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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

1.2 WORK INCLUDED

- A. Definition: "Cutting and patching" is hereby defined to include but is not necessarily limited to the cutting and patching of nominally completed and previously existing work, in order to accommodate the coordination of work, or the installation of other new work, or to uncover other work for access or inspection, or for similar purposes.
- B. Demolition is recognized as an example of a related but separate category of work, which may or may not also require cutting and patching as defined in this Section; refer to Section 02070.

1.3 QUALITY ASSURANCE

- A. Requirements for Structural Work: Do not cut and patch structural elements in a manner that would reduce their load-carrying capacity or load-deflection ratio.
 - 1. Obtain Engineer's approval of the cutting and patching proposal before cutting and patching the following structural elements:
 - a. Bearing walls.
 - b. Structural concrete and concrete slabs.
 - c. Structural steel.
 - d. Lintels.
 - e. Structural decking.
 - f. Miscellaneous structural metals.
 - g. Exterior curtain wall construction.
 - h. Equipment supports
- B. Visual Requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces, in a manner that would, in the Engineer's opinion, reduce the building's aesthetic qualities, or result in visual evidence of cutting and patching. Remove and replace Work cut and patched in a visually unsatisfactory manner.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Except as otherwise indicated or approved by the Engineer, provide materials or cutting and patching which will result in equal or better work than the work being cut and patched, in terms of performance characteristics and including visual effect where applicable. Comply with requirements, and use materials identical with the original materials where feasible and where recognized that satisfactory results can be produced thereby.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Before cutting existing surfaces, examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed. Take corrective action before proceeding, if unsafe or unsatisfactory conditions are encountered.
 - 1. Before proceeding, meet at the site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

3.2 PREPARATION

- A. Temporary Support: Provide temporary support to ensure structural integrity of the Work. Provide devices and methods to protect other portion of Project from damage.
- B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Project that might be exposed during cutting and patching operations.
- C. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Take all precautions necessary to avoid cutting existing pipe, conduit or ductwork serving the building, but scheduled to be removed or relocated until provisions have been made to bypass them.
- E. Maintain excavations free of water.

3.3 CUTTING AND PATCHING

- A. Execute cutting, fitting, and patching to complete Work.
- B. Fit products together to integrate with other work.
- C. Remove and replace defective or non-conforming work.
- D. Provide openings in the Work for penetration of mechanical and electrical work.

3.4 PERFORMANCE

- A. General: Employ skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.
 - 1. Cut existing construction to provide for installation of other components or performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition.
 - 2. All cutting/coring of structural concrete and all concrete slabs shall be with permission of and in presence of Engineer. Existing slabs are post tension construction.
- B. Cutting: Cut existing construction using methods least likely to damage elements to be retained or adjoining construction. Where possible review proposed procedures with the original installer; comply with the original installer's recommendations.
 - 1. In general, where cutting is required use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots neatly to size required with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Cut through concrete and masonry using a cutting machine such as a carborundum saw or diamond core drill.
 - 4. Comply with requirements of applicable Sections of Division-2 where cutting and patching requires excavating and backfilling.
 - 5. By-pass utility services such as pipe or conduit, before cutting, where services are shown or required to be removed, relocated or abandoned. Cut-off pipe or conduit in walls or partitions to be removed. Cap, valve or plug and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting.
- C. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.

SECTION 01045
CUTTING AND PATCHING

1. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.
 2. 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.
 3. Where removal of walls or partitions extends one finished area into another, patch and repair wall surfaces in the new space to provide an even surface of uniform color and appearance. Coordinate flooring with hazardous materials documents.
 - a. Where patching occurs in a smooth painted surface, extend final paint coat over entire unbroken containing the patch, after the patched area has received primer and second coat.
 4. Patch, repair or rehang existing ceilings as necessary to provide an even plane surface of uniform appearance.
- D. Plaster Installation: Comply with manufacturer's instructions and install thickness and coats as indicated.
1. Unless otherwise indicated provide 3-coat Work.
 2. Finish gypsum plaster with smooth-troweled finish. Sand lightly to remove trowel marks and arises.
 3. Cut, patch, point-up and repair plaster to accommodate other construction and to restore cracks, dents and imperfections.

3.5 CLEANING

- A. Thoroughly clean areas and spaces where cutting and patching is performed or used as access. Remove completely paint, mortar, oils, putty and items of similar nature. Thoroughly clean piping, conduit and similar features before painting or other finishing is applied. Restore damaged pipe covering to its original condition.

END OF SECTION - 01045

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PART 1 - GENERAL

1.1 SUMMARY

- A. This Section discusses the minimum requirements necessary for general coordination and precautionary measures which are to be undertaken by the Contractor during the progression of work generally specified as follows.

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

3.1 PROJECT COORDINATION AND SCHEDULING

- A. The Contractor shall coordinate all construction activities with the Owner, including but not limited to demolition and window and siding installation, as necessary to minimize disruption with facility operations. Sufficient notice shall be provided by the Contractor as necessary for the Owner to make the necessary arrangements to relocate personnel and tenants surrounding areas of work.
- B. Prior to the commencement of work, the Contractor shall submit a construction schedule to the Owner establishing the sequencing of work. Construction operations shall be scheduled in such a manner to accommodate the Owner and minimize disruption to facility operations.

3.2 PRECAUTIONARY MEASURES

- A. The Contractor shall undertake all necessary precautions to avoid interference and/or disturbance of existing construction to remain resulting from, but not limited to, the demolition of windows and synthetic stucco finish. Any damage resulting from this work, shall be repaired at the Contractor's expense.

3.3 PROTECTION AND CLEANING

- A. The Contractor shall maintain an uninterrupted means of building egress and roadway access at all times until completion of the work.
- B. The contractor shall attend weekly job progress meetings with the Owner to discuss construction scheduling.

END OF SECTION - 01050

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PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section shall be governed by the Contract Documents. Provide materials and services necessary to furnish and deliver the work of this Section as specified herein, and/or as required by job conditions.

1.2 SHOP DRAWINGS AND PRODUCT DATA

- A. Definitions
 - 1. Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or any Subcontractor, Manufacturer, Supplier or Distributor to illustrate some portion of the work.
 - 2. Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate a material, product or system for some portion of the work.
 - 3. Samples are physical examples which illustrate materials, equipment or workmanship and establish standards by which the work will be judged. See Schedule of Samples under each Section of the Specifications.
- B. The Contractor shall review, approve and submit, within seven (7) days after receipt thereof and in such sequence as to cause no delay in the Work or in the Work of the Owner or any separate contractor, all Shop Drawings, Product Data, Samples and Certificates required by the Contract Documents.
- C. By approving and submitting Shop Drawings, Product Data Samples, the Contractor represents that he has determined and verified all materials, field measurements, and field construction criteria related thereto, or will do so, and that he has checked and coordinated with information contained within such submittal with the requirements of the Work of the Contract Documents.
- D. The Contractor shall "not be relieved of responsibility" for any deviation from the requirements of the Contract Documents by the Engineers review of Shop Drawings, Product Data or Samples unless the Contractor has specifically informed the Engineer in writing of such deviation at the time of submission and the Engineer has given written notice to the specific deviation. The Contractor shall not be relieved from responsibility for errors or omissions in the Shop Drawings, Product Data or Samples by the Engineer's review thereof Contract Documents indicate the work to be performed.
- E. The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data or Samples to revisions other than those requested by the Engineer on previous submittal.

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SUBMITTALS, PRODUCTS, AND SUBSTITUTIONS

- F. No portion of the Work requiring submission of a Shop Drawing, Product Data or Samples shall be commenced until the submittal has been reviewed by the Engineer. All such portions of the Work shall be in accordance with reviewed submittal.

1.3 SUBMISSION PROCEDURES

- A. After the date specified for commencement of work the Contractor, within a mutually agreed to time with Engineer and Owner, -shall submit a shop Drawing Schedule to the Engineer, This schedule shall be broken down into the various items of work and shall list a "Begin" date and a "Complete" date for Shop Drawing Submission.
- B. Submit to the Engineer Shop Drawings, Product Data and Samples in sufficient time to allow at least fifteen (15) working days for review. Submittal shall be checked and signed by the Contractor prior to submission to indicate that the Contractor has coordinated the work and that it conforms to the Contract Documents.
- C. When catalog cuts, brochures, product data or other printed data are sent to the Engineer for review, a minimum of six (6) copies of each shall be submitted.
- D. The quantities and types of samples are listed in each Section of the Specifications.
- E. Each Shop Drawing shall contain a title block with provisions for the following:
 - 1. Number and title of drawing.
 - 2. Date of drawing and revision
 - 3. Name of project building or facility.
 - 4. Name of Contractor or Subcontractor submitting drawing.
 - 5. Specification Section title and number,
 - 6. Space for Engineer's stamp and received stamps
- F. Each Shop Drawing shall have listed on it all contract reference drawing numbers plus shop drawing numbers on related work by other Subcontractors if available. The Engineer's drawings may not be reproduced and submitted as Shop Drawings, unless consent is obtained from the Engineer in writing prior to such use.
- G. Each Shop Drawing submission shall have indicated on the Drawing a submission number (whether first, second, third, etc.) and each submission after the first submission shall be clear of all previous stamps.
- H. Shop Drawings for work of one trade shall be checked by Subcontractors of related trades if available, and shall have received their stamp of approval, before being submitted to the Engineer.
- I. Shop Drawings which involve change or variances with Contract Documents shall be so noted by the Contractor, and the Owner and Engineer

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SUBMITTALS, PRODUCTS, AND SUBSTITUTIONS

shall be advised in writing of the recommended change and reasons for such changes.

1.3 ENGINEER'S ACTION

- A. After the completion of his checking, the Engineer will return the (2) two copies of shop drawings to Contractor marked in one of the following ways. As explained below.

With notation as follows:

corrections or comments made on the shop drawings during this review do not relieve contractor from compliance with requirements of the drawings and specifications. This check is only for review of general conformance with the design concept of the project and general compliance with the information given in the Contract Documents, The Contractor is responsible for confirming and correlating all quantities and dimensions- selecting fabrication processes and techniques of construction; coordinating his work with that of all other trades-, and performing his work in a safe and satisfactory manner.

B. EXPLANATION OF COMMENTS

1. No Exceptions Taken: No corrections, contractor may proceed with the work; only these drawings should be used for fabrication and in the field.
2. Comment Attached, Resubmit: minor amount of corrections; all items can be fabricated in accordance with notes; review is completed; record copy incorporating the minor changes, must be submitted and shall not be considered as a re-submission.
3. Rejected: Drawings and/or catalogs are rejected as not in accordance with design concept of the project and information given in the contract documents.
4. Remarks: See note on shop drawings review stamp. Changes in shop drawings, other than those noted by Engineer shall be brought to Engineer's attention in writing.

- C. Shop Drawings that are returned: "Revise and Resubmit" or "Rejected" shall be corrected and resubmitted to the Engineer promptly.

- D. The review of a specific item shall not imply review of an entire assembly of which the item is a component unless the whole assembly is submitted and approved.

- E. Engineer may withhold review on any Shop Drawing until Shop Drawings indicating all related items have been submitted. Submit (and Resubmit) Shop Drawings for such related items as approximately the same date to permit coordinating checking,

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SUBMITTALS, PRODUCTS, AND SUBSTITUTIONS

1.4 SAMPLES

- A. Submit for review, to the Engineer, samples of materials listed under each Section of the Specification. Samples shall be properly labeled for identification, consisting of the following information-. Job Titles, Sample No, and Submission No.
- B. Do not commence work under Sections of the Specifications until the Engineer's review in writing is obtained for all listed samples.
- C. Do not construe review of advance samples as total guarantee of acceptance of materials. Materials will be submitted to field inspections, from time to time, as work progresses.
- D. Samples of Specific manufactured product shall be accomplished with appropriate manufacturers literature at time of submission.

1.5 PROGRESS SCHEDULE

- A. The Contractor shall prepare a construction schedule in a form acceptable to the Engineer and Owner within two (2) weeks from the execution date of the Contract for the Engineer's and Owner approval.
- B. The progress schedule shall be in the form of a network schedule chart.
- C. The progress schedule shall be updated at least once a month or more frequently, if necessary, should the Project be faced with the threat of delay for any reason. Should changes that have occurred since previous submission of updated schedule, indicate progress of activity, show completion dates.
- D. Furnish the Engineer and the Owner with sufficient copies of the original schedules and all updated schedules as the Owner or Engineer may require.
- E. After approval of the schedule, the Contractor shall be responsible for seeing that it is adhered to, and for ascertaining that proper coordination is maintained between all work of the Contract.

1.6 SCHEDULE OF VALUES

- A. The Contractor shall submit to the Engineer and Owner a Schedule of Values, on form supplied by Owner, at least ten (10) days prior to submitting the first application for payment
- B. The Schedule of Values shall list the breakdown of the work generally following the Table of Contents of this Specification, with identification of project, issue date, Contractors name and address.

