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SECTION 01010

SUMMARY OF WORK

PART 1 - GENERAL REQUIREMENTS

1.01 GENERAL

A. The General Documents listed in Index, including the General Conditions, Supplementary General Conditions and General Requirements are hereby made an integral part of this section of the Specifications.

B. Equality of materials or articles other than those named or described in this section will be determined in accordance with the provisions of the Supplementary General Conditions.

C. This subcontractor shall review, in detail, all other sections of the construction specifications affecting the work of this section of the Specifications.

D. It shall be the overall responsibility of the General Contractor (selected for this project) to see that his/her Filed Sub-Bidders, non-Filed Sub-Bidders, specialty contractors and vendors receive the necessary documents and other information with which to undertake and complete this project in a first-class manner.

It shall be the responsibility of all Filed Sub-Bidders to completely familiarize themselves with the contract drawings and all sections of the contract specifications. Each Filed Sub-Bidder will also be responsible for seeing that any sub-sub-bidder(s) required to do work under their section become totally familiar with the requirements of the contract and the importance of planning and the coordinating their particular specialty into the work.

1.02 WORK UNDER THIS CONTRACT

A. The work to be done under this contract, Craigville Beach Bathhouse Renovations – Craigville Beach in Barnstable, Massachusetts includes but is not limited to furnishing all labor, materials, tools, equipment, appliances, transportation and other necessary facilities for the performance and completion of all work as indicated on the drawings and specifications, including but not limited to, the following major work:

1. Selective Demolition of existing partitions, plumbing, electrical and ventilation appurtenances as indicated on the Architectural, Plumbing and Electrical Demolition Drawings. All existing flooring is to remain and care taken to not incur any unnecessary additional damage. Any existing flooring damaged beyond serviceability is to be replaced to match surrounding flooring.

2. Retain and protect all existing surfaces (walls, floors, studs and underside of roof deck) in the Attic "as is".

3. Restoration of all site construction, etc. areas disturbed under this contract.

4. Concrete slabs, foundations, footings, walkways, aprons, and misc. footings and pads.

5. Rough carpentry and framing, plywood and fasteners.

6. Finish carpentry.

7. Waterproofing, dampproofing and caulking.

8. Fiberglass and Wood doors and frames.

9. Hardware.

10. Toilet Partitions & Misc. Accessories.

11. Metal Railings and Misc. Metals

12. Fiberglass Wall Panels.

13. Resinous Flooring.

14. Painting of surfaces, doors and frames, exterior railings, structural steel and metals, epoxy coatings.

15. Plumbing work.

16. Ventilation.

17. Electrical Work.

18. Ramps, Decks & Exterior Shower

B. Reference Drawings: Work shall be performed as shown on drawings listed on the ***"Schedule of Drawings***" found at the beginning of this manual after the Table of Contents.

1.03 WORK UNDER SEPARATE CONTRACTS

A. As provided in Article 6 of the General Conditions, the following items shall be provided by others under a separate agreement with the Owner for which the Owner has responsibility. **Coordination with these vendors or sub-contractors is required of the selected General Contractor**.

1. Installation of four (4) skylights.

2. Removal of existing vinyl siding on south elevation along grid line 'A-A' and installation of new siding at same location.

3. Installation of new cupola.

4. Telephone System, except as specified herein.

1.04 CUTTING & PATCHING OF WORK

A. Except as specifically specified otherwise under other sections of the Specifications, the general contractor shall do all cutting, fitting and patching that may be required to make the several parts of the work fit together properly and shall not endanger any work or any part of it.

1.05 CORING & DRILLING

A. Except as specifically specified otherwise under other sections of the Specifications, each trade subcontractor shall do all his own coring and drilling as may be required to complete his portion of the work. All coring and drilling shall be performed so as not to endanger adjacent work to remain. Coring and drilling will not be considered synonymous with cutting and patching.

B. Conduits and openings shall be laid out in advance to permit their provisions in the work. Sleeves and conduits shall be set in forms before concrete is poured. Any extra work required where sleeves or conduits have been omitted or improperly placed shall be performed at the expense of the trade which made the error or omission.

C. Where conduits pass through footings, beams or slabs, they shall be provided with waterproof seals.

1.06 NUISANCE & HOURS

A. The committing of nuisances on the site, in the building or on adjacent property by any person in the employ of the contractor, his subcontractors or his suppliers is vigorously prohibited and adequate steps shall be taken by the contractor to prevent it.

B. The Contractor shall limit work hours to period between 7:00 AM and 5:00 PM Monday – Friday unless otherwise approved by Owner in writing.

1.07 QUANTITIES

A. Where technical specifications refer to any material, item, assembly, system, component

or the like in singular, such reference shall be taken in the plural where required in more than one location and the correct numbers of items shall be provided by the contractor at each location at no additional cost to the Owner.

1.08 FIELD ENGINEERING

A. Provide field engineering services; establish grades, lines and levels by use of recognized engineering survey practices.

B. Provide control datum and benchmark for survey that is shown on the drawings. Locate and protect control and reference points.

C. The contractor shall employ a registered land surveyor to establish construction lines and for the preparation of all required building department site engineering documents during construction and record drawings at the construction closeout.

1.09 REFERENCE STANDARDS

A. For products specified by association or trade standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. The date of the standard is that in effect as of the bid date, except when a specific date is specified.

C. Obtain copies of standards when required by contract documents. Maintain copy at job site during progress of the specific work.

1.10 PRE-CONSTRUCTION CONFERENCE

A. A pre-construction conference to review the work will be conducted by the Architect.

B. Representatives of the following shall be invited to attend this conference:

Owner

General contractor

All subcontractors

Applicable municipal agencies

1.11 PROJECT MEETINGS

A. Project meetings shall be held every two weeks subject to the discretion of the Architect. Project meetings shall be chaired by the designer. Minutes of project meetings shall be prepared by the Architect or by his designated representative and shall be distributed in a

timely manner to all present.

B. As a prerequisite for monthly payments, payroll record submissions, ordering schedules, shop drawing schedules and coordination meeting schedules shall be prepared and maintained by the general contractor and shall be revised and updated on a monthly basis and a copy shall be submitted to the Architect.

C. In order to expedite construction progress on this project, the general contractor shall order all materials immediately after the approval of shop drawings and shall obtain a fixed date of delivery to the project site for all materials ordered which shall not impede or otherwise interfere with construction progress.

D. Scheduling shall be discussed with all concerned parties, and methods shall be presented by the general contractor which shall reflect construction completion not being deferred, at no additional expense to the Owner.

1.12 PERMITS, INSPECTION & TESTING REQUIRED BY GOVERNING AUTHORITIES

A. If the contract documents, laws, ordinances, rules, regulations or orders of any public authority having jurisdiction require any portion of the work to be inspected, tested or approved, the general contractor shall give the Architect and Owner and such Authority timely notice of its readiness so the designer may observe such inspection and testing.

B. Prior to the start of construction, the general contractor and subcontractors shall complete application to the applicable building code enforcement authority for all building permits; all municipal fees will be waived. Such permit shall be displayed in a conspicuous location at the project site.

C. Permits necessary may include but not be limited to:
- Building Permit
- Roadway Opening Permit
- Electrical Permit
- Plumbing Permit

1.13 EXAMINATION OF SITE & DOCUMENTS

A. The bidders are expected to examine and to be thoroughly familiar with all contract documents and with the conditions under which work will be carried out. The Owner will not be responsible for errors, omissions and/or charges for extra work arising from general contractor's or sub-contractor's failure to familiarize themselves with the contractor documents or existing conditions. By submitting a bid, the bidder agrees and warrants that he has had the opportunity to examine the site and the contract documents, that he is familiar with the conditions and requirements of both and where they require, in any part of the work a given result to be produced, that the contract documents are adequate and that he will produce the required results.

1.14 DELIVERIES

A. The general contractor shall be responsible for receiving all materials and equipment in connection with work under this contract. Unloading, unpacking and distribution to the various portions of the building(s) shall be the responsibility of the general contractor.

1.15 CERTIFIED WELDERS

A. All welding shall be performed only by operators who have been qualified by tests, as prescribed in the "Standard Qualification Procedure" of the American Welding Society, to perform the type of work required.

B. Pipe welds shall be made only by operators who have been qualified by the National Certified Pipe Welding Bureau and the operator's qualification record shall be submitted to the designer before any work is performed.

C. Shop welding shall be in accordance with the "Code for Welding in Building Construction".

1.16 SAFETY REGULATIONS

A. This project is subject to compliance with Public Law 91-596 "Occupational Safety and Health Act of 1970" (OSHA), with respect to all rules and regulations pertaining to construction, including volume 36, Nos. 75 and 105, of the Federal Register, as amended, and as published by the US Dept. of Labor.

1.17 REFERENCES

A. Where references are made in the contract documents to publications and standards issued by associations or societies, the intent shall be understood to specify the current edition of such publication or standards (including tentative revisions) in effect of the date of the contract advertisement notwithstanding any reference to a particular date.

1.18 MASSACHUSETTS SALES & USE TAX

A. The exemption number assigned to the Owner as an exempt purchase under the Sales Act, Chapter 14 of the Acts of 1966, to the extent that materials and supplies are used or incorporated in the performance of the contract for the Commonwealth is as stipulated in the general conditions.

1.19 PROGRESS SCHEDULE

A. The general contractor shall prepare and submit to the designer, for the information of the Owner and the designer, estimated construction progress schedules for the work, with sub-schedules of related activities which are essential to its progress.

B. Prepare progress schedule in form of horizontal bar chart.

1. Provide separate horizontal bar column for each trade or operation, in chronological order of beginning of each item of work.

2. Identify each column by major specification section number and distinct graphic delineation.

3. Identify horizontal time scale by first work day of each week.

4. Identify monetary value of work by indicating estimated monthly percent, actual monthly value, estimated total value and actual total value. Superimpose progress/value of work curve on bar chart.

C. Updating schedule:

1. Indicate all changes occurring since previous submission of updated schedule.

2. Indicate progress of each activity, show completion dates.

3. Include major changes in scope, activities modified since previous updating, revised projections due to changes and other identifiable changes.

D. Submit initial schedule within 21 days after date of notice to proceed. Submit updated schedule to coincide with payment requisition on monthly basis, accurately depicting progress to first day of each month. Submit schedule to Owner and Architect.

1.20 MASSACHUSETTS RIGHT TO KNOW LAW

A. The general contractor is responsible to comply with the provisions of Chapter III F of the Massachusetts General Laws; added by Chapter 470 of the Acts of 1983 (Right to Know Law).

1.21 DIG SAFE

A. Within the Commonwealth, "Dig-Safe" is the name of the Utility Underground Plant Damage Prevention Authority. They are located at 111 South Bedford Road, Burlington, MA 01803. The phone number is 1-800-344-7233.

B. Contractors must notify "Dig-Safe" of contemplated excavation, demolition, or explosive work in public or private ways, and any utility company right of way or easement.

C. This notification must be made at least 72 hours prior to the work but not more than 60 days before the contemplated work. Such notice shall set forth the name of the street or the route number of said way and an accurate description of the location and nature of the proposed work.

D. The Owner requires that the notification be sent to "Dig-Safe" by certified mail, with copies to the Owner. The Owner requires a copy of the signed receipt of delivery.

E. "Dig-Safe" is required to respond to the notice within 72 hours from the time said notice is received by designating at the locus the location of pipes, mains, wires or conduits.

F. Contractors shall not commence work until "Dig-Safe" has responded as noted above. The work shall then be performed in such a manner, and with reasonable precautions taken to avoid damage to utilities under the surface in said areas of work.

G. Prior to the "Dig-Safe" notification, the Owner requires contractors to provide their superintendent with current "Dig-Safe" regulations, and a copy of Massachusetts General Laws Chapter 80, Section 40.

1.22 STAKING

A. The general contractor shall be responsible for staking the work limit areas, building location lines, paving lines, etc.

1.23 DEBRIS

A. Debris shall not be permitted to accumulate and work shall, at all times, be kept clean and acceptable.

B. Remove debris from the site of work and dispose of at any private or public dump which the general contractor may choose provided that the general contractor shall make arrangements and obtain approvals necessary from the owner or officials in charge of the dump and shall pay costs and fees resulting from legal disposal of debris.

1.24 GLASS

A. All broken or defective glass not required to be replaced under the provisions of the appropriate Sections, shall be replaced at the expense of the general contractor.

B. All glass surfaces installed by the contractor and that adjacent thereto shall be thoroughly cleaned and washed by qualified window cleaners at the expense of the general contractor just prior to acceptance of the work.

1.25 BARRIERS

A. The general contractor shall provide protection for existing including but not limited to, trees, shrubs, grass, planted areas, paving, walkways, and utilities. Damage resulting from actions of the general contractor shall be paid for by the general contractor.

B. Contractor shall provide the Owner with the name, address and home telephone number of at least 2 tradesman (one to be the superintendent) either of whom can be called on in

an emergency basis nights and other times when the contractor is not working on the job to take care of emergencies. Such emergency work, if required, will be done at NO additional cost to the Owner. If, for any reason the contractor's representative cannot be reached within 2 hours, temporary repairs will be made by others at the contractor's expense.

1.26 SUPERVISION OF WORK

A. The Contractor shall be held directly responsible for the correct installation of all work performed under this Contract. He must make good repair, without expense to the Owner, of any part of the work which may become inoperative on account of leaving the work unprotected during the construction of the system or which may break or give out in any manner by reason of poor workmanship, defective materials, or lack of space to allow for expansion or contraction of the work during a period of one year from date of final acceptance of the work by the Owner.

B. The Contractor shall employ a competent Massachusetts licensed superintendent satisfactory to the Owner and to the Architect, who shall supervise all work under this Contract, and who shall remain available at the site throughout the Contract period while work is in progress.

1.27 TIME OF COMPLETION

A. In accordance with Article 9 of the General Conditions, all work shall be commenced at the time stated in the applicable Notices to Proceed and shall be substantially complete and have an issued Certificate of Occupancy by May 27, 2016.

1.28 PROTECTION OF PERSONS & PROPERTY

A. The general contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the work.

B. The general contractor shall take all reasonable precautions for the safety of persons, and shall provide all reasonable protection to prevent damage, injury or loss to:

1. All employees on site and all other persons who may be affected thereby.

2. All the work and materials and equipment to be incorporated therein, whether in storage on or off the site, under the care, custody or control of the contractor or any of his subcontractors or sub-subcontractors.

