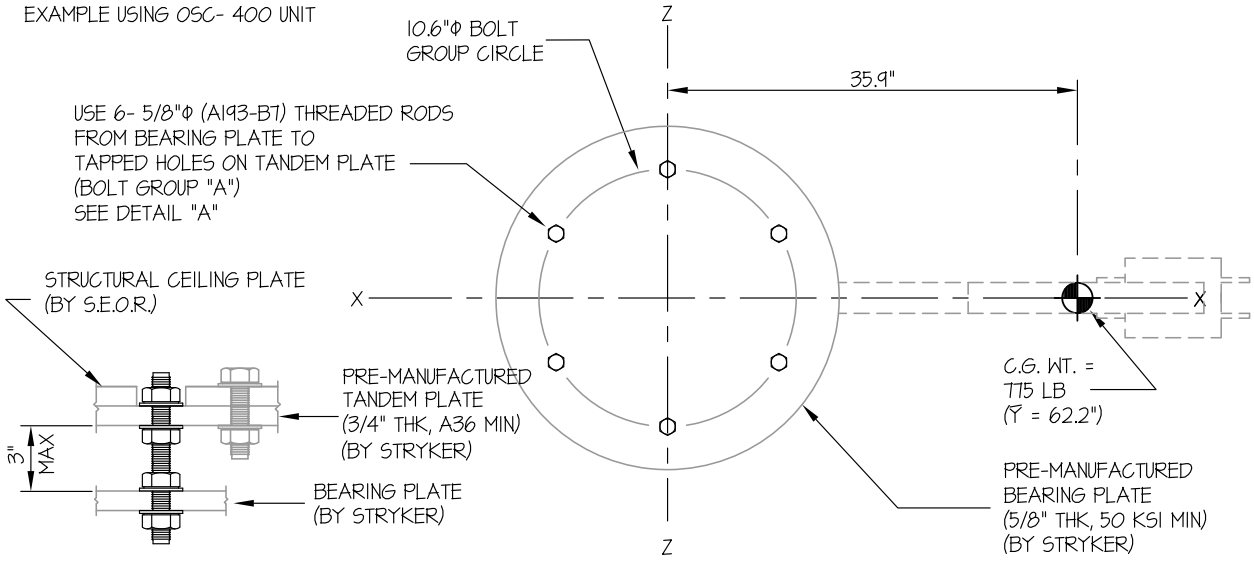
	JOB NO. 11-1106	
TANDEM MOUNT	DATE 3/25/13	OF 7 SHEETS

SEISMIC ANCHORAGE

EXAMPLE USING OSC- 400 UNIT



DETAIL "A"

PLAN AT BEARING PLATE

SECTION "A"-"A" AT OSC-400 UNIT

BEARING PLATE TO TANDEM PLATE

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TANDEM MOUNT

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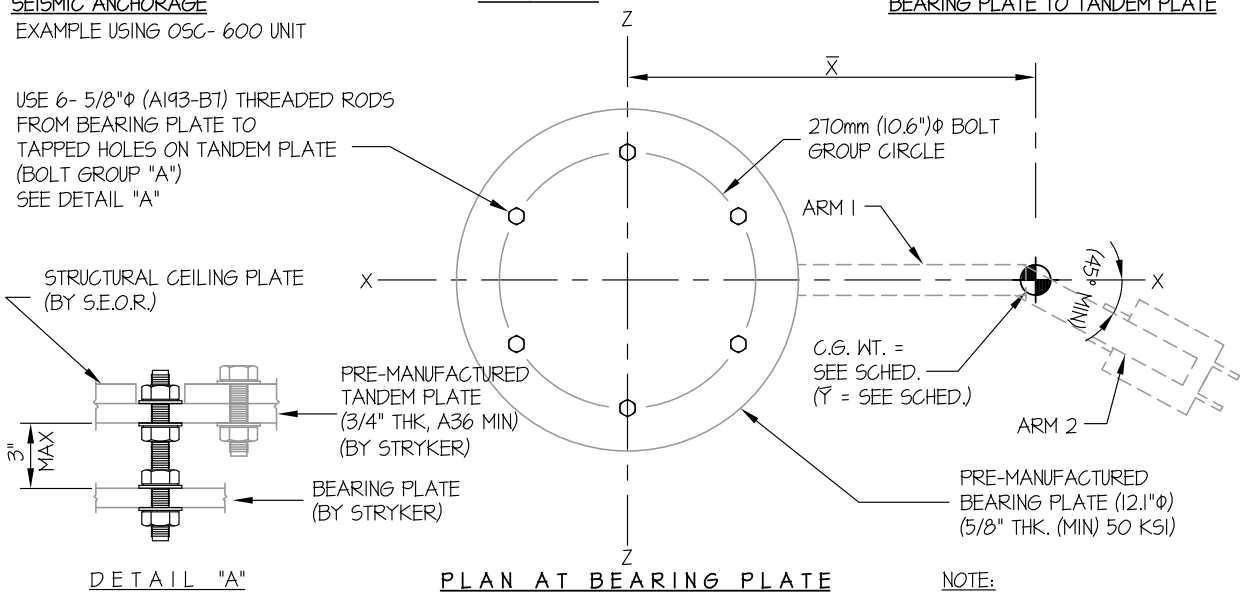
SHEET 4 OF 7 SHEETS

SEISMIC ANCHORAGE
EXAMPLE USING OSC- 600 UNIT

DOUBLE ARM

BEARING PLATE TO TANDEM PLATE



DETAIL "A"

PLAN AT BEARING PLATE
SECTION "A"-"A" AT OSC-600 UNIT

NOTE:
THE OSC- 600 SERIES ARM
MUST NOT EXTEND PAST A 45°
ANGLE SHOWN

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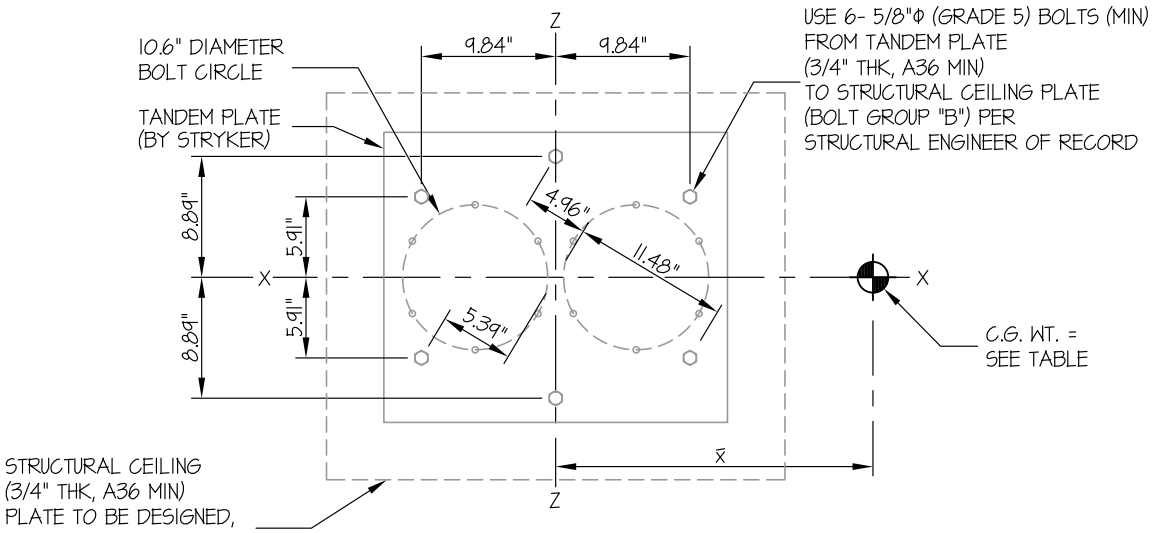
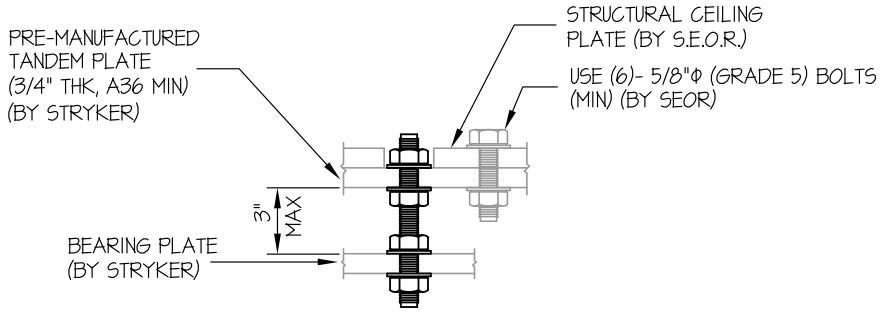
	JOB NO. 11-1106	
TANDEM MOUNT	DATE 3/25/13	OF 7 SHEETS

SEISMIC ANCHORAGE

TANDEM PLATE TO STRUCTURAL CEILING PLATE



PLAN AT "B-B"



DETAIL "B"

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TANDEM MOUNT

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SHEET 6 OF 7 SHEETS

SEISMIC ANCHORAGE

CEILING MOUNTED

	TANDEM CONFIGURATION	MAX WEIGHT (lbs)	X̄ (in)	Ȳ (in)
		2010 CALIFORNIA BUILDING CODE STRENGTH DESIGN		
OSC-400	OSC-400	1688	35.9	62.2
	OSC-600	1704	41.1	58.3
	SINGLE HALOGEN	957	40.8	59.6
	DUAL HALOGEN	1023	40.5	58.7
	TRIPLE HALOGEN	1090	40.5	58.1
	SINGLE LED	975	40.3	61.0
	DUAL LED	1048	40.6	62.1
	TRIPLE LED	1126	41.5	63.0
	SINGLE FLAT PANEL ARM	1028	39.1	59.1
	DUAL FLAT PANEL ARM	1058	39.1	59.5
	SINGLE HYBRID	1006	43.5	60.8
	DUAL HYBRID	1112	46.5	61.8
OSC-600	OSC-600	1720	46.3	54.4
	SINGLE HALOGEN	973	50.1	52.7
	DUAL HALOGEN	1039	49.2	52.3
	TRIPLE HALOGEN	1106	48.6	52.1
	SINGLE LED	991	49.4	54.2
	DUAL LED	1064	49.0	55.8
	TRIPLE LED	1142	49.3	57.1
	SINGLE FLAT PANEL ARM	1044	47.7	52.7
	DUAL FLAT PANEL ARM	1074	47.4	53.3
	SINGLE HYBRID	1022	52.2	54.2
	DUAL HYBRID	1128	54.3	55.9

	TANDEM CONFIGURATION	MAX WEIGHT (lbs)	X̄ (in)	Ȳ (in)
		2010 CALIFORNIA BUILDING CODE STRENGTH DESIGN		
MMP-200	OSC-400	1459	43.3	57.0
	OSC-600	1475	49.2	52.5
	MMP-200	1230	55.8	49.8
	SINGLE HALOGEN	728	57.2	48.3
	DUAL HALOGEN	794	55.5	48.0
	TRIPLE HALOGEN	861	54.3	48.1
	SINGLE LED	746	56.1	50.4
	DUAL LED	819	55.1	52.7
	TRIPLE LED	897	54.9	54.7
	SINGLE FLAT PANEL ARM	799	53.5	48.7
	DUAL FLAT PANEL ARM	829	53.0	49.6
	SINGLE HYBRID	777	59.6	50.5
	DUAL HYBRID	883	61.4	53.1
SINGLE FLAT PANEL ARM	SINGLE FLAT PANEL ARM	368	31	45.0
	DUAL FLAT PANEL ARM	398	31.6	47.2
	SINGLE HYBRID	346	43.2	48.8
	DUAL HYBRID	452	50.7	54.3

NOTE: WORST CASE SHOWN FOR LIGHT CONFIGURATIONS. THESE APPLY FOR ANY OTHER LIGHT CONFIGURATION WITH A CG AND WEIGHT LESS THAN THAT SHOWN (EXAMPLE: TRIPLE LED WITH TRIPLE LED IS SHOWN BUT A TRIPLE LED WITH A SINGLE LED ALSO WORKS)

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TANDEM MOUNT

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SHEET 7 OF 7 SHEETS

SEISMIC ANCHORAGE

CEILING MOUNTED

		2010 CALIFORNIA BUILDING CODE STRENGTH DESIGN		
TANDEM CONFIGURATION		MAX WEIGHT (lbs)	$\bar{X}$ (in)	$\bar{Y}$ (in)
DUAL PANEL ARM	SINGLE HALOGEN	327	36.3	45.9
	DUAL HALOGEN	393	36.3	45.8
	TRIPLE HALOGEN	460	36.8	46.3
	SINGLE L.E.D.	345	35.0	50.5
	DUAL L.E.D.	418	36.7	55.1
	TRIPLE L.E.D.	496	39.3	58.3
	DUAL FLAT PANEL ARM	428	33.0	49.0
	SINGLE HYBRID	376	43.9	50.8
	DUAL HYBRID	482	50.8	55.5
TRIPLE HALOGEN	TRIPLE HALOGEN	492	41.0	44.0
	SINGLE FLAT PANEL ARM	430	37.6	44.4
	SINGLE HYBRID	408	48.4	47.7
	DUAL HYBRID	514	53.9	52.7
TRIPLE LED	TRIPLE LED.	564	45.6	65.4
	SINGLE FLAT PANEL ARM	466	41.2	57.3
	SINGLE HYBRID	444	51.2	60.9
	DUAL HYBRID	550	55.8	63.1
SINGLE HYBRID	SINGLE HYBRID	324	56.3	53.2
	DUAL HYBRID	430	60.9	57.9
DUAL HYBRID	DUAL HYBRID	536	66.2	60.7

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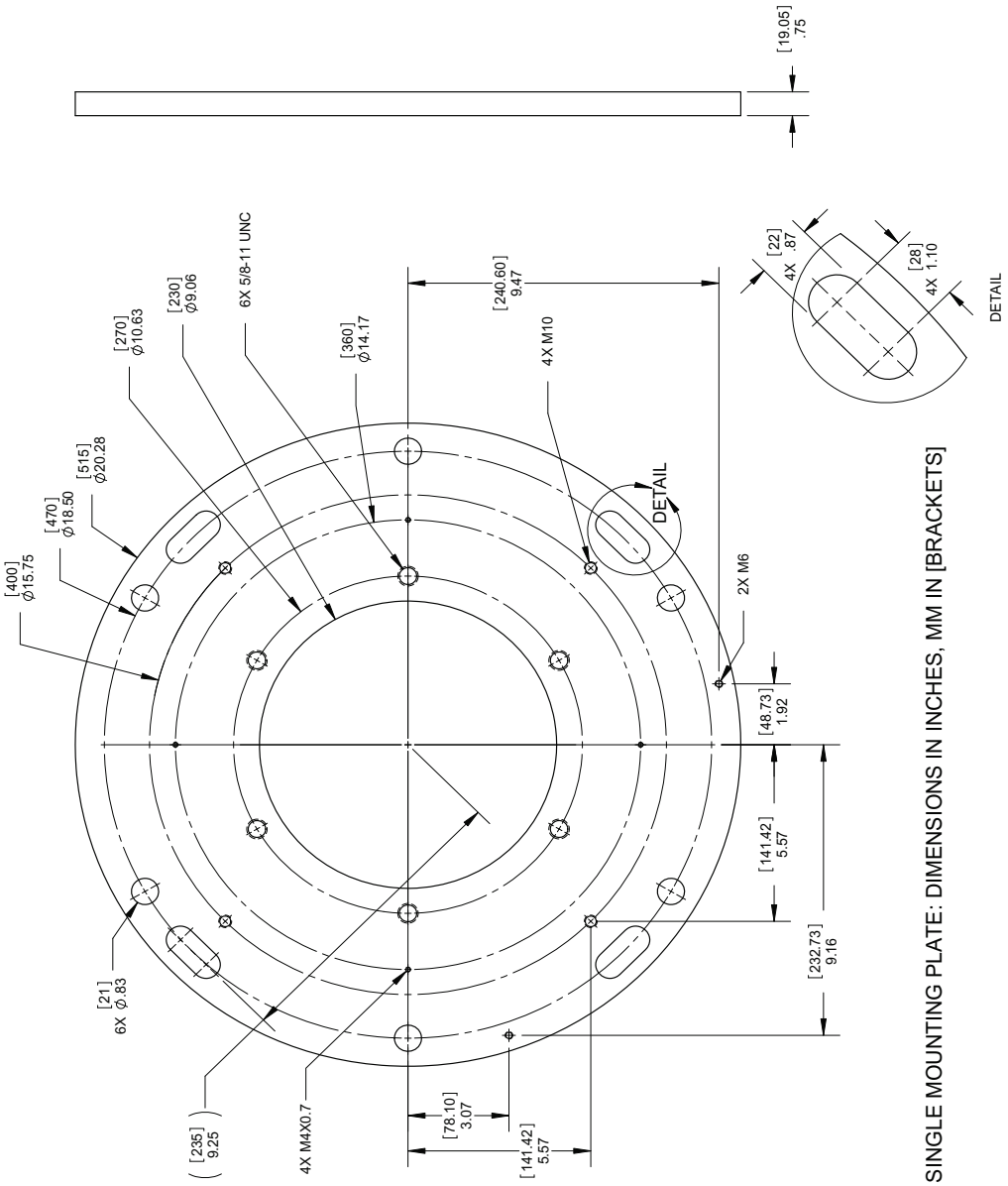
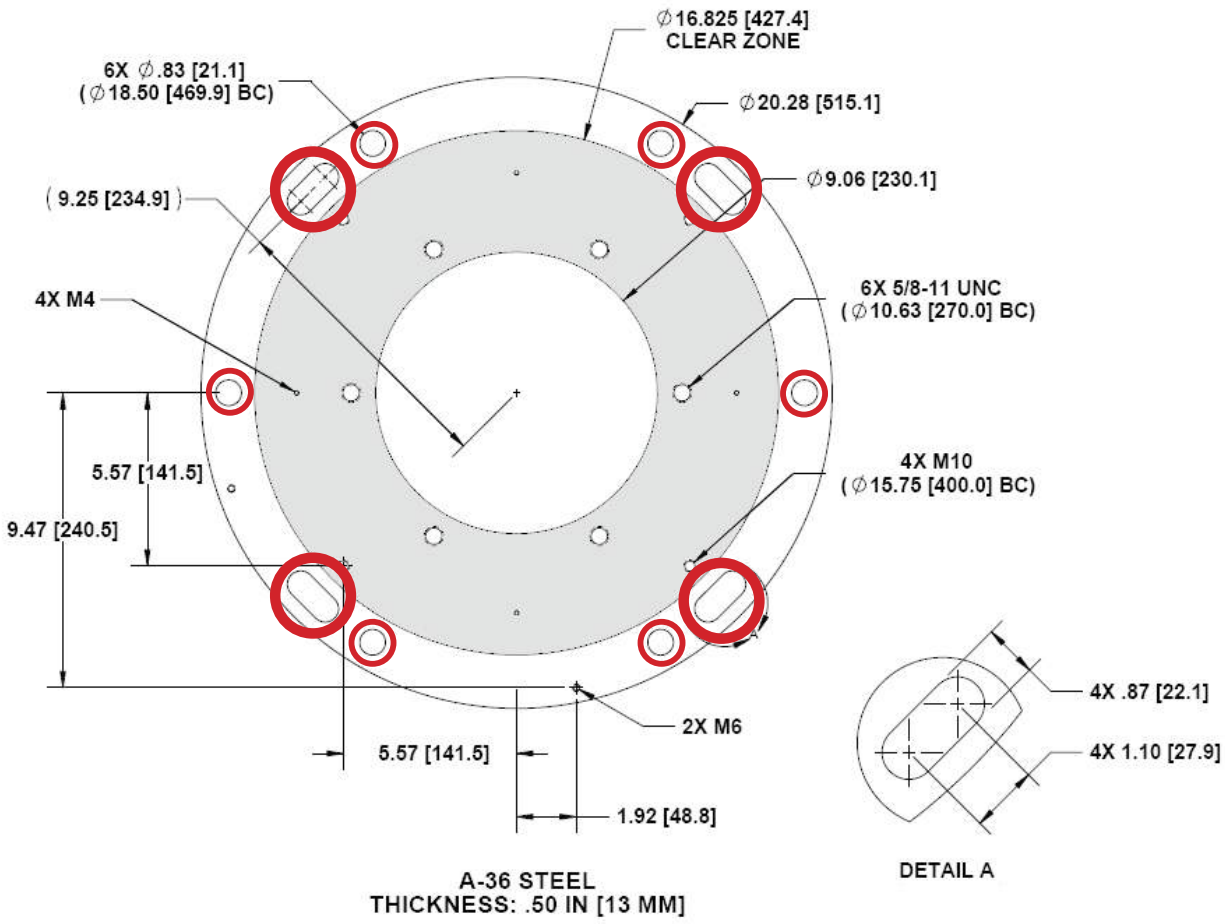
12