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- C. Each item shall be accompanied by a dollar value rounded off to the nearest ten dollars. As requested by the Engineer support values given with data that will substantiate their correctness.
- D. The use of the Schedule of Values shall be only as a basis for Contractor's Application for Payment.
- E. Sum total of all costs of items listed in the Schedule shall be equal to the total contract sum.
- F. The Schedule of Values shall be submitted each month along with the Application for the payment.

1.7 MATERIAL AND EQUIPMENT LIST

- A. Within appropriate time after the date of award of the Contract, the Contractor shall submit for approval a complete list of suppliers, materials and equipment proposed for use in connection with the Project.
- B. After a material piece of equipment has been approved, no change in brand or make will be permitted unless satisfactory written evidence is presented and approved by the Engineer that the manufacturer cannot make scheduled delivery of approved material, or that material delivered has been rejected and the substitution of a suitable material is an urgent necessity, or that other conditions have become apparent which indicate that the approval of such other material is in the best interest of the Owner.

1.8 PRODUCT ACCEPTANCE STANDARDS

- A. Where the words "or and acceptable equal" or other synonymous terms are used, it is expressly understood that they shall mean that the acceptance of any such submission is vested in the Engineer, whose decision shall be final and binding upon all concerned. All submissions are subject to such review.
- B. The intent of this article is to encourage and permit competition on qualified products by reputable and qualified Contractors, suppliers and manufacturers, whose product, reputation and performance warrant review for the conditions, intent of design and performance considerations.
- C. When descriptive catalog designations including manufacturers name, product brand name, or model number are referred to in the Contract Documents, such designations shall be considered as being those found in industry publications of current issue at date of first invitation to bid.
- D. When standards of the Federal Government, Trade Societies, or Trade Associations are referred to in the Contract Documents by specific date of issue, these shall be considered a part of this contract. When such references do not bear a date of issue, the current published edition at date of first invitation to bid

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SUBMITTALS, PRODUCTS, AND SUBSTITUTIONS

shall be considered as part of this contract, Suppliers need not be a member of such trade societies or associations referred to in the Specifications.

- E. Whenever any product is specified or shown by describing proprietary items, model numbers, catalog numbers, manufacturer, trade names or similar reference, the bidder obligates himself to submit proposals and accepts awards of contract based upon the use of such products. Use of such reference is intended to establish the measure of quality which the Engineer has determined as requisite and necessary for this project, Where two or more products are chosen or specified, the bidder has his option of which to use, provided the product used meets all requirements of specifications and design criteria. The right is reserved to review proposed deviations of design, function, construction or similar differences which will effect the design intent

1.9 SUBSTITUTIONS

- A. Requests for substitutions will be considered up to ten (10) days prior to bid open.
- B. After the Contract has been executed, the Engineer will consider a formal request for the substitution of products in place of those specified under the following conditions:
1. The request is accompanied by complete data an the proposed substitution substantiating compliance with the Contract Documents including product identification and description, performance and test data, references and samples where applicable, and an itemized comparison of the proposed substitution with the products specified or named by addenda, with data relating to Contract time schedule, design and artistic effect where applicable.
 2. The request is accompanied by accurate cost data on the proposed, substitution in comparison with the product specified, whether or not modification of the Contract Sum is to be a consideration.
- C. Requests for substitution based on paragraph (1) above, when forwarded by the Contractor to the Engineer and Owner, are understood to mean that the Contractor.
1. Represents that he has personally investigated the proposed substitute product and determined that it is equal or superior in all respects to that specified.
 2. Will provide the same guarantee for the substitution that he would for that specified.
 3. Certified that the cost data presented is complete and Includes all related costs under this contract, and that he waives all claims for additional costs related to thin substitution which subsequently become apparent and
 4. Will coordinate the installation of the accepted substitute, making such changes as may be required for the work to be complete in all respects, at no additional cost to the Owner and at no extension of the contract completion date.
- D. Substitutions will not be considered if:

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SUBMITTALS, PRODUCTS, AND SUBSTITUTIONS

1. They are indicated or implied on shop drawings submissions without the formal request required in paragraph (1) above; or
2. for their implementation they require a substantial revision of the Contract Documents in order to accommodate their use.

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

Not Applicable

END OF SECTION - 01300

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PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Quality assurance and control of installation
- B. Tolerances
- C. Field samples
- D. Manufacturer's field services and reports.

1.2 QUALITY ASSURANCE/CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship to produce work of specified quality.
- B. Comply fully with manufacturer's instruction, including each step in sequence.
- C. Should manufacturer's instructions conflict with contract documents, request clarification from Engineer before proceeding.
- D. Comply with specified standards as a minimum quality for the work except when more stringent tolerances, codes or specified requirements indicate higher standards or more precise workmanship.
- E. Perform work by persons qualified to produce workmanship of specified quality.
- F. Secure products in place with positive anchorage devices, designed and sized to withstand positive anchorage devices designed and sized to withstand stresses, vibration physical distortion or disfigurement.

1.3 TOLERANCES

- A. Monitor tolerance control of installed products to produce acceptable work. Do not permit tolerances to accumulate.
- B. Comply with manufacturer tolerance should manufacturers tolerances conflict with contract documents, request clarification from engineer before proceeding.
- C. Adjust products to appropriate dimensions position before securing products in place.

1.4 FIELD SAMPLES

- A. Install field samples at the site as required by individual specifications sections for review.
- B. Acceptable samples represent a quality level for the work.
- C. Where field sample is specified in individual section to be removed, clear area after field sample has been accepted.

1.5 MANUFACTURER FIELD SERVICES AND REPORTS

- A. Submit qualifications of observer to engineer 30 days in advance of required observations. Observer subject to approval of engineer.
- B. When specified in individual specification section require materials or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions of surfaces and installation quality of workmanship, start-up of equipment, test adjust, balance of equipment and as applicable and to initiate instruction when necessary.
- C. Report observations and site decisions or instruction given to applicators or installers that are supplemental or contrary to manufacturer's written instruction.
- D. Submit report in duplicate within 30 days of observations to engineer for review.

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

Not Applicable

END OF SECTION - 01400

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This Section requires the selective removal and subsequent offsite disposal of all items on the contract drawings as required to complete the work.

1.2 SUBMITTALS

- A. Submit schedule indicating proposed sequence of operations for selective demolition work to the Owner for review prior to start of work.
- B. Take photographs of existing conditions of building surfaces, equipment, and adjacent improvements that might be misconstrued as damage related to the removal operations. File with the Owner prior to start of work.

1.3 JOB CONDITIONS

- A. Occupancy: The units will be occupied during this project. Conditions satisfactory to the building tenants and the Owner must be maintained throughout the work.
- B. Condition of Structures: Owner assumes no responsibility for actual condition of items or structures to be demolished.
 - 1. Conditions existing at time of inspection for bidding purpose will be maintained by Owner insofar as practical.
- C. Partial Demolition and Removal: Items indicated to be removed, but not salvaged but of salvageable value to the Contractor may be removed as the work progresses. Transport salvaged items from site as they are removed.
 - 1. Extended storage or sale of removed items on site will not be permitted.
- D. Protections: Provide temporary barricades and other forms of protection to protect building tenants and the general public from injury due to selective demolition work.
 - 1. Provide protective measures as required to provide free and safe passage of building tenants and the general public to the occupied portions of the buildings.
 - 2. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of any element to be demolished and adjacent facilities or work to remain.
 - 3. Protect from damage existing finish work that is to remain in place and becomes exposed during demolition operations.
 - 4. Remove protections at completion of the work.

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SECTION 02070
SELECTIVE DEMOLITION

- E. Damages: Promptly repair damages caused to adjacent facilities by demolition work
- F. Traffic: Conduct selective demolition operations and debris removal to ensure minimum interference with roads, streets, walks, or other occupied or used facilities.
 - 1. Do not close, block, or otherwise obstruct streets, walks, or other occupied or used facilities without written permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
- G. Utility Services: Maintain existing utilities indicated to remain in service and protect them against damage during demolition operations.
- H. Environmental Controls: Use water sprinkling, temporary enclosures, and other methods to limit dust and dirt migration. Comply with governing regulations pertaining to environmental protection.
 - 1. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, and pollution.

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

3.1 PREPARATION

- A. General:
 - 1. Cease operations and notify the Engineer immediately if safety of the structure appears to be endangered. Take precautions to support structure until determination is made as to continuing operations.
 - 2. Locate, identify, stub off, and disconnect utility services that are to be removed.

3.2 DEMOLITION

- A. General: Perform selective demolition work in a systematic manner. Use such methods as required to complete work indicated on the Contract Drawings in accordance with governing regulations.

3.3 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove from the building site, all debris, rubbish, and other materials resulting from demolition operations, on a daily basis. Transport and legally dispose off site.

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SECTION 02070
SELECTIVE DEMOLITION

1. If hazardous materials are encountered during demolition operations, comply with applicable regulations, laws, and ordinances concerning removal, handling, and protection against exposure or environmental pollution.
2. Burning of removed materials is not permitted on the project site.

3.4 CLEANUP AND REPAIR

- A. General: Upon completion of demolition work, remove tools, equipment, and demolished materials from site. Remove protections and leave interior areas broom clean. Return elements of construction and surfaces to remain too a condition existing prior to the start of operations. Repair adjacent construction or surfaces soiled or damaged by the selective demolition work.

END OF SECTION - 02070

PART 1 - GENERAL

1.1 SCOPE

- A. Provide all materials, labor, equipment and services necessary to furnish, deliver and install rough carpentry and related work herein specified generally as follows:
 - 1. Wood blocking.
 - 2. Plywood blocking.

1.2 PRODUCT STORAGE

- A. Store lumber a minimum of 6" off the ground/roof in a dry, well-ventilated place, protected from the weather. Lumber material sections directly exposed to moisture shall not be acceptable for use with work and shall be subject to approval by the Agency.

1.3 SUBMITTALS

- A. Submit manufacturers technical literature of proposed lumber and associated fasteners, for review and approval.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Lumber:
 - 1. Wood Blocking: Shall be No. 2 or better yellow pine, pressure treated wood. Pressure treated wood shall conform to the requirements of AWPA (American Wood Preserves Association) Standard C2 (above ground).
 - 2. Plywood Blocking: Shall be APA (American Plywood Association).
- B. Fasteners used in conjunction with rough carpentry work shall be corrosion and rust resistant nails, expansion anchors, toggle-bolts, joist hangers, and/or screws and shall be staggered in application as detailed on the Contract Drawings.
- C. Fasteners used to anchor wood/plywood blocking to masonry and/or concrete substrates shall be "Rawl Tapcon" as manufactured by Rawl. Fastener head style shall be phillips flathead.

PART 3 - EXECUTION

3.1 INSTALLATION

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SECTION 06100
ROUGH CARPENTRY

A. Wood Blocking:

1. Provide blocking as required to support other work solidly into studs as indicated on the Contract Drawings.
2. Install the work straight in line and true in plane unless otherwise indicated. Remove any existing surface irregularities. Provide wood shims if necessary to maintain work level/plumb.
3. Provide fasteners of adequate size and of sufficient numbers to securely anchor the materials in place.

END OF SECTION - 06100

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PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Finish carpentry items, other than shop prefabricated casework.
- B. Hardware and attachment accessories.

1.2 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

- A. Section 06100 - Rough Carpentry: Installation of recessed wood blocking.

1.3 RELATED SECTIONS

- A. Section 06100 - Rough Carpentry: Installation of recessed wood blocking.
- B. Section 09900 - Painting: Painting and finishing of finish carpentry items.

1.4 REFERENCES

- A. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials.
- B. AWI - Quality Standards.
- C. BHMA - A156.9 - Cabinet Hardware.
- D. FS MMM-A-130 - Adhesive, Contact.
- E. NEMA (National Electric Manufacturers Association) LD3 - High Pressure Decorative Laminates.

1.5 SUBMITTALS

- A. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories, to a minimum scale of 1-1/2 inch to 1 ft.
- B. Product Data: Provide data on fire retardant treatment materials and application instructions.

1.6 QUALITY ASSURANCE

- A. Perform work in accordance with AWI Premium quality. NHLA.

1.7 QUALIFICATIONS

- A. Fabricator: Company specializing in fabricating the products specified in this section with minimum three years documented experience.

1.8 REGULATORY REQUIREMENTS

- A. Conform to applicable code for fire retardant requirements.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Section 01600.
- B. Protect work from moisture damage.

1.10 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on shop drawings.

1.11 COORDINATION

- A. Coordinate work under provisions of Section 01039.
- B. Coordinate the work with plumbing and electrical rough-in, installation of associated and adjacent components.

PART 2 - PRODUCTS

2.1 LUMBER MATERIALS

- A. Softwood Lumber: Graded in accordance with AWI Custom pine species, sawn, maximum moisture content of 6 percent; with mixed grain, of quality suitable for transparent finish.
- B. Hardwood Lumber: Graded in accordance with AWI Custom oak species, maximum moisture content of 6 percent; with flat grain, of quality suitable for transparent finish.