3. Any other property at the site or adjacent thereto, including but not limited to, equipment, existing construction to remain, trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation or replacement in the course of the work. Restore to original condition

or replace any property on and/or off the site which may be damaged or destroyed in the execution of the work.

C. The general and subcontractors shall comply with (and the general contractor shall give all notices regarding) all applicable laws, ordinances, rules, regulations and lawful orders of any public authority bearing on the safety of persons or property or their protection from damage, injury or loss.

D. The general contractor shall erect and maintain, as required by existing conditions and progress of the work, all reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent utilities.

E. The general contractor shall promptly remedy all damage or loss to any property caused in whole or in part by the general contractor, any subcontractor or anyone directly or indirectly employed by any of them, or by anyone for whose acts of any of them may be liable, and for which the general contractor is responsible, except damage or loss attributable to the acts or omissions of the Owner or the Architect or anyone directly or indirectly employed by either of them or by anyone for whose acts either of them may be liable.

F. The general contractor shall designate a responsible member of his organization at the site, whose duty shall be the prevention of accidents. This person shall be the general contractor's superintendent unless otherwise designated by the general contractor in writing to the Owner and Architect.

G. The general contractor shall not load or permit any part of the work to be loaded so as to endanger its safety.

H. In any emergency affecting the safety of persons or property, the general contractor shall act, at his discretion, to prevent threatened damage, injury or loss. Any additional compensation or extension of time claimed by the general contractor on account of emergency work shall be determined as provided in the General Conditions for changes in contract and methods of preparation of changes.

I. Water Protection: Always protect excavation, trenches and buildings from damage from rain water, spring water, ground water, backing-up of drains or sewers, and other waters. Provide pumps, equipment and enclosures as required to provide this protection. Construct and maintain temporary drainage; do pumping necessary to keep excavations water free.

J. Remove snow and ice as necessary for safety and proper execution of work. Remove same when work is completed.

K. Provide constant protection against the weather as required to maintain work, materials,

apparatus, fixtures, free from injury or damage. If low temperatures make it impossible to continue operations, cease work and notify Architect.

L. General contractor is responsible for protection and security of all materials. The Owner is not responsible for lost or stolen articles and materials.

1.29 COORDINATION OF THE WORK

A. The contractor shall supervise and direct the work, using his best skill and attention. He shall be solely responsible for all construction means, methods, techniques, sequences and procedures and for coordinating all portions of the work under the contract.

B. The contractor shall be responsible for the proper fitting of all work and the coordination of the operations of all trades, subcontractors or material men engaged upon the work. He shall be prepared to guarantee each of his subcontractors all dimensions which they may require for the fitting of their work to all surrounding work.

C. The contractor shall layout his own work, and he shall be responsible for all lines, elevations and measurements of the building, grading, paving, and other work executed by him under the contract. He must exercise proper precaution to verify the materials shown on the drawings before laying out the work and will be held responsible for any error resulting from his failure to exercise such precaution.

END OF SECTION

SECTION 01030

ALTERNATES

1.01 SCOPE

A. This Section lists the Alternates which appear in the Contract Documents. Consult the individual sections for detailed requirements of each Alternate.

B. Bid prices of each Alternate shall include overhead, profit, and all other expenses due to incidental work by other trades, under each Alternate.

C. The contractor and subcontractors shall be responsible for examining the scope of each Alternate generally defined herein and for recognizing modifications to the work caused by the Alternates and including the cost thereof in the bid price.

D. The GC shall be responsible for the following;
   1. Notify each affected subcontractor immediately once an Alternate is accepted by the Owner
   2. Coordinate alternate work with related work and adjust adjacent work as required.

ALTERNATES SCHEDULE

Deduct Alternate No. 1: Contractor shall provide a cost for 1" painted steel partitions and screens in lieu of solid plastic (HDPE) toilet partitions and urinal screens. Partitions shall be floor mounted and overhead braced. Urinal screens shall be wall mounted. Partitions, doors and pilasters shall be 20 ga. galvanized steel with honeycomb core, powder coated finish. Mounting brackets and door hardware shall be chrome plated and attached with tamper proof torx fasteners.

Deduct Alternate No. 2: Delete removal of plumbing fixtures and toilet partitions in existing Men's and Women's Restrooms from base bid. Removal of fixtures and partitions required for installation of new door 01, door 02 and installation of new electrical panel shall be by others.

END OF SECTION

SECTION 01300

SUBMITTALS

1.01 GENERAL

A. The General Documents listed in Index, including the General Conditions, Supplementary General Conditions and General Requirements are hereby made an integral part of this section of the Specifications.

B. Equality of materials or articles other than those named or described in this section will be determined in accordance with the provisions of the Supplementary General Conditions.

C. This subcontractor shall review, in detail, all other sections of the construction specifications affecting the work of this section of the Specifications.

D. It shall be the overall responsibility of the General Contractor (selected for this project) to see that his/her Filed Sub-Bidders, non-Filed Sub-Bidders, specialty contractors and vendors receive the necessary documents and other information with which to undertake and complete this project in a first-class manner.

It shall be the responsibility of all Filed Sub-Bidders to completely familiarize themselves with the contract drawings and all sections of the contract specifications. Each Filed Sub-Bidder will also be responsible for seeing that any sub-sub-bidder(s) required to do work under their section become totally familiar with the requirements of the contract and the importance of planning and the coordinating their particular specialty into the work.

1.02 SCHEDULE OF VALUES

A. Prior to the first request for payment, the General Contractor shall submit to the Architect and the Owner, a Schedule of Values of the various portions of the work including quantities, aggregating the total contract sum, and divided so as to facilitate payments for work under each section. The schedule shall be broken down in phases of project construction. The schedule shall be prepared in such form as specified or as the Architect or the Owner may approve, and it shall include data to substantiate its accuracy. Each item of the schedule of values shall include its proper share of overhead and profit. This schedule requires the approval of the Architect and Owner and shall be used only as a basis for the contractor's requests for payment.

1.03 SHOP DRAWINGS, SAMPLES & PRODUCT DATA

A. In addition to, and not in lieu of, the requirements specified in the General Conditions, the contractor shall submit shop drawings, samples, printed data, brochures and catalog cuts in accordance with the following requirements.

B. Submission of shop drawings:

1. The general contractor shall submit to the Architect one legible reproducible (sepia) transparency and four black line prints of each shop drawing with sufficient blank space next to the title block for the contractor's and the Architect's approval stamps. The transparency and the prints shall be mailed or delivered to the Architect in roll form.

2. The Architect will make corrections, if any are required directly on the reproducible transparency and return the transparency to the contractor. The contractor shall incorporate the Architect's correction onto the original drawings and resubmit a new reproducible transparency and two prints thereof to the Architect for his approval. This procedure shall be repeated until all the corrections are made to the satisfaction of the Architect.

3. When the transparency is returned by the Architect with the stamp "REVIEWED" or "FURNISH AS CORRECTED", the contractor shall provide and distribute such number of prints as required for his own and his subcontractor's use and deliver four prints to the Architect. The costs of printing and incidental expenses shall be included in the contract sum. The Architect will deliver two prints of each approved shop drawing to the Owner.

C. Submission of Printed Data:

1. The contractor shall submit to the Architect, 6 copies of manufacturer's printed data, descriptive literature, catalogues, brochures, performance and test data and all other information which requires approval and which cannot be submitted in sepia transparency form. All such information shall be specific and identification of material or equipment submitted shall be clearly make in ink. Data of general nature will not be accepted.

2. Printed data shall state the project name, specification section and article number that applies to the submitted item.

3. The contractor shall resubmit 6 copies of such material until approved and, after approval, provide and distribute such number of copies as is required for his own and his subcontractor's use. The Architect will retain 4 copies of approved material and deliver 2 copies to the Owner.

D. Supplemental Requirements:

1. Only shop drawings and printed data received from the contractor and bearing his stamp of approval will be considered for approval by the Architect. All shop drawings and printed data prepared by subcontractors shall be processed through the contractor as stipulated above.

2. The shop drawings shall be complete, shall give all information necessary or requested in the individual sections of the Specifications and shall also show adjoining work and details of connection thereto.

3. Where adjoining work required shop drawings, the Architect reserves the right to require the contractor to prepare and submit composite shop drawings showing work under all affected trades. If any work is installed before being coordinated with the work of other trades so as to cause interference with the work of other trades, all necessary corrections shall be made as directed by the Architect at no cost to the Owner.

4. It shall be the responsibility of the contractor to submit the shop drawings on a schedule that allows reasonable time for checking, resubmission, rechecking, approval and subsequent fabrication and delivery.

5. The Architect reserves the right to review and approve shop drawings and printed data in a proper sequence reflecting the logical sequence and relative priority of the construction components so as to ensure preparation of a properly coordinated set of shop drawings. The Architect further reserves the right to review and approved shop drawings only after approval of any related samples.

E. Submission of samples:

1. Samples which can be conveniently mailed shall be sent directly to the Architect accompanied by transmittal notice stating name of project, specification article to which the sample refers and description of item being submitted.

2. All other samples shall be delivered to the field office of the project representative with sample identification tag attached and properly filled in. Transmittal notice of samples shall be given to the Architect by the contractor.

3. Three specimens of each sample requested shall be submitted, unless otherwise specified in the individual sections of the Specifications.

4. All charges in connection with delivery of samples as specified above shall be paid by the contractor.

5. Samples shall be of adequate size to permit proper evaluation of material. Where variations in color or other characteristics are to be expected, submit samples showing the maximum range of variation. Materials exceeding the range of variation of the approved samples will not be approved on the work.

6. Samples of items of interior finishes shall be submitted all at one time to permit a coordinated selection of colors and finishes.

7. It shall be the responsibility of the contractor to submit the samples on a schedule that allows reasonable time for checking, resubmission, rechecking, approval and subsequent fabrication and delivery.

8. Samples of concrete, masonry or other items of work manufactured or constructed at the site shall be located at a place designated by the Architect so that they may be left in place after approval, until removal is approved by the Architect.

9. All samples shall be removed by the contractor upon direction from the Owner or the Architect.

END OF SECTION

SECTION 01400

QUALITY CONTROL

PART 1 - GENERAL REQUIREMENTS

1.01 GENERAL

A. The General Documents listed in Index, including the General Conditions, Supplementary General Conditions and General Requirements are hereby made an integral part of this section of the Specifications.

B. Equality of materials or articles other than those named or described in this section will be determined in accordance with the provisions of the Supplementary General Conditions.

C. This subcontractor shall review, in detail, all other sections of the construction specifications affecting the work of this section of the Specifications.

D. It shall be the overall responsibility of the General Contractor (selected for this project) to see that his/her Filed Sub-Bidders, non-Filed Sub-Bidders, specialty contractors and vendors receive the necessary documents and other information with which to undertake and complete this project in a first-class manner.

It shall be the responsibility of all Filed Sub-Bidders to completely familiarize themselves with the contract drawings and all sections of the contract specifications. Each Filed Sub-Bidder will also be responsible for seeing that any sub-sub-bidder(s) required to do work under their section become totally familiar with the requirements of the contract and the importance of planning and the coordinating their particular specialty into the work.

1.02 GENERAL

A. The Owner and Architect and their representatives shall at all times have access to the work wherever it is in preparation or progress and the Contractor shall provide proper facilities and such information, assistance and personnel as reasonably required for such access and any inspection, measurement or testing the Architect may wish to perform.

B. Inspection by the Architect, Owner, independent testing services or other authorities, or their failure to inspect, shall not relieve the Contractor of any responsibilities under the Contract.

C. The Owner will employ and pay for an independent testing laboratory to carry out tests and inspections for:

1. Cast-in-place concrete

2. Soils compaction

3. Structural steel

4. Additional testing and inspection as may later be required by the Owner or public authorities

1.03 CONTRACTOR'S RESPONSIBILITY TO TESTING LABORATORIES

A. Coordinate with laboratory personnel. Provide access to work.

B. Provide to laboratory, preliminary representative samples of materials to be tested, in required quantities.

C. Furnish casual labor and facilities:

1. To provide access to work to be tested.

2. To obtain and handle samples at site.

3. To facilitate inspections and tests.

4. For laboratory's exclusive use for storage and curing of test samples.

1.04 TESTS

A. If the contract documents or the law, ordinances, rules, regulations or orders of any public authority having jurisdiction require any work to be inspected, tested or approved, the Contractor shall give the Architect timely notice of its readiness and the date arranged so that Architect may observe such inspection, testing or approval.

B. If, after the commencement of the work, the Architect determines that any work requires special inspection, testing or approval which subparagraph A does not include, he will, upon written authorization form the Owner, instruct the Contractor to order such special inspection, testing or approval and the Contractor shall given notice as in paragraph A. If such special inspection or testing reveals a failure of the work to comply (1) with the requirements of the Contract Documents or (2) with respect to the performance of the work with laws, ordinances, rules, regulations or orders of any public authority having jurisdiction, the Contractor shall bear all costs thereof, otherwise the Owner shall bear

such costs and an appropriate change order shall be issued.

C. Required certificates of inspection, testing or approval shall be secured by the Contractor and promptly delivered by him to the Architect.

D. Neither the observation of the Architect in his administration of the Construction Contract, nor the inspections, tests or approvals by persons other than the Contractor shall relieve the Contractor from his obligations to perform the work in accordance with the Contract Documents.

1.05 CERTIFIED WELDERS

A. Structural welds shall be made only by operators who have been qualified by tests, as prescribed in the "Standard Qualification Procedure" of the American Welders Society, to perform the type of work required.

B. Pipe welds shall be made only by operators who have been qualified by the National Certified Pipe Welding Bureau and each operator's qualification record shall be submitted to the Designer before all work is performed.

C. Shop welding shall be in accordance with the "Code for Welding in Building Construction".

END OF SECTION

SECTION 01500

CONSTRUCTION FACILITIES & TEMPORARY CONTROLS

PART 1 - GENERAL

1.01 GENERAL

A. The General Documents listed in Index, including the General Conditions, Supplementary General Conditions and General Requirements are hereby made an integral part of this section of the Specifications.