Mounting (interface) plate Detail

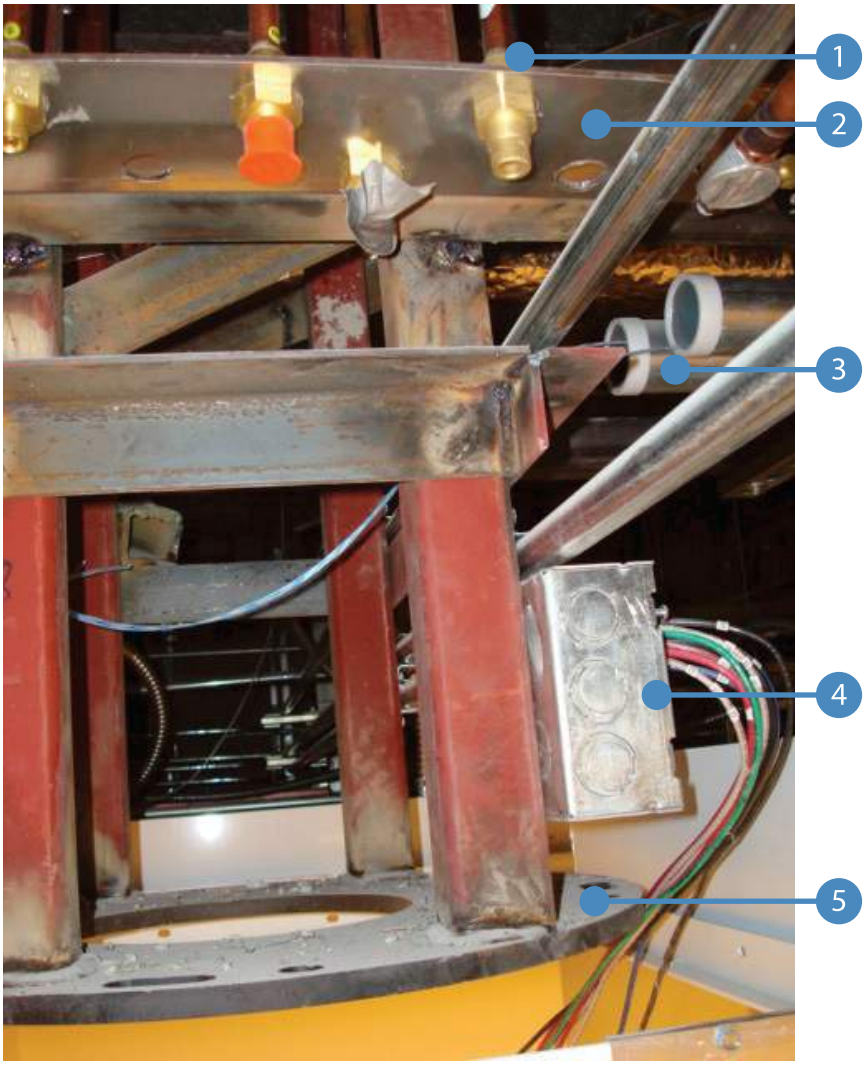




Use any of the holes marked in red.

13

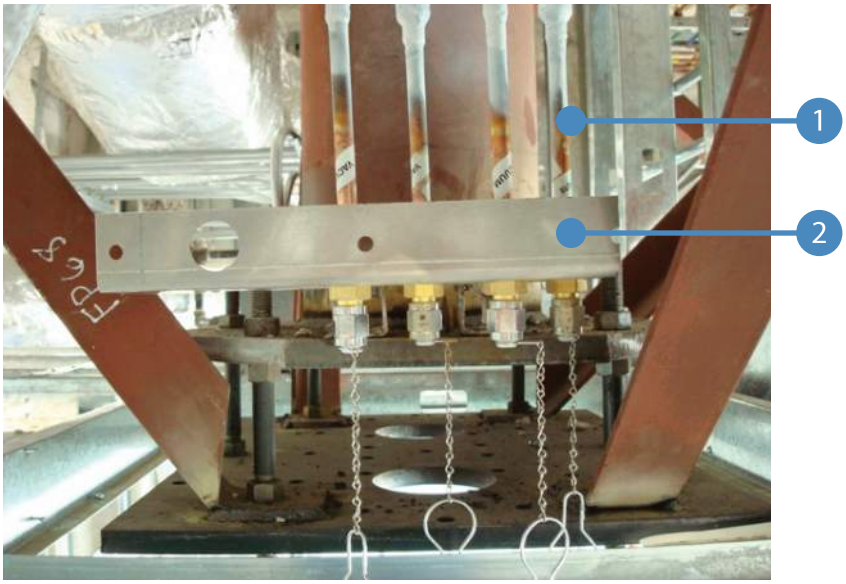
Installation-Ready Site



1	Gas Riser (Stryker supplied, contractor installed). Locate within 18” (457mm) of mounting plate center.
2	Riser Mounting Bracket (Stryker supplied, contractor installed).
3	Conduit with pull strings and insulated bushings (supplied and installed by contractor). Max distance = 45’ (13.7m). Locate within 18” (457mm) of mounting plate center.

4	J-Box - Power for hard-wired circuits (supplied and installed by contractor). Locate within 18” (457mm) of mounting plate center.
5	Boom Mounting Plate (Stryker supplied, contractor installed). Locate 4” (102mm) above finished ceiling with minimum of 3” (76mm) of clear space above mount.

Note: For installations in seismic zones, such as California, which must adhere to OSHPD regulations, install the Stryker-supplied mounting (interface) plate 70 mm +/- 10 mm above the finished ceiling.



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2017/01

WCR: U.3

1001400007 U

SECTION 134900

RADIATION PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes lead-lining for openings and partitions as required by the Physicist Reports.
   1. Lead sheet, strip, and plate.
   2. Lead-lined gypsum board.
   3. Lead glass.
   4. Lead-lined, hollow-metal door frames.
   5. Lead-lined flush wood doors.
   6. Lead-lined, observation-window frames.

1.2 DEFINITIONS

A. Lead Equivalence: The thickness of lead that provides the same attenuation (reduction of radiation passing through) as the material in question under the specified conditions.
   1. Lead equivalence specified for materials used in diagnostic x-ray rooms is as measured at 100 kV unless otherwise indicated.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.
   1. Review methods and procedures related to radiation protection including, but not limited to, the following:
      a. Sequence and schedule of radiation protection work in relation to other work.
      b. Supplementary lead shielding at duct, pipe, and conduit penetrations of radiation protection.
      c. Methods of attaching other construction and equipment to lead-lined finishes.
      d. Notification procedures for work that requires modifying radiation protection.
      e. Requirements for field quality control.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show layout of radiation-protected areas. Indicate lead thickness or lead equivalence of components. Show components and installation conditions not fully dimensioned or detailed in product data.
   1. Show ducts, pipes, conduit, and other objects that penetrate radiation protection; include details of penetrations.

C. Product Schedule: For observation windows, doors and frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final door hardware schedule.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For flush wood door manufacturer.

B. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For neutron-shielding doors to include in operation and maintenance manuals.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of products.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Lead-Lined Gypsum Panels: Neatly stack panels flat to prevent deformation.

B. Lead-Lined, Hollow-Metal Frames: Comply with requirements in Section 081115 "Interior Hollow Metal Door Frames" for delivery, storage, and handling.

C. Lead-Lined Flush Wood Doors: Comply with requirements in Section 081416 "Flush Wood Doors" for delivery, storage, and handling.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install radiation protection until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Provide materials and workmanship, including joints and fasteners, that maintain continuity of radiation protection at all points and in all directions equivalent to materials specified in thicknesses and locations indicated.
1. Materials, thicknesses, and configurations indicated are based on radiation protection design prepared by Owner's radiation health physicist. This design is available to Contractor on request.

B. Lead-Lined Assemblies: Unless otherwise indicated, provide lead thickness in doors, door frames, window frames, penetration shielding, joint strips, film transfer cabinets, and other items located in lead-lined assemblies not less than that indicated for assemblies in which they are installed.

C. Lead Glazing: Unless otherwise indicated, provide lead equivalence not less than that indicated for assembly in which glazing is installed.

2.2 MANUFACTURERS

A. Source Limitations: Obtain each type of radiation protection product from single source from single manufacturer unless otherwise indicated.

2.3 MATERIALS

A. Lead Sheet, Strip, and Plate: ASTM B 749, Alloy UNS No. L51121 (chemical-copper lead).
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
a. Radiation Protection Products, Inc.

B. Lead-Lined Gypsum: 5/8 inch- (16 mm-) thick gypsum board complying with Section 092900 "Gypsum Board," of width and length required for support spacing and to prevent cracking during handling, and with a single sheet of lead laminated to the back of the board.
1. Lead Sheet Lining: Full width and length of board.
2. Furnish 3 inch- (75 mm-) wide lead strips for wrapping metal stud flanges.
3. Furnish lead-headed nails for fastening gypsum board, accessories, and trim to wood members.
4. Furnish finishing materials, accessories, and trim for lead-lined gypsum board complying with Section 092900 "Gypsum Board."

C. Lead Glass: Lead-barium, polished glass containing not less than 60 percent heavy metal oxides, including not less than 48 percent lead oxide by weight.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Amerope Enterprises, Inc.
b. McGrory Glass, Inc.
c. Schott North America, Inc.
2. Safety Glass: Tempered lead glass.

D. Glazing Compounds, Gaskets, and Accessories: Comply with requirements in Section 088000 "Glazing."

E. Accessories and Fasteners: Manufacturer's standard fasteners and accessories as required for installation, maintaining same lead equivalence as rest of system.

F. Asphalt Coating: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

G. Asphalt Felt: ASTM D 226/D 226M.

2.4 LEAD-LINED, HOLLOW-METAL DOOR FRAMES

A. General: Steel door frames complying with NAAMM-HMMA 861, except 0.0667 inch (1.7 mm) thick, lined with lead sheet of thickness not less than that required for doors and walls where frames are used.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Accurate Radiation Shielding, Inc.

b. A & L Shielding Inc.
c. Deronde Products.
d. El Dorado Metals, Inc.
e. Fluke Biomedical; Radiation Management Services.
f. Karpen Steel Custom Doors & Frames.
g. Mayco Industries; a Metalico company.
h. NELCO, Inc.
i. New Shield.
j. Radiation Protection Products, Inc.
k. Ray-Bar Engineering Corp.

2. Furnish with additional reinforcements and internal supports to adequately carry the weight of lead-lined doors. Install reinforcements and supports before installing lead lining.
3. Form lead sheet to match frame contour, continuous in each jamb and across the head, lapping the stops. Form lead shields around areas prepared to receive hardware. Fabricate lead lining wide enough to maintain an effective lap with lead of adjacent shielding.
4. Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.
   a. Color and Gloss: As selected by Architect from manufacturer's full range.

2.5 LEAD-LINED FLUSH WOOD DOORS

A. Lead-Lined Flush Wood Doors: Solid-core wood doors with lead lining, thickness not less than that required for partition in which door is installed .
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Algoma Hardwoods, Inc.
      b. Ampco, Inc.
      c. Eggers Industries.
      d. Marshfield DoorSystems, Inc.
      e. NELCO, Inc.
      f. New Shield.
      g. Radiation Protection Products, Inc.
      h. VT Industries Inc.
   2. Door Construction: Veneer face, five ply, bonded particleboard core.
   3. Door Construction: Plastic-laminate face, five ply, bonded particleboard core.
   4. Lead Lining: One or more continuous sheets of lead extending from top to bottom and edge to edge, constructed either in the core or between the core and faces, at manufacturer's option.
   5. Comply with Section 081416 "Flush Wood Doors" for grade, faces, veneer matching, performance grade, fabrication, finishing, and other requirements unless otherwise indicated.

B. Prepare doors to receive observation windows ; cut and trim openings through doors in factory. Provide removable wood stops for glazed openings.

C. Shield cutouts for locksets with lead sheet of same thickness used in door. Lap lining of cutouts with door lining.

D. Factory fit doors to suit frame openings indicated with 1/16 inch (1.5 mm) clearance at heads and jambs and minimum clearance at bottom. Factory machine doors for hardware not surface applied.

2.6 LEAD-LINED, OBSERVATION-WINDOW FRAMES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
   1. Radiation Protection Products, Inc.

B. General: Fabricate from 0.043 inch- (1.1 mm-) thick, formed-steel sheet or 0.064 inch- (1.6 mm-) thick aluminum extrusions with mitered corners, welded or bolted with concealed fasteners.
   1. Line with lead sheet formed to match frame contour, continuous in each jamb and across head and sill, lapping the stops, and fabricated wide enough to maintain an effective lap with lead of adjoining assemblies.
   2. Construct so lead lining overlaps glazing material perimeter by at least 3/8 inch (9.5 mm) and furnish removable stops.
   3. Form sill with an opening for sound transmission. Offset sound passage to make opening lightproof and to maintain required lead equivalence at all points and in all directions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates in areas to receive radiation protection, with Installer present, for compliance with requirements, installation tolerances, and other conditions affecting performance of radiation protection.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF LEAD-LINED GYPSUM BOARD

A. Install with long edge parallel to supports and lead lining facing supports. Provide blocking at end joints.

B. Fastening to Metal Supports: Use steel drill screws spaced as recommended in writing by gypsum board manufacturer.
1. Install lead strips covering face of framing and wrap around flange to cover points of screws. Where possible, install lead-lined gypsum board before installing gypsum board on other side of partition, and do not fold lead strips back over inside of flange until after lead-lined gypsum board is applied. Apply lead disks recessed flush with surface of board over heads of screws securing trim.
2. Install lead strips, 2 inches (50 mm) wide and same thickness as lead lining, to face of supports and blocking where joints occur. Secure lead strips with construction adhesive. Provide shims at face of supports and blocking where joints do not occur.

C. Fastening to Metal and Wood Supports: Use steel drill screws spaced as recommended in writing by gypsum board manufacturer.
1. Install lead strips, 2 inches (50 mm) wide and same thickness as lead lining, to face of supports and blocking where joints occur. Secure lead strips with construction adhesive. Provide shims at face of supports and blocking where joints do not occur.
2. Apply lead disks recessed flush with surface of board over heads of screws securing gypsum board and trim.

D. Fastening to Wood Supports: Use lead-headed nails spaced as recommended in writing by gypsum board manufacturer. Drill pilot holes to prevent deforming nails or distorting board. Drive nail heads slightly below exposed surface.
1. Install lead strips, 2 inches (50 mm) wide and same thickness as lead lining, to face of supports and blocking where joints occur. Secure lead strips with construction adhesive. Provide shims at face of supports and blocking where joints do not occur.
2. Fasten accessories and trim to wood supports with lead-headed nails as specified above for fastening gypsum board.

E. Two-Layer System: Apply a facing sheet of gypsum board vertically over base sheet using laminating adhesive recommended in writing by gypsum board manufacturer. Offset joints in finish layer from joints in base layer, and fasten at top and bottom of sheet to support finish panel until adhesive has set.
1. Locate fasteners above ceiling or behind wall base and cover fasteners with lead disks recessed flush with surface of board.

F. Openings: Extend lead-lined gypsum board into frames of openings, lapping lead lining with lead frames or frame linings at least 1 inch (25 mm). Arrange board around openings so neither horizontal nor vertical joints occur at corners of openings.

G. Install control and expansion joints where indicated, with appropriate trim accessories. Install lead strip on face of framing, extending across joint, and lap with lead lining of gypsum board.

H. Finish lead-lined gypsum board to comply with Section 092900 "Gypsum Board."

3.3 INSTALLATION OF LEAD-LINED DOORS AND DOOR FRAMES

A. Install lead-lined steel door frames according to Section 081115 "Interior Hollow Metal Door Frames."
1. Apply a coat of asphalt mastic or paint to lead lining in door frames where lead comes in contact with masonry or grout.

B. Install lead-lined wood doors according to Section 081416 "Flush Wood Doors."

C. Glazing: Comply with installation requirements in Section 088000 "Glazing" and with door manufacturer's written instructions.

D. Frames: Comply with HMMA 840 unless otherwise indicated. Except for frames located in existing walls or partitions, place frames before constructing walls. Set frames accurately in position, plumb, and brace securely until permanent anchors are set.
1. Provide three anchors per jamb, located adjacent to hinge on hinge jamb and at corresponding heights on strike jamb.

2. In masonry construction, use wire or T-strap anchors and apply a coat of asphalt mastic or paint to lead lining where lead comes in contact with masonry or grout.
3. In metal stud construction, use wall anchors attached to studs with screws.

E. Lap lead lining of frames over lining in walls at least 1 inch (25 mm).

F. Lead Lining of Frames: Line inside of frames with lead of thickness not less than that required in doors and walls where frames are used. Form lead to match frame contour, continuous in each jamb and across the head, lapping the stops. Form lead shields around areas prepared to receive hardware. Lap lining over lining in walls at least 1 inch (25 mm).

G. Install doors in frames level and plumb, aligned with frames and with uniform clearance at each edge.

H. Line astragals with lead sheet.

I. Hardware: Line covers, escutcheons, and plates to provide effective shielding at cutouts and penetrations of frames and doors. See Section 087100 "Door Hardware" for other installation requirements.

J. Touch up damaged finishes with compatible coating after sanding smooth.

K. Operation: Rehang or replace doors that do not swing or operate freely. Check and readjust operating hardware items, leaving doors and frames undamaged and in proper operating condition.

3.4 INSTALLATION OF LEAD-LINED OBSERVATION WINDOWS

A. Install observation windows according to manufacturer's written installation instructions.
1. Apply a coat of asphalt mastic or paint to lead lining in frames where lead comes in contact with masonry or grout.

B. Install windows level, plumb, square, true to line, and anchored securely in place to structural support.

C. Install leaded side of frame on radiation side of wall. Lap lead lining of frames over lining in walls at least 1 inch (25 mm).

D. Glazing: Comply with installation requirements in Section 088000 "Glazing" and with manufacturer's written instructions.