2.2 SHEET MATERIALS

- A. Hardwood Plywood: Graded in accordance with AWI Custom veneer core, type of glue recommended for application; Oak faced species.

2.3 FASTENERS

- A. Fasteners: Of size and type to suit application.
- B. Concealed Joint Fasteners: Threaded steel.

2.4 ACCESSORIES

- A. Lumber for Shimming and Blocking.
- B. Primer: Alkyd primer sealer type.
- C. Wood Filler: Solvent base, tinted to match surface finish color.

2.5 FINISHING

- A. Sand work smooth and set exposed nails and screws.
- B. Apply wood filler in exposed nail and screw indentations.
- C. On items to receive transparent finishes, use wood filler which matches surrounding surfaces and of types recommended for applied finishes.
- D. Seal, stain and polyurethane exposed to view surfaces. Brush apply only.
- E. Seal, stain and polyurethane semi-exposed to view surfaces. Brush apply only.
- F. Prime paint surfaces in contact with cementitious materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify adequacy of backing and support framing.
- B. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

3.2 INSTALLATION

- A. Install work in accordance with AWI Premium Quality Standard.
- B. Set and secure materials and components in place, plumb and level.

SECTION 06200
FINISH CARPENTRY

- C. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.
- D. Install hardware in accordance with manufacturer's instructions.

3.3 SITE APPLIED WOOD TREATMENT

- A. Apply preservative treatment in accordance with manufacturer's instructions.
- B. Brush apply two coats of preservative treatment on wood in contact with cementitious materials and treat site-sawn cuts.
- C. Allow preservative to dry prior to erecting members.

3.4 PREPARATION FOR SITE FINISHING

- A. Set exposed fasteners, apply wood filler in exposed fastener indentations. Sand work smooth.
- B. Before installation, prime paint surfaces of items or assemblies to be in contact with cementitious materials.

3.5 ERECTION TOLERANCES

- A. Maximum Variation from True Position: 1/16 inch.
- B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

END OF SECTION - 06200

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. The work under this section consists of furnishing all labor, materials, services, and equipment to complete all items of work indicated on the Drawings, described in the Specification or reasonably implied therefrom, including, but not necessarily limited to the following:
 - 1. All gypsum wallboard work and related materials, etc., as required.
 - 2. Taped and sanded joint treatment, in preparation for finish painting, etc.

1.2 QUALITY ASSURANCE

- A. Perform all gypsum wallboard system work in accordance with recommendations of ASTM C754, and GA 216 unless otherwise specified in this section.

1.3 REFERENCES

- A. GA 216 - Recommended Specifications for the Application and Finishing of Gypsum Board.

PART 2 - PRODUCTS

2.1 GYPSUM WALLBOARD

- A. Provide gypsum wallboard materials in accordance with recommendations of GA 216, manufactured by U.S. Gypsum Company or equal.
- B. Gypsum wallboard: match existing thickness, maximum permissible lengths, ends square cut, tapered edges.

2.2 GYPSUM WALLBOARD ACCESSORIES

- A. Provide gypsum wallboard accessories in accordance with GA 216.
- B. Corner Beads: Metal (USG Dur-A-Bead) or as noted on drawings.
- C. Edge Trim: LC bead, L bead, USG #200 Series, or as noted on drawings.
- D. Reinforcing tape, joint compound, adhesive, water, fasteners: GA 216.

PART 3 - EXECUTION

3.1 GENERAL

- A. Install members true to lines and levels to provide surface flatness with a maximum variation of 1/8" to 10 feet in any direction.

3.2 WOOD STUD ERECTION

- A. (Not Utilized)

3.3 GYPSUM BOARD INSTALLATION

- A. Install gypsum board in accordance with recommendations of GA 216, and as scheduled on drawings.
- B. Erect single layer standard gypsum board in direction most practical and economical with ends occurring over firm bearing.
- C. For double layer applications, use gypsum backing board for first layer, placed perpendicular to framing or furring members. Use fire rated gypsum backing board for fire rated partitions. Place second layer perpendicular to first layer. Ensure joints of second layer do not occur over joints of first layer. All party wall partitions are to be fire rated (2 layer).
- D. Use screws when fastening gypsum board to wood furring or framing, Type S with resilient channel walls.
- E. For double layer application, secure second layer to first with adhesive and sufficient fasteners to hold in place. Apply adhesive in accordance with manufacturer's recommendations.
- F. Place control joints to be consistent with lines of building spaces in consistent pattern and as directed by Engineer.
- G. Place specified corner beads at external corners. Use longest practical lengths. Place specified edge trim where gypsum board abuts dissimilar materials, and at panelized edges.
- H. Tape, fill and sand exposed joints, edges, corners, openings and fixings, to produce surface ready to receive surfaces finishes. Feather coats onto adjoining surfaces so that camber is maximum 1/32". Apply three coats in successive passes at taped joints. Sanding is not required at extension of partitions above finished ceilings.

SECTION 09260
GYPSUM WALLBOARD SYSTEMS

I. Remove and re-do defective work.

3.4 CLEAN UP

A. At the end of the work remove all equipment and debris connected with this work from the site. Dispose of debris in a legal manner and leave the work in a clean, orderly and acceptable condition.

END OF SECTION - 09260

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PART 1 - GENERAL

1.1 SCOPE

- A. Provide all materials, labor, equipment, and services necessary to furnish, deliver, and install all resilient flooring and related work as required by the drawings and/or herein specified generally as follows:
1. Vinyl composition tile flooring where indicated on the Contract Drawings, including feature strips.
 2. Vinyl base where indicated on the Contract Drawings.
 3. Reducer strips where resilient flooring adjoins finished flooring of different thickness, and edge strips at all exposed edges of resilient flooring, except where saddles are indicated.
 4. Preparation of substrate, remove existing surfaces as required for installation of resilient flooring and to produce smooth and level finished floors.
 5. Cleaning, finishing, and protecting the finished installations.
 6. Furnish replacement stock as specified.
 7. All other labor and materials needed to make the work of this Section complete.

1.2 SUBMITTALS

- A. Samples of all materials proposed for use shall be submitted for approval as directed by the Engineer, including samples of all colors and patterns selected.

PART 2 - PRODUCTS

2.1 VINYL COMPOSITION TILE

- A. Vinyl composition tile shall be 12" x 12" size, 1/8" thick, conforming to ASTM F1066 Composition 1 (asbestos free), Class 2 (through pattern tile, flat surface, of colors and patterns selected by the Owner; as manufactured by Armstrong Company, Azrock Floor Products, Kentile Floors, Inc., or approved equal.

2.2 VINYL BASE

- A. Vinyl base, except as otherwise specified, shall be top-set cove base not less than .080"

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thick, 4" high as manufactured by Mercer Plastics Company or approved equal. Color to be selected by the owner. Provide preformed corners (internal and external).

2.3 REDUCER AND EDGE STRIPS

- A. Reducer and edge strips shall be vinyl, of the sizes and types to suit conditions encountered, as approved by the Engineer, and of colors selected; as manufactured by Mercer Plastics Co. or approved equal.

2.4 ADHESIVES AND PRIMERS

- A. Adhesives and primers shall be waterproof types recommended by the manufacturers of the flooring materials furnished.

2.5 UNDERLAYMENT PATCHING AND LEVELING COMPOUNDS

- A. Underlayment, patching, and leveling compounds shall be the types recommended by the manufacturers of the flooring materials furnished. Leveling compound shall be Latticrete.

2.6 QUALITY

- A. All materials shall be first line or grade, free from defects. All material furnished, of each color or pattern selected, shall be from the same production run.

PART 3 - EXECUTION

3.1 EXAMINATION OF SURFACES

- A. Surfaces to receive the work of this Section shall be carefully examined prior to starting work and shall be acceptable to the manufacturer of the materials being furnished.

3.2 WORKMANSHIP

- A. Unless otherwise noted on the Contract Drawings, resilient floors and bases shall be installed in all closets, recesses, niches, alcoves, and similar spaces, using the same materials as in adjoining rooms. Bases shall be carried around all cabinets, columns, recesses and similar surfaces, and extend behind all movable furniture and equipment, unless otherwise indicated on the drawings.
- B. All installation procedures and materials shall be as recommended by manufacturers of materials to be used, and as approved by the Engineer. All work shall be laid, tamped, rolled, cemented, etc., in strict accordance with the manufacturer's instructions and shall be submitted to the Engineer.
- C. Preparation of surfaces that are to receive the resilient flooring and base materials shall

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SECTION 09650
RESILIENT FLOORING

be included as work of this Section, including the priming of concrete subfloors.

- D. Surfaces to receive resilient flooring shall be thoroughly dry, smooth, and level; free from dust, grit, grease, paint, moisture, laitance, foreign substances or coatings, and other defects liable to impair the quality of installations.
- E. Finished floors shall have no visible unevenness or imperfections. Provide approved underlayment as may be required to achieve this result. Grind down all ridges, projections, and high spots using grinding machines. Level all low spots and fill all holes, cracks, and other depressions using an approved patching material. Thoroughly clean all subfloor surfaces prior to application of flooring materials.
- F. A temperature of not less than 70 degree F shall be maintained in the locations receiving resilient flooring for at least 48 hours before application, and the 70 degree temperature shall be continuously maintained during the installation. All materials shall be brought into the locations during the 48 hour period and allowed to condition at least 24 hours before installation.
- G. Tile flooring shall be installed in true and straight lines and levels, with tight joints and smooth surfaces. The tiles for each space shall be laid out from center lines and finished with pieces not less than one-half full size at walls. Tiles shall be placed squarely against each other and firmly pressed into the adhesive to insure complete contact adhesion.
- H. Floor tile shall be laid with the grain or pattern running in one direction, perpendicular to the short dimension of the room. Joints shall be straight and parallel with walls.
- I. Where different color flooring occurs in adjoining spaces and saddles are not shown, provide a feature strip the full width between jambs, centered beneath the door. Provide beveled edge or reducer strips at all other exposed free edges of resilient flooring, and where resilient flooring adjoins floor finishes of different height or thickness. Types of edge strips and reducer strips shall be subject to approval by the Owner.
- J. All misplaced and excess adhesive on the face of flooring shall be removed immediately using a cloth moistened with a suitable solvent which will not affect the surface finish or otherwise damage the resilient flooring.
- K. Laying the flooring shall be deferred until all other work that might cause damage to the flooring is completed. As soon as flooring is laid in each space, resulting debris shall be removed and floors shall be cleaned.
- L. Bases shall be applied level, straight and true, in firm contact with vertical and horizontal surfaces, and without loose edges. Corners shall be neatly folded and firmly cemented to prevent unsightly bulges or gaps behind the base. Joints shall be made at internal corners wherever possible neatly mitered and carefully formed without visible separation of joint. Where joints are made at locations other than internal corners

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SECTION 09650
RESILIENT FLOORING

because of limitations of lengths available, the joints shall be made flush and tight. After installation, bases and adjoining surfaces that may have been soiled shall be thoroughly cleaned.

3.3 PROTECTION

- A. The Contractor shall be responsible for protecting all surfaces from damage until final completion of the Contract. In areas that are subject to heavy traffic or work of other trades, flooring shall be covered with "Seekure" manufactured by St. Regis Paper Co., or approved equal, with joints lapped and sealed with tape. Additional protection shall be provided as may be necessary to prevent damage.

3.4 CLEANING AND WAXING

- A. Upon substantial completion of the Contract, protection shall be removed and all work of this Section carefully examined. Evidence of any defects such as damaged, loose, broken or curled tiles, or open joints in sheet vinyl flooring, shall be thoroughly cleaned. Floors shall be waxed, buffed, and left in a condition satisfactory to the Engineer upon completion of the Contract.

3.5 REPLACEMENT STOCK

- A. The Contractor shall furnish three full boxes or cartons of each kind, color, and pattern of tile supplied under this Contract for future use by the Owner. Coordinate delivery with Owner.
- B. The Contractor shall also furnish three boxes or cartons of each type and color of vinyl base supplied under this Contract for future use by the Owner. Coordinate delivery with Owner.

END OF SECTION - 09650

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PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work entails all items shown on the contract drawings including but not limited to:
 - 1. Prime and paint trim, walls, ceilings as indicated on contract drawings.

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Paint coordination:
 - 1. Provide finish coats which are compatible with the prime coats actually used.
 - 2. Furnish information on the characteristics of the specific finish materials to assure that compatible prime coats are used.

1.3 SUBMITTALS

- A. Submit manufacturer's literature for all products.

1.4 JOB CONDITIONS

- A. Do not apply solvent-thinned paints when the temperature of surfaces to be painted and the surrounding air temperatures are below 45 degrees F, unless otherwise permitted by the manufacturers' printed instructions.
- B. Weather conditions:
 - 1. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85%; or to damp or wet surfaces, unless otherwise permitted by the manufacturer's printed instructions.
 - 2. Applications may be continued during inclement weather only within the temperature limits specified by the paint manufacturer as being suitable for use during application and drying periods.