B. Equality of materials or articles other than those named or described in this section will be determined in accordance with the provisions of the Supplementary General Conditions.

C. This subcontractor shall review, in detail, all other sections of the construction specifications affecting the work of this section of the Specifications.

D. It shall be the overall responsibility of the General Contractor (selected for this project) to see that his/her Filed Sub-Bidders, non-Filed Sub-Bidders, specialty contractors and vendors receive the necessary documents and other information with which to undertake and complete this project in a first-class manner.

It shall be the responsibility of all Filed Sub-Bidders to completely familiarize themselves with the contract drawings and all sections of the contract specifications. Each Filed Sub-Bidder will also be responsible for seeing that any sub-sub-bidder(s) required to do work under their section become totally familiar with the requirements of the contract and the importance of planning and the coordinating their particular specialty into the work.

1.02 TEMPORARY OFFICES

A. The General Contractor shall provide and maintain temporary field offices.

1. Contractor shall provide temporary lockable field office for the Superintendent and Owner's Representative or Clerk-of-the-Works.
2. Provide conference space for a table to accommodate 6-8 persons.
3. Contractor shall provide electrical and telephone utilities:
   a. Telephone for Contractor
   b. Telephone for Owner's Rep./Clerk
   c. Fax machine may be shared
   d. Contractor and Owner to provide other electronic equipment independently (such computers, printers, cameras etc…)

1.03 TEMPORARY TOILETS

A. The contractor shall provide toilet booths with chemical-type toilets, as necessary for all persons engaged on the work at the site.

B. The toilets shall be erected in a location approved by the Owner and shall be maintained by the contractor in a clean and orderly condition in compliance with all local and state health requirements, and shall remove same when written direction for their removal is received from the Architect.

C. When the permanent sanitary system is in operating condition, the contractor may use portions of the system as approved by the Architect, provided that the contractor (1) assumes full responsibility for the used portions of the sanitary system, and (2) pays all costs for operation, maintenance, cleaning and restoration of the used portions.

1.04 TEMPORARY WATER

A. Water shall be distributed via connections to the permanent service lines that are to be installed at the expense of the Plumbing Subcontractor.

B. Any temporary pipe lines and connections from the permanent service lines either outside or within the building, necessary for the use of the General Contractor and his Subcontractors, shall be installed, protected and maintained at the expense of the General Contractor.

C. Use of the water may be discontinued by the Owner if, in the opinion of the Owner, it is wastefully used.

D. The General Contractor shall provide an adequate supply of drinking water from approved sources of acceptable quality, satisfactorily cooled, for his employees and those of his Subcontractors.

1.05 TEMPORARY STAIRS, RAMPS & CHUTES

A. The contractor shall furnish, install, maintain all temporary ramps, stairs, ladders and chutes, as required for the use of all trades for the proper execution of their work and shall bear all costs therefrom.

B. No materials, rubbish or debris will be allowed to drop free, or to be thrown from openings in the exterior walls of the building(s).

1.06 TEMPORARY PROTECTION

A. The contractor shall perform the following work:

1. Protect concrete surfaces from adverse weather or cold / heat variations which are to receive work of other trades from any soiling which will prevent proper adhesion of subsequent work. Leave surfaces broom clean and free of all blemishes at the time other trades begin application of their work.

2. Protect all exposed concrete surfaces and finished floors against mechanical damage, oil, grease, paint or other materials which will stain the floor finish. Install and maintain protective coverings on finished floors in areas where other work will be done.

B. After the installation of work by a subcontractor is properly completed, the contractor shall be responsible for its protection and repairing, replacing or cleaning any such work which has been damaged by other trades or by any other cause, so that all work is in perfect condition at the time of acceptance of the building.

1.07 TEMPORARY WORK IN PUBLIC WAYS

A. Prior to commencing any work in public ways, and other areas which are used by the public, the contractor shall submit in writing to the Architect and the owner the proposed methods of protection. Work shall not be commenced in these areas until written approval of protective measures has been received from the Architect and the Owner.

B. The contractor will be required to furnish, install and maintain in good condition, at no additional cost to the Owner, all safety measures which are required to protect the public, 24 hours/day, from accident due to work performed under this contract. Contractor to provide public safety officer, as required for traffic control or construction operations.

1.08 WEATHER PROTECTION

A. It is the intent of these specifications to require the general contractor to provide temporary enclosures and heat to permit construction work to be carried on during the months of November through March in compliance with the Massachusetts General Laws Chapter 149, Section 44G. These specifications are not to be construed as requiring enclosures or heat for operations that are economically unfeasible to protect in the judgement of the Architect. Included in this unfeasible category, without limitation, are items such as site work, excavation, pile driving, steel erection, erection of certain exterior wall panels, roofing and similar operations.

B. "Weather Protection" shall mean the temporary protection of that work adversely affected by moisture, wind and cold by covering, enclosing and/or heating. This protection shall provide adequate working areas during the months of November through March as

determined by the Architect and consistent with the approved construction schedule to permit the continuous progress of all work necessary to maintain an orderly and efficient sequence of construction operations. The general contractor shall furnish and install all "weather protection" material and be responsible for all costs, including heating required to maintain a minimum temperature of 40 degrees Fahrenheit at the working surface. This provision does not supersede any specific requirements for methods of construction, curing of materials or the applicable general conditions set forth in the contract articles with added regard to performance obligations of the contractor.

C. Within 30 calendar days after his award of contract, the general contractor shall submit in writing to the Architect for approval, 3 copies of his proposed methods for "weather protection".

D. Installation of weather protection and heating devices shall comply with all safety regulations including provisions for adequate ventilation and fire protection devices. Heating devices which may cause damage to finish surfaces shall not be used.

E. The general contractor shall furnish and install one accurate Fahrenheit thermometer at each work area as designated by the Architect. However, one additional accurate Fahrenheit thermometer shall be provided for every 2,000 SF of floor space where the work area exceeds 2,000 SF.

F. Wind Protection: Should high wind warnings be issued by the U.S. Weather Bureau, the contractor shall take every precaution to minimize danger to persons to the work, and to the adjacent property.

1.09 TEMPORARY HEAT

A. Within 30 calendar days after the commencement of work under this contract, the general contractor shall submit in writing to the Architect for approval, 3 copies of his method and time schedule for heating during construction. The schedule shall concur with his general progress schedule heretofore submitted as required.

B. After the building or portion thereof is completely enclosed by either permanent construction or substantial temporary materials having a comparable resistance as the specified permanent construction, the general contractor shall pay for and provide heat therein of not less than 55 degrees Fahrenheit nor more than 75 degrees Fahrenheit which shall be continuously maintained in the enclosed area until the project is accepted.

C. The general contractor shall furnish and install one accurate recording Fahrenheit thermometer at a place designated by the Architect, and one additional accurate thermometer for every 2,000 SF of floor space, located as directed by the Architect in order to determine if the specified temperatures are being maintained. The general contractor or his authorized agent shall furnish daily to the resident engineer, 3 copies of

a signed statement of temperatures recorded 3 times a day.

D. The general contractor may (with the approval of the Architect and the Owner), elect to use the permanent heating system as specified for the project once it has been tested, flushed out and chemically treated, and is ready to operate. The general contractor shall pay all energy costs for heating during construction and provide meters if required. The general contractor and the heating and/or electrical subcontractor shall coordinate their work so that the permanent heating system for the building will be available and ready to provide heat as soon as the building is closed in. In case the contract includes more than one building, heating shall be provided for each building in accordance with the above provisions.

E. Operating labor shall be provided for continuous direct attendance, including frequent inspection of the system, emergency repairs, and keeping of temperature records. Continuous direct attendance shall mean 24 hours each day, 7 days per week, Saturdays, Sundays and holidays included, throughout the progress of the work, unless otherwise permitted by the Architect and the Owner and so certified in writing.

F. It shall be the sole responsibility of the general contractor to arrange for and pay the heating and/or electrical subcontractor to operate and to put in first-class condition all portions of the permanent heating system used for heating during construction. The Owner will require the discharge of inexperienced or unsatisfactory operating labor.

G. The installation and operation of heating devices used herein shall comply with all safety regulations including provisions for adequate ventilation and fire protection. Heating devices which may cause damage to finish surfaces shall not be used.

1.10 TEMPORARY LIGHT & POWER

A. The Electrical Subcontractor is required under Section 16600, Electrical, to provide temporary feeders of sufficient capacity from the local utility company. Eversource's power lines, at the point designated on the drawings, will provide for the electric light and power requirements of the building while under construction and until the permanent feeders have been installed and put in operation. It is not the intent of the above statement to relieve the General Contractor of the responsibility of payment for energy consumed during construction, but rather to afford him use of permanent electrical distribution feeders during construction. Payment for energy consumed during construction shall be the responsibility of the General Contractor until either Use and Occupancy or Final Acceptance has occurred.

B. The General Contractor shall pay for the cost of electric energy consumed by himself and by all of his subcontractors. Any temporary wiring of a special nature, other than that specified in Section 16600, Electrical, shall be paid for by the Subcontractor requiring it, such as:

1. Special circuits required by electric welders, elevators, lifts or other special equipment requiring high-amperage and/or special voltage service, etc.

2. Exterior lighting circuits for protection against vandalism, public warning lights and lights for advertising, etc.

C. The General Contractor and Subcontractors, individually, shall furnish all extension cords, sockets, motors, and accessories required for their work.

D. All temporary wiring installed by the Electrical Subcontractor shall be removed after it has served its purpose. Use copper wire only.

1.11 STAGING

A. All staging, exterior and interior, required to be over 8' in height, shall be furnished and erected by the general contractor and maintained in safe condition by him without charge to and for use of all trades as needed by them for proper execution of their work, except where specified to the contrary in any filed sub-bid section of the Specifications.

1.12 HOISTING EQUIPMENT & MACHINERY

A. All hoisting equipment and machinery required for the proper and expeditious prosecution of the work shall be provided, installed, operated and maintained in safe condition by the general contractor for the use of all subcontractors. All costs for hoisting operations shall be borne by the general contractor unless specifically excluded in the contract documents.

1.13 DUST CONTROL

A. It is the intent of these Specifications to require the general contractor to provide an adequate means for the purpose of preventing dust caused by construction operations for the period of the construction contract.

B. This provision does not supersede any specific requirements for methods of construction or applicable general conditions set forth in the contract articles with added regard to performance obligations of the contractor.

1.14 NOISE CONTROL

A. Develop and maintain a noise-abatement program, enforce strict discipline over all personnel to keep noise to a minimum.

B. Execute construction work by methods and equipment which will reduce excess noise.

1. Employ construction methods and equipment which will produce the minimum amount of noise.

2. Equip air compressors with silencers, and power equipment with mufflers.

3. Handle vehicular traffic and scheduling to reduce noise.

1.15 PEST CONTROL

A. Provide control / abatement of potential or harmful plant growth, bacterial fungi or insects.

1. Pesticide applicators must be licensed (certified) by the Commonwealth of Massachusetts.

2. Employ methods and use materials which will not adversely affect conditions at the site or on adjoining properties.

3. Should the use of pesticides be considered necessary, submit an informational copy of the proposed program to the Owner with a copy to Architect. Clearly indicate:

a. The nuisance(s) to be controlled.

b. The area or areas to be treated.

c. The pesticides to be used, with copy of manufacturer's printed instructions.

d. The pollution prevention measures to be employed.

B. The use of any pesticide shall be done in full accordance with the manufacturer's printed instructions and recommendations.

1.16 POLLUTION CONTROL

A. Provide methods, means and facilities required to prevent contamination of soil, water or atmosphere by the discharge of noxious substances from construction operations.

B. Provide equipment and personal, perform emergency measures required to contain any spillage, and to remove contaminated soils or liquid:

1. Excavate and dispose of any contaminated earth off-site, and replace with suitable compacted fill and topsoil.

C. Take special measures to prevent harmful substances from entering public waters.

1. Prevent disposal of waters, effluents, chemicals, or other such substances adjacent to streams, or in sanitary or storm sewers.

D. Provide systems for control of atmospheric pollutants.

1. Prevent toxic concentrations of chemicals.
2. Prevent harmful dispersal of pollutants into the atmosphere.

1.17 ROOF PROTECTION

A. During the construction period and after the installation of the roofing system as specified under roofing and flashing, the general contractor shall take strict precautions against unnecessary traffic on the roof surface.

B. After the satisfactory completion of roofing and flashing work, the general contractor shall be responsible for damages to the roof caused by work or materials of the other trades.

C. The general contractor shall not store materials on the roof exceeding the design roof load of 30 pounds per square foot.

1.18 PROJECT SIGN (see attached)

A. The contractor shall provide, where directed by the Architect, a project sign at:

1. 997 Craigville Beach Road, Barnstable, MA
2. Design of sign to be determined upon consultation with the Architect and Town of Barnstable.

B. Sign shall be plywood, MDO/EXTAPA, 4'x6’-6”, supported on 2 - 4" x 4" P.T. posts, with adequate bracing. Paint all surfaces of sign with 2 coats of exterior paint and provide lettering of size, type and layout as illustrated by the Architect.

C. No other signs or advertisements will be allowed to be displayed without the approval of the Architect and Owner.

D. The contractor shall obtain approval of local authorities for erection of signs.

1.19 TEMPORARY CONSTRUCTION FENCE

A. The contractor shall be responsible for providing and maintaining temporary fencing or barricades around the construction as may be necessary to assure the safety of all

persons, authorized or unauthorized. Such protective measures shall be located and constructed as required by local, state and federal ordinances, laws or regulations.

1.20 SECURITY

A. The contractor shall be responsible for providing all security precautions necessary, in the contractor's opinion, to ensure adequate protection of his and the Owner's interests.

1.21 FIRE PROTECTION

A. The Contractor shall take necessary precautions to ensure against fire during construction. He shall be responsible that the area within contract limits is kept orderly and clean and that combustible rubbish is promptly removed from the site.

B. Installation of equipment suitable for fire protection shall be done as soon as possible after commencement of operations. Fire protection shall be in accordance with Commonwealth of Massachusetts, and the Yarmouth Fire Department approval.