3.5 INSTALLATION OF PENETRATING ITEMS

A. At penetrations of lead linings, provide lead shields to maintain continuity of protection.

B. Provide lead linings, sleeves, shields, and other protection in thickness not less than that required in assembly being penetrated.

C. Secure shields at penetrations using adhesive or wire ties but not penetrating fasteners unless indicated on Drawings.

D. Outlet Boxes and Conduit: Cover or line with lead sheet lapped over adjacent lead lining at least 1 inch (25 mm). Wrap conduit with lead sheet for a distance of not less than 10 inches (250 mm) from box.

E. Duct Openings: Unless otherwise indicated, line or wrap ducts with lead sheet for distance from partition/ceiling equal to three times the largest opening dimension. Lap lead sheet with adjacent lead lining at least 1 inch (25 mm).

F. Piping: Unless otherwise indicated, wrap piping with lead sheet for a distance of not less than 10 inches (250 mm) from point of penetration.

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections after radiology equipment has been installed and placed in operating condition.

B. Correct deficiencies in or remove and replace radiation protection that inspection reports indicate does not comply with specified requirements.

3.7 PROTECTION

A. Lock radiation-protected rooms once doors and locks are installed, and limit access to only those persons performing work in the rooms.

END OF SECTION

SECTION 210100
FIRE PROTECTION

PART 1 - GENERAL

1.1 GENERAL

A. All work shall be in accordance with the "General Conditions", "Supplemental Conditions" and the "General Requirements for Mechanical Work".

B. All work shall be in accordance with City Building and Fire Codes and with all state and national codes as they may apply to the project and to public safety.

1.2 SCOPE OF WORK

A. It is the intent that the contractor shall install a complete and operable fire protection system, fully adjusted and ready for use.

B. Materials and equipment have been carefully selected for the project. The Contractor is expected to furnish and install items that the specification required as closely as possible.

C. The drawings accompanying these specifications show the extent of the fire protection work and the general arrangement. The drawings, however, are diagrammatic and exact layout of the systems is the responsibility of the Contractor.

D. The Contractor shall pay all fees and charges to City or other agencies.

1.3 SUMMARY

A. Extent of Automatic Sprinkler Fire Extinguishing System Work required by this section is indicated on Drawings and by requirements of this section.

B. This section includes design and provisions of an Automatic Sprinkler Fire Extinguishing System. Types of Fire Extinguishing Automatic Sprinkler Systems specified in this section include the following:

1. Wet Pipe System

1.4 REFERENCES

A. NFPA No. 13 - Installation of Sprinkler Systems.

1.5 DESIGN CRITERIA

A. System to provide coverage for building areas noted.

B. Interface system with building control system.

C. Design systems to the occupancy requirements of NFPA 13, City Codes and Ordinances, and Owner's Insurance Underwriter.

D. Provide detailed shop drawings of the automatic sprinkler systems in accordance with NFPA 13.

E. Provide hydraulic calculations of the automatic sprinkler systems in accordance with NFPA 13. Hydraulic calculations shall not exceed 90 percent of the available pressure.

1.6 QUALITY ASSURANCE

A. Conformance with applicable state and local codes and ordinances.

B. Equipment and Components: Bear UL label or marking.

C. Specialist Firm: Company specializing in sprinkler systems design and installation, Licensed Fire Protection Contractor by the Texas State Board of Insurance Underwriters with minimum three years experience.

1.7 REGULATORY REQUIREMENTS

A. Design and install in accordance with NFPA 13 and the requirements of Owner's Insurance Underwriter or Texas State Board of Insurance Underwriters.

B. Pipe sizes as shown on the Drawings are minimum pipe sizes. Contractor shall increase those pipe sizes if calculations so require at no additional cost, but under no circumstance shall pipe sizes be decreased.

C. Piping materials specified herein are acceptable products to the Architect, but all are not necessarily acceptable to applicable local codes and ordinances. It is the responsibility of the contractor to provide materials from the options listed herein that are acceptable to both the Architect and applicable codes and ordinances.

1.8 SUBMITTALS

A. Prior to submittal to Architect submit shop drawings to local Fire Marshal and Owner's Insurance Underwriter.

B. After approval from local Fire Marshal and Owner's Insurance Underwriter submit shop drawings, product data and hydraulic calculations to Architect (with Certificate of Approval from local Fire Marshal and Owner's Insurance Underwriter) for approval in accordance with Division 01.

C. Indicate hydraulic calculations, detailed pipe layout, hangers and supports, components and accessories.

D. Indicate pipe materials used, joining methods, supports, floor and wall penetration seals.

E. Indicate valve data and ratings.

F. Submit certificates as listed below to Architect in accordance with Division 01.

G. Test Certificate of Approval for piping, equipment, and system operation.

1.9 PROJECT RECORD DOCUMENTS

A. Submit documents in accordance with Division 01.

1.10 OPERATION AND MAINTENANCE DATA

A. Submit manufacturer's operation and maintenance data under provisions of Division 01.

B. Include written maintenance data on components of system, servicing requirements, and Record Drawings.

1.11 DELIVERY, STORAGE AND HANDLING

A. Deliver and store equipment in shipping containers with labeling in place under provisions of Division 01.

1.12 EXTRA STOCK

A. Provide extra sprinkler heads under provisions of NFPA 13.

B. Provide suitable wrenches for each head type.

C. Provide metal storage sprinkler head and wrench cabinet in location designated.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Provide above floor pipe, fittings, valves in accordance with NFPA 13 for sprinkler systems.

B. The minimum thin wall piping allowed shall be schedule 40 for pipe up to 2 in. and Schedule 10 for pipe over 2 in. All thin wall piping shall be joined using rolled grooves with coupling.

C. Grooved and Shouldered Pipe End Couplings: Malleable iron housing clamps to engage and lock, designed to permit some angular deflection, contraction and expansion; “C” shape composition sealing gasket; steel bolts, nuts, and washers; galvanized couplings for galvanized pipe.

1. Acceptable Manufacturers:

a. Victaulic

b. Tyco (Grinnell Mechanical Products)

c. Gruvlok (Anvil International)

D. For all threaded pipe, use Schedule 40.

E. Piping for all dry pipe sprinkler systems and all dry standpipes shall be galvanized.

F. Within 5 ft. 0 in. of the building provide ductile iron pipe (AWWA C151) for below ground installation. Fittings shall be ductile iron, 250 pound rated, flanged joint (AWWA C110). Joints shall be flanged with full-face 1/16-in. thick red rubber gasket. All bolts and nuts shall be 316 stainless steel. Both pipe and fittings shall be tar coated outside and cement-mortar lined inside.

G. All-exterior below ground piping shall be ductile iron pipe (AWWA C151). Fittings shall be ductile iron, 250 pound rated, mechanical joint (AWWA C110). Joints shall be mechanical joint or push-on (AWWA C111). Both pipe and fittings shall be tar coated outside and cement-mortar lined inside (AWWA C104). All-exterior below ground piping shall be PVC pipe (AWWA C900 DR-18). Fittings shall be ductile iron standard thickness and mechanical joint (ANSI/ASTM C110). Joints shall be rubber gasket push-on mechanical joint (ANSI/ASTM C111).

2.2 ALARM CHECK VALVE

A. Alarm Check Valve: Automatic flow detector with alarm circuits, pressure switch, retard chamber, and electric alarm bell .

2.3 SPRINKLER HEADS

A. Suspended Ceiling Type:

1. Fully-recessed "Standard" pendent type with cover and finish that matches surrounding color.

2. In all electrical rooms provide institutional vandal resistant pendant type sprinkler heads with nickel-plated conical escutcheon equal to Star Sprinkler Corporation, Model PH-2, Style B.

3. The use of o-ring sealed sprinkler heads is prohibited.

B. Exposed Area Type: Standard upright types with chrome finish.

C. Fusible Link: Temperature rated for specific area hazard.

D. Guards: Finish to match sprinkler head.

2.4 ELECTRIC SWITCHES

A. Alarm switch:

1. Vane type, 24 VDC, adjustable retard (wet system only).

2. Pressure Type, Snap Action, NEMA 4 construction, 5 psi to 15 psi adjustment range, 24 VDC (dry system only). Designed to activate alarm on increase in pressure.

B. Supervisory switch:

1. OS&Y gate valve type, 24 VDC.

2. Pressure switch: 24 VDC.

2.5 ALARM BELL

A. Exterior Alarm Bell: Electric 10 in. diameter, weatherproof, 97 dB at 10 ft. 0 in., 24 VDC, marked "Sprinkler Alarm."

B. Interior Alarm Bell: Electric 6 in. diameter, 93 dB at 10 ft. 0 in., 24 VDC, marked sprinkler alarm.

2.6 EXCAVATION, BACKFILLING AND COMPACTING

A. Provide excavation, backfilling and compacting in accordance with Division 31.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate Work of this Section with other affected work.

3.2 INSTALLATION (GENERAL)

A. Installation shall be in accordance with NFPA 13, for sprinkler systems.

B. Locate fire department connection in accordance with City Codes and Ordinances, with sufficient clearance from walls, obstructions, or adjacent Siamese connectors to allow full swing of fire department wrench handles.

C. Locate exterior alarm bell on outside building wall next to riser. Locate interior alarm bell on inside building wall next to riser.

D. Place pipe runs to minimize obstruction to other work.

E. Place piping in concealed spaces above finished ceilings.

F. Center heads in one direction (short side) only in ceiling tile with location in other direction (long side) variable, dependent upon spacing and coordination with ceiling elements.

G. Apply strippable tape or paper cover to ensure sprinkler heads do not receive field paint finish.

H. Installation of preaction system and accessories shall be in accordance with manufacturer's recommendations.

I. Provide 24 in. x 24 in. x 6 in. thick concrete collar around base of sidewalk fire department connection.

J. Sprinkler heads located under glass or plastic skylights exposed to direct rays of sun shall be intermediate temperature classification.

K. All interconnecting power, control, and alarm wiring between pre-action battery charger/power supply and all system components shall be by Fire Protection Contractor. Electrical Contractor shall provide power supply to battery charger/power supply unit and provide connected supervisory and alarm circuits.

3.3 INSTALLATION - PIPE

A. Thread steel pipe joints up to and including 1-1/2-in. diameter. Thread, weld, or groove 2-in. diameter and larger, including branch connections.

B. Mechanical joints may be used instead of threaded or welded joints.

C. Die-cut threaded joints with full-cut standard taper pipe threads with red lead and linseed oil or other non-toxic joint compound applied to male threads only.

D. Coat threaded ends with pipe lubricant compound.

E. In steel piping, main sized saddle branch connections or direct connection of branch lines to mains is permitted if main is two pipe sizes larger than the branch. Do not project branch pipes inside the main pipe.

F. Solder or braze copper tubes.

G. Do not penetrate or cut building structural members.

H. Provide sleeves when penetrating floors and walls.

I. Seal pipe and sleeve penetration to achieve fire and smoke resistance equivalent to fire and smoke separation.

J. Fire protection water service piping below building shall be provided with both flanged joints and thrust block restraint in accordance with NFPA 24. Flange bolts and nuts shall be stainless steel. Thrust block restraint shall be provided on the below floor elbow at the base of the riser. Area of bearing face of concrete thrust block shall be a minimum of 3.2 square feet.

K. Establish elevation of buried pipe outside the building to ensure not less than 3 ft. of cover over top of pipe.

L. Piping shall not run through grade beams. Piping shall run under grade beams.

3.4 INSTALLATION - VALVES

A. Install valves with stems upright or horizontal, not inverted.

B. Provide drain valves at main shut-off valve and after all zone valves. In addition, provide auxiliary drains at all low points.

3.5 SYSTEM TESTS

A. Test wet pipe system to ensure proper operation. Tests shall be performed in accordance with the City Fire Marshal, Factory Mutual, and NFPA 13.

B. Tests shall be witnessed and approved by local Fire Marshal.

C. After completion and approval of testing submit "Test Certificate of Approval" for wet pipe system stating that all test results are satisfactory. Certificate of Approval must be signed by Contractor.

3.6 DEMONSTRATION OF SYSTEM AND EQUIPMENT

A. Prior to final acceptance, Contractor and Manufacturer's Representative shall provide a minimum of 4 hours (or as long as required by the Owner) to demonstrate to the Owner the proper operation of the preaction automatic sprinkler system including associated accessories and controls.

B. Prior to final acceptance, Contractor shall provide a minimum of 4 hours (or as long as required by the Owner) to demonstrate to the Owner the proper operation of the wet pipe automatic sprinkler system including associated accessories and controls.

C. After completion and approval of demonstrations, submit "Demonstration Certificates of Completion" for wet pipe automatic sprinkler system including all associated accessories and controls stating that the Demonstrations of the systems are satisfactory. Certificates must be signed by the Manufacturer's Representative.

END OF SECTION

SECTION 220100
PLUMBING

PART 1 - GENERAL

1.1 GENERAL

A. All work shall be in accordance with the "General Conditions", "Supplemental General Conditions" and the "General Requirements for Mechanical Work".

B. All work shall be in accordance with City Building and Plumbing Codes and with all state and national codes as they may apply to the project and to public safety.

1.2 SCOPE OF WORK

A. It is the intent to furnish and install complete medical gas piping systems, fully adjusted and ready for use.

B. Materials and equipment have been carefully selected for the project and the contractor is expected to provide items as closely as possible to the specifications.

C. The drawings accompanying these specifications show the extent of the plumbing work and the general arrangement. The drawings, however, are diagrammatic and exact layout of the systems is the responsibility of the Contractor.

D. The Contractor shall pay all fees and changes to City or other agencies.

1.3 SUBMITTAL

A. Submit manufacturer's product data on piping and valves specified herein as outlined under the provisions of Division 01.

B. Include data on pipe materials and pipefittings.

C. Submit certificates as listed below to Architect in accordance with division 01.

1. Certificarion of Cross Connection Testing and Labeling Verification from a "Licensed Medical Gas Certification Contractor."

2. Certification of Leakage Testing, Purging, Piping Labeling and Delivery Pressures.

3. The Brazing Procedure Specification and the supporting Qualification Records per NFPA current edition.

PART 2 - MATERIALS

2.1 MEDICAL GASS PIPING

A. Copper Tubing: ASTM B819, Type "K" hard drawn and cleaned and capped for medical service (Type ACR-OXY). Fittings: ANSI B16.22, wrought copper ANSI B16, cast bronze. Joints : ANSI/AWS A5.8 silver braze (1000° F minimum melting point).

2.2 FLANGES, UNIONS, AND COUPLINGS

A. Pipe Size 2 in. and under: 250 psig bronze unions for copper tubing, brazed joints.

B. Pipe Size Over 2 in.: 250psi bronze flanges for copper tubing, brazed joint

PART 3 - EXECUTION

3.1 INSTALLATION

A. A. Lay out medical piping in careful coordination with all other trades, determine proper elevations for all components of the system and use minimum number of bends to produce a functional system. Follow general layout shown on the Drawings except where other work may interfere. Arrange for pipes to run above ceiling and fall within partitions, walls or ceiling cavities.

B. In addition to the installation requirements specified herein, install in accordance with NFPA 99.

C. Continuously cap piping throughout the installation to prevent contamination. Recap unused portions of cut piping immediately after cutting.

D. Make connections for each system including vacuum with a brazing alloy exhibiting a melting temperature in excess of 1000°F.

E. The use of flux is prohibited. Suggested brazing material would be phosphor, bronze or silver alloy.

F. Make provisions to adequately support all piping by means of pipe hangers.

G. Provide labeling by color-coding and indexing indicating the service as the piping is installed.

H. The use of compressed gas other than that defined in NFPA 99 is prohibited during the installation and testing of the Medical Piping Systems. Use of on-site compressor is considered a violation of this item.

I. Maintain total isolation between new and existing medical piping systems until new piping has been tested for leakages, alarms, cross connection, and zone valve operation.

J. Internally examine all piping, fittings and valves just prior to assembly, when necessary, reclean in accordance with NFPA requirements.

K. Debur pipe ends and blow out with oil free dry nitrogen to remove the copper drips.

L. Maintain a nitrogen flow through the pipe during brazing to minimize the oxidation of the copper interior walls.

M. Maintain a nitrogen charge on the medical systems once installation is complete until the time of final testing.

N. Do not cut into or reduce the size of any load-bearing structural member without the prior approval of the Owner's Representative. Install pipes to clear beams and obstructions.

O. Conceal all piping unless otherwise indicated on the Drawings.

P. Inspect each piece of pipe, coupling, fitting and equipment for defects and obstructions. Promptly remove all defective material from the site.

Q. The injection of foreign material into piping systems, e.g. Freon, water, liquid-cleaning solutions is prohibited.

R. Provide piping, valve and equipment identification for all systems.

3.2 JOINTS AND CONNECTIONS

A. Threaded: Ream all cut pipe. Cut all threads straight and true. Apply high quality Teflon tape to male pipe threads, but not to the inside of fittings.

B. Brazed: Make all copper tubing joints with silver solder (1000°F. minimum melting point) conforming to ANSI/AWS A5.8.

C. Welded joints shall be in accordance with AWS D10.12-79. The oxyacetylene or electric process shall make all joints.

3.3 SYSTEMS TESTING

A. In addition to the testing requirements specified herein, test in accordance with NFPA 99.

B. Blow down: After installation of the piping, but before installation of the equipment, the line for each installed gas and vacuum system shall be blown clear by means of oil free dry nitrogen.

C. Leak Test: Before attachment of systems, pressure actuating switches for alarms, and pressure gauges, but after installation of the station outlets, with caps in place, and before closing of the walls subject each section of the piping system to a minimum test pressure of 150 psig (maximum 200 psig) with oil fee dry air or nitrogen. Maintain this test until each joint has been examined for leakage by means of soapy water of other equally effective means of leak detection safe for use with medical gas. When leak occurs, repair and retest the section.

D. Final Leak Test: After testing of each individual system as specified above, install the station outlets and all other system components such as pressure actuating switches for alarms and pressure gauges and subject the medical piping systems to a 24-hour standing pressure test at 20% above normal line pressure. When leak occurs, repair and retest the section

E. Cross Connections: Test outlet stations to verify there are no cross-connected medical piping lines or outlets.

1. To determine that no cross connection to other piping systems exists reduce all systems to atmospheric pressure. Disconnect all sources of test gas from all of the systems with the exception of the one systemto be checked. Pressure this system with oil free, dry air or nitrogen to apressure of 50psig (350kPa) With appropriate matching outlet labels. Check individual station outlet of all systems installed to determine that test has is being dispensed from only the outlets of the system being tested.

    a. Disconnect all the source of test gas and reduce the system tested to atmospheric pressure. Proceed to test each additional piping system in accordance with (1 above).

b. Where a medical vacuum piping system is installed, the cross-connection testing shall include that system with all the other medical gas piping systems.

F. Labeling: Verify proper label of piping systems exist and zone valves for medical piping service.

G. Test at operational pressure with all systems hardware and equipment installed to verify there are no leakages within the systems. Conduct test on a zone-by-zone basis.

H. Systems purging: At each station purge medical piping systems into a white cloth until there is no discoloration to minimize the solid particulate contaminants that may be present in the systems.

I. Final purging: Introduce the applicable gas for each system into the respective medical piping systems. Purge each installed outlet valve to remove any of the nitrogen test gaspresent during the conduction of phase I testing. In addition, testall vacuum outlets for ability to flow as an assurance line blockage or restrictions.