PART 2 - PRODUCTS

2.1 PAINT MATERIALS

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- A. Acceptable materials:
 - 1. Sherwin Williams, or approved equal..
- B. Undercoats and thinners:
 - 1. Provide undercoat paint produced by the same manufacturer as the finish coat.
 - 2. Use only the thinners recommended by the paint manufacturer, and use only to the recommended limits.
 - 3. Insofar as practicable, use undercoat, finish coat, and thinner material as parts of a unified system of paint finish.
- C. Additives:
 - 1. For bathroom applications, M-1 by Zinsser or approved equal.

2.2 COLOR

- A. Colors are to be selected by the Owner.

2.3 APPLICATION EQUIPMENT

- A. For application of the approved paint, use only such equipment as is recommended for application of the particular paint by the manufacturer of the particular paint.
- B. Prior to use of application equipment, verify that the proposed equipment is actually compatible with the material to be applied, and that integrity of the finish will not be jeopardized by use of the proposed equipment.

2.4 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 MATERIALS PREPARATION

- A. General:
 - 1. Mix and prepare paint materials in strict accordance with the manufacturers' recommendations.
 - 2. When materials are not in use, store in tightly covered containers.
 - 3. Maintain containers used in storage, mixing, and application of paint in a clean condition, free from foreign materials and residue.

- B. Stirring:
 - 1. Stir materials before application, producing a mixture of uniform density.
 - 2. Do not stir into the material any film which may form on the surface, but remove the film and, if necessary, strain the material before using.

- C. Ventilation
 - 1. Provide adequate ventilation in all areas to be painted to satisfaction of Owner.

3.3 SURFACE PREPARATION

- A. General:
 - 1. Perform preparation and cleaning procedures in strict accordance with the paint manufacturers' recommendations.
 - 2. Schedule the cleaning and painting so that dust and other contaminants from the cleaning process will not fall onto wet newly painted surfaces.

- B. Preparation of surfaces to be painted:
 - 1. Thoroughly clean surfaces until free from dirt, oil, grease, and any other materials which may effect the bond of the paint.
 - 2. Remove all loose paint (where applicable) by sanding. Surfaces shall be approved by the Engineer as to the acceptability and completeness of the rust removal.
 - 3. Allow to dry thoroughly before application of paint.

- C. Preparation of Gypsum Board Surfaces:
 - 1. Surfaces must be clean and dry.
 - 2. Screw heads must be spackled.
 - 3. Joints must be taped and covered with joint compound.
 - 4. Spackled nail heads and tape joints must be sanded smooth and all dust removed prior to paint application.

3.4 PAINT APPLICATION

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SECTION 09900
PAINTING

A. General:

1. Sand and dust between coats to remove defects visible to the unaided eye from a distance of five feet.

B. Drying:

1. Allow sufficient drying time between coats, modifying the period as recommended by the material manufacturer to suit adverse weather conditions.

C. Brush applications:

1. Brush out and work the brush coats onto the surface in an even film.
2. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, and other surface imperfections will not be acceptable.

END OF SECTION - 09900

SECTION 13100
BULLET RESISTANT PARTITIONS AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Bullet Resistant Financial Counter Lines.
- B. Bullet Resistant Opaque Armor.
- C. Bullet Resistant Ballistic Counters.
- D. Bullet Resistant Currency Trays.

1.2 REFERENCES

- A. ASTM A 666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate and Flat Bar.
- B. ASTM B 209/B 209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- C. NIJ Standard 0108.01 - (National Institute of Justice) Standard for Ballistic Resistant Protective Materials.
- D. Underwriters Laboratories: UL 752 - Standard for Bullet Resisting Equipment.

1.3 PERFORMANCE REQUIREMENTS

- A. Design, fabricate and install all partition materials specified in this section to meet or exceed the requirements of UL 752.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Shop Drawings: Submit Manufacturer approved shop drawings detailing plan, section and elevation views as necessary to ensure proper field installation procedures. Coordinate locations with those listed in the Contract Drawings.
- D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- E. Verification Samples: For each finish product specified, two samples, minimum size

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SECTION 13100
BULLET RESISTANT PARTITIONS AND EQUIPMENT

6 inches (150 mm) square, representing actual product, color, and patterns.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: All primary products specified in this section will be supplied by a single manufacturer with a minimum of ten (10) years experience.
- B. Installer Qualifications: All products listed in this section are to be installed by a single installer with a minimum of five (5) years demonstrated experience in installing products of the same type and scope as specified.
- C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
 - 1. Finish areas designated by Architect.
 - 2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect/Owner.
 - 3. Refinish mock-up area as required to produce acceptable work.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of hazardous materials, and materials contaminated by hazardous materials, in accordance with requirements of local authorities having jurisdiction.

1.7 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.8 WARRANTY

- A. At project closeout, provide to Owner or Owners Representative an executed copy of the manufacturer's standard limited warranty against manufacturing defect, outlining its terms, conditions, and exclusions from coverage.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Total Security Solutions
- B. Engineer approved equal
- C. Requests for substitutions will be considered in accordance with provisions of Section 01300.

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SECTION 13100
BULLET RESISTANT PARTITIONS AND EQUIPMENT

2.2 COMPONENTS

- A. Glazing: Bullet Resistant Glazing:
1. Glazing Type: Laminated polycarbonate.
 2. Rating: UL 752 Level 3.
 3. Glazing Thickness: 9/16 inch (14mm).
 4. All panels finish 48 inches (1219mm) above the teller riser, 60 inches (1524mm) above the teller counter or to the underside of an existing soffit if lower than 100 inches (2540mm) Above the Finished Floor (A.F.F.).
 5. All transparent arched panels spanning teller transaction spaces must be symmetrical, notched from the edges of the teller risers and to 72 inches (1829mm) A.F.F. at the apex of the arch. A transparent backer shall overlap the notch 4 inches (102mm) around and be set back 1 1/2 inches (39mm). Arch centerline will bisect the center of the stainless steel money tray.
- B. Aluminum Sections: Extruded aluminum alloy 6063 T5 manufactured in accordance with ASTM B209. Anodized or powder coated finish to match the existing decor and be free of sharp edges or burrs when in place.
1. Glazing Channel: U-Channel specifically designed for securing transparencies tightly in place. Angles and stops are only acceptable for top attachment.
 2. Door Frames: 1 3/4 inch by 4 inches by 1/8 min. (44mm x 102mm x 3mm) wall thickness. Anodized or powder coated finish to match the existing decor and be free of sharp edges or burrs when in place.

2.3 BULLET RESISTANT COUNTER LINE SYSTEMS

- A. Scope: Custom fabricated bullet resistant panels with secure air passage as required for voice transmission. Panels are prefabricated to fit existing fixtures, with all necessary components, hardware, and accessories being supplied as needed for complete installation.
1. System Type: Arch Window System.
 2. Rating: UL 752 Level 3.
- B. Glazing: As specified in Article 2.2 of this section. Meets Underwriters Laboratories Standard 752 for bullet resistance and/or tested by H.P. White Laboratory for specified bullet resistance.
1. Glazing Type: Laminated polycarbonate.
- C. Frame: Extruded aluminum alloy 6063 T5 manufactured in accordance with ASTM B209. Anodized or powder coated finish to match the existing decor and be free of sharp edges or burrs when in place.
1. Type: U-Channel.
 2. Finish: by owner from mfg selection.
- D. Cash Tray:

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SECTION 13100
BULLET RESISTANT PARTITIONS AND EQUIPMENT

1. Mounting: Surface Mount.
2. Finish: by owner from mfg selection.

2.4 BULLET RESISTANT ACRYLIC DOORS

- A. Construction: Frameless and fabricated from the bullet resistant glazing specified in this section.
 1. Frame: Steel, primed.
 2. Rating: UL 752 Level 3.
- B. Glazing: As specified in Article 2.2 of this section. Meets Underwriters Laboratories Standard 752 for bullet resistance and/or tested by H.P. White Laboratory for specified bullet resistance.
 1. Vision Lite: Full Vision.
- C. Hardware:
 1. Lockset: Schlage D80PD.
 2. Kick Plate and Midband: Located on both sides of the door. Finish to match frame.
 3. Lockset: Schlage D80PD lockset.
 4. Closer: LCN-4041 door closer.
 5. Hinges: Select 21 continuous hinge.
 6. Additional Security: Anti-jimmy device.
 7. Latch: Adams Rite 7100 series electric strike.

2.5 OPAQUE ARMOR

- A. Bullet resistant fiberglass armor tested and approved to meet U.L. 752 for the level of protection specified.
 1. Model: 3.
 - a. Rating: UL 752 Level 3, UN Listed.
 - b. Panel Thickness: 3/8 inch (10mm).
 - c. Panel Weight: 4.0 Lbs per square foot (19.53 kg/sm).

2.6 BALLISTIC COUNTERS

- A. Scope: Countertop integrated into a complete bullet-resistant barrier system matching adjacent materials featured. Ballistic counters use layered, reinforced, structural polyester laminate (fiberglass).
- B. Counter Surface:
 1. Material: Plastic Laminate.

2.7 CURRENCY TRAYS

- A. Mounting: Recessed with Bullet Trap.

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SECTION 13100
BULLET RESISTANT PARTITIONS AND EQUIPMENT

1. Dimensions: 12 inches by 8 inches by 1-1/2 inches (305mm x 203mm x 38mm).
- B. Finish:
 1. Finish: by owner from mfg selection.

2.8 STRUCTURAL SUPPORTS

- A. Where installation requires lateral bracing, locate braces no wider than 96 inches (2438mm) on centerlines. The depth of the brace below the counter and vertical support (brace) above the counter must maintain a ratio of at least 20 percent of the total installation height.
- B. Install 1 1/2 inch (39mm) square steel tube braces below the counter and hoods with a minimum wall thickness of 1/8 inch (3mm). Welded in place and include two vertical and horizontal members. Bolt or weld a diagonal member between the two horizontal members.
- C. Extend braces located above the counter and hoods to the top of the acrylic slotted jump shield. Material to be of the specified bullet resistant material. At no time shall the vertical supports be less than 10 inches (254mm) in depth.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

3.4 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General Conditions apply to this section.

1.2 DESCRIPTION

- A. General: Materials and methods for performance of mechanical work related to HVAC systems installation.
- B. Provide complete and operational mechanical systems including, but not limited to, all required materials, parts, equipment, labor, tools, and accessories.

1.3 SUMMARY

- A. This Section includes general administrative and procedural requirements for mechanical installations. The following administrative and procedural requirements are included.
 - 1. Codes & standards.
 - 2. Submittals.
 - 3. Quality control.
 - 4. Permits, fees, and inspections.
 - 5. Schedule and sequence.
 - 6. Project and site conditions.
 - 7. Delivery, storage, and handling.
 - 8. Coordination drawings.
 - 9. Record documents.
 - 10. Maintenance manuals.
 - 11. Warranties and guaranties.
 - 12. Rough-ins.
 - 13. Mechanical installations.
 - 14. Cutting and patching.
 - 15. Firestopping
 - 16. Mechanical identification.
- B. Related Sections: The following sections contain requirements that relate to this section:
 - 1. Division 2 through 14 all sections
 - 2. Division 16 - all sections.

1.4 CODES AND STANDARDS

- A. Except as modified by governing codes, comply with applicable provisions and recommendations of the following:
1. ANSI Standards.
 2. Owner's Insurance Company.
 3. All applicable federal, state and local laws and statutes.

1.5 SUBMITTALS

- A. Shop Drawings:
1. Submit for review, detailed shop drawings of all the equipment and material required to complete the work. No material or equipment may be delivered to the jobsite or installed until accepted shop drawings for the particular material or equipment have been approved by the Owner or his authorized representative.
 2. Submit shop drawings in accordance with the requirements outlined in the General Conditions.
 3. Failure to submit shop drawings in ample time for checking will not entitle Contractor to Contract time, or increase in contract cost.

1.6 QUALITY ASSURANCE

- A. Drawings:
1. Drawings are diagrammatic. They indicate the general arrangement of systems and work included in the contract. Drawings are not to be scaled. Original architectural drawings and details shall be examined for exact location of fixtures and equipment. When drawing are not available or where they are not definitely located, this information shall be obtained from the Owner or authorized representative.
 2. Surveys and Measurements:
 - a. Before submitting bid, visit site, become familiar with conditions under which work will be installed. Contractor will be held responsible for assumptions, omissions, and errors made as a result of failure to become familiar with site and contract documents.
 - b. Base all measurements, both horizontal and vertical, from established benchmarks. All work shall agree with established lines and levels. Verify all measurements at site and check the

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correctness of same.