END OF SECTION

SECTION 01600

MATERIALS & EQUIPMENT

1.01 GENERAL

A. Transferring and Handling:

1. Materials shall be transported, unloaded, and handled by methods appropriate for each of the materials.

2. All packaging shall be original, unopened, and complete with labels indicating product description, brand names, quality designations, model numbers, fire-resistance ratings, etc.

B. Storage and Protection:

1. Store materials off ground, under cover, or indoors, in dry, well ventilated locations secured from vandalism and theft. Protect materials from mechanical damage, dampness and extremes of temperature.

2. Protect all installed products and finished work by appropriate protective coverings or by restricting traffic.

3. Materials shall be stored to allow access of staff and members.

C. Installation of Materials:

1. All materials shall be installed, finished and cleaned in accordance with manufacturer's printed specifications, installation instructions and approved shop drawings, by fully skilled workmen working under adequate supervision of well-trained, thoroughly experienced supervisory personnel.

D. Field Measurement:

1. Before order materials, the contractor shall verify all measurements at the building and shall be responsible for their correctness. No extra charge will be allowed because of differences between actual dimensions and measurements indicated on the drawings.

2. All dimensions for fixed materials or assemblies shall be determined by field measurements taken jointly by the contractor and the supplier or fabricator involved. Correct all misfitting fixed materials or assemblies.

E. Holes, Hangers, Pads, Etc.

1. Design of hangers and supports, except those fully described in the contract documents, shall be the responsibility of the contractor. All parts of such hangers and supports designed in accordance with accepted engineering practice, using a factor of safety of at least 2.5. Satisfactory evidence of the strength of proprietary hangers and those designed by the contractor shall be supplied with the shop drawings thereof.

2. Hangers for items hung from beams shall be centered on the vertical center of gravity of the beam.

END OF SECTION

SECTION 01700

CONTRACT CLOSEOUT

PART 1 - GENERAL

1.01 GENERAL

A. The General Documents listed in Index, including the General Conditions, Supplementary General Conditions and General Requirements are hereby made an integral part of this section of the Specifications.

B. Equality of materials or articles other than those named or described in this section will be determined in accordance with the provisions of the Supplementary General Conditions.

C. This subcontractor shall review, in detail, all other sections of the construction specifications affecting the work of this section of the Specifications.

D. It shall be the overall responsibility of the General Contractor (selected for this project) to see that his/her Filed Sub-Bidders, non-Filed Sub-Bidders, specialty contractors and vendors receive the necessary documents and other information with which to undertake and complete this project in a first-class manner.

It shall be the responsibility of all Filed Sub-Bidders to completely familiarize themselves with the contract drawings and all sections of the contract specifications. Each Filed Sub-Bidder will also be responsible for seeing that any sub-sub-bidder(s) required to do work under their section become totally familiar with the requirements of the contract and the importance of planning and the coordinating their particular specialty into the work.

1.02 FINAL CLEANING

A. Unless otherwise specified under the various sections of the Specifications, the general contractor shall perform final cleaning operations as herein specified prior to final inspection.

B. Maintain project site free from accumulations of waste, debris, and rubbish caused by operations. At completion of work, remove waste materials, rubbish, tools, equipment, machinery and surplus materials, and clean all sight-exposed surfaces; leave project clean and ready for occupancy.

C. Cleaning shall include all surfaces, interior and exterior, in which the general contractor has had access whether existing or new.

D. Refer to sections of the Specifications for cleaning of specific products or work.

E. Use only those materials which will not create hazards to health or property and which will not damage surfaces.

F. Use only those cleaning materials and methods that are recommended by the manufacturer or surface material to be cleaned.

G. Employ experienced workmen, or professional cleaners, for final cleaning operations.

H. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels, and other foreign materials resulting from performing the work from sight-exposed interior and exterior surfaces.

I. Repair, patch and touch up surfaces marred by performing the work to specified finish or to match adjacent surfaces.

J. Polish glossy surfaces to a clear shine.

K. Prior to final completion, or Barnstable Building Department Building Use and Occupancy, the general contractor shall conduct an inspection of sight-exposed interior and exterior surfaces, and all work areas, to verify that the entire work is clean.

L. Broom clean exterior paved surfaces and rake clean other surfaces of the grounds.

M. Leave pipe and duct spaces, plenums, furred spaces and the like clean of debris and decayable materials.

N. In cleaning items with manufacturer's finish or items previously finished by subcontractor, care shall be taken not to damage such manufacturer's or subcontractor's finish. In cleaning glass and finish surfaces, care shall be taken not to use detergents or other cleaning agents which may stain adjoining finish surfaces. Any damage to finishes caused by cleaning operations shall be repaired by the contractor at his own expense.

1.03 RECORD DRAWINGS

A. Record drawings shall consist of all the contract drawings.

B. The general contractor and all subcontractors shall be required to maintain one set of record drawings, as the work relates to their sections of the specifications, at the site.

C. The record drawings shall be stored and maintained in the general contractor's field office apart from other documents used for construction. The record drawings shall be maintained in a clean, dry and legible condition and shall not be used for construction purposes.

D. Record drawings, as submitted by the general contractor, shall be verified in the field by the Designer or his consultants. Verification by the Designer shall occur during the construction process and prior to the related work being completed and covered up.

E. The record drawings shall be available at all times for inspection by the Owner's agents. All deficiencies noted shall be promptly corrected.

F. The following information shall be indicated on the record drawings:

1. Record all changes, including change orders, in the locations, size, number and type both horizontally and vertically of all elements of the project which deviate from those indicated on all the contract drawings.

2. The tolerance for the actual location of utilities and appurtenances within the building to be marked on the record drawings shall be plus or minus two (2) inches.

3. The location of all underground utilities and appurtenances referenced to permanent surface improvements, both horizontally and vertically at ten (10) ft. intervals and at all changes of direction.

4. The location of all internal utilities and appurtenances, concealed by finish materials, including but not limited to valves, coils, dampers, vents, cleanouts, strainers, pipes, junction boxes, turning vanes, variable and constant volume boxes, ducts, traps, and maintenance devices. The location of these internal utilities, appurtenance, and devices shall be shown by offsets to the column grid lines on the drawings.

5. Each of the utilities and appurtenances shall be referenced by showing a tag number, area served, and function on the record drawings.

G. At the end of each month and before payment for materials installed, the general contractor, his subcontractors and agents of the Owner shall review record drawings for purpose of payment. <u>If the changes in location of all installed elements are not shown on the record drawings and verified in the field, then the material shall not be considered as installed and payment will be withheld.</u>

H. Prior to the installation of all finish materials, a review of the record drawings shall be made to confirm that all changes have been recorded. All costs to investigate such conditions shall be borne by the applicable party as determined by the Designer.

I. The Owner will provide 2 sets of black or blue line on white drawings to the General Contractor and each Subcontractor hereinafter required to maintain and submit record drawings, one set of which shall be maintained at the site and on which, at all times, shall accurately, clearly and completely show on an updated daily basis the actual installation in accordance with the requirements of the hereinafter listed sub-sections. At the completion of the contract, each listed Subcontractor shall submit to the General Contractor, a complete set of record drawings showing all “as-built” corrections. After checking the above drawings, the General Contractor shall certify that they are complete and correct and shall submit the record drawings to the Designer. The Designer shall have his consulting engineers review the drawings and verify that the installations as

shown thereon are complete and accurate.

J. After approval of the working record drawings, the Contractor shall incorporate all changes on the original drawings. The Contractor shall submit to the Architect, disks of drawings on Auto-CAD Version 14 or 2000 Format with two sets of prints and reproducible drawings on mylar. Inaccuracies in Record Drawings, as determined by the Designer, shall be corrected.

1.04 OPERATING & MAINTENANCE REQUIREMENTS

A. At least four weeks prior to the time of turning over this contract to the Owner for Use and Occupancy or Final Acceptance, the general contractor shall secure and deliver to the Owner via the Designer, two complete, indexed files containing approved operating and maintenance manuals, shop drawings, and other data as follows:

1. Operating manuals and operating instructions for the various systems.

2. Catalog data sheets for each item of mechanical or electrical or equipment actually installed including performance curves, rating data and parts lists.

3. Catalog sheets, maintenance manuals, and approved shop drawings of all mechanical or electrical equipment controls and fixtures with all details clearly indicated, including size of lamps.

4. Names, addresses and telephone numbers of repair and service companies for each of the major systems installed under this contract.

B. Non-availability of operating and maintenance manuals or inaccuracies therein may be grounds for cancellation and postponement of any scheduled final inspection by the Owner until such time as the discrepancy has been corrected.

C. Instructions of Owner's Personnel:

1. Where specified in the individual sections of the Specifications, the subcontractor, affected by such section, shall instruct the Owner's personnel at the site in the use and maintenance of equipment installed by him under the contract.

2. Submission to the Designer of a certificate of compliance to this requirement signed by the subcontractor and the resident engineer, shall be a condition precedent to final payment.

1.05 CONTRACT REQUIREMENTS & SUBMITTALS

A. Final Inspection:

1. The general contractor shall submit written certification that:

a. Project has been inspected for compliance with contract documents and has satisfied the Barnstable Building Department.

b. Equipment and systems have been tested in the presence of Designer and are operational and satisfactory.

c. Project is completed, and ready for final inspection.

2. Building Department Use & Occupancy Permit:

a. Arrange for a Building Department final inspection and secure the signed Certificate of Inspection for Use and Occupancy from the Building Department.

1.06 PUNCH LIST

A. The contractor shall supervise and direct the work using his best skill and attention. He shall be solely responsible for all construction means, methods, techniques, sequences and procedures, and for coordinating all portions of the work under the contract.

B. The contractor shall carefully check his own work and that of subcontractors as the work is being performed. Unsatisfactory work shall be corrected immediately.

C. During the finishing stages of the project, the contractor shall make frequent inspections with subcontractors and the Designer and/or Engineer so as to progressively check for and correct faulty work.

D. When the contractor determines that he is substantially complete, that he has less than one percent of his contract remaining to be completed, he shall prepare for submission to the Designer and/or Engineer a list of items to be completed or corrected. The failure to include any items on such list does not alter the responsibility of the contractor to complete all work in accordance with the contract documents.

E. Upon receipt of the contractor's list of items to be completed or corrected, the Designer and/or Engineer will promptly make a thorough inspection and prepare a "punch list", setting forth in accurate detail any items on the contractor's list and additional items that are not acceptable.

F. When the punch list has been prepared, the Designer and/or Engineer will arrange a

meeting with the contractor and subcontractors to identify and explain all punch list items and answer questions on the work which must be done before final acceptance.

G. If the contractor gives notice that a filed subcontractor has completed his punch list items, the Designer and/or Engineer will inspect that portion of the work and, if the items are found to be satisfactorily completed, advise the contractor accordingly.

H. The general contractor shall correct all punch list items or shall cause the correction of the punch list items within a time frame to be established when the punch list is made. The time frame for the completion of the punch list shall not exceed the completion date of the contract. Should the punch list not be completed within the specified time frame, the Owner may invoke the rights given under Article 2.4 of the General Conditions.

1.07 GUARANTEES & WARRANTIES

A. Submit to the Designer all extended guarantees and warranties that have been specified in various, individual sections of the Specifications.

END OF SECTION

SECTION 02070

SELECTIVE DEMOLITION

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS, and all sections within DIVISION 1 - GENERAL REQUIREMENTS, which are hereby made a part of this Section of the Specifications as if fully repeated herein.

B. Examine all other Sections of the Specifications for requirements which affect work under this Section whether or not such work is specifically mentioned in this Section.

C. Coordinate work with that of all other trades affecting, or affected by the work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.02 SCOPE OF WORK

In general, the Contractor shall supply all access, labor, equipment, temporary protection, tools and appliances necessary for the proper completion of the work as required in the Specifications and in accordance with good construction practice. The work under this Section generally includes the following:

A. Removal and disposal of existing construction, as follows:

1. Existing ventilation systems as indicated on the Drawings including ductwork and grilles.
2. Portions of the existing electrical and lighting systems as indicated on the Drawings.
3. Portions of existing plumbing systems as indicated on the Drawings.
4. Portions of existing interior and exterior millwork and trim as indicated on the Drawings and as required to properly complete the work.
5. Portions of existing interior and exterior wood framed walls where indicated on the drawings and as required to complete the work.

B. Temporary protection of adjacent existing construction and improvements not indicated to be demolished.

1.03 RELATED WORK:

Carefully examine all of the Contract Documents for requirements which affect the work of this section. Certain construction, systems, or equipment identified in the Contract Documents, shall remain in-place for future service and shall be protected.

A. Section 06100 – Rough Carpentry
B. Section 07310 – Flashing
C. Section 09250 – Gypsum Board
D. Section 15400 – Plumbing
E. Section 15600 – HVAC
F. Section 16100 – Electrical

1.04 SUBMITTALS

A. Submittals shall be made in accordance with Division 1, Section 01300.

B. The following shall be submitted:
   1. Permit for transport and legal disposal off-site of demolition material and debris.

1.05 QUALITY ASSURANCE

A. Comply with governing codes and regulations. Use experienced workers.

1.06 JOB CONDITIONS

A. The Contractor shall be responsible for securing and protecting materials, equipment and tools as well as partially completed construction from damage, vandalism or abuse.

B. The Contractor shall utilize skilled and experienced specialty workers to complete the work. Experienced trade workers shall be utilized for all aspects of the work.

C. The Contractor shall provide all masking, tarps and protection to prevent damage to adjacent construction, new or existing, including landscaped and paved areas.

D. The Contractor shall patch, repair and/or replace all adjacent materials and surfaces damaged as a result of the work, at no expense to the Owner. All repair or replacement work shall match the existing in kind and appearance.

E. Coordinate the work in this section with the work in other sections to assure the orderly progress of the work.

F. The building will be open to normal use during the time of construction. The Contractor shall take all precautions to create as little disruption as possible during the course of the work and provide adequate temporary protection to allow normal use of the building during the work.

1.07 PRE-CONSTRUCTION CONFERENCE

A preconstruction conference will be held with a representative of the Owner, Architect and all involved trades to discuss all aspects of the project. The Contractor's field representative and foreman for the work shall be in attendance.