J. Systems Delivery Pressures: Test medcal piping systemsto confirm the supply sources are set to deliver gas at the nominal pressure levels as defined by NFPA 99.

K. Certification:

1. The Licensed Medical Gas Certification Contractor shall submit the certification of cross connections testing and labeling of zone valves to the Architect.

2. Medical Gas Contractor shall submit the certification of leakage testing, final leakage testing, piping, labeling, systems leakage testing, system purging, final purging, and systems delivery pressures.

3. If any testing fails, Medical Gas Contractor shall make necessary corrections and retesting and recertification shall be performed as outlined above no additional cost to the Owner.

3.4 CLOSING IN UNINSPECTED WORK

A. Do not cover up or enclose work until it has been properly and completely inspected and approved. Should any of the work be covered up or enclosed prior to all required inspections and approvals, uncover the work as required. After it has been completely inspected and approved, make all repairs and replacements as necessary to the satisfaction of the Owner's Representative. Repairs and replacements will be made at no additional cost to the Owner.

END OF SECTION

SECTION 230100
HEATING, VENTILATING & AIR CONDITIONING (HVAC) (SHORT FORM)

PART 1 - GENERAL

1.1 GENERAL

A. All work shall be in accordance with the "General Conditions", "Supplemental Conditions" and the "General Requirements for Mechanical Work".

B. All work shall be in accordance with City Building and Mechanical Codes and with all state and national codes as they may apply to the project and to public safety.

1.2 SCOPE OF WORK

A. It is the intent that the contractor shall install a complete and operable heating, ventilating, and air conditioning (HVAC) system, fully adjusted and ready for use.

B. Materials and equipment have been carefully selected for the project. The Contractor is expected to furnish and install items that the specification required as closely as possible.

C. The drawings accompanying these specifications show the extent of the HVAC work and the general arrangement. The drawings, however, are diagrammatic and exact layout of the systems is the responsibility of the Contractor.

D. The Contractor shall pay all fees and charges to City or other agencies.

1.3 HVAC SUBMITTAL

A. The Contractor shall check all items of submittal data and verify by statement and initial that each item has been checked for the following conditions:

1. Item is equal to specified item in construction and quality.

2. Item is of the same physical size. If not of the same physical size, the dimensions have been checked and item will fit within the allocated space shown on the drawings. Where items proposed are different than scheduled item, furnish 1/4 in. scale plan and 1/4 in. sections on tracing paper (for direct overlay) of proposed equipment including space required for connections or service. The tracing of 1/4 in. plans and 1/4 in. sections must be furnished in submittal for other than scheduled equipment in order to compare proposed equipment with scheduled equipment.

3. System connections to the item can be made as shown on the drawings.

4. Shop drawings show in detail all connections, etc., required to meet the overall specifications in every detail.

5. Statement of guarantee that the proposed equipment shall operate properly as applied to the project and will not require additional devices or changes in the installation shown on the drawings.

B. In addition to the above, provide an individual fan curve for each fan provided as a part of this project. Each submitted fan curve shall have the design operating point clearly indicated.

C. When equipment other than specified is proposed, the Contractor shall be responsible for the proper design and installation of electrical power to equipment. Submit listing of electrical feeder size, conduit size, breaker size, etc., for each item of equipment for review.

PART 2 - INSTALLATION

2.1 TESTS AND INSPECTIONS FOR HVAC SYSTEMS (BY HVAC CONTRACTOR)

A. This contractor shall, at their own expense, start-up, adjust, check, repair and place in service the various heating, ventilating and air conditioning systems herein specified with their respective equipment, accessories and piping. They shall furnish all labor, materials, equipment and tools necessary to conduct the tests herein specified and those required by the governing authorities. This contractor in the presence of the Owner’s Representative shall make all tests.

B. No work of any nature shall be covered, enclosed or otherwise concealed until properly inspected, tested and approved. Any leaks that develop during any of the tests shall be corrected with new material and made good as required; said test should be repeated until the work is satisfactory in every way.

C. This contractor shall pay all costs for fuel, electricity, labor, materials, equipment etc. as required for testing, adjusting and balancing of all mechanical systems.

D. This subcontractor shall operate each separate system with its various components for a reasonable length of time to demonstrate the performance of all equipment and piping in accordance with the true intent and purpose of the plans and specifications. All necessary adjustment shall be made.

E. Controls: All heating and other controls shall be adjusted and placed in operation and their operation demonstrated to the Owner's Representative.

F. All pilot burners and main burners shall be adjusted for proper flame. All flame safety controls shall be checked for proper operation.

G. Hydronic Piping Tests:

1. All piping installed on the project unless specifically shown otherwise, shall be hydraulically tested as specified herein. Refrigeration piping, if used on the project, shall be tested as specified under refrigeration piping. This subcontractor shall provide all equipment required to make the tests specified herein.

2. Piping may be tested a section at a time in order to facilitate the construction.

3. The subcontractor shall fill the section of pipe to be tested with water and bring the section up to pressure with a test pump. The subcontractor in the presence of the Owner’s Representative shall conduct the tests. These tests shall be conducted before any insulation is installed and any insulation installed prior to these tests shall be removed. Gauges used in the tests shall have been recently calibrated with a dead weight tester.

4. All tests shall apply full test pressure to the piping for a minimum of twenty-four (24) hours.

5. All tests shall be conducted at a water working pressure of the pipe installed. When Schedule 40 or standard weight pipe is used, the test pressure shall be 150 pounds per square inch. When Schedule 80 or extra strong pipe is used, the test pressure shall be 250 pounds per square inch.

6. When the test pressure has fallen over 5% during the twenty-four (24) hours test period, the point of leakage shall be found, repaired and the test repeated. This procedure shall be followed until the piping system has been proven absolutely right.

7. The use of chemicals or so called stop-leak compounds will not be permitted at any time.

8. When delicate control mechanisms are installed in the piping system, they shall be removed during the tests to prevent shock damage. This does not apply to control valves.

9. Leaks developing subsequent to these tests shall not be repaired by mastic or other temporary means. All leaks shall be repaired by removal of the valve, fitting, joint, or section that is leaking and reinstalling new materials with joints as specified hereinbefore.

H. System Test:

1. Subsequent to the final air balance test, the entire heating and air conditioning system shall be tested to satisfy performance of all units as satisfactory system.

2. All heating and air conditioning systems shall be tested at completion of the building and it shall be established that all controls are calibrated accurately and performing satisfactorily and that all units are operating satisfactorily. The systems shall be checked for vibration and excessive noise and all such conditions corrected.

3. All systems shall be tested for opposite season operation, approximately 6 months 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 operating satisfactorily. The systems shall be checked for vibration and excessive noise and all such conditions corrected.

4. 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.

5. At the completion of all work all equipment on the project shall be checked and thoroughly cleaned including coils, plenums, under equipment and any and all other areas around or in equipment provided under this section. Any filters used during construction shall be replaced with new filters during final cleanup.

6. 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.

7. Check all firestats/smoke detectors on the project to assure that they are functioning properly.

2.2 AIR FLOW BALANCE AND TEST (BY INDEPENDENT AIR BALANCE AND TESTING COMPANY).

A. The HVAC Contractor shall include in their bid the cost of hiring an independent test and balance firm to perform the following work. The test and balance firm shall be certified by AABC for test and balance work and shall have test and balance work performed under the direction of a licensed Professional Engineer.

B. Each HVAC system shall be balanced and tested in accordance with the following requirements.

1. Scope: After completion of the installation of the air conditioning, heating, ventilating and exhaust systems, and prior to acceptance by the owners, all air handling systems and appurtenances applicable to the above system shall be adjusted and balanced to deliver the air and water quantities as specified, indicated on the drawings or as directed.

a. Air quantity measurements in main and branch ducts shall be performed by pitot tube traverse of the entire cross sectional area of the duct. Ducts having velocities of 1000 or more feet per minute shall be measured by inclined manometers (draft gage) or magnehelic gauges. Air measurements required for ducts having velocities of less than 1000 feet per minute shall be performed with micromanometers, hook gauges or similar low-pressure instruments. Opening in ducts for pitot tube insertion shall be sealed with snap-in plugs after air balance is complete. Direct reading velocity meters in accordance with outlet and inlet manufacturer’s recommendations shall determine outlet and inlet air quantities.

b. Total air quantities shall be obtained by adjustment of fan speeds. Volume or splitter dampers shall adjust branch duct air quantities. Dampers shall be permanently marked after air balance is complete so that they can be restored to their correct position if disturbed at any time.

c. Adjust dampers, diffusers, VAV boxes, registers and sheaves for the delivery and distribution of air quantities indicated on the drawings.

d. Adjust exhaust and recirculation air systems for air quantities indicated on drawings and to establish the proper relationship between supply and exhaust.

e. Volume adjusters may be used to balance air quantities at outlets and inlets providing final adjustments do not produce sound levels in excess of heretofore-specified limits, or objectionable drafts. Air quantity adjustments by outlet deflectors, grids or air scoops will not be permitted.

f. Adjust distribution system to obtain uniform space temperature free from objectionable drafts and noise within the capabilities of the system.

g. Acceptable Tolerances: Adjust fan systems, air devices, etc. as follows:

1) Supply air fan CFM: -5% to +5% of scheduled

2) Return air fan CFM: -5% to +5% of scheduled

3) Exhaust air fan CFM: -0% to +10% of scheduled

4) Supply air device CFM: -0% to +10% of scheduled

5) Return air device CFM: -10% to +0% of scheduled

6) Exhaust air device CFM: -0% to +10% of scheduled

2. Mark balancing devices at final setting.

3. Replacement of adjustable pulleys, installation of additional balancing dampers or pressure taps, required to effect proper air balance shall be furnished and installed by the HVAC contractor at no additional cost to the Owner.

4. The air balance shall be recorded and submitted for evaluation. Submit two (2) certified copies of the complete air balance report. If requested, any or all of the above field tests shall be conducted in the presence of the Owner's Representative.

END OF SECTION

SECTION 260510
GENERAL REQUIREMENTS FOR ELECTRICAL WORK

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all labor, materials, supervision, tools, services, equipment and incidentals necessary for complete and operational systems as specified under this division and as shown on the Contract Drawings.

B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Division.

1.2 DRAWINGS AND SPECIFICATIONS

A. Prior to submitting a bid:

1. Examine the Drawings.

2. Read the Specifications and other Contract Documents, including Addenda and referenced material.

3. Visit the site of the work.

4. Become informed prior to bidding as to existing conditions and limitations of the project.

B. Bring exceptions and inconsistencies in Drawings, specifications, addenda, referenced material, other Contract Documents and site conditions to the attention of the Architect in writing seven days before the bid opening; otherwise be responsible for changes and additions that become necessary during construction.

C. Interpretation or correction of the Contract Documents will be made by Addendum and will be mailed or delivered to each Contract Bidder of Record.

D. Location of material, equipment, devices and appliances shown in the Contract Drawings are approximate and are subject to such revisions as may be necessary or desirable at the time the work is installed. Install the work in relation to existing conditions and be responsible for the correctness of the work with reference to finish elevations and surrounding conditions.

E. The Contract Documents show the general arrangements of the work. Should project conditions require any rearrangement, or if equipment or accessories can be installed to better advantage in a different manner, the Contractor may, before proceeding with the work, prepare and submit five copies of shop drawings of the proposed rearrangement for the Architect's review.

F. If the Contractor proposes to install equipment requiring space conditions other than those shown,theyshall assume responsibility for the rearrangement of the space and shall have the Architect review the change before proceeding with the work. The request for such changes shall be accompanied by shop drawings of the space affected.

G. The accompanying Drawings do not indicate the existing electrical installations other than to identify modifications and extensions thereto. Visit the site and ascertain the conditions to be met and the work to be accomplished in removing and modifying the existing work, and installing the new work. Failure to comply with this shall not constitute grounds for any additional payment in connection with removing or modifying any part of the existing installations and/or installing any new or temporary work under this Division.

1.3 CODES AND STANDARDS

A. Execute the work in accordance with local, state and national codes, ordinances and regulations having jurisdiction or authority over the work. Make any and all adjustments required by these agencies without further cost to the Owner. In addition, conform to the applicable provisions and recommendations of the following standards:

1. National Electrical Manufacturer Association (NEMA)
2. American Society for Testing and Materials (ASTM)
3. National Fire Protection Association (NFPA)
4. National Electrical Safety Code (NESC)
5. Institute of Electrical and Electronic Engineers (IEEE)
6. National Electrical Code (NEC), including local amendments
7. Underwriters' Laboratories (UL)
8. American National Standards Institute (ANSI)
9. International Building Code (IBC)
10. Occupational Safety and Health Administration (OSHA)
11. Americans with Disabilities Act (ADA)
12. Applicable utility companies
13. Texas Accessibility Standards (TAS)
14. International Energy Conservation Code (IECC), including local amendments

B. Execute the work in accordance with the most current codes and standards in effect at the time of bidding.

C. In the event standards and codes conflict with each other, the most stringent shall apply.

D. Conform to National Electrical Code rules. Provide material and equipment, which is approved by Underwriter's Laboratories, bears UL label and is acceptable to Factory Mutual.

E. It is specifically understood, however, that in those instances where capacities, sizes, etc., of electrical equipment, devices or material as designated in these Specifications or on the Drawings are in excess of the minimum requirements of the National Electrical Code, such designated capacities shall prevail.

1.4 COMMISSIONING

A. The Contractor shall provide all system commissioning services as required by section C408 of the 2015 International Energy Conservation Code (IECC). Electrical power and lighting systems shall comply with IECC section C405.

B. Commissioning, as outlined in IECC section C408 shall include the following:

1. A commissioning plan.

2. Functional performance testing for all lighting controls.

3. A preliminary commissioning report.

4. Final documentation including drawings, O&M manual(s), T&B report, and final commissioning report.

PART 2 - PRODUCTS

2.1 SUBMITTALS AND SHOP DRAWINGS

A. Definitions:

1. Submittal - Equipment, Product Data, and Material Information for components proposed to be installed for the project.

2. Shop Drawing - Scaled floor plans showing equipment layout and elevations of proposed components to be installed for the project.

B. Submit Submittals for all material furnished under this division of the work. Refer to the General Requirements for additional requirements. In addition to the quantity of Shop Drawing copies required by the General Requirements, furnish one additional copy for the Electrical Engineer's file. No material shall be fabricated, delivered to the jobsite, or installed which the Architect through Shop Drawing submittals has not approved.

C. The submittals shall include sufficient descriptive material, such as catalog cuts, diagrams, and other data published by the manufacturer, as well as evidence of compliance with safety and performance standards, to demonstrate conformance to the specification requirements; catalog numbers alone will not be acceptable. The data shall include the name and address of the nearest service and maintenance organization that regularly stocks repair parts.

D. Deliver Submittals to the Architect in sufficient time to avoid delay of the project. Group Division 26 submittals as identified below, submit sections not included in these groupings separately. All proposed changes to the overcurrent protection devices shall be clearly identified in the distribution equipment submittal.

1. Distribution Equipment – Low Voltage

a. Section 262416 - PANELBOARDS

b. Section 262816 - OVERCURRENT PROTECTIVE DEVICES

c. Section 262817 - DISCONNECT SWITCHES

d. Section 262913 - MOTORS, MOTOR STARTERS AND CONTROLS

e. Section 26 43 13 - SURGE PROTECTION DEVICES (SPDs)

2. Lighting

a. Section 265113 - LIGHTING

E. Submit samples for approval when requested by the Architect.

F. Before submitting Submittals for review, examine them and verify that they correctly represent the material or equipment intended for this project. The Contractor's review of Shop Drawings is not intended to take the place of the review of the Architect, and Shop Drawings which have not been reviewed by the Architect shall not be used in fabricating or installing any work.

G. List deviations and exceptions from the specified equipment in writing and submit Shop Drawings as required by this section. Shop drawings must be submitted if proposed equipment differs in physical size than specified equipment to indicate proposed equipment has been coordinated with other trades and space allocated for this equipment. Shop Drawings must be at a 1/4" per foot scale indicating proposed equipment layout and any other equipment/materials noted in that general area. Contractor agrees that if deviations, discrepancies, or conflicts between Shop Drawing submittals and the Contract Documents are discovered either prior to or after Shop Drawing submittals are reviewed by the Architect, the Contract Documents shall control and shall be followed, unless deviations have been specifically approved by the Architect.

H. The review of Submittals or catalog data by the Architect shall not relieve the Contractor from responsibility for deviations from plans and specifications unless they have, in writing, specifically called attention to such deviations at the time of submission and has obtained the permission of the Architect thereon; nor shall it relieve them from responsibility for error of any kind in Shop Drawings. When the Contractor does call such deviations to the attention of the Architect, they shall state in their letter whether or not such deviations involve any extra cost. If this is not mentioned, it will be assumed that no extra cost is involved for making the change.

I. Contractor agrees that Submittals and Shop Drawings reviewed by the Architect are not change orders; that the purpose of Shop Drawing submittals by the Contractor is to demonstrate to the Architect that the Contractor understands the design concept, that they demonstrate their understanding by indicating which equipment and material they intend to furnish and install and by detailing the fabrication and installation methods they intend to use.

J. Failure to submit scaled Shop Drawings will indicate that the Contractor has coordinated their efforts with other trades and finds no conflicts with the work presented in the Contract Documents.

2.2 STANDARDS FOR MATERIALS

A. It is the intention of these specifications to indicate a standard of quality for all materials incorporated in this work. Manufacturer's names and catalog numbers are used to designate the item of equipment or material as a means of establishing grade and quality. Where several manufacturers are named, only the named manufacturer's products will be considered and the Contractor's bid shall be based on their product.

B. Where the phrase 'or approved equivalent' or 'or equivalent' or 'equivalent to' or 'accepted substitute' is used in these specifications, the names or name mentioned are to be used as a basis of quality. Other manufacturers will be considered if the quality of the proposed material is equivalent to that of materials named, in the opinion of the Architect. Such unnamed manufacturers' products will, however, be considered as substitutions and shall not be used as a basis for bidding.

C. Basis of quality shall include material, workmanship, weight, finishes, and gauges of material, appearances, capacity and performance. Manufacturer's representation as to availability of equipment, replacement parts and service personnel in the area will be a factor in consideration of submittals.

D. All materials shall be fully warranted.

E. Furnish standard products and manufacturers regularly engaged in production of such equipment.

F. Furnish manufacturer's latest standard design.

G. All equipment shall conform with applicable IEEE, UL, ANSI and/or NEMA Standards.

H. Obtain manufacturer's recommendations and instructions for all installed equipment including installation instructions, preparation cleaning, tests and preservice checks, and then ensure all have been performed prior to completion of work.

2.3 SUBSTITUTIONS

A. The Architect prior to installation shall approve substitutions of equipment. Substitution of equipment shall be in accordance with Division 01 of the specifications.

B. When alternate or substitute materials and equipment are used, the Contractor shall be responsible for space requirements, configurations, performance, changes in bases, supports, structural members and openings in structure, and other apparatus and trades that may be affected by their use.

C. Contractor shall bear all additional costs resulting from the use of substituted materials. Such changes shall be at no additional cost to the Owner.

PART 3 - EXECUTION

3.1 COORDINATION

A. Coordinate and direct the work under this division of the specifications with the work under other divisions of the specifications. Examine the Contract Documents and report any discrepancies between divisions of the work to the Architect and obtain written instructions for changes necessary in the work.

B. Before installation, make proper provisions to avoid interferences with the work under other divisions of the specifications. Changes required in the work of the Contractor caused by their neglect to do so shall be made by them at their own expense.