- c. Notify the Engineer promptly of discrepancies between actual measurements and those indicated, which prevents following good practice or intent of drawings and specifications. Do not proceed with work until Contractor has received instructions from Engineer.

B. Labor:

1. Cooperation with Other Trades:

- a. Give full cooperation to other trades; furnish in writing to Contractor, with copies to the Owner, information necessary to permit the work of all trades to be installed satisfactorily and with the least possible interference or delay.
- b. Where work will be installed in close proximity to, or will interfere with work of other trades, assist in working out space conditions to make a satisfactory adjustment. If directed by the Owner, prepare composite working drawings and sections at a suitable scale not less than $1/4" = 1'0"$, clearly showing how work is to be installed in relation to the work of other trades. If work under this division is installed before coordinating with other trades, or to cause any interference with work of other trades, make necessary changes to correct the condition without additional cost.
- c. Furnish to other trades all necessary templates, patterns, setting plans, and shop details for the proper installation of work and for the purpose of coordinating adjacent work.

2. Materials & Workmanship:

- a. Materials and apparatus required for the work shall be new and of first class quality. Furnished, delivered, erected, connected and finished in every detail. Select and arrange to fit properly into the building spaces. Where no specific kind or quality of material is given, furnish first class standard article as accepted by Owner.
- b. Furnish the services of an experienced superintendent who shall be in constant charge of the work, together with skilled craftsmen and labor required to unload, transfer, erect, connect-up, adjust, start, operate, and test each system.

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- c. All equipment and materials to be installed with the acceptance of the Owner or his authorized representative in accordance with the recommendations of the manufacturer. This includes the performance of such test as the manufacturer recommends.

3. Protection of Materials:

- a. Multiple Units: When two or more units of materials or equipment of the same type or class are required, these units shall be products of one manufacturer.
- b. Welding: Before any welding is performed, submit a copy of the Welding Procedure Specification (WPS) together with the Procedure Qualification Record a required by Section IX of the ASME Boiler and Pressure Vessel Code.
 - 1. Before any welder performs any welding, submit a copy of the Manufacturer's Record of Welder or Welding Operator Qualification Tests as required by Section IX of the ASME Boiler and Pressure Vessel Code. The letter or symbol (as shown on the qualification test form) shall be used to identify the work of that welder and shall be affixed, in accordance with appropriate construction code, to each completed weld.
 - 2. The types and extent of non-destructive examinations required for pipe welds are shown in Table 136.4 of the Code for Pressure Piping, ASNI/ASME B31.1.
- c. Manufacturer's Recommendations: Where installation procedures or any part thereof are required to be in accordance with the recommendations of the manufacturer of the material being installed, printed copies of these recommendations shall be furnished to the Engineer prior to the installation. Installation of the item will not be allowed to proceed until the recommendations are received. Failure to furnish these recommendations can be cause for rejection of the material.

1.7 PERMITS, FEES, & INSPECTIONS

- A. Give all necessary notices, obtain all permits, and pay all government sales taxes, fees, and other costs, including utility connections or extensions in connection with work. File necessary approvals of governmental departments having

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jurisdiction. Obtain required certificates of inspection for work and deliver a copy to the Owner or his authorized representative before requesting acceptance for final payment.

1.8 SCHEDULE & SEQUENCE

A. Temporary Shutdowns:

1. Installation of new systems requiring the temporary shutdown of an existing operating system, the connection of the new system to be performed at such time as designated by the owner or authorized representative.
2. Notify the Owner of the estimated duration of the shutdown as noted elsewhere.
3. Arrange work for continuous performance, including authorized overtime if required, to assure existing operating services will be shut down only during the time actually required to make connections.

B. Temporary Services:

1. Refer to the General Conditions and Special Conditions for a full description of the temporary services to be provided.

C. Temporary Openings:

1. Ascertain from examination of the drawings any special temporary openings in the building required for the admission of apparatus provided under this Division. Notify the Owner accordingly. In the event of failure to give sufficient notice to the Contractor in time to arrange for openings during construction, assume all costs of providing such openings thereafter.

D. Sequencing:

1. Coordinate sequence of work with General Contractor.

1.9 PROJECT & SITE CONDITIONS

A. Cutting and Patching:

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1. Furnish all cutting and patching. Furnish sketches showing the locations and sizes of openings, chases, etc., required for the installation of work. Furnish the Contractor with an approximation of the number of openings, chases, etc., required.

B. Waterproofing:

1. Where a work pierces existing waterproofing, re-waterproof. The method of installation to be reviewed by Owner or his authorized representative before work is done. Furnish all sleeves, caulking, and flashing required to make openings watertight.

1.10 DELIVERY, STORAGE, & HANDLING

A. Delivery & Receipt:

1. Contractor is responsible for the delivery and storage of all materials, parts, equipment, etc. required for this project.

B. Storage:

1. The Contractor shall store all material, parts, and equipment required for this project in accordance with supplier's and manufacturer's recommendations, and Owner's requirements.

C. Handling, Hoisting, Rigging, & Scaffolding:

1. Furnish all scaffolding, rigging, hoisting, and services necessary for erection and delivery into the premises of any equipment and apparatus furnished under this Division. Remove same from premises when no longer required.

1.11 RECORD DOCUMENTS

- A. Maintain at the job site a record set of drawings on which any changes in location of equipment, piping, ducts, valves, cleanouts, panels, and major conduits shall be recorded. These shall be clearly marked on a clean set of prints at the completion of work for record drawings and turned over to the Owner.

1.12 OPERATION & MAINTENANCE MANUALS FOR MECHANICAL SYSTEMS

- A. Bind Operation & Maintenance Manual for Mechanical System in a hard-backed binder. Spine of each binder shall have the following lettering done in silkscreen:

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OPERATION AND MAINTENANCE MANUAL
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1. Provide a master index at beginning of Manual showing items included. Use plastic tab indexes for sections of Manual.
 2. First section shall consist of name, address, and phone number of Mechanical & Electrical Engineers, General Contractor and Mechanical, Plumbing, Sheet Metal, Refrigeration, Temperature Control & Electrical Contractors. Also include a complete list of equipment installed with name, address, and phone number of vendor.
 3. Provide section for each type of item of equipment.
 4. Submit three copies of Operation & Maintenance Manual to Engineer for his approval. Use one of these approved copies during final inspection and leave with building custodian.
- B. Include descriptive literature (Manufacturer's catalog data) of each manufactured item. Literature shall show capacities and size of equipment used and be marked indicating each specific item with applicable data underlined.
- C. Operating instructions shall include:
1. General description of each mechanical system.
 2. Step by step procedure to follow in putting each piece of mechanical equipment into operation.
 3. Provide schematic control diagrams for each separate fan system, cooling system, heating system, control panel, etc. Each diagram shall show locations of start-stop switches, insertion thermostats, room thermostats, thermometers, firestats, pressure gauges, automatic valves, and refrigeration accessories. Mark correct operating setting for each control instrument on these diagrams.
 4. Provide diagram for electrical control system showing wiring of related electrical control items such as firestats, fuses, interlock, electrical switches, and relays.
 5. Provide drawing of each temperature control panel identifying components on the panels and their functions.
- D. Maintenance instructions shall include:

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1. Manufacturer's maintenance equipment installed in Project. Instructions shall include name of vendor, installation instructions, parts numbers & lists, operation instructions of equipment and maintenance & lubrication instructions.
2. Summary list of mechanical equipment requiring lubrication showing name of equipment, location and type, and frequency of lubrication.
3. List of mechanical equipment used indicating name, model, serial number, and name plate data of each item together with number and name associated with each system item.
4. List spare parts and quantities to be maintained in ready inventory at project site.

1.13 WARRANTIES AND GUARANTIES

- A. Guarantee all material and workmanship under this Division for a period of one year, (compressors five (5) years) from the date of final acceptance by the Owner.
- B. During guarantee period, all defects developing through materials and/or workmanship shall be replaced immediately without expense to the owner. Make such repairs or replacements to the satisfaction of the Owner.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. As specified on drawings.

2.2 MATERIALS

- A. As specified on drawings.

2.3 EQUIPMENT DEVIATIONS

- A. Where the Contractor proposed to use an item of equipment other than that specified or detailed on the drawings which requires the redesign of the structure, partitions, foundations, piping, wiring or any other part of the mechanical, electrical or architectural layout, all such redesign, and all new drawings and detailing required therefore, shall be prepared at the Contractor's expense and are subject to the review and approval of the Owner or his authorized representative.

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Owner reserves the right to have the Architect or Engineer of his choice prepare any redesign work.

- B. Where such accepted deviation requires a different quantity and arrangement of ductwork, piping, wiring, conduit, and equipment from that specified or indicated on the drawings, the Contractor will provide ductwork, piping, structural supports, insulation, controllers, motors, starters, electrical wiring and conduit, or other additional equipment required at no additional cost to the Owner.
- C. When equipment or methods deviate from original plans or specifications, the Contractor must submit a written request to deviate to the Engineer. At a minimum the request will address the following:
 - equipment which is different than specified
 - name and data related to the proposed deviation
 - reason for deviation
 - advantageous or disadvantageous to the Owner
 - credit or increase in cost to the Owner
 - guarantees or warranties offered (if any)
 - acceptance of liability for equivalent performance.

2.4 MANUFACTURER'S IDENTIFICATION

- A. Attach manufacturer's nameplate, name, trademark and address permanently to equipment and material furnished under this Division. Nameplate of a Contractor or Distributor is not acceptable.

2.5 ELECTRICAL REQUIREMENTS

- A. Motors:
 - 1. Electric motors furnished as a component part of equipment furnished under this Division shall conform to the requirements of IEEE, NEMA, UL, ANSI C50, and ANSI CI. Motors to be suitable for required load, duty voltage, phase, frequency, service and location.
 - 2. Motors to be suitable for continuous duty at rated horsepower with temperature rise not to exceed 40°C for drip-proof motors, 50°C for splash-proof motors, and 55°C for totally enclosed motors. Motors to be capable of withstanding momentary overloads of 25 percent without injurious overheating.
 - 3. Motors to have nameplates giving Manufacturer's name, serial number,

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horsepower, speed and current characteristics.

4. Motors smaller than 1 HP to be capacitor start or split-phase type designed for 120 volts, single phase, 60 cycles alternating current. Motors 1 HP and larger to be squirrel-cage induction or wound rotor, induction type, 3 phase, 60 cycles, alternating current.
5. Motor leads shall be permanently identified and supplied with connectors.
6. Each motor to be selected for quiet operation in accordance with NEMA standards.

B. Motor Starters:

1. Electric motor starters shall conform to requirements of IEEE, NEMA, UL, ANSI, CI and shall be suitable for the required load, duty, voltage, phase, frequency, service, and location.
2. When interlocking or automatic control of single-phase motors is required, motors to be furnished with full voltage, across-the-line starters.

C. Connections:

1. Power wiring to be furnished and installed complete from power source to motor or equipment junction box, including power wiring through the starters. Starters not factory mounted on equipment shall be furnished and installed under Division 16.

2.6 MECHANICAL REQUIREMENTS

A. Bases & Supports:

1. Provide necessary foundations, supports, pads, bases and piers required for equipment, piping, motors, and other equipment furnished under this Division. Submit drawings to Owner for review before purchase, fabrication, or construction.
2. Construction of foundations, supports, pads, bases, and piers where mounted on the floor to be of the same materials and same quality of finish as the adjacent surrounding flooring material.
3. Securely attach equipment to building structure. Attachments that are, in the opinion of the Owner or his authorized representative deficient, will be

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replaced as directed.

B. Vibration Isolation:

1. Provide vibration isolation features and related installation in accordance with manufacturer requirements and engineer's recommendations.

C. Lubrication:

1. Lubricate all equipment having moving parts and requiring lubrication according to manufacturer's recommendations prior to testing and operation. Equipment discovered to have been operated before lubrication is subject to rejection and replacement at no cost to the Owner.

D. Accessibility:

1. Be responsible for the sufficiency of the size of shafts and chases, adequate clearance in double partitions and hung ceilings for proper installation of work. Cooperate with the Contractor and other contractors whose work is in the same space. Advise the Contractor of requirements. Such spaces and clearances shall be kept to the minimum size required.
2. Locate all equipment which requires servicing in fully accessible positions. Equipment shall include but not be limited to, valves, traps, clean-outs, motors, controllers, and drain points. If required for better accessibility furnish access doors for the purpose. Minor deviations from the drawings may be made to allow for better accessibility. Any change shall be submitted to the Owner or his authorized representative for review.

E. Connection to Existing Structures:

1. Before cutting, drilling, attaching, or any work involving building elements, coordinate work with others and Owner to avoid damage to building elements.

F. Quiet Operation:

1. Objectionable noise or vibration transmitted to occupied portions of the building by apparatus, piping, ducts, or other parts of the work to be remedied.