1.08 PROTECTION OF WORK AND MATERIAL STORAGE

A. Protection of work and materials storage shall be done in accordance with Section 01600.

B. Prevent movement or settlement of adjacent construction designated to remain. Provide and place bracing or shoring and be responsible for safety and support of structures. Assume liability for such movement, settlement, damage, or injury.

C. Cease operations and notify Architect immediately if safety of adjacent facilities or structures appears to be endangered. Take precautions to properly support structures. Do not resume operations until safety is restored.

D. Temporary Protections: Provide temporary barricades and other forms of protection as required for protection of personnel from injury due to selective demolition operations.

1. Protect existing work that is to remain from damage from demolition operations.
2. Construct temporary dustproof and insulated partitions where required to separate areas where dusty and noisy operations are performed.
3. Remove temporary protection at completion of work.

E. Traffic: Conduct operations and removal of debris to ensure minimum interference with the normal use of public ways, spaces, and other adjacent

facilities. Do not close of obstruct traffic ways, streets, walks or other used facilities without the written permission of the Owner and authorities having jurisdiction.

F. Protection: Ensure safe passage of persons in and around the building during the work. Prevent injury to persons and damage to property. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement or collapse of existing structures, construction, materials and systems to be demolished and adjacent facilities to remain. Immediately repair damages caused to adjacent facilities by demolition operations at no additional cost to the Owner. Return property to its original condition before demolition. Take effective measures to prevent windblown dust. Do not create ice hazards by water spraying in cold weather. Maintain existing fire protection systems in operation throughout the work on this project, unless otherwise approved by Architect.

G. Dust and Noise Control: Take special care to control dust and noise to avoid creating a nuisance. Obtain Architect's and Owner's approval of means, methods and techniques used to control dust and noise. Provide dust and noise control to protect adjacent occupied interior and exterior spaces.

H. Temporary Weather Protection: maintain the building in a weather tight condition at all times. Provide temporary weather protection as required. Provide temporary protection to existing roof system as required to prevent damage.

I. Utilities: Maintain all utilities except those requiring removal or relocation. Keep utilities in service and protect from damage. Do not interrupt utilities serving occupied areas or areas in use without first obtaining permission from the utility company and the Owner. Provide temporary services as required.

1.09 CLEAN-UP

A. Clean-up shall be done in accordance with this Section, and with Section 01700.

B. Do not allow demolished materials to accumulate on-site. Remove debris, rubbish and other materials resulting from demolition operations from the building site in a safe and legal manner. Transport and legally dispose of materials off-site in accordance with all laws, regulations and ordinances.

C. Leave interior areas broom clean upon completion of demolition.

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

3.01 INSPECTION

A. Prior to commencement of selective demolition work, inspect areas in which work will be performed. Photograph existing conditions which could be misconstrued as damaged resulting from selective demolition work.

3.02 PREPARATION

A. Cover and protect existing finishes, fixtures and equipment to remain. Protect from soiling, dust, or damage during demolition work.

B. Erect and maintain dust and noise proof partitions.

C. Locate, identify, stub-off and disconnect or make safe utility services that are indicated not to remain. Provide by-pass services as necessary to maintain continuity of service to occupied areas.

3.03 SELECTIVE DEMOLITION

A. Perform selective demolition work in a systematic manner. Items indicated to be removed shall be completely removed down to the surrounding substrates.

B. Saw cut materials to define limits of demolition.

C. Take care to prevent damage to adjacent materials designated to remain.

D. Remove debris from site, and dispose of legally.

END OF SECTION

CAST-IN-PLACE CONCRETE

SECTION 03300

PART 1 - GENERAL REQUIREMENTS

1.01 GENERAL

A. The General Documents listed in the Index, including the General Conditions, Supplementary General Conditions, and General Requirements are hereby made an integral part of this section of the Specifications.

B. Equality of materials or articles other than those named or described in this section will be determined in accordance with the provisions of the Supplementary General Conditions.

C. This contractor shall review, in detail, all other sections of the Construction Specifications affecting the work of this section of the Specifications.

D. It shall be the overall responsibility of the General Contractor (selected for this project) to see that his/her Filed Sub-Bidders, non-Filed Sub-Bidders, specialty contractors and vendors receive the necessary documents and other information with which to undertake and complete this project in a first-class manner.

It shall be the responsibility of all Filed Sub-Bidders to completely familiarize themselves with the contract drawings and all sections of the contract specifications. Each Filed Sub-Bidder will also be responsible for seeing that any sub-sub-bidder(s) required to do work under their section become totally familiar with the requirements of the contract and the importance of planning and the coordinating their particular specialty into the work.

1.02 DESCRIPTION OF WORK

A. Work Included:

The Contractor shall furnish all materials, equipment, tools, and labor necessary for the layout, forming, construction, curing, and finishing of all poured-in-place concrete and related work, as specified herein and/or detailed on the Drawings, but is not limited to the following:

1. Furnishing, placing, curing and finishing of all plain and reinforced concrete work for the building and site.

2. Furnishing and installation of pre-cast concrete curbing.

3. Furnishing, erection and removal of formwork and shoring.

4. Furnishing and placing of reinforcing steel and related accessories.

5. Furnishing and installation of joint fillers.

6. Furnishing and installation of anchor slots.

7. Setting of anchor bolts and grouting of leveling plates and bearing plates, if applicable.

8. Coordination with all other trades for location of all pipe sleeves, duct openings, keys, chases, electrical boxes and conduits, anchors, inserts, fastenings and other devices required by other trades.

B. Items to be installed only: Install the following items furnished by the designated Sections:

1. Section 05101 – METAL RAILINGS AND MISC. METAL

C. Related Work Specified Elsewhere:

1. Section 09705 – SPECIAL FLOORING

D. Coordinate concrete work with all related work which requires items to be inserted in the forms and cast in the concrete, regardless of whether such inserted items are specifically described in the Contract Documents.

E. Reference Drawings: Work shall be performed as shown on drawings listed on the ***"Schedule of Drawings***" found at the beginning of this manual after the Table of Contents.

1.03 QUALITY ASSURANCE

A. All materials, measuring, mixing, transportation, placing and curing shall be subject to inspection by the Architect or by the testing agency. However, such inspection, wherever conducted, shall not relieve the Contractor of his responsibility to furnish materials and workmanship in accordance with Contract requirements, nor shall inspector's acceptance of material or workmanship prevent later rejection of same by the Owner or Architect if defects are discovered.

B. A qualified testing agency for testing and inspection will be selected by the Owner and shall be paid by the Owner.

C. The Architect shall retain the services of a qualified testing agency, approved by the Owner, to test aggregate and to prepare or review mix designs for each strength of concrete specified, and shall submit mix designs and test results to the Architect for approval. The costs of all such preliminary services shall be borne by the Contractor.

D. Advise the testing agency of intent to place concrete by notification at least 24 hours prior to the time of placement.

E. Concrete will be sampled and tested for quality control as follows:

1. Sampling fresh concrete: ASTM C 172
2. Compression test specimens: ASTM C 31
3. Slump: ASTM C 143
4. Air content: ASTM C 231
5. Compressive strength: ASTM C 39

F. Compression tests shall consist of four (4) cylinders for each test made, cured and tested by the laboratory during the progress of the job. At least one (1) test shall be made for each strength of concrete up to 50 cubic yards thereafter, unless otherwise directed by the Architect. Concrete for each set of cylinders shall be from one (1) sample representative of the entire batch. All cylinders shall be standard 6” x 12”.

G. When tests of the control specimens fall below required strength, the Architect may require core specimens taken from concrete in question and tested in accordance with ASTM C 42. If these specimens do not meet strength requirements, Architect will have right to require additional curing, load tests, strengthening or removal and replacement of those parts of structure which are unacceptable, and in addition, removal of such sound portions of structure as necessary to ensure safety, appearance, and durability of the structure. Additional testing, load tests, strengthening or removal and replacement of parts of structure shall be at the Contractor’s expense.

H. Accept as final, results of tests made by the qualified professional testing organization engaged by the Owner.

I. Testing required because of changes requested by the Contractor in materials, sources of materials or mix proportions, and extra testing of concrete or materials because of failure to meet the Specification requirements is to be paid by the Contractor.

1.04 NOTIFICATION OF RELATED TRADES

A. Notify all other trades responsible for installing chases, inserts, sleeves, anchors, louvers, etc. when ready for such installation, and for final checking immediately before concrete is placed. Cooperate with such trades to obtain proper installation.

B. Leave openings in walls for pipes, ducts, etc. for mechanical and electrical work, as shown on Drawings or required by layout of mechanical systems.

1.05 REFERENCE STANDARDS

A. Except as modified by the requirements specified herein and/or the details on the Drawings, all work included in this Section shall conform to the applicable provisions of the following codes and standards:

1. **American Society for Testing and Materials (ASTM):**

ASTM A 82: Standard Specification for Cold-Drawn Steel Wire for Concrete Reinforcement.

ASTM A 185: Standard Specification for Welded Steel Wire Fabric for Concrete Reinforcement.

ASTM A 615: Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

ASTM C 31: Standard Method of Making and Curing Concrete Test Specimens in the Field.

ASTM C 33: Standard Specification for Concrete Aggregates.

ASTM C 39: Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

ASTM C 42: Standard Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.

ASTM C 94: Standard Specification for Ready-Mixed Concrete.

ASTM C 150: Standard Specification for Portland Cement.

ASTM C 143: Standard Test Method for Slump of Portland Cement Concrete.

ASTM C 171: Standard Specification for Sheet Materials for Curing Concrete.

ASTM C 309: Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

ASTM C 494: Standard Specifications for Chemical Admixtures for Concrete.

2. **American Concrete Institute (ACI):**

ACI 301: Specifications for Structural Concrete for Buildings.

ACI 305: Hot Weather Concreting.

ACI 306: Cold Weather Concreting.

ACI 315: Manual of Standard Practice for Detailing Reinforced Concrete Structures.

ACI 318: Building Code Requirements for Reinforced Concrete.

ACI 347: Recommended Practice for Concrete Formwork.

ACI 350: Concrete Sanitary Engineering Structures.

ACI 546: Guide for Repair of Concrete Bridge Superstructures.

ACI 614: Recommended Practice for Measuring, Mixing, and Placing Concrete.

3. **Concrete Reinforcing Steel Institute (CRSI):**

Reinforced Concrete - A Manual of Standard Practice.

Recommended Practice for Placing Reinforcing Bars.

Recommended Practice for Placing Bar Supports.

4. Federal Specifications (FS) CCC-C-467.

5. U.S. Army Corps of Engineers Standards. CRD-C-588: Specification for Non-Shrink Grout.

1.06 SUBMITTALS

A. Prior to casting any concrete of a specific proposed mix, submit to the Engineer satisfactory evidence that the proposed mix will conform in all respects with the strength, durability and serviceability requirements of the Specifications. Test data, compiled in accordance with ACI 301, will be considered the minimum acceptable satisfactory evidence for compliance.

B. Reinforcing steel shop drawings shall be of such detail and completeness that all fabrication and placement at the site can be accomplished without the use of Contract Drawings for reference. Reinforcing steel shop drawings shall include number of pieces, sized, and grade of reinforcing steel, accessories, and any other information required for fabrication and placement.

C. Check architectural, structural, mechanical, electrical, plumbing and site drawings for anchor bolts, anchors, inserts, conduits, sleeves, and any other items which are required to be embedded in concrete, and make necessary provisions as required so that reinforcing steel will not interfere with the placement of such embedded items.

PART 2 - PRODUCTS

2.01 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150, Type II of U.S. manufacture. Only one brand of cement shall be used on the project. Temperature of cement shall not be over 140 degrees F. when delivered to the batching plant.

B. Fine aggregate: ASTM C 33, clean and graded from 1/4 in. to fines.
Coarse aggregate: ASTM C 33, clean and graded from 1/4 in. to maximum sizes hereinafter specified.

C. Air entraining agent: DAREX AEA as manufactured by W.R. Grace & Co., MBVR as manufactured by Master Builders, SIKA AER as manufactured by Sika Chemical Co., or approved equal.

D. Water reducing agent: WRDA as manufactured by W.R. Grace & Co., "Plasto-crete" as manufactured by Sika Chemical Corporation, "Pozzolith" as manufactured by Master Builders, or approved equal. Admixture shall conform to ASTM C 494 in accordance with the type and use intended. The dosage shall not be higher than that prescribed by these standards.

E. Water: Clean and potable, free of impurities detrimental to concrete.

2.02 CONCRETE MIXES

A. Proportion each concrete mix in accordance with Chapter 3.8 of ACI 301, Method 1, laboratory trial mixes. Laboratory trial mixes shall be prepared and tested by the testing laboratory from materials provided by the Ready Mix Plant. Where a proposed mix is identical to a Ready Mix Plant standard mix, field test data, submitted in accordance with Chapter 3.8 of ACI 301, Method 2, may be used to substantiate the proposed mix design.

B. The design of the exact proportion for the mix, including amounts of admixture (if any), and water, to meet all specification requirements shall be the responsibility of the concrete supplier and Contractor.

C. All concrete shall have the following minimum compressive strengths at 28 days and shall be proportioned and used within the following limits:

Class	Minimum psi at 28 Days	Maximum Size of Aggregate	Minimum Sacks Cement per cu. yd.	Slump
A	4000	3/4"	6.50	3" to 4"

Class Description of Use

A. General Use

D. The proportions of aggregate to cement for any concrete shall be such as to produce a mixture which will work readily into the corners and angles of the forms and around reinforcement with the method of placing employed on the work, but without permitting the materials to segregate or excess free water to collect on the surface.

E. Air-Entrainment: The air content in all concrete exposed to weathering shall be maintained at 5 to 6 percent.

2.03 FORMWORK

A. Use plywood forms for all concrete work except where otherwise scheduled or specified. Plywood shall conform to U.S. Product Standard PS 1 and shall be a minimum of 5/8 in. thick. Each panel shall carry the grade trademark of the American Plywood Association along with the DFPA quality stamp.

B. Form ties and spreaders: Standard metal form clamp assembly and plastic cone sinkage, of type acting as spreaders and leaving no metal within 1 in. of concrete face. Leave inner tie rod in concrete when forms are removed. No wire ties or wood spreaders will be permitted. Use 1/2" x 1" C.T. plastic cones for sinkages.