C. Harmonize the work under this division with the work under other divisions of the specifications such that it may be installed in the most direct and workmanlike manner without hindering, handicapping, or conflicting with the work under other divisions of the specifications. Piping interferences shall be handled by giving precedence to pipelines that require a stated grade for proper operation.

3.2 PERMITS AND FEES

A. Secure and pay for all necessary permits, licenses and inspections required by law for the completion of the Work. Secure and pay for all certificates of approval that are required and deliver them to the Architect before final acceptance of the Work.

B. If a utility company in connection with the work under this division makes any charges, the Contractor shall advise the Owner, so that the Owner can pay these charges. Advise the Owner of these charges in a timely manner, so as not to delay construction of the project.

3.3 QUALITY ASSURANCE

A. Use adequate quantities of skilled workers who are trained and experienced in their crafts and who are familiar with the specified requirements and methods needed to perform the work in this division.

B. Install materials and equipment based upon actual dimensions and conditions at the project site. Field measure for materials or equipment requiring exact fit.

C. Be responsible for the proper location and sizes of all slots, holes or openings in the building structure pertaining to the work in this division, and for the correct location of pipe sleeves.

D. Perform work in accordance with good commercial practice. The good appearance of the finished work shall be of equivalent importance with its operation.

E. Isolate all conduit, transformers and motors to insure an acceptable noise level free from objectionable vibration for all systems.

3.4 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Follow the manufacturer's directions in the delivery, storage and handling of equipment and materials.

B. Equipment and materials shall be tightly covered and protected against dirt, water, chemical or mechanical injury and theft. Damaged equipment will not be accepted.

C. After materials are installed, protect the installation until the work is completed and accepted by the Owner.

3.5 CLEANING UP

A. Remove all shipping labels, dirt, paint, grease and stains from all equipment under this division of the Work. Remove debris as it accumulates. Upon completion of the Work, clean all electrical equipment and the entire electrical installation in order to present a first class electrical installation suitable for occupancy. No loose parts, scraps, tools nor debris shall be left on the premises.

3.6 ELECTRICAL SERVICE FOR TESTING

A. Construct sufficient temporary electric service and connect to refrigeration machines, related pumps, fans, fan coil units, elevators and other equipment furnished under other divisions of the specifications such that the equipment installers may begin testing 30 workdays before job completion deadline.

B. Notify the electric utility company with sufficient time in advance so they can construct their portion of the permanent electric service entrance to this project. If the electric utility company indicates that permanent service will not be installed when needed, notify the Architect in writing immediately.

3.7 CUTTING AND PATCHING

A. Be responsible for the cost of cutting and patching required in connection with the work under this division of the specifications.

B. Coordinate the work to eliminate unnecessary cutting of construction. Where it becomes necessary to cut through walls, floors, ceilings and other construction to permit installation of the work, or to repair defective work under this division, the costs for such cutting and patching shall be included in this division of the work. Comply with other applicable divisions of the specifications concerning the quality of cutting and patching.

C. Where openings are cut through masonry walls, provide lintels or structural supports to protect the remaining masonry. Provide adequate support during the cutting operation to prevent any damage to the affected masonry.

D. Cutting of structural members is not permitted unless the Architect grants specific written permission.

3.8 FLASHINGS, SLEEVES, INSERTS

A. Be responsible for maintaining the integrity of the waterproofing of conduit penetrations through roofs, exterior walls and floors.

B. Install 22 gauge galvanized sheet iron sleeves for each conduit passing through floors. Extend sleeves 1-1/2 in. above the floor slab and cement watertight. The sizes of sleeves shall be installed to permit the subsequent insertion of the proper size conduits or raceways.

C. Install galvanized wrought iron pipe sleeves around conduits and raceways that pass through concrete beams or walls and masonry exterior walls. The inside diameter of these sleeves shall be at least 1/2 in. greater than the outside diameters of the service pipes. After the pipes are installed in these sleeves, fill the annular space between pipes and sleeves with mastic. The completed installation shall be watertight.

D. Be responsible for maintaining the fire rating of penetrations through walls, floors and ceilings.

E. Waterproofing and fireproofing work shall conform to the requirements of other applicable sections of the specifications.

3.9 PAINTING

A. Maintain original factory finish on all material and equipment installed under this division of the work unless specifically noted otherwise within the Contract Documents. Should the finish be marred in transit or during installation, it shall be re-finished to present a neat, workmanlike appearance. Leave equipment clean and free from any grease, dirt and rust and in a suitable condition for painting.

3.10 IDENTIFICATION OF ELECTRICAL EQUIPMENT

A. Identify electrical equipment in accordance with the NEC, local authorities and in accordance with the requirements of the Contract Documents.

B. Use laminated three-ply, engraved plastic nameplates with black surface and white interior core, at least 1/16 in. thick. Engraved lettering shall be condensed gothic at least 1/4 in. high and properly spaced for legible and easy reading. Attach plates to equipment with chromium-plated screws. Adhesive attachment is not acceptable. Identify the following items with engraved nameplates, located as follows:

1. Each switch/fuse unit or circuit breaker in each main panel and each distribution panel - adjacent to switch/fuse unit or circuit breaker.

2. Spares shall be labeled 'Spare'.

3. Each branch circuit panel - on panel trim cover immediately above panel door.

4. Each safety switch, relay cabinet, time clock - on outside of cover. Include the power source on safety switches.

5. Each exhaust fan switch - custom engraved on outside of switch coverplate (high and low if required).

6. Each motor starter - on outside of cover.

7. Each motor starter in motor control center on outside of cover.

8. Outside light switches - custom engraved on outside of switch coverplate.

9. Any switch for load that cannot be seen from the control point - custom engraved on outside of switch coverplate.

10. Engrave coverplates for wiring devices served by emergency power systems with panel designation and circuit number(s) connected to the devices. Fill engraving with indelible black ink.

C. Custom engraving on cover plates for items noted above shall be equivalent to custom engraving as performed by Hubbell, or accepted substitute.

D. Install adhesive arc flash warning labels on all equipment as required by the latest NFPA 70E. Each label shall show specific and correct information for specific equipment based on its arc flash calculations. Labels shall show the followings:

1. Nominal system voltage.

2. Equipment/bus name, date prepared, and preparer's name and address.

3. Arc flash boundary.

4. Available arc flash incident energy and the corresponding working distance.

5. Minimum arc rating of clothing.

6. Site-specific level of PPE.

E. Branch circuit panelboard directories shall be completely and properly typewritten, including room numbers. Room numbers and names shall be as finally designated at the jobsite.

F. Refer to other sections of the specifications for conductor color-coding requirements.

G. Refer to Section 260533 for identifying of underground electrical work.

3.11 BALANCING OF PANELS

A. At the completion of the installation of the electrical system, check each phase of all panels under full load and arrange loads such that all phases carry the proper proportion of load. Submit load readings to Engineer for review as part of project close out documentation.

3.12 LOCKING OF ELECTRICAL FACILITIES

A. Provide padlocks for exterior electrical facilities subject to unauthorized entry.

B. Furnish locks to match Owner's locking system. Key all locks alike.

C. Furnish Owner with two keys per lock up to a quantity of ten keys.

D. Install locks immediately upon installation of electrical facility.

3.13 ACCESS DOORS

A. Wherever access is required in walls, ceilings, or soffits to concealed junction boxes, pull boxes or other electrical equipment installed under this division, provide and install access doors as indicated herein.

B. Furnish and install hinged access door and frame with flush latch handle as follows:

1. Plaster surfaces - Milcor Style K, or accepted substitute.

2. Ceramic tile or drywall surface - Milcor Style M (with 'B' label where required), or accepted substitute.

3. Install panels in locations approved by the Architect and paint as directed.

3.14 RECORD DOCUMENTS

A. Job set: Promptly following receipt of the Owner's Notice to Proceed, secure from the Architect at no charge to the Contractor, one complete set of all Documents comprising the Contract.

B. Final Record Documents: At a time nearing the completion of the work, secure from the Architect at no charge to the Contractor one complete set of sepia transparencies of all Drawings in the Contract.

C. Maintenance of Job Set: Immediately upon receipt of the job set described in paragraph above, identify each of the Documents with the title, "RECORD DOCUMENTS - JOB SET".

D. Preservation:

1. Considering the Contract completion time, the probable number of occasions upon which the job set must be taken out for the new entries and for examination, and the conditions under which these activities will be performed, devise a suitable method for protecting the job set to the approval of the Architect.

2. Do not use the job set for any purpose except entry of new data and for review by the Architect, from start of transfer of data to final Project Record Documents.

3. Maintain the job set at the site of Work where the Architect designates that site.

E. Making Entries on Drawings:

1. Using an erasable colored pencil (not ink or indelible pencil), clearly describe the change by graphic line and note as required.

2. Date all entries.

3. Call attention to the entry by a 'cloud' drawn around the area or areas affected.

4. In the event of overlapping changes, use different colors for the overlapping changes.

5. All equipment shall be clearly indicated in its installed location. Exposed items or those easily accessible, as above lay-in ceilings, may be located to scale. Concealed items not readily accessible, such as underground piping, shall be located by dimension.

F. Transfer of Data to Final Project Documents:

1. Approval of recorded data prior to transfer:

a. Following receipt of the transparencies described above, and prior to beginning transfer of recorded data thereto, secure the Architect's approval of all recorded data.

b. Make required revisions.

2. Transfer of Data to Drawings:

a. Carefully transfer change data shown on the job set of Record Drawings to the corresponding transparencies, coordinating the changes as required.

b. Clearly indicate at each affected detail and other drawing a full description of changes made during construction, and the actual location of items described above.

c. Call attention to each entry by drawing a 'cloud' around the area or areas affected.

d. Make changes neatly, consistently, and with the proper media to assure longevity and clear reproduction.

G. Review and Submittal:

1. Submit the completed set of Project Record Documents to the Architect as described above.

2. Participate in review meetings as required.

3. Make required changes and promptly deliver the final Project Record Documents to the Architect.

3.15 OPERATIONS AND MAINTENANCE DATA

A. Accumulate, as the job progresses, the following data, in duplicate, prepared in a neat brochure or packet folder, and deliver to the Architect for checking and subsequent delivery to the Owner.

1. Manufacturers' warranties, guarantees, service manuals, and operating instructions for equipment and materials covered by this division of the specifications.

2. Copies of approved Shop Drawings.

3. Any and all other data and/or Drawings required during construction.

4. Repair parts list of all major items and equipment including name, address, and telephone number of local supplier and agent.

3.16 INSTRUCTION OF OWNER'S PERSONNEL

A. Provide the services of competent engineers or technicians acceptable to the Architect to instruct representatives of the Owner in the complete and detailed operation of each item of equipment, and each system. These instructions shall be provided for whatever periods may be necessary to accomplish the desired results. Upon completion of these instructions, the Contractor shall obtain a Letter of Release, acknowledged by the Owner or their Authorized Representative, stating the dates on which the various kinds of instruction were given, and the personnel to whom the instructions were given.

B. Be responsible for proper maintenance of equipment and systems until the instructions have been given to the Owner's personnel and the letter of release acknowledged.

C. In providing the instructions to the Owner's personnel, follow the written operating and maintenance manuals in all instances, and familiarize the Owner's personnel with such manuals. Operating and maintenance manuals used for instructions shall include wiring diagrams, manufacturers' operation and maintenance manuals, parts lists (with sources identified), and other data as appropriate for each system, and as required elsewhere in the Specifications to be furnished to the Owner prior to final acceptance of the project.

3.17 LOCAL PARTS AND SERVICE

A. Each item of equipment furnished on this project shall have local representation, factory-authorized service, and an adequate stock of repair parts. "Local" shall be defined, for this purpose, as "within 150 miles of the project site".

3.18 INSTALLATION INSPECTIONS AND CERTIFICATIONS

A. Obtain timely inspections of the installation by the constituted authorities. Remedy any deficiencies to the satisfaction of the inspection authority.

B. Upon final completion of the Work, obtain certificates of acceptance from the constituted authorities. Deliver the certificates to the Architect for transmission to the Owner.

3.19 OPERATION PRIOR TO ACCEPTANCE

A. When any equipment is operable, and it is to the advantage of the Contractor to operate the equipment, they may do so provided that they properly supervise the operation and retains full responsibility for the equipment operated. Regardless of whether or not the equipment has or has not been operated, clean the equipment properly; make required adjustments, and complete punch list items before final acceptance by the Owner.

B. The date of acceptance by the Architect, for beneficial use by the Owner, shall be the beginning date of the warranty period.

3.20 ACCEPTANCE OF THE WORK

A. The Work, when completed, will be accepted in a finished, perfect and undamaged state only. Provide for protection of the Work during its progress, and if damaged, do all patching or replacing necessary to its full and satisfactory completion.

3.21 WARRANTY

A. Furnish a written certificate, guaranteeing all materials, equipment and labor to be free of all defects for a period of one year from the date of final acceptance by the Owner of the Work, and guarantee that if any defects appear within the stipulated guarantee period, such work shall be replaced without charge.

B. This guarantee shall be extended to include the capacity and integrated performance of all component parts of the various systems.

C. Lamps for light fixtures shall be excluded from the guarantee requirements of this section.

3.22 FINALLY

A. It is the intention that this Specification provide a complete installation. Include all accessory construction and apparatus necessary to the operation and testing of the work under this division. The omission of specific reference to any part of the work necessary for such complete installation shall not relieve this Contractor from furnishing and installing such parts.

END OF SECTION

SECTION 260511
WORK IN EXISTING BUILDING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Refer to Section 260510 - GENERAL REQUIREMENTS FOR ELECTRICAL WORK.

B. Furnish all labor, materials, services, equipment, and appliances required in conjunction with the work in existing buildings as indicated in the Contract Documents.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Use materials to match existing construction unless specified elsewhere in these Contract Documents. Materials shall comply with local codes, be UL listed, and be properly applied for their intended function.

PART 3 - EXECUTION

3.1 EXISTING CONDITIONS

A. Inspect the jobsite prior to bidding and be familiar with all existing conditions. Include the cost of the work required to accommodate the existing conditions in the bid proposal.

B. Obtain data related to existing facilities from existing documents, measurements, notations, photographs, surveys and other observations at the site.

C. Relocate existing items as required to accommodate the new construction. Remove, relocate and reconnect equipment and accessories that are to be reused.

D. Coordinate the Work with other divisions of the specifications. Determine which items and equipment are to remain, to be relocated or be removed, and perform all work consistent with the Scope of Work.

E. Loads that exist and are to remain shall be connected to the new distribution system as shown on the Drawings or as required to maintain their proper operation.

F. Refer to other divisions of the specifications and determine equipment that requires power to be disconnected, or power to be relocated and disconnect power and relocate power to this equipment.

G. Remove all conductors and exposed conduit rendered unused back to the source of supply.

H. Perform splices as required to maintain circuit continuity to existing devices or equipment to remain in service.

3.2 DISRUPTION OF EXISTING FUNCTIONS

A. Access: Access to and use of the existing facilities and site will be restricted, and shall be under the direction and control of the Owner.

B. Disruptions: Maintain existing electrical, communications, alarm, and other existing systems, and maintain existing functions in service except for scheduled disruptions. Where existing functions to remain in use are disrupted, they shall be fully restored after disruption, in full compliance with this division of the specifications for new work.

C. Scheduling of Disruptions: Seek and obtain approval two weeks in advance of the event date. Indicate date of event, starting time, and duration of each required disruption.

D. Notice of Disruption: Date, time and duration of each disruption shall be subject to the Owner's prior approval, and shall include the following information in the form of a memorandum submitted by the Contractor to the Architect for approval by the Owner:

FACILITY/SYSTEM	STARTING DATE	TIME	DURATION

E. Emergency Disruptions: When circumstances preclude obtaining advance approval as specified above, make request immediately upon knowledge of the requirement, and perform work so as to cause the minimum amount of disruption, for the minimum duration.

F. Notification: Notify the Architect and the Owner immediately by telephone and then in writing, as changes and additions to the scheduled disruption requirements become known.

G. Duration: Complete as large a portion of the work as possible before initiating disruption and perform only that work necessary so as to minimize duration of disruption. Maintain adequate personnel, supplies, materials, equipment, tools, and other resources at job site to avoid unnecessary delay in resumption of normal service.

3.3 SALVAGE, DEMOLITION AND RELOCATION

A. General

1. Modify, remove, or relocate materials and items indicated in the Contract Documents and required by the installation of new facilities.

2. Working jointly with the work under other divisions of the specifications establish and mark salvage and demolition items before commencing work; report items scheduled for relocation, reinstallation or reuse, which are found to be in damaged condition; await further instructions from the Owner's Representative and/or the Architect before commencing with work.

3. Owner shall have first right of refusal for all material and equipment. Deliver salvaged material accepted by the Owner to destinations on the premises as directed and remove material rejected by the Owner from the site.

B. Relocations

1. Make minor relocations necessitated by the conditions at the site or as directed by the Architect, without additional cost to the Owner.

2. Repair and restore to good functional condition equipment, materials and items scheduled for relocation, which are damaged during dismantling or reassembly operations.

3. New materials and items of similar design and quality may be substituted for materials and items indicated to be relocated upon approval of shop drawings, product data, and samples.

4. Remove carefully, in reverse order to original assembly or placement, items that are to be relocated.

5. Protect items until relocation is complete.

6. Clean and repair items to be relocated, and provide new materials, fittings, and appurtenances required to complete the relocations and to restore items to good operating order.

7. Perform the relocation work in accordance with applicable sections of these specifications, utilizing skilled workers.

C. Relocating Devices: Remove and reinstall, in locations designated by the Owner's Representative and the Architect, temperature control system devices, relays, wire, conduit, fixtures, equipment and other devices required for the operation of the various systems that are installed in existing-to-be-removed construction.

3.4 EXISTING RACEWAYS

A. Reuse raceways where possible and where permitted by local codes. Rework raceways to meet code requirements. Secure all raceways that are not properly supported. Paint raceways when exposed to view to match surroundings if existing finish is damaged or soiled.

B. Fasten existing boxes and raceways securely to provide proper support.

3.5 NEW RACEWAYS

A. Provide new raceways where required to provide wiring as indicated in the Contract Documents.

B. Where raceways must be exposed to view, use wiremold, securely fastened, and painted to match surroundings. Provide number of coats of paint as required to cover prime coat of original finish of wiremold.

3.6 EXISTING WIRING DEVICES

A. Inspect existing wiring devices, which are to be reused, for damage and replace as necessary.

B. Clean existing wiring devices, to be reused, to a "like- new" condition.

C. Replace damaged wiring devices cover plates with new cover plates that match the existing.

D. Tighten wire terminations at reused wiring devices.

E. Replace existing lighting switches rated 15 amperes with new switches rated 20 amperes when the load to be controlled exceeds 12 amperes.

F. Replace existing receptacles rated 15 amperes with new receptacles rated 20 amperes when the load to be connected exceeds 12 amperes.

3.7 EXISTING LIGHTING FIXTURES

A. Service existing lighting fixtures as follows:

1. Clean reflective surfaces, lenses, and sight exposed portions.

2. Re-lamp with new lamps of the same types removed.

3. Repair or replace lamp holders, ballasts, wiring, and door latching and hinging mechanisms.

4. Reconnect to branch circuit wiring, tighten connections.

B. Existing lighting fixtures may be replaced with new fixtures in lieu of the actions required by Paragraph 3.8 A above, if, in the Contractor's opinion, costs to the Owner would be lower.