2.7 FIRESTOPPING

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- A. Fire-stopping material shall be UL listed and tested silicone elastomer specifically formulated for use in horizontal and vertical applications shall possess intumescent characteristics; upon exposure to heat above 250 degrees F. shall expand to not less than five times its original volume to form a fireproof envelope UL rated for 2 and 3 hour protection, when applied in accordance with the manufacturer's recommendation.

PART 3 - EXECUTION

3.1 ROUGH-IN

- A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.
- B. Refer to equipment specifications in Divisions 2 through 16 for rough-in requirements.

3.2 MECHANICAL INSTALLATIONS

- A. General: Sequence, coordinate, and integrate the various elements of mechanical systems, materials, and equipment. Comply with the following requirements:
 - 1. Coordinate mechanical systems, equipment, and materials installation with other building components.
 - 2. Verify all dimensions by field measurements.
 - 3. Arrange for chases, slots, and openings in other building components during progress of construction, to allow for mechanical installations.
 - 4. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.
 - 5. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work.
 - 6. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible.
 - 7. Coordinate connection of mechanical systems with exterior underground

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and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.

8. Install systems, materials, and equipment to conform with approved submittal data, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Engineer.
9. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.
10. Install mechanical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations. Extend grease fittings to an accessible location.
11. Install access panel or doors where units are concealed behind finished surfaces.
12. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.

3.3 CUTTING AND PATCHING

- A. General: Perform cutting and patching in accordance with, the following requirements:
 1. Protection of Installed Work: During cutting and patching operations, protect adjacent installations.
- B. Perform cutting, fitting, and patching of mechanical equipment and materials required to:
 1. Uncover Work to provide for installation of ill-timed Work.
 2. Remove and replace defective Work.
 3. Remove and replace Work not conforming to requirements of the Contract Documents.
 4. Remove samples of installed Work as specified for testing.

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5. Install equipment and materials in existing structures.
 6. Upon written instructions from the Engineer, uncover and restore Work to provide for Engineer observation of concealed Work.
- C. Cut, remove and legally dispose of selected mechanical equipment, components, and materials as indicated, including but not limited to removal of mechanical piping, heating units, plumbing fixtures and trim, and other mechanical items made obsolete by the new Work.
- D. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.
- E. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.
1. Patch existing finished surfaces and building components using new materials matching existing materials and experienced Installers. Installers' qualifications refer to the materials and methods required for the surface and building components being patched.
 2. Patch finished surfaces and building components using new materials specified for the original installation and experienced Installers. Installers' qualifications refer to the materials and methods required for the surface and building components being patched.

3.4 FIRE STOPPING

- A. Firestopping: Unused slots, sleeves and other penetrations in floor, walls or other general construction shall be closed and sealed with an approved firestopping material.
1. Floor slots and openings shall be closed with 16 gage galvanized steel sheet supported on 1-inch by 1-inch by 1/8 inch structural angle drilled or supported with powder driven studs into the building structure. Firestop with a layer of silicone elastomer not less than 1-inch thick which completely fills the opening. The top surface of the silicone elastomer shall be approximately 1-inch below the finished floor slab.
 2. Openings in walls shall be closed with 16 gage galvanized steel sheet securely attached at the midpoint of the wall thickness and firestopped on both sides of steel sheet with not less than 1/8-inch thick layer of non-

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sagging silicone elastomer to fully cover the opening.

3. Single or multiple pipes passing through walls and floors shall have the annular space between pipes or between pipes and structure filled with silicone elastomer to provide a 3-hour rated firestop for floors and walls.
- B. Pipe and ducts: The annulus between exposed pipe and ductwork and walls or floors in finished spaces shall be filled, sealed, and painted to match adjacent surfaces.

3.5 FIELD QUALITY CONTROL

- A. Perform field tests as specified under other sections.
- B. Arrange for local inspection authorities to inspect work performed prior to burial, closing-in behind wall and above ceiling or encase in concrete. Also arrange for final inspection of work and obtain Final Inspection Certificate before final inspection by Owner or his representative.

3.6 PAINTING

- A. See Division 9 for painting in finished areas.
- B. Materials shipped to the job site under this Division to have prime coat and standard manufacturer's finish.

3.7 EQUIPMENT IDENTIFICATION

- A. Equipment Identification:
1. Identify air handling units, heaters, and condensing units with the following data engraved in white on black laminated plastic (2" x 3") and fastened to equipment with screws.
 - a. Equipment mark noted on Drawings (i.e., EF-1).
 - b. Area served.

3.8 CLEANING

- A. Thoroughly clean ducts and equipment of foreign substances before making operational.
- B. Any part of a system stopped by foreign matter after being placed in operation, to

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be disconnected, cleaned, and reconnected to locate and remove obstructions. Work damaged in the course of removing obstructions will be repaired or replaced at no additional cost to the Owner.

- C. Cap all ducts and pipes to protect against entrance of foreign matter.
- D. Remove rubbish, debris, and excess materials. Remove oil and grease stains on floor areas.

END OF SECTION 15010

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General Conditions, apply to this section.

1.2 SUMMARY

- A. This Section includes general administrative, procedural, and other requirements for electrical installations. The following requirements are included in this Section to expand the requirements specified in Divisions 1 through 16:
 - 1. Submittals.
 - 2. Quality control.
 - 3. Definitions and abbreviations.
 - 4. Scheduling.
 - 5. Coordination drawings.
 - 6. Record documents.
 - 7. Maintenance manuals.
 - 8. Delivery, storage, and handling.
 - 9. Products.
 - 10. Rough-ins.
 - 11. Electrical installations.
 - 12. Permits and instructions.
 - 13. Field quality control.
 - 14. Protection.
 - 14. Additional work.
 - 15. Electrical schedules.
 - 16. Cutting and patching.
- B. Related Sections: The following sections contain requirements that relate to this section:
 - 1. Division 2 thru 14
 - 2. Division 15 - Mechanical

1.3 SUBMITTALS

- A. General: Follow the procedures specified.

1.4 QUALITY CONTROL

- A. Functional and Operational Test Procedure:

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1. Test procedure to completely test all systems as to their functional and sequential operation.
 2. Submit two (2) draft copies for review before conducting test.
 3. Certify that the test procedure was used and testing completed, and that all systems are operational and functioning properly.
 4. Submit certified Test Procedure for review prior to the date of final inspection.
- B. Installation shall comply with the National Electrical Code (N.E.C.), local authorities, State of Connecticut, Life Safety and Building Codes.

1.5 DEFINITIONS AND ABBREVIATIONS

- A. Electrical Definitions: As defined by National Electrical Code, Article 100.
- B. The term "indicated" shall mean "as shown on contract documents (specifications, drawings, and related attachments)".
- C. The term "provide" shall mean "to furnish, install and connect completely".
- D. The term "size" shall mean one or more of the following: "length, current and voltage rating, number of poles, NEMA size, and other similar electrical characteristics".
- E. The term "space" on panelboard and switchboard schedules shall mean "provide space to install the number of poles and size of the protective device indicated with all the necessary buss and fittings to install the device at some future date".

1.6 SCHEDULING

- A. Coordinate electrical work with other divisions of this project.
- B. Coordinate electrical work with Owner.
- C. Written requests for approval for planned shutdowns or interruption of Owner's operation or equipment shall be made in accordance with Special Conditions.

1.7 RECORD DOCUMENTS

- A. Prepare record documents in accordance with the requirements specified. Indicate installed conditions for:
 1. Equipment locations (exposed and concealed), dimensioned from prominent building lines.
 2. Approved substitutions, Contract Modifications, and actual equipment and materials installed.

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1.8 MAINTENANCE MANUALS

- A. Prepare maintenance manuals in accordance with the requirements specified. Include the following information for equipment items:
 - 1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
 - 2. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
 - 3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
 - 4. Servicing instructions and lubrication charts and schedules.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Unless otherwise indicated, all electrical equipment has been based on General Electric Company products.
- B. Comparable manufacturers may be utilized, and include the following:
 - 1. Eaton Corp
 - 2. Siemens
 - 3. Square D
- C. As specified on Drawings.

2.2 MATERIAL

- A. General:
 - 1. Unless otherwise indicated, all raceways for service, feeders, branch and control wiring are IMC.
 - 2. Unless otherwise indicated, interior branch and control wiring may be installed in EMT.

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3. Unless otherwise indicated, wiring to equipment and motors may be installed in liquid tight flexible conduit, or in interior locations in flexible metal conduit, with a maximum length of 5 feet.
4. Unless otherwise indicated, all conductors to be copper THHN/THWN.
5. Unless otherwise indicated, all outlet and switch boxes to be cast iron with threaded hubs.
6. In interior protected locations, outlet and switch boxes may be stamped steel.
7. Unless otherwise indicated, provide ivory, heavy duty grade, 20 ampere, receptacles and switches. Plates for surface mounted interior boxes may be stamped steel. Plates exposed to weather or water to be metal, weatherproof type.

B. As specified on Drawings.

2.3 EQUIPMENT

A. General:

1. Unless otherwise indicated, externally operated safety switches are unfused, solid neutral, heavy duty, and selected to meet the load requirements.

B. As specified on Drawings.

2.4 FABRICATION

A. General:

1. Unless otherwise indicated, all enclosures NEMA Type 1. Enclosures exposed to the wet and/or damp locations shall be NEMA Type 3R.

B. As specified on Drawings.

2.5 WIRING DEVICES:

A. General: Provide wiring devices, in types, characteristics, grades, colors, and electrical ratings for applications indicated which are UL listed and which comply with NEMA WD 1 and other applicable UL and NEMA standards. Provide ivory color devices and wall plates except as otherwise indicated. Verify color selections with Architect.

B. Ground-Fault Interrupter (GFI) Receptacles: 20 Ampere rated heavy duty ; provide "feed-thru" type ground-fault circuit interrupter, with integral heavy-duty NEMA 5-20R duplex receptacles arranged to protect connected downstream receptacles on same circuit. Provide unit designed for installation in a 2-3/4 inch deep outlet box without adapter, grounding type, Class A, Group 1, per UL Standard 94.3.

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- C. Snap Switches: quiet type AC switches 277/120VAC, 20 ampere rated.

2.6 WIRING DEVICE ACCESSORIES

- A. Wall plates: single and combination, of types, sizes, and with ganging and cutouts as indicated. Provide plates which mate and match with wiring devices to which attached. Provide metal screws for securing plates to devices with screw heads colored to match finish of plates. Provide wall plates with engraved legend where indicated. Provide plates possessing the following additional construction features:
 - 1. Material and Finish: 0.04 inch thick, type 302 satin finished stainless steel, typical throughout.
 - 2. Material and Finish: steel plate, galvanized, limited to mechanical rooms only.

PART 3 - EXECUTION

3.1 ROUGH-IN

- A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.
- B. Refer to equipment specifications in Divisions 2 through 16 for rough-in requirements.

3.2 ELECTRICAL INSTALLATIONS

- A. General: Sequence, coordinate, and integrate the various elements of electrical systems, materials, and equipment. Comply with the following requirements:
 - 1. Coordinate electrical systems, equipment, and materials installation with other building components. Electrical plans and details do not show all interferences and conditions, visible and/or hidden, that may exist. Before selecting material and equipment, and proceeding with work, inspect areas where material and equipment are to be installed to insure suitability, and check needed space for placements, clearances and interconnections. Before cutting or drilling into building elements inspect and layout work to avoid damaging structural elements or building utilities.
 - 2. Electrical plans, details, and diagrams show the general location and arrangement of electrical systems. They are diagrammatic and do not show all conduit bodies, connectors, bends, fittings, hangers, and additional pull and junction boxes which the Contractor must provide to complete the electrical system.
 - 3. Verify all dimensions by field measurements.

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4. Arrange for chases, slots, and openings in other building components during progress of construction, to allow for electrical installations.
5. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.
6. Sequence, coordinate, and integrate installations of electrical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building. Verify dimensional constraints of building door openings and passageways, and the maximum floor loadings, for the movement of selected material and equipment. Order equipment and material, broken down as may be required, to meet these constraints.
7. Measurement from above finished floor (AFF) shall be taken from the finished floor surface to the top of wall receptacles and switch boxes, to the centerline of wall lighting outlet boxes, to the top of wall mounted equipment enclosures, to the centerline of top most switch handle, or to the lowest surface of ceiling lighting fixtures and other ceiling mounted equipment.
 - a. Unless otherwise indicated, wall switch boxes shall be 42 inches AFF.
 - b. Unless otherwise indicated, receptacle boxes shall be 18 inches AFF.
8. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible. Switch and receptacle heights shall meet handicap accessible code requirements.
9. Coordinate connection of electrical systems with incoming utilities and services. Comply with requirements of governing regulations, power, telephone, and data service companies, and controlling agencies. Provide required connection for each service.
 - a. Also:
 - 1) Provide power and control wiring for elevator system interface. Coordinate with Division 14.
 - 2) Provide isolated ground back to main electrical service grounding point.
 - 3) Provide elevator circuits as noted.
10. Install systems, materials, and equipment to conform with approved submittal data, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Engineer.
11. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.