C. Form Release Agent: Non-grain raising and non-staining type that will not leave residual matter on surface of concrete or adversely affect proper bonding of subsequent application of other material applied to concrete surface, “Nox-Crete Form Coating” as manufactured by Nox-Crete Company, “Arcal-80” as manufactured by Arcal Chemical Corporation, “Synthex” as manufactured by Industrial Synthetics Company, or approved equal. Coatings containing mineral oils or other non-drying ingredients will not be permitted.

2.04 OTHER MATERIALS

A. Joint filler where used with caulking or sealants, shall be cork type, non-extruding, self-expanding filler strips conforming to ASTM C 1752, III. Where no sealant or caulking is required, strips may be non-extruding bituminous type in accordance with ASTM D 1751.

B. Dovetail Anchor Slots shall be formed of not less than 20 gauge hot dipped galvanized steel, 1" by 1" and furnished with felt or fiber fillers.

C. Pre-cast concrete curbing at perimeter of exterior concrete slab.

2.05 CURING MATERIALS

A. Chemical sealer-hardener: Merit Paper and Chemical Corporation's "Concrete Kote Triumph" or approved equal.

B. Curing materials:

1. Water proof paper shall conform to ASTM C 171, type 1 or type 2.

2. Burlap shall conform to FS CCC-C-467.

3. Membrane-forming compounds shall conform to ASTM C 309 and shall not interfere with bonding of subsequently applied paint, coatings, adhesives, or sealers. The product shall be applied in accordance with the manufacturer's instructions. Use is subject to approval by the Engineer.

2.06 GROUT

A. Grout under levelling plates: Non-shrink, 5,000 psi minimum, U.S. Grout Corp. "Five Star Grout," Sonneborn "Sonogrout," Master Builders "Embeco," W.R. Meadows "V-3," Upcon "High Flow" or approved equal.

B. Grout under base plates: Expansive type high strength, 7,500 psi minimum, non-shrink grout such as "High Flow Construction Grout" by Upcon, which meets or exceeds U.S. Corps of Engineers Standard CRD-C-588, and which contains no chlorides, iron particles or gas-forming agents.

2.07 STANDARD ACCESSORY PRODUCTS

A. Non-slip aggregate: No. 12-30 non-ferrous metallic abrasive grit, or other approved non-ferrous abrasive grit manufactured for the purpose.

B. Expansion joint filler: Premolded, of sizes and thicknesses shown on Drawings, conforming to ASTM D 1751.

C. Expansion joint sealer: Applied polysulfide or polyurethane rubber elastomer sealant, of sizes and thicknesses shown on Drawings, conforming to sealants sited by ACI Committee 504, Tables 1 and 4.

D. Rust inhibitive primer: Alkyd modified oil base type, gray tnemec 1009, Pratt & Lambert noxide gray primer, or approved equal.

E. Concrete expansion bolts: Standard Kwik bolts of the sizes shown on the plans and installed as per manufactures specifications, high strength steel bolts and nuts as manufactured by Hilti Fastening Systems or approved equal. Provide cored holes when noted on the plans.

PART 3 - EXECUTION

3.01 SITE CONDITIONS

A. Cold weather requirements

1. **Do not mix or place concrete when the temperature is below 40 deg. F, or when conditions indicate that the temperature will fall below 40 deg. F within 72 hours unless precautions are taken to protect the concrete.**

2. Maintain concrete temperature, at time of placing, at not less than 60 deg. F. Reinforcement, forms, and ground which concrete will contact must be completely free of frost.

3. Keep concrete and formwork at a temperature of not less than 50 deg. F for not less than 96 hours after placing.

4. Calcium chloride shall not be used.

B. Hot Weather Requirements

1. The maximum temperature of the concrete, at time of placing, shall be 80 deg. F. If the weather causes the placing temperature to exceed 80 deg. F, the mix shall be cooled by appropriate methods if approved by the Engineer.

2. Forms shall be cooled immediately before concrete is placed.

3.02 CONSTRUCTION OF FORMS

A. Wood Forms: Constructed of sound materials, of the correct shape and dimensions, mortar tight, of sufficient strength, and cambered, braced and tied together so that the movement of workers, equipment and materials and placing and vibrating the concrete will not move them out of line or position.

B. Install pipes, sleeves, anchors, inserts, reglets, anchor slots, nailers, waterstops, and all other products of related work. No wood other than necessary nailing blocks shall be embedded in concrete. All embedded items shall be securely anchored in correct location

and alignment prior to placing concrete. Coordinate and cooperate with all work forces to assure a complete and proper installation of concrete and products of related work.

C. Do not embed electrical and telephone conduit runs larger than 3/4 in. diameter in structural floor, wall or slab-on-grade concrete. One layer of 3/4 in. diameter or smaller conduit may be run in concrete walls or concrete slabs on-grade provided that parallel runs are spaced a minimum of 12 inches apart. Do not embed conduit runs of any size in structural floor concrete cast on steel deck. Do not install aluminum conduit in any concrete.

D. Frame openings in concrete where indicated on "architectural, structural, plumbing, mechanical, or electrical drawings." Establish exact locations, sizes, and other conditions required for openings and attachment of work specified under other sections. Coordinate all work of this nature in order that there will be no unnecessary cutting and patching of concrete. All cutting and repairing of concrete required as a result of failure to provide for such openings shall be at the expense of the Contractor at no additional expense to the Owner.

E. All exposed square concrete edges shall be formed with a continuous 1 inch chamfer.

F. Treat forms with a form release agent applied according to the manufacturer's instructions, by roller, brush or spray to produce a uniform think film without bubbles or streaks. Apply the release agent in two coats for the first use of the form and in one coat for each additional use.

3.03 MIXING OF CONCRETE

A. Mix and deliver all concrete in accordance with ASTM C 94. The batch plant of the concrete producer shall be certified for compliance with the standards established by the National Ready-Mixed Concrete Association.

B. In the event concrete is mixed at a central batching plant, arrange the delivery so that intervals between batches are kept to a minimum, and in any event not more than 30 minutes. Trucks shall be in first class condition and kept in constant rotation during delivery.

C. Add no water during transit or at the job site without specific approval of the Engineer. Place concrete within 90 minutes after cement has been mixed with aggregate or 45 minutes after addition of water and admixtures.

D. Use no admixtures, except those specified, without specific approval of the Engineer. Admixtures containing calcium chloride will not be permitted.

E. At the end of each week, forward to the Engineer truck delivery slips of all concrete delivered to the job indicating the quantity and quality of concrete, additives, date and time of delivery, and location of placement.

3.04 FIELD TESTING

A. As a minimum, the responsibilities of the testing laboratory shall include:

1. Checking of truck delivery slips to verify that the mix, as stated on the slip, is correct.

2. Noting duration of mixing.

3. Making slump tests of each truck load of concrete in accordance with ASTM C 143.

4. Testing air entrained concrete for air content in accordance with ACI 301. Make at least one air content test for each set of air entrained concrete test cylinders molded.

5. Molding, transporting and testing concrete test cylinders in accordance with ACI 301.

6. Provide the Engineer documented results for the five items above.

B. Testing laboratory field personnel must immediately notify both the Contractor and the Engineer of any concrete, delivered or discharged, which does not meet the Specifications. Concrete which does not conform to all requirements of the specifications must not be incorporated in the structure.

C. Compression Tests

1. The testing laboratory will prepare compression test samples. One set of at least four cylinders will be made for each test in accordance with ASTM C 31. All cylinders in a set will be marked with a number on one end. The testing laboratory will record this number on its record of concrete placed. Cylinders shall be cured at the job site in a curing box provided by the Contractor. The testing laboratory representative will deliver the cylinders to the laboratory for testing.

2. One cylinder from each set will be tested at 7 days and two at 28 days in accordance with ASTM C 39.

3. In the event the compressive strength of the cylinders, when tested, is below the specified minimum or early test cylinders indicate that the specified minimum strength may not be reached in 28 days, the Architect may require test cores of the hardened structure to be taken by a testing laboratory in accordance with ASTM C 42. If such test indicates that the core specimen is below the required strength, remove and replace the concrete in question without cost to the Owner. Replace all other work damaged as a result of this concrete removal with new materials to the satisfaction of the Architect at no additional cost to the Owner. The cost of coring and testing will be deducted from the contract amount at no additional cost to the Owner even if the concrete proves to be satisfactory as determined by the

Architect. Where core cylinders have been taken by the testing laboratory and the concrete proves to be satisfactory as determined by the Architect, core holes shall be filled in a manner satisfactory to the Architect at no additional cost to the Owner.

D. Coordinate the date and location of tests with the Engineer before concrete work is started.

3.05 CONVEYING AND PLACING CONCRETE

A. Notify the Engineer at least 72 hours in advance of the placing of any concrete.

B. Soil bottoms for footings and slabs must be approved by the Engineer before placing concrete.

C. Before placing concrete, inspect forms thoroughly. Remove all chips, dirt, deleterious material and all temporary bracing and cleats. Properly box all openings for pipes, etc. Properly secure and make tight all forms in their correct position. Properly secure reinforcement, anchors and embedded items in their proper places. Remove concrete which may be on the forms or reinforcement and which is set and dry. Wash forms and steel before proceeding. Remove all foreign matter from forms and excavations.

D. Remove water from place of deposit before concrete is placed unless otherwise permitted by the Engineer. Divert all flow of water into an excavation through proper side drains into a sump, or remove it by other approved methods.

E. Thoroughly dampen soil onto which concrete will be placed, except in freezing weather, without softening the properly prepared bearing material.

F. Accurately secure in position all anchors, bolts, sleeves, inserts, wood blocking, and all other items to be embedded in concrete before the concrete is placed. Do not embed aluminum in concrete.

G. The maximum length in any direction of any concrete placement shall be as follows:

1. Slab and walls . . . 30 feet.

2. Slabs on grade shall be placed in alternate panels no larger than 600 s.f. and having no side greater than 30 feet.

H. At least 48 hours shall elapse between adjacent pours.

I. Handling and Placing

1. Notify Architect at least 24 hours prior to each placement.

2. Before concrete is placed, coordinate all work which is any way connected with or influenced by the concrete work, and give reasonable time to complete all portions of work which must be completed before concrete is placed.

3. Immediately before concrete is placed inspect all forms to be sure that they are in proper position, sufficiently rigid, thoroughly clean, properly oiled and free from foreign materials, and that all reinforcement is in proper position.

4. Once started, continue concreting operation without interruption until the section of approved size and shape is completed.

5. Convey concrete as rapidly as practicable from the mixer to the place of final deposit by methods which prevent the separation or loss of ingredients. Place concrete, as nearly as practicable, in its final position to avoid rehandling or flowing.

6. Do not freely drop concrete where reinforcement will cause segregation, nor more than 6 feet. Place concrete to maintain a plastic surface approximately horizontal, and not more than 3'-0" deep.

7. In placing columns, walls, or thin sections of heights greater than 10 ft., use openings in the forms, elephant trunk tremies, or other approved devices which will permit the concrete to be placed without segregation or accumulation of hardened concrete on the forms or steel reinforcement above the level of the fresh concrete. Install such devices so that the concrete will be dropped vertically.

8. Concrete that has partially hardened shall not be placed in the work. The discharge of concrete shall be completed within 90 minutes of the first introduction of water into the mix.

9. Place columns at least one day before slabs and beams supported on them.

10. Concrete may be placed by pumping if first approved in writing by the Engineer for the location proposed. Equipment for pumping shall be of such size and design as to ensure a practically continuous flow of concrete at the delivery end without separation of materials. The concrete mix shall be designed to the same requirements as specified, and may be richer in lubricating components in order to allow proper pumping. Do not pump concrete through aluminum pipes. All pumping operations must have full-time inspection by a recognized testing laboratory approved by the Engineer and paid for by the Contractor. Include the cost of this full-time inspection in the Contract Sum Guaranteed Maximum Cost if the option of pumping is elected.

K. Vibrating and Compacting

1. Thoroughly consolidate and compact all concrete by suitable means during the operation of placing. Thoroughly work concrete around reinforcement, embedded

items, and into corners of the forms. Thoroughly spade all concrete against forms. Use internal vibrators under experienced supervision. Prevent contact with reinforcement and wood forms. Do not use vibrators in a manner that forces mortar between individual form members.

2. Vibrators shall be flexible electric type or approved compressed air type, adequately powered and capable of transmitting to the concrete not less than 7,000 impulses per minute. Vibration shall be sufficiently intense to cause the concrete to flow or settle readily into place without separation of the ingredients. Employ a sufficient number of vibrators so that complete compaction is secured throughout the entire volume of each layer of concrete. Keep at least one vibrator in readiness as a spare for emergency use. Use vibrators such that the concrete becomes uniformly plastic.

3. Vibrate close to the forms but not excessively at one spot in order to avoid the formation of large areas of grout and settlement of aggregates. Do not disturb concrete which has its initial set.

4. Where conditions make compacting difficult, or where the reinforcement is congested, deposit batches of mortar containing the same proportions of cement to sand as used in the concrete in the forms, to a depth of at least one inch.

5. Construct fully filled out, smooth, clean, and properly aligned surfaces, free from objectionable pockets and blemishes.

3.06 CONSTRUCTION JOINTS

A. Locate and construct construction joints as indicated and detailed on the Drawings, or as required by the Engineer. If, for any reason, a change is necessary, prepare a placing plan and submit it to the Engineer for approval. Where a joint is to be made, sandblast or thoroughly pick and thoroughly clean the surface of the concrete and remove all laitance. Thoroughly wet and slush joints with a coat of grout immediately before the placing of new concrete. Use approved keys shown on Drawings at all joints, unless detailed otherwise. Obtain Engineer's approval for all joints not shown on the Drawings. Retighten forms before placing of concrete is continued. Allow an interval of at least 48 hours between adjacent pours. Install additional reinforcement at construction joints as shown on Drawings.

3.07 EXPANSION JOINTS

A. Install preformed expansion joint filler where indicated on the Drawings. Install with edge 3/4 inch from the surface. Use steel pins to hold material in place during placing and finishing of concrete.