3.8 EXISTING CEILINGS

A. Provide a typewritten list of existing damaged ceilings and ceiling tiles. Disregard rooms in which ceilings are to be repaired and replaced. Correlate list to room numbers indicated on drawings.

B. Mark damaged ceilings and ceiling tiles with easily removable red "stick-on" labels, minimum size two square in.

C. Submit list prior to commencing work. Do not start work until Architect and Owner review list; otherwise repair and replace damaged ceilings and ceiling tiles.

3.9 EXISTING PANELBOARDS

A. Service existing panelboards to be reused as follows:

1. Clean interiors and exteriors.

2. Touch-up damaged finishes with manufacturer's matching touch-up paint.

3. Inspect for component damage and repair or replace as necessary.

4. Tighten conduit and wire terminations.

5. Verify panelboards and panelboard feeders are of adequate capacity for loads to be served as follows:

a. Activate loads connected to panelboards to simulate 100 percent demand.

b. Measure and record amperage readings of phase and neutral conductors of panelboards feeders.

c. Provide typewritten record of recorded measurements to the Engineer for review.

6. Rebalance loads as specified in other sections of the specifications to provide for evenly balanced phases.

7. Provide new typewritten circuit directories.

8. Provide new panelboard identification labels if panelboard designation changes or if no labels exist.

3.10 EXISTING WIRING

A. Inspect existing wiring to be reused for damage. Repair or replace damaged wiring.

B. Assure integrity of existing wiring insulation as follows:

1. Megger wiring phase-to-phase, phase to neutral, phase to ground, and neutral to ground.

2. Record megger results. Provide typewritten record of results to the Architect for review.

3. Repair defective insulation to a dielectric value equivalent to that of wire of the same type.

4. Existing wiring may be replaced with new wiring if, in the Contractor's opinion, costs to the Owner would be lower.

C. Secure and label existing wiring that is to be disturbed.

D. Tighten existing wiring terminations and connections.

3.11 EXISTING FOUNDATIONS AND FLOORS

A. Prior to coring, penetrating or cutting of existing foundations or floors, the Contractor shall notify the Architect in writing and request all as-built and building record drawings showing the location of post tension cables in slabs and subsequent floors. In the event post tension cables do exist in the building, the Contractor shall X-ray the area to be cut, cored or penetrated. Two copies of the X-ray shall be forwarded to the Architect and written approval issued to the Contractor prior to proceeding with the work.

B. If no as-built or record building drawings are available, then the Contractor shall X-ray the area to be cut, cored or penetrated. Two copies of the X-ray shall be forwarded to the Architect and written approval issued to the Contractor prior to proceeding with the work.

END OF SECTION

SECTION 260519
WIRES AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Divisions 00 and 01 Specification Sections, apply to this Section.

1.2 DESCRIPTION

A. Refer to Section 260510.

B. Provide labor, materials, services, equipment and appliances required in conjunction with the installation of wire and cable systems as indicated in the Contract Documents.

1.3 SUBMITTALS

A. Manufacturer's Data: Submit copies of manufacturer's specifications for products to be used.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Provide conductors made of soft-drawn-annealed copper with conductivity not less than that of 98 percent pure copper. Conductors #12 gauge and smaller shall be solid. Conductors No. 10 gauge and larger shall be stranded.

B. Utilize conductors with insulation rated at 600 volts and insulated with type 'THHN' insulation locations shall be as specifically rated for temperature in Article 300 in the NEC.

C. Minimum wire sizes shall be in accordance with other requirements of the specifications and as follows: For 20 ampere branch circuits #12 gauge, except that home runs greater than 50 ft. from the panel to the first outlet box on 120/208 volt shall be #10 gauge.

D. All wire shall be color-coded. Mark conductors on each end with a 1 in. band of colored pressure-sensitive plastic tape or by the use of brilliant waterproof lacquer, applied according to manufacturer's instructions. Colors for each phase and the neutral shall be consistent throughout the system in accordance with the requirements of this section.

E. Conductor sizes shown on the Contract Documents are selected based upon use with 75 degrees C terminations. Furnish terminations, which are UL listed for 75°C, or derate conductors for use at 60°C. Use of 90°C terminations is acceptable, but conductor must be sized at the 75°C rating. Do not use 90°C rating for conductors.

F. Armored cable types AC and BX are specifically not allowed.

G. Armored cable type MC is specifically not allowed.

1. Where installed within existing wall cavities to a point 12 inches maximum above the top of the wall.

2. Where installed above existing unaccessible ceilings to points 12 inches maximum beyond the edges of the existing ceiling.

3. Where installed in accessible ceiling spaces in lengths not exceeding six feet if allowed by local building codes.

4. Branch circuit wiring. However, MC cable may not be used for homeruns.

PART 3 - EXECUTION

3.1 GENERAL WIRING METHODS

A. Place an equivalent number of conductors for each phase, neutral and ground of a circuit in same raceway or cable.

B. Do not share neutral conductors between branch circuits connected to single pole circuit breakers unless shown otherwise on drawings.

C. Splice only in junction or outlet boxes.

D. Neatly train and lace wiring inside boxes, equipment, and panelboards.

E. Make conductor lengths equal for parallel circuits.

F. Pull all conductors into a raceway at the same time. Use UL listed wire pulling lubricant for pulling #4 gauge and larger wires.

G. When inserting conductors in raceways, comply with the following:

1. Raceways shall first be installed as a complete raceway system without conductors.

2. Do not install pull wires and conductors until the raceway system is in place.

3. Do not use cleaning agents and lubricants that have a deleterious effect on the conductors.

4. Completely and thoroughly swab raceway system before installing conductors.

3.2 PHASING

A. Identify wire and cable for feeders and branch circuits for general power and lighting with a visible color code in accordance with the requirements of this section as follows:

120/208 Volt	277/480 Volt
Phase A - Black	Phase A - Brown
Phase B - Red	Phase B - Orange
Phase C - Blue	Phase C - Yellow
Neutral - White	Neutral - Gray
Ground - Green	

B. Provide green or bare grounding conductor identification for grounding conductors. Identification of all ungrounded conductors at junction boxes, wireways, and/or terminations may be by means of colored tape or painting when color-coded conductors as specified above are not available.

C. Phasing of the complete electrical installation shall be connected and maintained the same throughout the power distribution system. Where the project is an addition or modification to an existing facility, the electrical distribution system phasing shall be made the same as the existing.

D. Switchgear, safety switches, motor starters, plug-in type bus duct, lighting and power panels and power receptacles shall have all the same phase arrangements throughout the facility.

3.3 INSTALLATION

A. Install conductors in a neat and workmanlike manner to meet code requirements and make runs continuous without weld, splice, or joint between boxes. Do not install wires in conduit unless the entire system of conduit and outlet boxes is permanently in place. Pull conductors using a UL approved wire lubricant.

B. Provide conductors continuous from outlet to outlet with no splices except at outlets. Leave sufficient wire at all outlets to make connections without straining.

C. Deliver cable and wire to the project in original packages. Conductors with insulation showing deterioration within one year after final completion and acceptance of the Work shall be removed and replaced at no cost to Owner.

D. Thoroughly clean wires before installing lugs and connectors.

E. Make splices, taps and terminations to carry full ampacity of conductors without perceptible temperature rise.

F. Terminate spare conductors with electrical tape.

G. Torque test conductor connections and terminations to manufacturer's recommended values.

H. Where outlets only are indicated, leave 48-in. leads of conductors, for connection to equipment. Identify all conductors’ circuit numbers with Brady tape at terminals and junctions.

I. Where more than three current-carrying conductors are installed in a raceway, use larger size conductor and appropriate larger size raceway to comply with Article 310 of the National Electrical Code.

J. Where conductor is installed in an environment where the ambient temperature will exceed 86°F, use larger size conductor and appropriate larger size raceway to comply with Article 310 of the National Electrical Code.

K. Test all circuits for grounds. Light and test each lamp. Prove and test energy available at the load side of disconnect switches and at the final point of connection to driven equipment. Make all necessary and reasonable tests as required by the Architect to prove the integrity of work and leave the complete electrical installation ready for operation.

END OF SECTION

SECTION 260520
WIRE CONNECTION AND DEVICES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Refer to Section 260510 - GENERAL REQUIREMENTS FOR ELECTRICAL WORK.

B. Provide labor, materials, services, equipment and appliances required in conjunction with the installation of wire connections and devices systems as indicated in the Contract Documents.

1.2 SUBMITTALS

A. Manufacturer's Data: Submit copies of manufacturer's specifications for products to be used.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Make cable and wire connections for splicing or terminating with compression deforming type connectors as manufactured by Burndy Corp., Thomas & Betts Co., Inc., Dossert Manufacturing Corp., Ilsco Corp., or accepted substitute. Connectors for cable sizes 250 Kcmil and larger shall be the long barrel type for double indentation. Soldered connections will not be permitted. Twist-on insulated connectors, of proper size, and resistant to vibration, may be used. Use twist-on connectors as manufactured by Minnesota Mining and Manufacturing Co., Thomas & Betts Co., Inc., Ideal Industries, Inc., or approved equivalent.

B. Provide terminal connectors with the hole sizes and spacing in accordance with NEMA standards. Provide terminal connectors with two holes in tongue for use on conductor sizes 250 Kcmil and larger. Terminal connectors are not required for connections to the circuit breakers in the lighting and/or receptacle panels.

C. Insulate connections made with non-insulated connectors with three layers of plastic tape, each layer being half-lapped. Use No. 35+ plastic tape as manufactured by Minnesota Mining and Manufacturing Co., or similar and equivalent plastic tape as manufactured by Plymouth Rubber Co.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Make all electrical power and control connections to equipment furnished under other divisions of the specifications and furnish wiring, conduit, outlet boxes, disconnect switches, etc., as required for same. Check General Construction, Controls, Plumbing, Heating, and Air Conditioning, etc. plans and specifications to determine the amount of such wiring required and include cost of same in bid. Verify locations, horsepower, voltages, etc., of all equipment as the job progresses. If a conflict arises in wiring, ask the Engineer immediately for clarification.

B. Provide branch circuits and connections to all motors furnished to this project. Provide all disconnect switches as shown and where required by national or local codes. In general, all wiring shall be in conduit, with a short section of flexible conduit at each motor. Securely attach conduit to flexible conduit. When the motor is an integral part of equipment, isolate with a short section of flexible metal conduit to prevent vibration and/or noise amplification to the building structure. If the motor is adjustable, an additional length of flexible metal conduit shall be installed at the motor. Connect a ground wire from the conduit termination to the motor frame on the inside of the flexible conduit. Use approved grounding lugs or clamps on the conduit connection.

C. Branch circuits and connections to all electrically operated equipment are included in this contract, whether or not specifically mentioned. Check, on the job, for further details on equipment provided by others as project progresses. Ground equipment in an approved manner.

D. Major equipment furnished under the mechanical and other sections of the specifications may require different rough-in requirements than indicated on the plans due to the 'or equivalent' equipment clause. Secure detailed drawings from the trade furnishing the equipment to determine actual rough-in locations, conduit and conductor requirements.

E. Before connecting equipment, check the nameplate data against the information shown on the Drawings. Call any discrepancies to the attention of the Architect.

END OF SECTION

SECTION 260527
SEALING OF PENETRATIONS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Refer to Section 260510.

B. Provide labor, materials, services, equipment and appliances required in conjunction with sealing of penetrations as indicated in the Contract Documents.

1.2 SUBMITTALS

A. Samples: Provide samples upon written request.

B. Product Data: Manufacturer's specifications and installation instructions.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Acceptable Manufacturers:

1. Caulk and Putty: 3M's No. CP-25 and No. CP-303 synthetic elastomers.

2. Wrap/Strip: 3M's No. FS-195 organic/inorganic, fire resistive sheet with aluminum foil on one side.

3. Composite Sheet: 3M's No. CS-195 organic/inorganic fire resistive elastomeric sheet, bonded on one side with 28-gauge galvanized steel and the other side with reinforced hexagonal shaped steel wire mesh and covered with aluminum foil.

4. Thunderline Model "LS/Link-Seal" seals, of the required size and number of links, shall be used on all conduit penetrations of exterior walls. Similar fittings by O.Z./Gedney shall be considered approved equivalents.

2.2 ROOF PENETRATION SYSTEMS

A. Manufacturer: Subject to compliance with requirements, provide roof penetration systems of one of the following:

1. Portals Plus, Inc.

2. Thycurb Div.; Thybar Corp.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Review the detailed requirements of the UL through penetration fire stop assembly to be used and verify dimensional requirements such as maximum conduit size, conduit spacing, maximum opening size, minimum length of sleeve, etc.

B. For sealing of sleeves on or below grade and in wet locations, install link seals around all conduit penetrations properly sealing the annular space between the sleeve and the conduit to provide a waterproof seal.

C. For sealing of sleeves above grade and in dry/damp locations, use specified fire stop material and install per manufacturer's instructions and in conformance with UL requirements.

D. Attach an adhesive warning label identifying the fire stop assembly and warning against removal without proper resealing.

E. Seal floor, wall and ceiling penetrations or fire rated assemblies in above grade and in dry/damp locations, both horizontal and vertical, utilizing intumescent (expand when heated) materials designed to be applied as a fire, cold smoke, noxious gas, and water sealant. Penetrations shall meet the requirements of ANSI/UL 1479 "Fire Tests of Through-Penetration Firestops".

END OF SECTION

SECTION 260529
SUPPORTING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Refer to Section 260510.

B. Furnish all labor, materials, services, equipment and appliances required in conjunction with installation of supporting devices as indicated in the Contract Documents.

1.2 SUBMITTALS

A. Product Data: Submit copies of manufacturer's specifications for products to be used.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Kindorf

B. Unistrut

C. Superstrut

D. Powerstrut

2.2 MATERIALS

A. Continuous slotted channel: 12 gauge steel with electro-galvanizing and gold zinc dichromate barrier bases and dimensions as required for application.

B. Hanger rods: Continuous thread, electro-galvanized, steel, with gold zinc dichromate barrier, sizes as required for loads imposed.

C. Hex head cap screws and nuts: No. H-113 and No. 114, respectively.

D. One-hole pipe straps: Series HS-100, galvanized steel.

E. Single bolt channel pipe straps: Steel, with machine screw and nut, Series C-105 and Series C-106.

F. Lay-in pipe hanger: Series C-149.

G. Conduit and pipe hanger: Series 6H.

H. Beam clamps: Series 500, RC, EC and PC as applicable.

I. Concrete inserts, spot: Series D-256 or D-255.

J. Concrete inserts, channel: Series D-980 or Series D-986.

K. Riser clamps: Series C-210.

L. Cable supports: O.Z./Gedney Type S.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Carefully lay out supporting devices to coordinate with the work under other divisions of the specifications.

B. Securely fasten and support conduits and raceways to the building structure.

C. Suspend horizontal runs of conduits and raceways from the floor and roof construction by rod hangers spaced 10 ft. or less on centers for sizes 2-1/2 in. and greater, and 9 ft. or less on centers for 2 in. and smaller.

D. Fasten single runs of conduit to the structure with one-hole pipe straps and beam clamps or hang on rod hangers.

E. Support multiple runs of conduit and raceways from continuous channel inserts or from trapeze hangers constructed of rod hangers and channels.

F. Fasten single conduits to rod hangers with adjustable lay-in pipe hangers or for conduits of sizes 2 in. and smaller with Series 6H pipe hangers.

G. Fasten conduits to channels with pipe channel straps.

H. Support conduits and raceways within 3 ft. of each bend, of each termination, and at other intervals to maintain horizontal and vertical alignment without sag and deformation.

I. Do not use cable, strap, or wire hangers and fasteners.

J. Provide riser clamps for conduits at floor lines. Provide wire and cable supports in pull boxes for risers in accordance with NEC.

K. Install supports to permit equivalently distributed expansion and contraction of conduits and raceways with expansion joints. Use guides consisting of saddles, U-bolts and anchors designed for equivalent effectiveness for both longitudinal and transverse thrusts. Submit complete details for review.

L. Do not support conduits and raceways from equipment connections.

M. Provide special supports with vibration dampers to minimize transmission of vibrations and noises, where required.

N. Provide hangers, racks, cable cleats, and supports for wires and cables in cable chambers and other locations to make a neat and substantial installation.

O. Provide steel angle and channel supports to the floor and structure for panelboards, cabinets, pull and junction boxes. Provide independent support from entering conduits and raceways.

P. Provide supports as specified for conduits and raceways for outlet boxes and pull boxes 100 cubic in. and smaller.

Q. Paint all cuts, breaks, welds and other points where the rust inhibiting coating of supports is damaged.

R. Provide supports sized for the ultimate loads to be imposed.

S. Anchor supporting devices with:

1. Wood screws on wood.

2. Toggle bolts on hollow masonry.

3. Bolts and expansion anchors in concrete or brick.

4. Machine screws, threaded rods and clamps on steel.

T. Provide supports with hot-dipped galvanized finish in outdoor and wet locations.

U. Pipe and conduit supports:

1. Single run pipe and conduits, 2-1/2 in. O.D. and less, shall have Type SS-8R/SS-8C as manufactured by Portable Pipe Hangers, Inc., or approved equivalent, spaced at maximum eight ft. on center and installed on roof pads if required by the roofing manufacturer.

2. Multiple run pipe and conduits larger than 2-1/2 in. O.D. shall have Type PS, PSE, PP-10 with Roller, or PP-10 with Bar, as manufactured by Portable Pipe Hangers, Inc., or approved equivalent, spaced at maximum eight ft. on center and installed on roof pads if required by the roofing manufacturer. All conduits shall be held in place with clips on bars.

END OF SECTION

SECTION 260532
PULL AND JUNCTION BOXES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Refer to Section 260510.

B. Provide labor, materials, services, equipment and appliances required in conjunction with the installation of pull and junction boxes as indicated in the Contract Documents.

1.2 SUBMITTALS

A. Manufacturer's Data: Submit copies of manufacturer's specifications for products to be used.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Pull boxes and junction boxes used on concealed runs of conduit in walls and over ceilings shall be of code gauge galvanized steel with sheet steel covers. Pull boxes in floors shall be of galvanized malleable cast iron, with gasketed covers. Exposed pull boxes or junction boxes installed outdoors shall be weatherproof and shall be provided with watertight gasketed covers fastened with corrosion resistant screws.

B. Pull Boxes and Junction Boxes: Metal construction conforming to National Electrical Code, with screw-on or hinged cover. Use hinged cover for boxes larger than 12 in. in any dimension.

C. Flush-Mounted Pull Boxes: Provide overlapping covers with flush-head cover retaining screws, prime coated.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Use separate pull boxes and junction boxes for electric power, control, lighting, computer and communication systems.

B. Install pull boxes and junction boxes where required by the National Electrical Code and wherever required to overcome mechanical difficulties.

C. Install pull boxes in interior conduit at not more than 100 ft. apart when junction or outlet boxes do not break conduit runs.

D. Size pull boxes and junction boxes to best meet the needs of the particular situation and/or location and to comply with the National Electrical Code.

E. Coordinate the work in this section with the work under other divisions of this specification.

END OF SECTION

SECTION 260533
CONDUITS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Refer to Section 260510.

B. Provide labor, materials, services, equipment, and appliances required in conjunction with the installation of conduit systems as indicated in the Contract Documents.