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SECTION 16010
BASIC ELECTRICAL REQUIREMENTS

12. Conduit Sizing:
 - a. Unless otherwise indicated, conduit size for indicated conductor shall be based on Chapter 9 of NEC.
 - b. Conduit size: 1/2 inch minimum.
13. Install electrical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations. Measure and locate placement of equipment and materials in relation to building structure and surfaces, and between equipment to be installed and wired. Maintain required minimum access spacing for equipment and enclosures.
14. Install access panel or doors where units are concealed behind finished surfaces. Access panels and doors are specified elsewhere.
15. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.

3.3 PERMITS AND INSPECTIONS

- A. Obtain all required permits and arrange for all required inspections in accordance with state and local governing authorities.
- B. Final Electrical Inspection Certificate from inspection agency or governing authority.

3.4 FIELD QUALITY CONTROL

- A. Perform field tests as specified under other electrical sections.
- B. Arrange for local Inspection Authorities to inspect work performed prior to burial, closing-in behind wall and above ceiling, or encased in concrete. Also arrange for final inspection of work and obtain Final Inspection Certificate before final inspection of work by Owner or his representative.

3.5 PROTECTION

- A. Protect personnel from coming in contact with live parts.
- B. During remodeling or alteration work, maintain fire ratings of walls, floors and ceilings when work is left unattended.
- C. Protect from damage and theft equipment and materials provided or supplied by others in accordance with manufacturer's recommendation and warranties, and with electrical standards and practices.

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3.6 ADDITIONAL WORK

- A. Provide power and control wiring for heating and ventilation systems.
- B. Provide temporary electric service power outlets and lighting during construction.
- C. Provide elevator recall system connection as required.
- D. Demolish existing electrical systems as indicated and in accordance with specifications.
- E. Provide power and control wiring to lighting fixtures.
- F. Provide wiring to miscellaneous components as indicated.
- G. Provide lighting fixtures as noted.
- H. Provide isolated grounding as required and as noted.

3.7 ELECTRICAL SCHEDULES

- A. As shown on drawings.

3.8 CUTTING AND PATCHING

- A. General: Perform cutting and patching in accordance with the following requirements:
 - 1. Perform cutting, fitting, and patching of electrical equipment and materials required to:
 - a. Uncover Work to provide for installation of ill-timed Work.
 - b. Remove and replace defective Work.
 - c. Remove and replace Work not conforming to requirements of the Contract Documents.
 - d. Remove samples of installed Work as specified for testing.
 - e. Install equipment and materials in existing structures.
 - f. Upon written instructions from the Engineer, uncover and restore Work to provide for Engineer observation of concealed Work.
 - 2. Cut, remove, and legally dispose of selected electrical equipment, components, and materials as indicated, including but not limited to removal of electrical items indicated to be removed and items made obsolete by the new Work.

SECTION 16010
BASIC ELECTRICAL REQUIREMENTS

3. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.
4. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.
5. Protection of Installed Work: During cutting and patching operations, protect adjacent installations.
6. Patch existing finished surfaces and building components using new materials matching existing materials and experienced Installers. Installers' qualifications refer to the materials and methods required for the surface and building components being patched.
7. Patch finished surfaces and building components using new materials specified for the original installation and experienced Installers. Installers' qualifications refer to the materials and methods required for the surface and building components being patched.

END OF SECTION 16010

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PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Requirements of other specified Division 16 Sections apply to this section.

1.2 SUMMARY

- A. This Section includes wires, cables, and connectors for power, lighting, signal, control and related systems rated 600 volts and less.

1.3 SUBMITTALS

- A. Product Data for electrical wires, cables and connectors.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with provisions of the following code:
- B. NFPA 70 "National Electrical Code."
 - 1. Conform to applicable codes and regulations regarding toxicity of combustion products of insulating materials.
- C. UL Compliance: Provide components which are listed and labeled by UL under the following standards.
 - 1. UL Std. 83 Thermoplastic-Insulated Wires and Cables.
 - 2. UL Std. 486A Wire Connectors and Soldering Lugs for Use with Copper Conductors.
 - 3. UL Std. 1569 Metal Clad Cable.
- D. NEMA/ICEA Compliance: Provide components which comply with the following standards:
 - 1. WC-5 Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
- E. IEEE Compliance: Provide components which comply with the following standard.
 - 1. Std. 82 Test procedures for Impulse Voltage Tests on Insulated Conductors.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:
 - 1. Wire and Cable:
 - a. American Insulated Wire Corp.
 - b. Brintec Corp.
 - c. Carol Cable Co. Inc.
 - d. Senator Wire and Cable Co.
 - e. Southwire Company.
 - 2. Connectors for Wires and Cable Conductors:
 - a. AMP
 - b. 3M Company
 - c. O-Z/Gedney Co.
 - d. Square D Company.

2.2 WIRES AND CABLES

- A. General: Provide wire and cable suitable for the temperature, conditions and location where installed.
- B. Conductors: Provide stranded conductors for power and lighting circuits no. 10 AWG and smaller. Provide stranded conductors for sizes no. 8 AWG and larger.
- C. Conductor Material: copper for all wires and cables.
- D. Conductor sizes indicated are based on copper.
- E. Insulation: Provide THHN/THWN-2 insulation for all conductors size 500MCM and larger, and no. 8 AWG and smaller. For all other sizes provide, THHN/THWN-2 or XHHW insulation as appropriate for the locations where installed.
- F. Color Coding for phase identification in accordance with Table 1 in Part 3 below.
- G. Jackets: Factory-applied nylon or PVC external jacketed wires and cables for pulls in raceways over 100-feet in length, for pulls in raceways with more than three equivalent 90 deg. bends, for pulls in conduits underground or under slabs on grade, and where indicated.

SECTION 16120
WIRES AND CABLES

- H. Cables: Provide the following type(s) of cables in NEC approved locations and applications where indicated. Provide cable UL listed for particular application:
1. Metal-Clad Cable: Type MC - limited to lighting fixtures and outlets concealed in gypsum wall partitions.
 2. Metal clad above ceilings to be limited to five (5) feet whips.

2.3 CONNECTORS FOR CONDUCTORS

- A. Provide UL-listed factory-fabricated, solderless metal connectors of sizes, ampacity ratings, materials, types and classes for applications and for services indicated. Use connectors with temperature ratings equal to or greater than those of the wires upon which used.

PART 3 EXECUTION

3.1 WIRING METHOD

- A. Use the following wiring methods as indicated:
1. Wire: install all wire in raceway.
 2. Metal Clad Cable, Type MC: where wiring concealed in gypsum wall partitions, ceilings, for connections from raceway outlet boxes to lighting fixtures, unless otherwise noted.

3.2 INSTALLATION OF WIRES AND CABLES

- A. General: Install electrical cables, wires, and connectors in compliance with NEC.
- B. Coordinate cable installation with other Work.
- C. Pull conductors simultaneously where more than one is being installed in same raceway. Use UL listed pulling compound or lubricant, where necessary.
- D. Use pulling means including, fish tape, cable, rope, and basket weave wire/cable grips which will not damage cables or raceways. Do not use rope hitches for pulling attachment to wire or cable.
- E. Conceal all cable in finished spaces.
- F. Keep conductor splices to minimum.

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SECTION 16120
WIRES AND CABLES

- G. Install splice and tap connectors which possess equivalent or better mechanical strength and insulation rating than conductors being spliced.
- H. Use splice and tap connectors which are compatible with conductor material.
- I. Provide adequate length of conductors within electrical enclosures and train the conductors to terminal points with no excess. Bundle multiple conductors, with conductors larger than no 10 AWG cabled in individual circuits. Make terminations so there is no bare conductor at the terminal.
- J. Tighten electrical connectors and terminals, including screws and bolts, in accordance with manufacturer's published torque tightening values. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL 486A and UL 486B.

3.3 FIELD QUALITY CONTROL

- A. Prior to energizing, check installed wires and cables with megohm meter to determine insulation resistance levels to assure requirements are fulfilled.
- B. Prior to energizing, test wires and cables for electrical continuity and for short-circuits.
- C. Subsequent to wire and cable hook-ups, energize circuits and demonstrate proper functioning. Correct malfunctioning units, and retest to demonstrate compliance.
- D. TABLE 1: Color Coding for Phase Identification:
 - 1. Color code secondary service, feeder, and branch circuit conductors with factory applied color as follows:

<u>208Y/120 Volts</u>	<u>Phase</u>	<u>120/240 Volts</u>
Black	A	Black
Red	B	Red
Blue	C	-
White	Neutral	White
Green	Ground	Green

END OF SECTION 16120

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PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes cabinets, boxes, and fittings for electrical installations and certain types of electrical fittings not covered in other sections. Types of products specified in this Section include:
 - 1. Outlet and device boxes.
 - 2. Pull and junction boxes.
 - 3. Cabinets.
 - 4. Hinged door enclosures.

1.2 DEFINITIONS

- A. Cabinets: An enclosure designed either for surface or for flush mounting and having a frame, or trim in which a door or doors may be mounted.
- B. Device Box: An outlet box designed to house a receptacle device or a wiring box designed to house a switch.
- C. Enclosure: A box, case, cabinet, or housing for electrical wiring or components.
- D. Outlet Box: A wiring enclosure where current is taken from a wiring system to supply utilization equipment.
- E. Wiring Box: An enclosure designed to provide access to wiring systems or for the mounting of indicating devices or of switches for controlling electrical circuits.

1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections:
 - 1. Product data for cabinets and enclosures with classification higher than NEMA 1.
 - 2. Shop drawings for boxes, enclosures and cabinets that are to be shop fabricated, (nonstock items). For shop fabricated junction and pull boxes, show accurately scaled views and spatial relationships to adjacent equipment. Show box types, dimensions, and finishes.

1.4 QUALITY ASSURANCE

- A. UL Listing and Labeling: Items provided under this section shall be listed and labeled by UL.

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CABINETS, BOXES AND FITTINGS

- B. Nationally Recognized Testing Laboratory Listing and Labeling (NRTL): Items provided under this section shall be listed and labeled by a NRTL. The term "NRTL" shall be as defined in OSHA Regulation 1910.7.
- C. National Electrical Code Compliance: Components and installation shall comply with NFPA 70 "National Electrical Code."
- D. NEMA Compliance: Comply with NEMA Standard 250, "Enclosures for Electrical Equipment (1000 Volts Maximum)."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
 - 1. Outlet Boxes:
 - a. American Electric.
 - b. Cooper Industries, Inc.
 - c. Raco, Inc.
 - d. Thomas & Betts Corp.
 - 2. Cabinets:
 - a. Erickson Electrical Equipment Co.
 - b. Spring City Electrical Mfg. Co.
 - c. Square D Co.

2.2 CABINETS, BOXES, AND FITTINGS, GENERAL

- A. Electrical Cabinets, Boxes, and Fittings: Provide units of types, sizes, and classes appropriate for the use and location. Provide all items complete with covers and accessories required for the intended use. Provide gaskets for units in damp or wet locations.

2.3 MATERIALS AND FINISHES

- A. Sheet Steel: Flat-rolled, code-gage, galvanized steel.
- B. Fasteners for General Use: Corrosion resistant screws and hardware including cadmium and zinc plated items.

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CABINETS, BOXES AND FITTINGS

- C. Fasteners for Damp or Wet Locations: Stainless steel screws and hardware.
- D. Cast Metal for Boxes, Enclosures, and Covers; Copper-free aluminum.
- E. Exterior Finish: Gray baked enamel for items exposed in finished locations.
- F. Fittings for Boxes, Cabinets, and Enclosures: Conform to UL 514B. Malleable iron or zinc plated steel for conduit hubs, bushings and box connectors.

2.4 METAL OUTLET, DEVICE, AND SMALL WIRING BOXES

- A. General: Conform to UL 514A, "Metallic Outlet Boxes, Electrical," and UL 514B, "Fittings for Conduit and Outlet Boxes." Boxes shall be of type, shape, size, and depth to suit each location and application.
- B. Steel Boxes: Conform to NEMA OS 1, "Sheet Steel Outlet Boxes, Device Boxes, Covers, and Box Supports." Boxes shall be sheet steel with stamped knockouts, threaded screw holes and accessories suitable for each location including mounting brackets and straps, cable clamps, exterior rings and fixture studs.
- C. Cast-Iron Boxes: Iron alloy, waterproof, with threaded raceway entries and features and accessories suitable for each location, including mounting ears, threaded screw holes for devices and closure plugs.