B. Roughen adjacent concrete surfaces as detailed on the drawings a full amplitude of a 1/4 inch minimum.

3.08 PATCHING

A. Immediately after concrete has attained its initial set and forms are stripped, patch minor defect, form-tie holes, honeycombed areas, plastic cone sinkages, etc. Remove ledges and bulges. Repair gravel pockets by cutting out to solid surface, form key, and thoroughly wet before placing patching mortar. Patching mortar shall consist of 1 part cement to 2 parts fine sand; compact into place and neatly finish to exactly match surface texture. Grind or fill surfaces to produce level, true planes. In case of honeycombed areas or gravel pockets which, in the Architect's opinion, are too large and unsatisfactory for mortar patching as described above, cut out to solid surface, key, and pack solid with matching concrete to produce firm bond and surface. Patching shall match adjacent surfaces.

1. Perform all concrete cutting required, removing the minimum amount required. Excessive cutting is not permitted. Do not cut structural members and reinforcement without instructions from the Engineer.

2. Where required, patch and point after work has been installed, using Portland cement mortar 1:2 mix.

3.09 PROTECTION AND CURING

A. Protect concrete from injurious action of the elements and defacement of any nature during construction operations.

B. Maintain concrete in a thoroughly moist condition from the time it is placed until it has cured, for at least seven days.

C. Keep all forms sufficiently wet to prevent drying out of the concrete.

D. Carefully protect exposed concrete corners from damage.

E. Do not allow slabs to become dry at any time until curing operations are complete. Apply one coat of sealer-hardener in accordance with manufacturer's specifications immediately after troweling, to floors which are not scheduled to receive floor finish. Continue wet curing for seven days. In general, cure slabs with non-staining curing paper, hosing or fog spray. Cure vertical surfaces with wet burlap or fog spray. Protect fresh concrete from drying winds, rain, damage, and soiling. Lap curing paper 4 inches minimum at joints and seal with waterproof tape.

3.10 FORM REMOVAL

A. Forms shall be removed without damage to concrete. The contractor shall be responsible for the safety of the construction during and after form removal. No act of the Architect shall relieve him of this responsibility.

B. Protect corners from damage after form removal by boxing, corner boards or other means approved by the Architect.

C. Formwork for pilasters, walls, and other parts not supporting the weight of concrete may be removed as soon as the concrete has reached 30% of its specified 28-day strength, but not before 36 hours, provided it is properly cured and protected.

D. Bracing for foundation walls retaining earth shall remain in place until upper level floor slab has achieved its 28- day strength.

3.11 CUTTING OF HOLES

A. Cut holes required by other trades in any cast-in-place concrete which did not receive sleeves. Use a core drilling process or sawing process which produces clean sharp edges and the minimum hole size which accommodates the piping, conduit, or equipment requiring the opening.

B. Obtain approval of Architect before cutting any holes for any trades.

3.12 NON-SHRINK GROUT

A. Grout solid all column leveling plates and beam bearing plates in accordance with manufacturer's recommendations.

3.13 CONCRETE FINISHES

A. Walls which will receive wall dampproofing or waterproofing, or which will be exposed but are located in concealed areas: "Smooth form" finish as defined in ACI 301, without further treatment other than necessary patching.

B. All other unexposed walls: "Rough form" finish as defined in ACI 301.

C. Exposed-to-view walls: "Smooth form" finish, patched as hereinbefore specified, and sacked to a uniform texture while concrete is still green. Sacking of concrete shall include smoothing off joint marks and fins and rubbing with abrasive stones, and grout or slurry treatment as required or necessary to produce a surface acceptable to the Engineer in every respect.

3.17 SLAB LEVELS AND FINISHES

A. Apply two coats of chemical sealer-hardener to all slabs not scheduled to receive a floor finish in accordance with the manufacturer's specifications and application instructions. Apply the first coat immediately after troweling of the floor, and the second coat just before the building is turned over to the Owner. Cover at the rate of 1 gallon per 350 sq. ft. Thoroughly clean floors before applying sealer-hardener. There shall be no marks or stains of any kind on concrete at time of application. Call for manufacturer to provide job service at no additional cost to Owner. Continue wet curing for at least seven days after the application of the first coat.

B. Broomed finish for exterior slabs: Where noted on Drawings, finish similar to a steel trowel finish, except that after hand troweling, finish surfaces by scoring in parallel lines with a fine hair stable broom, perpendicular to the direction of traffic or as indicated on the Drawings.

C. Abrasive or non-slip finish for stair treads, landings and ramps: Where noted on drawings, float and then lightly trowel. Sprinkle abrasive aggregate on surface evenly and uniformly at the rate of 1/4 pound per square foot. After sprinkling on aggregate, finish troweling, taking care not to work aggregate below the surface. Apply sealer-hardener as specified.

D. The addition of cement, sand, water, or mortar to slab surfaces while finishing concrete is strictly prohibited.

E. All surfaces shall be finished to a Class A (1/8 inch in 10 feet) tolerance as defined in ACI 301 except areas to receive broomed finish which shall be finished to a Class B (1/4 inch in 10 feet) tolerance as defined in ACI 301. Maintain finish surface at edges of slab at same elevations as the rest of the top surface of the slab. Lay slabs to temporary screeds set level at the proper elevations. Slope slabs to drains where shown on Drawings.

F. Form mark-off lines with curved edging tool, neat and true to line, uniform throughout. Conform to markings shown on Drawings.

3.18 DEFECTIVE WORK

A. All concrete not in accordance with the intent of the Drawings and Specifications will be considered defective and may be ordered to be removed and replaced at the Contractor's expense.

END OF SECTION

SECTION 05101

METAL RAILING ASSEMBLIES & MISCELLANEOUS METALS

PART 1 - GENERAL REQUIREMENTS

1.01 GENERAL

A. The General Documents listed in the Index, including the General Conditions, Supplementary General Conditions, and General Requirements are hereby made an integral part of this section of the Specifications.

B. Equality of materials or articles other than those named or described in this section will be determined in accordance with the provisions of the Supplementary General Conditions.

C. This contractor shall review, in detail, all other sections of the Construction Specifications affecting the work of this section of the Specifications.

D. It shall be the overall responsibility of the General Contractor (selected for this project) to see that his/her Filed Sub-Bidders, non-Filed Sub-Bidders, specialty contractors and vendors receive the necessary documents and other information with which to undertake and complete this project in a first-class manner.

It shall be the responsibility of all Filed Sub-Bidders to completely familiarize themselves with the contract drawings and all sections of the contract specifications. Each Filed Sub-Bidder will also be responsible for seeing that any sub-sub-bidder(s) required to do work under their section become totally familiar with the requirements of the contract and the importance of planning and the coordinating their particular specialty into the work

1.02 SCOPE OF WORK

In general, the Contractor shall supply all labor, equipment, temporary protection, tools and appliances necessary for the proper completion of the work as required in the Specifications and in accordance with good construction practice. The work under this Section generally includes the following:

A. The scope of work consists of the installation (unless noted otherwise), of all materials to be furnished under this section and without limiting the generality thereof, consists of furnishing all labor, materials, hoisting, plant, transportation, equipment, appurtenances, and services necessary and/or incidental to the proper completion of all miscellaneous

and ornamental metal as shown on the drawings, as described in the specifications, or as reasonably inferred from either, in the opinion of the Architect, as being required. See paragraph 3.04 for schedule of work.

1. Aluminum Handrail Assemblies

B. For purpose of clarification, those items shown, detailed, designed and sized on structural drawings, excluding loose lintels, will be considered as structural steel. All other steel items will be considered Miscellaneous Metals.

C. Furnish, erect and maintain staging, including mechanical hoisting equipment, required for the performance of work specified herein. Staging over 8'-0" in height to be provided by the General Contractor.

D. Clean and restore all areas affected by the work.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Section 03300 – Cast-in-Place Concrete
B. Section 06100 – Rough Carpentry
C. Section 06200 – Finish Carpentry
D. Section 07101 – Waterproofing, Damp Proofing and Caulking
E. Section 09900 – Painting

1.04 QUALITY ASSURANCE

A. Single Source Responsibility: Manufacturer shall have single source responsibility for design, engineering, fabrications, delivery, preparation, installation, and adjusting of the railing systems and meet the following criteria:
   1. Design Engineer Qualifications: Structural engineer registered to practice in the State of Massachusetts.
   2. Installer Qualifications: A minimum of five (5) years of experience in manufacturing and installing railing systems.

B. Welder Qualifications: The personnel manufacturing the metal railing systems must be certified welders. Provide welder certifications.

C. Provide written welding procedure specifications, per AWS standard qualification procedures.

1.05 SUBMITTALS

A. Submittals shall be made in accordance with Division 1, Section 01300.

B. Submit manufacturer’s and fabricator’s certification that the furnished materials

meet or exceed the specification requirements. Including certified test results showing compliance with the specified performance criteria.

C. Prepare and submit shop drawings stamped by a Structural Engineer registered to practice in the State of Massachusetts with structural calculations, in accordance with the requirements of Section 01300 – Submittals, and performance requirements.

1. Take measurements in the field and verify all dimensions before submitting shop drawings.

2. Stamped Shop Drawings shall show in detail the various portions of the work, kind of materials, size of members, and methods of securing same together and to work of other trades.

3. Where provisions must be made for attaching other materials of work included under this section or where provisions must be made for assembly and installation of steel and misc. iron in the field, the required holes shall be provided in the shop. Unless such connections are to be welded, the sizes and locations of all such holes shall be shown on the shop drawings. Such holes shall be either drilled or punched and reamed.

4. Submit all samples for all railing materials and finishes as specified.

1.06 JOB CONDITIONS

A. The Contractor shall be responsible for securing and protecting materials, equipment and tools as well as partially completed construction from damage, vandalism or abuse.

B. The Contractor shall utilize skilled and experienced specialty workers to complete the work. Experienced trade workers shall be utilized for all aspects of the work.

C. The Contractor shall provide all masking, tarps and protection to prevent damage to adjacent construction, new or existing, including landscaped and paved areas.

D. The Contractor shall patch, repair and/or replace all adjacent materials and surfaces damaged as a result of the work, at no expense to the Owner. All repair or replacement work shall match the existing in kind and appearance.

E. Coordinate the work in this section with the work in other sections to assure the orderly progress of the work.

1.07 PRE-CONSTRUCTION CONFERENCE

A preconstruction conference will be held with a representative of the Owner, Architect and all involved trades to discuss all aspects of the project. The Contractor's field representative and foreman for the work shall be in attendance.

1.08 PROTECTION OF WORK AND MATERIAL STORAGE

A. Protection of work and materials storage shall be done in accordance with Section 01600.

B. Immediately upon delivery to job site, place materials in area protected from weather and construction operations. Trim materials shall be stored on a flat and level surface on a full shipping pallet. Store materials under a protective covering to prevent the accumulation of job site dirt and debris.

C. Handle materials to prevent damage to product edges and corners.

D. Deliver and store items in a manner to prevent cracking or stress of components, and to prevent mechanical damage or damage by the elements.

E. Items which become rusted or damaged because of non-compliance with these conditions will be cause for rejection, and such items shall be replaced without additional cost to the Owner.

F. Deliver items to site in ample time to avoid delay in job progress and at such times as to permit proper coordination of the various parts.

G. Deliver anchor bolts, washers and other anchorage in time for building-in by contractor. Deliver bolts, and other small items required for erection of work under this section, bundled with their respective items.

H. Hot-dip galvanized steel shall be marked with a stamp indicating ASTM number and weight of coating and shall be inspected for compliance with applicable ASTM requirements.

1.09 DIMENSIONS AND QUANTITIES

A. The Contractor shall verify dimensions and quantities in the field. The Project Plans and Drawings have been compiled from various sources and may not reflect the actual field conditions at the time of construction.

B. The Contractor is solely responsible for means and methods of construction. Make necessary investigations and take necessary precautions to properly supply, fabricate, and install work.

C. Unfamiliarity with existing project conditions will not be considered as a basis for

additional compensation.

D. In case of inconsistency between Drawings and Specifications or within either document, the better quality and/or greater quantity of work shall be provided, as determined by the Owner.

1.10 WARRANTY/GUARANTEES

A. Upon completion of the work, and prior to final payment, the Contractor shall submit a Guarantee of his work to be free of defect in materials and workmanship. This Guarantee shall be for a period of two (2) years, and shall be signed by a Principal of the Contractor's firm, and sealed if a corporation.

B. Provide manufacturer's warranty against defects in manufacturing, provide warranty for finishes of Stainless Steel.

C. Attention is directed to provisions of the General Conditions regarding guarantees and warranties for work under this contract.

D. Manufacturers shall provide their standard guarantees for work under this section. However, such guarantees shall be in addition to and not in lieu of all other liabilities which manufacturers may have by law or by other provisions of the Contract Documents.

1.11 CLEAN-UP

Clean-up shall be done in accordance with this Section, and with Section 01700 – Contract Close Out.

1.12 STANDARDS & CODES

A. The work shall conform to the codes and standards of the following agencies as further cited herein:

ASTM: American Society for Testing Materials, as published in "Compilation of ASTM Standards in Building Codes".

Federal Specifications as published by the United States Government, are available from General Services Administration, Specification and Consumer Information Distribution Service.

AWS: American Welding Society Code, as published in "Standard D1.1-72, Structural Welding Code".

SSPC: Steel Structures Painting Council, as published in Volumes 1 and 2 of

"SSPC Manual".

AWS D1.1 – Structural Welding Code Steel; 2008

AWS B2.1-84 – Welding Procedure and performance calculations

ASTM E894 – Standard Test Methods for anchorage of permanent metal railing systems and rails for buildings.

ASTM E935 – Standard Test Methods for performance of permanent metal railing systems and rails for buildings.

ASTM E985 – Specifications for permanent metal railing systems and rails for buildings.

B. Comply with all local and State Codes, including, but not limited to the IBC 2009 with Massachusetts Amendments, inclusive of Section 1607.7 Loads on handrails, guards, grab bars, seats, and vehicle barrier systems, Section 1012 Handrails, and Section 1013 Guards.