1.2 SUBMITTALS

A. Manufacturer's Data: Submit copies of manufacturer's specifications and product data for products to be used.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Rigid Metal Conduit: Heavy-wall, mild steel tube with metallic corrosion-resistant coating on interior and exterior, hot-dipped galvanized, free from defects and manufactured in accordance with ANSI standards, and UL listed.

B. PVC Coated Rigid Metal Conduit:

1. Hot dip galvanized inside and out. Factory-cut threads shall be protected with hot galvanized threads and a clear urethane coating. Thread protectors shall be used on the exposed threads. The PVC coating must have been investigated by UL as providing the primary corrosion protection for the rigid galvanized steel conduit. The PVC coating shall be gray, 40 mils in thickness, continuous over the entire length of the conduit except at the threads, and be free of blisters, bubbles, or pinholes and manufactured in accordance with UL 6 Standard for Safety, Rigid Metal Conduit.

C. Electric Metallic Tubing (EMT): Welded steel tubing formed of low carbon steel, electro-galvanized exterior, inside coated with a thick, baked, tough elastic low-friction coating of enamel, and UL approved.

D. Intermediate Metal Conduit (IMC): Manufactured in accordance with UL 1242 with interior coating of silicone epoxy ester lubricant.

E. Flexible Metal Conduit: Single strip helically wound interlocking galvanized steel, UL listed; provide liquid tight with extruded polyvinyl jacket in damp and wet locations and in kitchens.

F. Elbows and Bends:

1. Rigid nonmetallic conduit systems - PVC coated rigid metal conduit.

2. Other conduit systems - same material as the conduit with which they are installed.

G. Bushings:

1. 1-1/4 in. and smaller - high-impact thermosetting phenolic insulation, 150°C, O-Z/Gedney Type A.

2. 1-1/2 in. and larger - hot-dipped galvanized with thermosetting phenolic insulation, 150°C, O-Z/Gedney Type B.

H. Locknuts:

1. 1-1/4 in. and smaller - zinc-plated heavy stock steel, O-Z/Gedney.

2. 1-1/2 in. and larger - cadmium-plated malleable iron, O-Z/Gedney.

I. Hubs: Cadmium-plated malleable iron, tapered threads, neoprene 'O' ring, insulated throat, O-Z/Gedney.

J. EMT Connectors: Compression type, zinc-plated steel body, cadmium-plated malleable iron nut, insulated throat, O-Z/Gedney.

K. EMT Couplings: Compression type, zinc-plated steel body, O-Z/Gedney.

L. Liquid tight Conduit Connectors: Cadmium-plated malleable iron body and nut, cadmium plated steel ferrule, insulated throat, integrally-cast external ground lug, O-Z/Gedney Type 4QL.

M. Through-Wall and Floor Seals: Malleable iron body, oversize sleeves, sealing rings, pressure clamps and hex-head cap screws, O-Z/Gedney Type FSK.

N. End Bells: Hot-dipped galvanized, threaded, malleable iron, O-Z/Gedney Type TNS.

O. Expansion Fittings: Hot-dipped galvanized, malleable iron with bonding jumpers.

1. Linear - O-Z/Gedney Type AX or TX.

2. Linear with deflection - O-Z/Gedney Type AXDX.

P. Escutcheons: Chrome-plated sectional floor and ceiling plates, Crane No. 10.

Q. Accessories: Reducers, bushings, washers, etc., shall be cadmium-plated, malleable iron of the forms and dimensions best suited for the application.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Size conduits as indicated on the Contract Drawings and as required by the National Electrical Code for the quantity and sizes of wires to be installed in the conduit. Do not use conduit sized less than 3/4 in. unless specified otherwise.

B. No more than one, three-phase circuit or three, single phase circuits may be placed in a single conduit, unless specifically noted on the drawings as such.

C. Conceal conduits from view in all areas except mechanical and electrical rooms and crawl spaces. Should it appear necessary to expose any conduit:

1. Bring it to the attention of the Architect immediately and obtain Architect's approval for location of exposed conduit.

2. Rearrange the work to facilitate an approved installation.

D. Install conduits at elevations to maintain headroom and at locations to avoid interference with other work requiring grading of piping, the structure, finished ceiling, walls, access panels, etc. Avoid crossing other work.

E. To prevent displacement, securely support conduits to be concealed in the building structure and installed in advance of other work. Carefully lay out conduits installed within the structure, such as floors, beams, and walls to avoid densities excessive for the construction.

F. Ream, remove burrs, and swab inside conduits before pulling in conductors.

G. Cap or plug conduits with standard manufactured accessories as soon as the conduits have been permanently installed in place.

H. Make bends and offsets in 1 in. and smaller conduits with approved bending devices. Do not install conduits, which have had their walls crushed, deformed or their surface finish damaged due to bending.

I. Where space conditions prohibit the use of standard ells, elbows, and conduits, use cast ferrous alloy fittings of such forms and dimensions as best suited for the application.

J. Make conduit joints mechanically tight, electrically continuous, and watertight. Pitch conduits in areas where moisture may subsequently be present in a manner to avoid creating moisture traps; where unavoidable, provide junction box with drain fitting at conduit low point.

K. Install insulated throat threaded hubs on conduits entering enclosures without threaded hubs in wet and damp locations.

L. Install and neatly rack exposed conduits parallel with and perpendicular to building walls. Provide space for 25% additional conduit. Do not install exposed diagonal conduit runs.

M. Route and suspend conduits crossing expansion joints to permit expansion, contraction, and deflection utilizing approved fittings to prevent damage to the building, conduits, and supporting devices.

N. Route conduit through roof openings for piping and duct-work where possible; otherwise, route through roof penetration system as specified in Section 260527.

O. Do not place conduits in close proximity to equipment, systems and service lines, such as hot water supply and return lines, steam pipes, which could be detrimental to the conduit and its contents. Maintain a minimum of 3 in. separation, except in crossing, which shall be a minimum 1 in.

P. Connect motors, equipment containing motors, equipment mounted on isolated foundations, transformers and other equipment and devices which are subject to vibration and which require adjustment, with flexible metallic conduit from the device to the conduit serving it. Restrict length of flexible conduit to 6 ft. maximum unless specifically instructed in writing otherwise by the Architect. Provide secure supports at the points of attachment on each side of the connection. Use bonding jumpers as directed by the National Electrical Code and other sections of these specifications.

Q. Install escutcheons on sight exposed conduits passing through interior floors, walls, and ceilings in finished spaces

R. Install fire seals on conduits passing through fire-rated partitions, floors and ceiling.

S. Install through-wall seals on conduits passing through exterior walls or use standard galvanized steel pipe sleeves, diameters 1/2 in. greater than the outside diameter of the sleeved conduit and fill the annular space with mastic.

T. Install insulated throat grounding bushings on conduits stubbed through slabs and foundations into electrical enclosures.

U. Provide grounding of conduits, fittings and accessories. Refer to grounding section of specifications.

V. Feeder Circuits:

1. Install rigid metal conduit in damp and wet locations, in concrete slabs, and where exposed in mechanical and electrical equipment rooms and crawl spaces.

2. Install flexible metal conduit where specified above and where permitted by the authorities having jurisdiction. Use liquid tight flexible metal conduit in damp and wet locations, where exposed in mechanical and electrical equipment rooms, and in kitchen and shop areas.

3. Exterior to the building and above grade, use rigid steel conduit and for elbows and bends greater than 30 degrees.

W. Branch Circuits:

1. Install rigid metal conduit in damp and wet locations, in concrete slabs, and where exposed in crawl space.

2. Install electrical metallic tubing where concealed by building structure and where exposed in mechanical and electrical equipment rooms.

3. Install flexible metal conduit where specified above and where permitted by the authorities having jurisdiction. Use liquid tight flexible metal conduit in damp and wet locations, where exposed in mechanical and electrical equipment rooms, and in kitchen and shop areas. Limit flexible conduit to a length of 6 ft. maximum unless specifically instructed otherwise, in writing, by the Architect.

END OF SECTION

SECTION 260534
OUTLET BOXES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Refer to Section 260510.

B. Provide labor, materials, services, equipment and appliances required in conjunction with the installation of outlet boxes as indicated in the Contract Documents.

1.2 SUBMITTALS

A. Manufacturer's Data: Submit copies of manufacturer's specifications for products to be used.

PART 2 - PRODUCTS

2.1 OUTLET BOXES

A. Sheet Metal Outlet Boxes: ANSI/NEMA OS 1; galvanized steel, with 1/2 in. male fixture studs where required.

B. Cast Boxes: Cast metal, deep type, gasketed cover, threaded hubs. Use cast boxes for damp and outdoor installation.

C. Provide boxes with plaster ring where required. Boxes for installation in masonry walls shall be special square corner masonry type.

D. Furnish boxes with proper covers and device plates.

PART 3 - EXECUTION

3.1 COORDINATION OF BOX LOCATIONS

A. Provide electrical boxes as shown on the Drawings, and as required for splices, taps, wire pulling, equipment connections and code compliance.

B. Determine from dimensions shown on the Contract Documents and by actual measurements on the site, the exact location of each outlet. Outlet locations shall be modified from those shown on the plans to accommodate changes in door swings, space changes or to clear other interferences that arise or from job modifications. Make such modifications at no cost to the Owner as a matter of job coordination. Coordinate job conditions and notify the Architect of discrepancies before proceeding with the installation of the work. Set wall boxes in advance of wall construction blocked in place, and secure. Set wall boxes flush with the finish. Install extension sleeves as required to extend boxes to finished surfaces.

C. The locations of equipment and outlets shown on the Contract Documents are approximate. Check and verify exact locations in the field. Coordinate installation with the Architect and with the work under other divisions of the specifications.

D. Unless otherwise noted, location of outlet boxes, measured to centerline of box, shall be as follows:

	EQUIPMENT OR OUTLETS	ELEVATION
		(ABOVE FINISHED FLOOR)
	Toggle Switches	3 feet - 10 inches
	Receptacles	1 foot - 6 inches
	Telephone/data outlets	1 foot - 6 inches
	Circuit protective devices	6 feet - 6 inches to top of enclosure

E. Locate and install boxes to allow access. Where installation is inaccessible, coordinate locations and sizes of required access doors in accordance with other sections of the specifications.

F. Locate and install to maintain headroom and to present a neat appearance.

3.2 OUTLET BOX INSTALLATION

A. Do not install boxes back-to-back in walls. Provide a minimum 6 in. separation in common wall cavity, except provide minimum 24 in. separation in acoustic rated walls. Refer to architectural drawings for locations of acoustic walls.

B. Locate boxes in masonry walls to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat openings for boxes.

C. Provide knockout closures for unused openings.

D. Use multiple-gang boxes where multiple devices are shown to be installed together; do not use sectional boxes. Provide barriers to separate wiring of different voltage systems.

E. Install boxes in walls without damaging wall insulation.

F. Coordinate mounting heights and locations of outlets mounted above counters, benches and back splashes.

G. Position outlets to coordinate luminaire locations with ceilings.

H. In inaccessible ceiling areas, position outlets and junction boxes within 6 inches of recessed luminaire, to be accessible through luminaire ceiling opening.

I. Provide recessed outlet boxes in finished areas; secure boxes to interior wall and partition studs, accurately positioning to allow for surface finish thickness. Use stamped steel stud bridges for flush outlets in hollow stud wall, and adjustable steel channel fasteners for flush ceiling outlet boxes.

J. Align wall-mounted outlet boxes for switches, thermostats and similar devices.

END OF SECTION

SECTION 262416
PANELBOARDS

PART 1 - GENERAL

1.1 SUMMARY

A. Refer to Section 260510.

B. Refer to Section 262816.

C. Furnish all labor, materials, services, equipment and appliances required in conjunction with the installation of panelboards as indicated in the Contract Documents.

1.2 SUBMITTALS

A. Manufacturer's Data: Submit copies of manufacturers' specifications for products used.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Panelboards shall consist of a box, front, interior and circuit protective devices and shall be manufactured in accordance with NEMA standards and bear applicable UL labels.

B. The box shall be fabricated of code gauge galvanized sheet steel in accordance with UL standards, and shall have turned edges around the front for rigidity and for clamping on front. Provide standard knockouts on panel enclosure. Fabricate the front from sheet steel and finish with baked on gray enamel over a rust inhibitor. Each front shall have a door mounted on semi-concealed hinges with a cylinder lock, index card and cardholder. For dry indoor installation cover shall be door in door type (hinged door and continuous hinged cover). All panelboard locks shall be master keyed and all index cards shall be properly completed on a typewriter. Furnish two keys for each panelboard.

C. The interiors shall consist of a factory-assembled rigid frame supporting the rectangular bus, the mains and the neutral bar. The busing shall be arranged for sequence phasing throughout. Bus bar shall be sized to limit the temperature rise in accordance with NEMA standards. The insulated neutral bar shall be located at the opposite end of the structure from the mains. Panelboards shall have either solderless lugs or a main circuit protective device as scheduled. Each enclosure shall be provided with grounding lugs and uninsulated equipment grounding terminals.

D. Busing shall be tin plated aluminum attached for sequence phasing throughout.

E. Panelboards shall be three-phase, four-wire as scheduled or as required. Panelboards shall contain sequence style busing and full capacity neutral, composed of an assembly of bolt-in-place molded case automatic air circuit breakers with thermal and magnetic trip and trip free position separate from either "on" and "off" positions. Provide circuit breakers that simultaneously open all poles on double and three-pole circuit breakers. Provide panelboard and circuit breaker interrupting capacities and ratings equivalent to or greater than the fault current available to each panelboard and as shown on the Drawings. Series rating shall not be used in determining interrupting rating of panelboards.

F. Where required by local or national code, ordinance or other authority, provide NEMA 3R enclosures where located in rooms with fire protection sprinklers. Further, if required by local or national code, ordinance or other authority, provide shields from sprinklers in working clearance in front of panelboards where panelboards are in rooms with fire protection sprinklers. Shields shall be constructed with same gauge metal as panelboard enclosure and shall have the same finish as panelboard enclosure.

G. Voltage rating, phase, number of wires and ampere rating shall be as shown and scheduled in the Contract Documents.

H. Approved manufacturers: Eaton (Cutler Hammer), General Electric (ABB), Siemens, or Square D.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install a panelboard at each location shown on the Drawings.

B. Each panel shall have a circuit index located on the inside of the cabinet door. This index shall have each circuit identified, including spares and spaces. The identification index shall be typewritten and covered with a plastic cover.

C. The various branch circuits served from the panelboards vary in loading. Carefully balance the load on each phase when connecting the various branch circuits in each panelboard. When all load is turned on and the system is operating a 100 percent demand, the initial unbalance shall not exceed 10 percent.

D. Refer to Section 260510 regarding labeling requirements for panelboards.

E. Coordinate the work under this section with the work under other divisions of the specifications.

END OF SECTION

SECTION 262726
WIRING DEVICES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Refer to Section 260510 - GENERAL REQUIREMENTS FOR ELECTRICAL WORK.

B. Provide labor, materials, services, equipment and appliances required in conjunction with the installation of wiring devices as indicated in the Contract Documents.

1.2 SUBMITTALS

A. Manufacturer's Data: Submit copies of manufacturer's specifications for products to be used. Manufacturer's catalog numbers listed are used to set the standard.

B. Acceptable Manufacturers: Hubbell, Leviton and Pass & Seymour. All wiring devices for the project shall be of one manufacturer.

PART 2 - PRODUCTS

2.1 RECEPTACLES

A. Ground fault circuit interrupting (GFCI), tamper resistant, type receptacle, equivalent to Hubbell GFST83W. Provide weather resistant GFCI receptacle for exterior locations. Do not use feed-through feature. Install GFCI device at each location.

B. Patient Care Areas:

1. Duplex receptacle, 20 amp equivalent to Hubbell HBL8300

2. GFCI receptacle, 20 amp equivalent to Hubbell GFR8300TR

C. Use 20-amp receptacle when only one receptacle is on a circuit by itself, or as otherwise noted.

2.2 WIRING DEVICES

A. All wiring devices shall be color as selected by Architect. Provide wiring devices for emergency power circuits to match existing devices served by emergency power.

2.3 COVERPLATES

A. Interior - Stainless steel equivalent to Leviton type 302/304 Series with cadmium plated screws.

PART 3 - EXECUTION

3.1 COORDINATION

A. Determine from dimensions shown in the Contract Documents and by actual measurements on the site the exact location of each wiring device. The wiring device locations shall be modified from those shown on the plans to accommodate changes in door swings, space changes or to clear other interferences that arise, or from other job modifications. Make such modifications at no cost to the Owner as a matter of job coordination. Notify the Architect of discrepancies before proceeding with the installation of the work.

3.2 INSTALLATION OF WIRING DEVICES

A. Install receptacles and switches only in electrical boxes that are clean, free from excess building materials, debris, etc.

B. Switches installed at one location shall be ganged together under one coverplate.

C. Install receptacles for electric water coolers out of sight where possible.

3.3 TESTING

A. Test wiring devices to insure electrical continuity of grounding then energize circuit to demonstrate compliance with requirements.

END OF SECTION

SECTION 262816
OVERCURRENT PROTECTIVE DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Refer to Section 260510.

B. Furnish all labor, materials, services, equipment appliances required in conjunction with installation of overcurrent protective devices as indicated in the Contract Documents.

1.2 SUBMITTALS

A. Manufacturer's Data: Submit copies of manufacturer's specifications for products to be used.

PART 2 - PRODUCTS

2.1 FUSES

A. Fuses shall be current-limiting, with 200,000 RMS symmetrical amperes interrupting rating and shall be UL listed. All fuses shall be of same manufacturer.

B. Fuses 600 amperes and smaller shall be Class RK1, dual element. These fuses shall have separated overload and short-circuit elements. The overload, time-delay element shall be spring activated and utilize a eutectic alloy with a 284-degree F. melting point. The fuse shall hold 500 percent of its rated fuse current for a minimum of 10 seconds, equivalent to Bussmann dual-element LPN-RK (250 volts or less rating) and LPS-RK (600 volts or less rating).

2.2 MOLDED CASE CIRCUIT BREAKERS

A. Molded Case Circuit Breaker Characteristics – General

1. Circuit breakers shall be constructed using glass reinforced insulating material. Current carrying components shall be completely isolated from the handle and the accessory mounting area.

2. Circuit breakers shall have an over center, trip free, toggle operating mechanism which will provide quick-make, quick-break contact action. The circuit breaker shall have common tripping of all poles.

3. The circuit breaker handle shall reside in a tripped position between ON and OFF to provide local trip indication. Circuit breaker escutcheon shall be clearly marked ON and OFF in addition to providing International I/O markings.

4. The maximum ampere rating and UL, IEC, or other certification standards with applicable voltage systems and corresponding interrupting ratings shall be clearly marked on face of circuit breaker.

5. Circuit breakers shall be equipped with UL Listed electrical accessories as noted in these specifications. Circuit breaker handle accessories shall provide provisions for locking handle in the ON and OFF position.

6. All circuit breakers shall be UL Listed for reverse connection without restrictive line and load markings and be suitable for mounting in any position.

7. Circuit breakers shall be equipped with factory installed mechanical lugs. All circuit breakers shall be UL Listed to accept field installable/removable mechanical type lugs (except Square D type Q2, Q2H and Q2-H or equivalent). Lug body shall be bolted in place; snap in design not acceptable. All lugs shall be UL Listed to accept solid (not larger than #8 AWG) and/or stranded copper and aluminum conductors . Lugs shall be suitable for 90°C rated wire, sized according to the 75°C temperature rating in the National Electrical Code. Provide lugs as required to accept feeder conductor sizes and quantities as shown on drawings.