2.5 PULL AND JUNCTION BOXES

- A. General: Comply with UL 50, "Electrical Cabinets and Boxes", for boxes over 100 cubic inches volume. Boxes shall have screwed or bolted on covers of material same as box and shall be of size and shape to suit application.
- B. Steel Boxes: Sheet steel with welded seams. Where necessary to provide a rigid assembly, construct with internal structural steel bracing.
- C. Hot-Dipped Galvanized Steel Boxes: Sheet steel with welded seams. Where necessary to provide a rigid assembly, construct with internal structural steel bracing. Hot-dip galvanized after fabrication. Cover shall be gasketed.
- D. Stainless-Steel Boxes: Fabricate of stainless steel conforming to Type 302 of ASTM A 167, "Specification for Stainless and Heat Resisting Chromium-Nickel Steel Plate, Sheet, and Strip." Where necessary to provide a rigid assembly, construct with internal structural stainless steel bracing. Cover shall be gasketed.
- E. Cast-Iron Boxes: Molded of cast iron alloy with gasketed cover and integral threaded

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conduit entrances.

2.6 CABINETS

- A. Comply with UL 50, "Electrical Cabinets and Boxes."
- B. Construction: Sheet steel, NEMA 1 class except as otherwise required. Cabinet shall consist of a box and a front consisting of a one piece frame and a hinged door. Arrange door to close against a rabbet placed all around the inside edge of the frame, with a uniformly close fit between door and frame. Provide concealed fasteners, not over 24-inches apart, to hold fronts to cabinet boxes and provide for adjustment. Provide flush or concealed door hinges not over 24-inches apart and not over 6-inches from top and bottom of door. For flush cabinets, make the front approximately 3/4 inch larger than the box all around. For surface mounted cabinets make front same height and width as box.
- C. Doors: Double doors for cabinets wider than 24-inches.
- D. Locks: Combination spring catch and key lock, with all locks for cabinets of the same system keyed alike. Locks may be omitted on signal, power, and lighting cabinets located within wire closets and mechanical-electrical rooms. Locks shall be of a type to permit doors to latch closed without locking.

2.7 STEEL ENCLOSURES WITH HINGED DOORS

- A. Comply with UL 50, "Cabinets and Enclosures" and NEMA ICS 6,
- B. "Enclosures for Industrial Controls and Systems."
- C. Construction: Sheet steel, 16 gage, minimum, with continuous welded seams. NEMA class as required; arranged for surface mounting.
- D. Doors: Hinged directly to cabinet and removable, with approximately 3/4-inch flange around all edges, shaped to cover edge of box. Provide handle operated, key locking latch. Individual door width shall be no greater than 24-inches. Provide multiple doors where required.
- E. Mounting Panel: Provide painted removable internal mounting panel for component installation.
- F. Enclosure: NEMA 12. Where door gasketing is required, provide neoprene gasket attached with oil-resistant adhesive, and held in place with steel retaining strips. For all enclosures of class higher than NEMA 1, use hubbed raceway entrances.

PART 3 EXECUTION

3.1 INSTALLATION, GENERAL

- A. Locations: Install items where required to suit code requirements and installation conditions.
- B. Cap unused knockout holes where blanks have been removed and plug unused conduit hubs.
- C. Support and fasten items securely in accordance with Division 16 Section "Supporting Devices."
- D. Sizes shall be adequate to meet NEC volume requirements.
- E. Remove sharp edges where they may come in contact with wiring or personnel.

3.2 APPLICATIONS

- A. Cabinets: Flush mounted, NEMA enclosure type suitable for installation location.
- B. Hinged Door Enclosures: NEMA Type 12 enclosure.
- C. Hinged Door Enclosures Outdoors: Install drip hood, factory tailored to individual units.
- D. Outlet Boxes and Fittings: Install outlet and device boxes and associated covers and fittings of materials and NEMA types suitable for each location and in conformance with the following requirements:
 - 1. Interior Dry Locations: NEMA Type 1, sheet steel or as permitted by local code.
 - 2. Locations Exposed to Weather, Dampness, or Wet Locations: NEMA Type 3R or 4 enclosures.
 - 3. Exterior locations: NEMA Type 3R.
- E. Pull and Junction Boxes: Install pull and junction boxes of materials and NEMA types suitable for each location, unless otherwise noted.
 - 1. Exterior locations provide NEMA Type 3R.

3.3 INSTALLATION OF OUTLET BOXES

- A. Outlets at Windows and Doors: Locate close to window trim.
- B. Column and Pilaster Locations: Locate outlet boxes for switches and receptacles on

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columns or pilasters so the centers of the columns are clear for future installation of partitions.

- C. Locations in Special Finish Materials: For outlet boxes for receptacles and switches mounted in desks or furniture cabinets or in glazed tile, concrete block, marble, brick, stone or wood walls, use rectangular shaped boxes with square corners and straight sides. Install such boxes without plaster rings. Saw cut all recesses for outlet boxes in exposed masonry walls.
- D. Gasketed Boxes: At the following locations use cast metal, threaded hub type boxes with gasketed weatherproof covers:
 - 1. Exterior locations.
 - 2. Where surface mounted on unfinished walls, columns or pilasters. (Cover gaskets may be omitted in dry locations).
 - 3. Where exposed to moisture laden atmosphere.
- E. Cast-Iron Boxes: Iron alloy, waterproof, with threaded raceway entries and features and accessories suitable for each location, including mounting ears, threaded screw holes for devices and closure plugs.
- F. Mounting: Mount outlet boxes for switches with the long axis vertical or as indicated. Mount boxes for receptacles either vertically or horizontally but consistently either way. Three or more gang boxes shall be mounted with the long axis horizontal. Locate box covers or device plates so they will not span different types of building finishes either vertically or horizontally. Locate boxes for switches near doors on the side opposite the hinges and close to door trim, even though electrical floor plans may show them on hinge side.
- G. Ceiling Outlets: For fixtures, where wiring is concealed, use outlet boxes 4-inches square by 1-1/2-inches deep, minimum.
- H. Cover Plates for Surface Boxes: Use plates sized to box front without overlap.
- I. Protect outlet boxes to prevent entrance of plaster, and debris. Thoroughly clean foreign material from boxes before conductors are installed.

3.4 INSTALLATION OF PULL AND JUNCTION BOXES

- A. Box Selection: For boxes in main feeder conduit runs, use sizes not smaller than 8-inches square by 4-inches deep. Do not exceed 6 entering and 6 leaving raceways in a single box. Quantities of conductors (including equipment grounding conductors) in pull or junction box shall not exceed the following:

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Size of Largest Conductors in Box	Maximum no. of Conductors in Box
No. 4/0 AWG	30
250 MCM	20
500 MCM	15
Over 500 MCM	10

1. Cable Supports: Install clamps, grids, or devices to which cables may be secured. Arrange cables so they may be readily identified. Support cable at least every 30-inches inside boxes.
2. Mount pull boxes in inaccessible ceilings with the covers flush with the finished ceiling.
3. Size: Provide pull and junction boxes for telephone, signal, and other systems at least 50 percent larger than would be required by Article 314 of NEC. Locate boxes strategically and provide shapes to permit easy pulling of future wires or cables of types normal for such systems.

3.5 INSTALLATION OF CABINETS AND HINGED DOOR ENCLOSURES

- A. Mount with fronts straight and plumb.
- B. Install with tops 78-inches above floor.
- C. Set cabinets in finished spaces flush with walls.

3.6 GROUNDING

- A. Electrically ground metallic cabinets, boxes, and enclosures. Where wiring to item includes a grounding conductor, provide a grounding terminal in the interior of the cabinet, box or enclosure.

3.7 CLEANING AND FINISH REPAIR

- A. Upon completion of installation, inspect components. Remove burrs, dirt, and construction debris and repair damaged finish including chips, scratches, abrasions and weld marks.
- B. Galvanized Finish: Repair damage using a zinc-rich paint recommended by the tray

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manufacturer.

- C. Painted Finish: Repair damage using matching corrosion inhibiting touch-up coating.

END OF SECTION 16135

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Requirements of other specified Division 16 Sections apply to this section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Receptacles
 - 2. Ground Fault Circuit Interrupter Receptacles
 - 3. Snap Switches
 - 4. Wall Plates
- B. Related Sections: The following sections contain requirements that relate to this section:
 - 1. Division 16 Section "Circuit and Motor Disconnects" for devices other than snap switches and plug/receptacle sets used as disconnects for motors.
 - 2. Division 16 Section "Electrical Identification" for requirements for legends to be engraved on wall plates.

1.3 SUBMITTALS

- A. Product data for each type of product specified.
- B. Samples of those products indicated for sample submission in Engineer's comments on product data submittal. Include color and finish samples of device plates and other items per Engineer's request.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with provisions of the following codes.
- B. NFPA 70 "National Electrical Code".
 - 1. UL and NEMA Compliance: Provide wiring devices which are listed and labeled by UL and comply with applicable UL and NEMA standards.

1.5 SEQUENCE AND SCHEDULING

- A. Schedule installation of finish plates after the surface upon which they are installed has

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received final finish.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:
1. General Electric Co.
 2. Hubbell Inc.
 3. Pass and Seymour Inc.
 4. Square D Co.

2.2 WIRING DEVICES

- A. General: Provide wiring devices, in types, characteristics, grades, colors, and electrical ratings for applications indicated which are UL listed and which comply with NEMA WD 1 and other applicable UL and NEMA standards. Provide ivory color devices and wall plates except as otherwise indicated.
- B. Receptacles: As scheduled in Paragraph 3.3 C Table 1: RECEPTACLES. Comply with UL 498 and NEMA WD 1.
- C. Ground-Fault Interrupter (GFI) Receptacles: as indicated in Paragraph 3.3 C Table 1: RECEPTACLES ; provide "feed-thru" type ground-fault circuit interrupter, with integral heavy-duty NEMA 5-20R duplex receptacles arranged to protect connected downstream receptacles on same circuit. Provide unit designed for installation in a 2-3/4 inch deep outlet box without adapter, grounding type, Class A, Group 1, per UL Standard 94.3.
- D. Snap Switches: quiet type AC switches as indicated in Paragraph 3.3 D Table 2: SNAP SWITCHES. Comply with UL 20 and NEMA WD1.

2.3 WIRING DEVICE ACCESSORIES

- A. Wall plates: single and combination, of types, sizes, and with ganging and cutouts as indicated. Provide plates which mate and match with wiring devices to which attached. Provide metal screws for securing plates to devices with screw heads colored to match finish of plates. Provide wall plates with engraved legend where indicated. Conform to requirements of Section "Electrical Identification." Provide plates possessing the following additional construction features:

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1. Material and Finish: 0.04 inch thick, type 302 satin finished stainless steel.

PART 3 - EXECUTION

3.1 INSTALLATION OF WIRING DEVICES AND ACCESSORIES

- A. Install wiring devices and accessories as indicated, in accordance with manufacturer's written instructions, applicable requirements of NEC and in accordance with recognized industry practices to fulfill project requirements.
- B. Coordinate with other Work, including painting, electrical boxes and wiring installations, as necessary to interface installation of wiring devices with other Work.
- C. Install wiring devices only in electrical boxes which are clean; free from building materials, dirt, and debris.
- D. Install wiring devices after wiring work is completed.
- E. Install wall plates after painting work is completed.
- F. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for wiring devices. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Standard 486A. Use properly scaled torque indicating hand tool.

3.2 PROTECTION

- A. Protect installed components from damage. Replace damaged items prior to final acceptance.

3.3 FIELD QUALITY CONTROL

- A. Testing: Prior to energizing circuits, test wiring for electrical continuity, and for short-circuits. Ensure proper polarity of connections is maintained. Subsequent to energizing, test wiring devices and demonstrate compliance with requirements, operating each operable device at least six times.
- B. Test ground fault interruptor operation with both local and remote fault simulations in accordance with manufacturer recommendations.

C. TABLE 1
RECEPTACLES

DESIG- NATION (1)	CURRENT RATING AMPS	VOLTAGE RATING	NEMA SINGLE/ DUPLEX	CONFIG- URATION	UL GRADE	NOTES
-	20	125	DUPLEX	5-20R	HEAVY DUTY	
-	20	125	SINGLE	5-20R	HEAVY DUTY	
GFCI	20	125	DUPLEX	5-20R	HEAVY DUTY	INTEGRAL GFCI
WP GFCI	20	125	DUPLEX	5-20R	HEAVY DUTY	INTEGRAL GFCI WEATHER- PROOF

NOTES

(1) Letter designations are used where symbols alone do not clearly designate on plans locations where specific receptacle types are used.

D. TABLE 2
SNAP SWITCHES

DESIG- NATION (1)	TYPICAL APPLICATION	LOAD RATING	VOLTAGE RATING (AC)	POLES	UL GRADE	NOTES
S	CONTROL LIGHTS	20A	120/277	1	HEAVY DUTY	-
S3	CONTROL LIGHTS	20A	120/277	3-way	HEAVY DUTY	-
STOL	DISCONN. MOTOR	1HP	120/277	1	HEAVY DUTY	(2)
STOL	DISCONN. MOTOR	2HP	208/480	3	HEAVY DUTY	(2)

NOTES

(1) For snap switches, designation is the same as the symbol used on plans for the device. Type of switch is determined from plan context including type of device or circuit

being controlled.

(2) With overload element in switch.

END OF SECTION 16143