8. All circuit breakers shall be capable of accepting bus connections.

9. Circuit breakers shall be fully rated and capable of interrupting the fault current available to them. Series connected ratings with upstream devices is not acceptable to meet this requirement.

B. Thermal-Magnetic Circuit Breakers

1. Circuit breakers shall have a permanent trip unit containing individual thermal and magnetic trip elements in each pole.

2. Thermal trip elements shall be factory preset and sealed. Circuit breakers shall be true RMS sensing and thermally responsive to protect circuit conductor(s) in a 40°C ambient temperature.

3. Circuit breaker frame sizes above 100 amperes shall have a single magnetic trip adjustment located on the front of the circuit breaker except type Square D, Q2, Q2H and Q2-H or equivalent.

4. Standard two- and three-pole circuit breakers up to 250 amperes at 600 VAC shall be UL Listed as HACR type.

C. Electronic Trip Circuit Breaker With Full Function Trip System

1. Circuit breaker trip system shall be a microprocessor-based true rms sensing design with sensing accuracy through the thirteenth (13th) harmonic. Sensor ampere ratings shall be as indicated on the associated schedules.

2. The integral trip system shall be independent of any external power source and shall contain no less than industrial grade electronic components.

3. The ampere rating of the circuit breaker shall be determined by the combination of an interchangeable rating plug, the sensor size and the long-time pickup adjustment on the circuit breaker. The sensor size, rating plug and switch adjustments shall be clearly marked on the face of the circuit breaker. Circuit breakers shall be UL Listed to carry 100% of their ampere rating continuously.

4. The following time/current response adjustments shall be provided. Each adjustment shall have discrete settings and shall be independent of all other adjustments.

a. Long Time Pickup Instantaneous Pickup

b. Long Time Delay Ground Fault Alarm Only Pickup

c. Short Time Pickup Ground Fault Pickup

d. Short Time Delay (I^2t IN and I^2t OUT)Ground Fault Delay (I^2t IN and I^2t OUT)

5. Circuit breakers with adjustable short-time function shall be provided with defeatable instantaneous adjustment and 30 cycles short time withstand ratings. Short time withstand ratings shall be specified in RMS symmetrical amperes, as shown on the drawings.

6. A means to seal the rating plug and trip unit adjustments in accordance with NEC Section 240-6(b) shall be provided.

7. Local visual trip indication for overload, short circuit and ground fault trip occurrences shall be provided.

8. An ammeter to individually display all phase currents flowing through the circuit breaker shall be provided. Indication of inherent ground fault current flowing in the system shall be provided on circuit breakers with integral ground fault protection. All current values shall be displayed in True RMS with 2% accuracy.

9. Long Time Pickup indication to signal when loading approaches or exceeds the adjusted ampere rating of the circuit breaker shall be provided.

10. The trip system shall include a Long Time memory circuit to protect against intermittent overcurrent conditions above the long time pickup point. Means shall be provided to reset Long Time memory circuit during primary injection testing.

11. Circuit breaker trip system shall be equipped with an externally accessible test port for use with a Universal Test Set. Disassembly of the circuit breaker shall not be required for testing. Test set shall be capable of verifying the operation of all trip functions with or without tripping the circuit breaker.

12. Communications capabilities for remote monitoring of circuit breaker trip system, to include phase and ground fault currents, pre-trip alarm indication, switch settings, and trip history information shall be provided.

13. Circuit breakers shall be provided with Zone Selective Interlocking (ZSI) communications capabilities on the short-time and ground fault functions compatible with all other electronic trip circuit breakers and external ground fault sensing systems .

D. Equipment Ground Fault Protection (Electronic Trip Circuit Breakers)

1. Circuit breakers shall be provided with integral equipment ground fault protection for grounded systems. The circuit breaker shall be suitable for use on three-phase, three-wire circuits where the system neutral is grounded but not carried through the system or on three-phase, four-wire systems.

2. A separate neutral current transformer shall be provided for three-phase four-wire systems as indicated on schedules.

3. Ground fault sensing system shall be residual sensing type.

4. The trip system shall include a ground fault memory circuit to sum the time increments of intermittent ground faults above the pickup point.

5. A means of testing the ground fault system to meet the on-site testing requirements of NEC Section 230-95(c) shall be provided.

6. Local visual trip indication for a ground fault trip occurrence shall be provided.

7. Zone Selective Interlocking (ZSI) communications capabilities on the ground fault function compatible with all other electronic trip circuit breakers and external ground fault sensing systems as noted on schedules shall be provided.

8. Circuit breakers shall be provided with communications capabilities for remote alarm indication only (no trip) per NEC Section 700-7(d) for emergency systems (Full Function circuit breakers only).

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install overcurrent devices in accordance with the National Electrical Code. Coordinate the work under this section with the work under other divisions of the specifications.

B. Do not share neutral conductors between circuits protected by arc fault circuit interrupters.

C. Fuses shall be installed in all switches as scheduled or noted on the Drawings, and shall be Bussman, Mersen, Littelfuse, Inc., or an approved equivalent.

D. Unless otherwise indicated, protective devices shall be mounted with top of cabinet or enclosure 6 ft. 6 in. above finished floor, properly aligned, and adequately supported independently of the connecting raceways. All steel shapes, etc., necessary for the support of the equipment shall be furnished and installed where the building structure is not suitable for mounting the equipment directly thereon.

E. A fuse identification label showing type and size shall be placed inside the door of each fused switch.

F. Circuit breaker pick-up level and time delay settings shall be adjusted to values indicated on the coordination study.

END OF SECTION

SECTION 262817
DISCONNECT SWITCHES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Refer to Section 260510.

B. Furnish all labor, materials, services, equipment and appliances required in conjunction with installation of disconnect switches as indicated in the Contract Documents.

1.2 SUBMITTALS

A. Manufacturer's Data: Submit copies of manufacturer's specifications for products to be used.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Furnish fusible Class 'R' or non-fusible disconnect switches of ampere rating as required, or as indicated on the Drawings. Furnish heavy-duty, quick-make, quick-break, three-phase, three-pole switches, unless otherwise noted. Use NEMA 1 enclosures where installed indoors. Provide enclosures with interlocking covers, externally front operated flange mounted switch levers, and provisions for use of three safety padlocks in the 'Off' position. Provide horsepower rated switches for motor circuits.

B. Approved manufacturers: Eaton (Cutler Hammer), General Electric (ABB), Siemens, or Square D.

PART 3 - EXECUTION

3.1 INSTALLATION

A. See Section 260510 paragraph: Identification of Electrical Equipment.

B. Install switches to comply with National Electrical Code and coordinate the work with the work under other divisions of the specifications.

END OF SECTION

SECTION 262913
MOTORS, MOTOR STARTERS AND CONTROLS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Refer to Section 260510.

B. Furnish all labor, materials, services, equipment and appliances required in conjunction with installation of motors, motor starters and controls as indicated in the Contract Documents.

1.2 SUBMITTALS

A. Manufacturer's Data: Submit copies of manufacturer's specifications for products to be used.

1.3 ELECTRICAL REQUIREMENTS FOR MECHANICAL EQUIPMENT

A. Electrical wiring for mechanical equipment is separated into two main wiring Divisions: "Power Wiring" and "Control Wiring".

B. Power wiring is wiring and conduit from the primary energy source and includes circuit protective devices, motor starters or controllers, conduit, wiring and safety disconnects beginning at the power supply and terminating at the motor terminals on equipment.

C. Control wiring is wiring and conduit not included in "Power Wiring", including automatic temperature control wiring, interlock wiring, pilot light, signal wiring, etc., that is included for proper operation or safety of the equipment.

D. Provide power wiring under Division 26 of this specification.

E. Control wiring will be provided under Division 23 of this specification.

F. Install power and control wiring in compliance with National Electrical Code and this Division.

G. Disconnect switches, except where furnished factory mounted, shall be supplied and installed by the Electrical Contractor.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Unless otherwise specified or required, control conductors with a potential of 120 volts or higher shall be a minimum of #14 THWN stranded, and control conductors with a potential of less than 120 volts may be #16 TFFN, unless larger conductors are required to compensate for voltage drop.

B. Install control wiring in a separate conduit raceway system.

C. Color code conductors to coordinate with wiring schematics and diagrams.

D. Other materials shall be as specified in other sections of the specifications.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Note that the electrical design and drawings are based upon equipment furnished under other divisions of the specifications as indicated in the Contract Documents. Should any equipment change dictate changes to the electrical design the required changes shall be made at no additional cost to the Owner.

B. Verify the electrical capacities of all motors and electrical equipment furnished by other Divisions and install wiring and equipment as required to completely connect all equipment.

C. Where possible, terminate conduits in conduit boxes on motors. Where motors are not provided with conduit boxes, terminate the conduits in condulet fittings at the motors.

D. Where disconnect switches are not provided integral with the control equipment for motors, provide disconnect switches required by these Specifications and the NEC. Generally, disconnect switches shall be heavy-duty, enclosed, externally operable, horsepower-rated switches. Each disconnect switch shall be installed where shown on the Drawings or as close as possible to the motor. Each disconnect switch shall be within sight of its associated controller.

3.2 OVERCURRENT PROTECTION

A. Prior to providing power to equipment, obtain manufacturer's engineering and electrical data.

B. Provide overcurrent protection of equipment in strict accordance with manufacturer's maximum recommendations and specifications. Provide HACR circuit breakers and fuses in accordance with manufacturer's recommendations and specifications.

C. Install wiring in a separate conduit raceway system in harmony with other raceway systems on the project.

D. Install starters, not furnished within a motor control center on a 3/4 in. thick marine plywood backboard painted to match the surrounding area. Apply a minimum of two coats of paint. Install control and/or accessory devices on the backboard also, in mechanical equipment areas.

3.3 ELECTRICAL CONNECTIONS

A. Provide electrical connections to each item of equipment requiring such connections.

3.4 EQUIPMENT IDENTIFICATION

A. Identify starters, switches, pushbuttons and other control devices by the attachment of nameplates constructed from laminated phenolic engraved plastic three-ply with black surface and white interior core at least 1/16 in. thick. Engraved lettering shall use an Arial bold font at least 1/4 in. high and properly spaced for legible and easy reading. Attach plates to equipment with chromium-plated screws. Adhesive attachment is not acceptable.

END OF SECTION

SECTION 265113
LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. Refer to Section 260510 - GENERAL REQUIREMENTS FOR ELECTRICAL WORK.

B. Furnish all labor, materials, services, equipment and appliances required in conjunction with the installation of a lighting system as indicated in the Contract Documents.

1.2 SUBMITTALS

A. Manufacturer's Data: Submit copies of fixture, ballast and lamp manufacturer's specifications for products used. Identify the total input watts including ballast losses for each fixture type.

B. Submit lighting facts documentation for all LED fixtures.

C. If required by Architect, submit samples of lighting fixtures for approval.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Lighting Fixtures: See Schedule in Contract Documents.

2.2 LED FIXTURES

A. Shall be tested for adherence to IESNA LM79 standards for lumen output and depreciation.

B. Shall be tested to IESNA LM80 standards and shall be rated to deliver LM80 performance for 50,000 hours.

C. Shall be DLC (DesignLight Consortium) certified.

D. Shall be equipped with 0-10 volt dimming driver.

E. Shall carry a 5 year all-inclusive component warranty for defects.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Provide lighting fixtures as specified and scheduled in the Contract Documents. Provide in accordance with the type designation shown in the Contract Documents. If a type designation is omitted, verify fixture selection with Architect prior to installation.

B. Check the architectural finishes, and provide fixtures with proper trim, frames, supports hangers, and other hardware as required to coordinate with proper finishes, regardless of specified or scheduled catalog number, prefixes and suffixes.

C. Coordinate with Division 23 and other divisions of the specifications to avoid conflicts between lighting fixtures, supports and fittings and mechanical equipment and other work.

D. Fixtures, which are tandem mounted and recessed in gypboard or plaster ceilings shall be yoke mounted.

E. Immediately before final inspection, clean all fixtures, inside and out, including plastics and glassware, adjust all trim to properly fit adjacent surface, replace broken or damaged parts. Lamp and test all fixtures for electrical as well as mechanical operation.

F. Provide new lamps delivered to the job in the original packing cases and sleeves.

G. Test and aim floodlights, after dark, to provide a uniform and widespread illuminated area. Direct units as indicated or instructed by Architect. Direct units to prevent objectionable glare.

3.2 UL LISTED CEILING ASSEMBLIES

A. Provide special mounting, enclosures, and fire saving as required by authorities having jurisdiction to maintain integrity of UL listed ceiling assemblies where applicable.

END OF SECTION

SECTION 270528
EMPTY CONDUIT SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Refer to Section 265010.

B. Furnish all labor, materials, services, equipment and appliances required in conjunction with the installation of empty conduit systems for telephone, computer communication and other systems as indicated in the Contract Documents.

1.2 SUBMITTALS

A. Manufacturer's Data: Submit copies of manufacturer's specifications for products used.

PART 2 - PRODUCT

2.1 MATERIAL

A. Provide cabinets as specified elsewhere in the specifications. Furnish total metal unit with enclosure, hinged door, lock with two keys and installed with 3/4 in. thick plywood in back.

B. Provide 3/4 in. thick marine plywood painted with one coat of primer and two coats of latex enamel to match surroundings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install pull wire in all empty conduits or conduit systems. Label pull wire indicating the location of the other end.

B. Quantity of bends and radius of each bend for telephone conduit system shall be in accordance with requirements as set forth by the telephone company.

C. Install junction and pull boxes in empty conduits for telephone system in accordance with telephone company requirements.

D. Coordinate the work in this section with the work under other divisions of the specifications.

END OF SECTION

SECTION 283107
EXTENSION OF EXISTING FIRE ALARM SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Provide all labor, materials, supervision, tools, services, equipment and incidentals necessary for complete and operational systems as specified under this division and as shown on the Contract Drawings. This section expands and supplements the requirements of Division 01.

C. Refer to Section 260510.

1.2 SCOPE

A. The work covered by this section of the specifications includes the furnishing of all design, labor, equipment, materials and performances of all operations in connection with the extension of the existing addressable fire alarm system as shown on the drawings, as specified herein, and as required by City of Fort Worth Fire Department, and the Texas Department of Licensing and Regulation Texas Accessibility Standards.

B. The complete installation shall conform to the applicable section of NFPA-72A, NFPA 71, local code requirements and National Electrical Code Article 760.

C. The work covered by this section of the specifications shall be coordinated with the related work as specified elsewhere under the project specifications.

1.3 QUALITY ASSURANCE

A. Each and all items of the fire alarm system shall be listed as a product of a single fire alarm system manufacturer under the appropriate category by Underwriter's Laboratories, Inc. (UL), and shall bear the UL label. All control equipment shall be listed under UL Category 1076 as a single control unit. Partial listing shall NOT be acceptable.

B. Provide the Owner's Representative with:

1. Manufacturer's certificate showing materials meet or exceed the minimum requirements as specified.

2. A copy of installing company's license to sell and install fire alarm systems in the State of Texas.

3. A copy of job superintendent's license to supervise installation of fire alarm systems in the State of Texas.

4. Shop drawings and wiring diagrams with equipment counts and locations shall be submitted to the local authority for approval and signature prior to submitting to Engineer through proper channels. The shop drawings must be approved by the Engineer prior to commencing work. Room names must be shown on shop drawings.

1.4 GENERAL

A. Furnish and install a modification to the existing fire alarm system as described herein and as shown on the plans; to be wired, connected and left in first class operating condition.

PART 2 - PRODUCTS

2.1 PERIPHERAL DEVICES

A. Programmable Electronic Sounders:

1. Electronic sounders shall operate on 24 VDC nominal.

2. Electronic sounders shall be field programmable without the use of special tools, to provide slow whoop, continuous, or interrupted tones with an output sound level of at least 90 dBA measured at 10 ft. from the device.

3. Shall be flush or surface mounted as show on plans.

B. Strobe lights shall meet the requirements of the ADA, UL Standard 1971 and shall meet the following criteria:

1. The maximum pulse duration shall be 2/10 of one second.

2. Strobe intensity shall meet the requirements of UL 1971.

3. The flash rate shall meet the requirements of UL 1971.

C. Audible/Visual Combination Devices:

1. Shall meet the applicable requirements of 2.01.A listed above for audibility.

2. Shall meet the requirements of 2.01.B listed above for visibility.

D. Manual stations shall be double-action and shall be constructed of high impact, red lexan with raised white lettering and a smooth high gloss finish. To minimize nuisance alarms, activation shall require two separate and distinct actions. The first action shall require a glass front to be broken exposing the pull lever. The second action requires the operating lever to be pulled down. Once pulled down, the lever shall remain at a 90-degree angle from the front of the station to provide a visual indication of the station in alarm. Reset shall require a key common to the control panel and replacement glass window. Pull station shall be by the same manufacturer to insure compatibility.

E. Photoelectric Smoke Detector: The detectors shall use the photoelectric (light-scattering) principal to measure smoke density and shall, on command from the control panel, send data to the panel representing the analog level of smoke density.

F. Duct Smoke Detectors: Duct smoke detectors shall be of the solid-state photoelectric type and shall operate on the light scattering photodiode principle. Detector construction shall be of the split type, that is, mounting base with twist--lock-detecting head. Removal of the detector head shall interrupt the supervisory circuit of the fire alarm detection loop and cause a trouble signal at the control panel. Auxiliary contacts shall be provided on the duct detectors for use by the mechanical contractor for air handling unit shut down. Duct detectors and wiring to the duct detectors shall be provided by the fire alarm contractor. Mounting of the duct detectors to be by the Fire Alarm contractor in compliance with NFPA-90A. Provide a remote alarm LED indicator/key test switch for each detector.

G. Magnetic door holders shall be controlled by 24-volt fire alarm circuit.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Provide and install the system in accordance with the plans and specifications, all applicable codes and the manufacturer's recommendations. All wiring shall be installed in conduit and shall be in a completely separate conduit system.

B. All junction boxes shall be sprayed red and labeled “Fire Alarm”. Wiring color code shall be maintained throughout the installation.

C. Installation of equipment and devices that pertain to other work in the contract shall be closely coordinated with the appropriate subcontractors.

D. Provide control relays to automatically and immediately shut down all central air supply systems and systems serving means of egress in a nursing facility upon activation of the fire alarm system.

E. The Contractor shall clean all dirt and debris from the inside and outside of the fire alarm equipment after completion of installation.

F. The manufacturer's authorized representative shall provide on-site supervision of installation.

G. Connect electromagnetic door holders to release doors when smoke is detected by smoke detectors on either side of doors. Refer to Architectural Specification Division 08, "DOOR HARDWARE" on drawings and FIRE ALARM drawing for locations.

3.2 DURING CONSTRUCTION

A. Provide temporary system during construction as required by Owner and all governing authorities.

3.3 TESTING

A. After all modifications, the fire alarm system shall be fully tested in accordance with NFPA-72H by the contractor in the presence of the Owner's Representative and the local Fire Marshall. Upon completion of a successful test, the contractor shall so certify in writing to the Owner and general contractor.

B. Any existing device that is intended to be reused or modified shall be tested after work is complete. Any such device including smoke detectors that fail to pass the appropriate tests shall be replaced in their entirety at no additional cost to the Owner.

3.4 WARRANTY

A. The contractor shall warrant the complete system for a period of one (1) year from the date of acceptance.

END OF SECTION