1.13 PERFORMANCE REQUIREMENTS

A. Handrail shall be designed to withstand without permanent deflection, the following loads:
   1. Top Rail:
      a. Concentrated load of 200 lb/ft applied at any point and any direction.
      b. Uniform load of 50 lb/ft applied horizontally and concurrently with uniform load of 100 lb/ft applied vertically downward.
      c. Concentrated and uniform loads above need not be assumed to act concurrently.
   2. Hand Rails (other than top rail):
      a. Concentrated load of 200 lb/ft applied in any point and any direction.
      b. Uniform Load of 50 1b/ft applied in any direction.
      c. Concentrated and uniform loads above need not be assumed to act concurrently.
   3. Infill Areas
      a. Concentrated horizontal load 50 lb/ft applied to 1 square foot at any point in the system, including intermediate rails, panels, pickets, cables, or other elements making up infill area. Loads need not be assumed to act concurrently with loads on top rails in determining stress on infill.

1.14 COORDINATION

A. The work shall be completely coordinated with the work of other sections. Verify dimensions and work of other trades which adjoin materials of this section before the installation of items herein specified.

B. Obtain all necessary templates and patterns required from other trades for the proper execution of the work of this section. Furnish to other trades all items included under this section that are to be built into structural or other work of other sections. Supervise installation of such built-in work.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Furnish new metals of best commercial quality for purposes specified. Provide metal free from pitting, seam marks, roller, marks, grinding marks, and stains.

B. Obtain railing systems from single manufacturer/fabricator. All components to be obtained from a single source to ensure consistent finish throughout the project.

C. Steel shapes shall conform to ASTM A36 for "Steel for Bridges and Building."

D. Steel pipe shall conform to ASTM A53, Schedule 40, full standard weight, galvanized for exterior work.

E. Aluminum extrusions shall be alloy 6063T5 for architectural applications and alloy 6061T6 for structural uses in conformance with US Fed. Spec. QQ-A-200.

F. Sheet aluminum shall be alloy 3003 or 5005-H14.

G. Castings shall be of uniform quality, free from blowholes, porosity, hard spots, shrinkage or other defects which would render then unfit for the service for which they are intended. Castings shall conform to dimensions indicated, with tolerance of plus or minus 1/8", except that dimensions of covers and openings to receive them shall be limited to plus or minus 1/16". Castings shall be smooth and well cleaned by shot blasting or other approved methods. Provide machined bearing or contact surfaces for joints where indicated or required. Castings shall be at least Class 25, conforming to ASTM A48 Specifications for Grey Iron Castings.

H. Fastenings:

1. Fastenings shall be of the same material as items to be fastened unless indicated or specified otherwise. Finish of fasteners exposed to view shall be of same quality as finish of materials fastened.

2. Except where otherwise specified under other sections, provide all non-corrosive expansion bolts, toggle bolts, lugs, shims, hook bolts, expansion shields, anchors, angle clips, plates and all other items of misc. iron shown on the drawings or required to complete all fastenings and to attach items of this section to work specified elsewhere.
   a. Provide concealed fasteners in all locations.

3. Rivet steel shall conform to ASTM A141.

4. Steel bolts and nuts shall conform to ASTM B6.

5. Filler electrodes or welding rods for steel shall conform to ASTM A233.

2.02 PAINTING & PROTECTION

A. Before shipment, painting for all ferrous metal surfaces, except prefinished, galvanized items and those obviously not to be painted, shall, before leaving the shop or manufacturing plant, be cleaned of all scale, rust, grease and other foreign matter, and shall be given one thorough shop coat Tnemec Series 59 Varaprime universal alkyd primer applied in the shop in accordance with manufacturer's specification. Damaged and abraded spots on concealed surfaces shall be touched up using the same paint as the used on the primer coat. Primer shall be compatible for finish painting at the building site selected from manufacturer's listed under "Painting Schedule" of Section 09900 - Painting.

B. Priming painting for non-ferrous metals shall be a product of a manufacturer approved by the Architect and shall be as follows:

Generic type: Two-part, Epoxy-Polymide
Minimum dry film thickness: 3.0 mils
Maximum dry to touch cure time: 2 hours
Minimum unmixed shelf life: 12 months

C. Damaged and abraded spots on hot-dipped galvanized steel shall be touched up with "ZRC" zinc paint as manufactured by ZRC Chemical Products Company, Quincy, MA. NOTE: Work required to be hot-dipped galvanized shall be shipped to the job site "unprimed" for visual inspection by the Architect.

D. Paint to protect dissimilar metals shall be a product approved by the Architect and shall be as follows:

Generic type:	Solvent based coal tar solution
Min. dry film thickness:	12 mils
Max. dry to touch:	3 hours
Min. shelf life:	12 months

2.03 GALVANIZING

A. All ferrous metal assemblies specified and/or noted as galvanized shall be hot-dip galvanized after fabrication. Hot dip galvanizing shall be nickelzine equal to "NiGalv" by Duncan Galvanizing Corporation or equal.

B. Galvanizing shall conform to ASTM A123 hot-dip process except as indicated below:

Steel pipe:	A120
Structural steel shapes:	A123
Assembled steel products:	A386
Steel headers:	A525

C. Submit to the Architect a notarized statement from the galvanizing plant certifying that all items and materials to be hot-dipped galvanized conform to the ASTM requirements listed herein. The statement shall include the list of items and material.

D. All galvanized items shall be inspected for compliance with these specifications and marked with the name of the galvanizer, ASTM number and weight of zinc-coating per unit area.

E. Galvanizing is required for, but not limited to, the following items and as scheduled later:

1. All ferrous metal exposed to the weather, to moisture or to conditions of continuing humidity.

2. All ferrous fasteners, clips, sleeves or accessories in contact with galvanized items.

3. All ferrous metal attached to, or embedded in, exterior wall masonry or concrete and membrane roofing or metal roofing and metal siding.

2.04 WELDING

A. The current issue of Standard Code of Arc and Gas Welding in Building Construction shall apply herein as though written out in fill.

B. Welding shall be continuous except where tack-welding is specifically permitted. Tack welding will not be permitted on exposed surfaces. All exposed welds shall be ground smooth.

C. Where structural joints are made by welding, the details of all joints, the techniques of welding employed, the appearance and quality of welds made, and the methods used to correct defective work shall conform to the requirements of the AISC and AWS Codes.

D. Welds shall be made only by welders who have previously been qualified by tests as prescribed in AWS "Standard Qualification Procedure" for the type of work required.

E. The use of a gas cutting torch in the field for correcting fabrication errors will be permitted on structural framing members only when the prior written approval of the Architect has been obtained for each specific condition.

2.05 HANDRAIL AND GUARDRAIL FABRICATION:

A. Provide members of type, size, style, and profile indicated unless otherwise required to support loads. Provide standard aluminum tube rails to greatest extent possible to meet applicable design load requirements. Provide continuous 1 ½" o.d. round handrails on both sides of all new exterior stairs and ramps complying with ADA requirements.
   1. Aluminum Railings: Provide Aluminum railing 1 ½" o.d. by Julius Blum, RDI (Railing Dynamics Inc.) or equal.

B. Return ends to walls with concealed anchors, except where detailed not to return to wall.

C. Provide brackets, flanges, fittings and anchors for connecting railings to railing, railings to floors, landing, stringers, and walls.
   1. Aluminum Railings: Provide Aluminum brackets #384 by Julius Blum, RDI (Railing Dynamics Inc.), or equal.

D. For Railing posts set in concrete, fabricate sleeves from alum. Tube not less than 6" long, and with an inside diameter not less than ½" greater than the outside diameter of post. Provide friction fit, removable covers designed to keep sleeves clean and hold top edge of sleeve ½" below finished surface of concrete.

PART 3 - EXECUTION

3.01 PREPARATION & INSPECTION

A. Verify measurements in the field, as required for work fabricated to fit job conditions.

B. Before starting work, examine adjoining work on which work is in any way dependent for perfect workmanship and fit. Do such corrective work to adjoining

work as may be necessary to make work in all respects perfect.

3.02 WORKMANSHIP

A. All items shall be installed plumb, straight, square, level and proper elevation, location and alignment with other work. All work shall be designed for adjustment to field variation, fitted with proper joints and intersections, adequately anchored in place.

B. Welding shall be performed only by qualified, skilled welders, in accordance with best practice, using equipment of characteristics suitable for work required to enable operator to produce work as specified. Electrodes of correct classification numbers for positions and other operating conditions in the intended work shall be used in accordance with manufacturer's instructions.

C. Parts for assembly shall be tack-welded prior to full welding. Joints shall be continuously welded, unless otherwise permitted by Architect. Stagger weld frames in order to reduce stress. Metal warped during welding shall be straightened and brought to true plane.

D. Dress welds smooth and flush where so indicated, or where necessary to remove sharp projections, particularly at handrails and ladders.

E. Provide necessary holes to specified depth for attaching hardware, other items, and anchorage for attachment to adjoining construction. Drill or punch holes of correct size required for anchor bolts or connections. Burned holes will not be acceptable. Drift pins may be used for aligning work but not for enlarging holes. Holes must e correctly located to permit bolts to be placed squarely and without offsets.

F. Assemblies specified to be hot-dipped galvanized shall be galvanized after fabrication. No drilling, welding or forming may take place after hot-dip galvanizing. Fasteners in assemblies shall be hot-dip galvanized. Where welding is required, weld with uncoated wire to prevent flux deposits. If coated wire is used, all flux residue must be thoroughly removed and bare white metal exposed. Where overlapping surfaces cannot be avoided and are welded, seal off contact area by welding all edges around contact area.

G. Finishes:

1. Ferrous Metal (Galvanized) to be field primed and painted, where noted.
2. Aluminum, clear anodized

H. Paint to protect dissimilar materials: Apply one coat of approved coal-tar only to those surfaces of metal which will be in direct contact with masonry, concrete or a

dissimilar metal.

3.03 INSTALLATION

A. Aluminum Railing Installation:

1. Each item of work shall be installed plumb, level, true to line and accurately fitted to adjoining work. Install supporting members, fastenings, framing, hangers, bracing, brackets, straps, bolts and angles required to set or connect work rigidly and properly to concrete masonry or other construction.

2. Place suitable anchors and expansion shields, as required for proper anchorage. Draw up bolts tight. Re-tighten bolts after assemblies are complete and in place.

3. Anchors and other connecting devices required in concrete or masonry shall be built-in as the work progresses. Fastening to wood plugs in masonry is not permitted.

4. Except where otherwise specified for particular work items, or where work is required to be built-in, secure to masonry with expansion or toggle bolts.
5. Drill holes in concrete or other materials of correct diameter and depth to properly accommodate expansion sleeves. If sleeves are improperly expanded after installation, remove same and install larger sleeves and bolts.

6. Set railings within sleeves using non-shrink anchoring cement grout for exterior applications, “SUPER POR-ROK” by CGM, Inc.

3.04 SCHEDULES

A. Note: It is not the intent herein to describe all the items of light iron and misc. metal work required for the building. All of the light iron and misc. metals not specified herein or under other sections, but shown on the drawings, shall be provided under this section at no additional cost to the Owner.

B. Handrails and Guardrails:
Install handrail and guardrail systems as indicated on approved shop drawings. Adjust handrails and guardrails prior to final anchoring and grouting. Plumb posts in all directions. Provide 1 ½” of clearance between walls and handrails unless otherwise indicated, or if not indicated, not more than 6 ft – 0 in on center, or as required to support loads.

C. Note: Take care to include the following misc. metal items unless otherwise specified under related sections:

1. Shelf angles, hot-dip galvanized steel (as required for all recessed cabinets, louver openings, valances, fascias, window framing, rolling door framing, counters, etc.)

2. Sleeves, steel as required.

3. Misc. anchor bolts, steel.

4. Appropriate anchors, fasteners, sockets and accessories required to complete the proper installation of all items of this section, whether indicated or not.

5. Misc. steel structural shapes.

6. Misc. light metal shapes, including closure plates, angles and brackets.

END OF SECTION

SECTION 06100

ROUGH CARPENTRY

PART 1 - GENERAL REQUIREMENTS

1.01 GENERAL

A. The General Documents listed in the Index, including the General Conditions, Supplementary General Conditions, and General Requirements are hereby made an integral part of this section of the Specifications.

B. Equality of materials or articles other than those named or described in this section will be determined in accordance with the provisions of the Supplementary General Conditions.

C. This contractor shall review, in detail, all other sections of the Construction Specifications affecting the work of this section of the Specifications.

D. It shall be the overall responsibility of the General Contractor (selected for this project) to see that his/her Filed Sub-Bidders, non-Filed Sub-Bidders, specialty contractors and vendors receive the necessary documents and other information with which to undertake and complete this project in a first-class manner.

It shall be the responsibility of all Filed Sub-Bidders to completely familiarize themselves with the contract drawings and all sections of the contract specifications. Each Filed Sub-Bidder will also be responsible for seeing that any sub-sub-bidder(s) required to do work under their section become totally familiar with the requirements of the contract and the importance of planning and the coordinating their particular specialty into the work

1.02 SCOPE

A. Section Includes:

1. Carpentry work not specified as part of other sections and which generally is not exposed, except as otherwise indicated.

2. Rough carpentry for:

   a. Wood Framing

   b. Misc. Lumber for attachment and support of other work

   c. Wood Furring

d. Sheathing

e. Construction Panels for misc. uses

f. Blocking for toilet accessories and fiberglass wall panels.

h. Blocking for MEP systems

3. Preservative treatment

B. Related Sections:

1. Finish Carpentry: Section 06200 (includes exterior trim)

C. Reference Drawings: Work shall be performed as shown on drawings listed on the "***Schedule of Drawings***" found at the beginning of this manual after the Table of Contents.

D. See Structural Notes on Drawings.

1.03 REFERENCES

A. APA AFG-01: Adhesive for Filed-Gluing Plywood to Wood Framing; American Plywood Association, 1984.

B. APA Form E30L: Residential and Commercial; American Plywood Association, 1990.

C. APA PRP-108: Performance Standard and Policies for Structural-Use Panels; American Plywood Association, 1988 (revised 1989).

D. ASTM A153-82(87): Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 1982 (reapproved 1987).

E. AWPA C27-91: Plywood - Fire-Retardant Treatment by Pressure Processes; American Wood-Preservers' Association, 1991.

F. AWPB LP-2-88: American Wood Preservers Bureau Quality Control and Inspection Procedures for Softwood Lumber, Timber and Plywood Pressure Treated with Waterborne Preservatives for Above Ground Use, 1988.

G. National Design Specification for Wood Construction; National Forest Products Association (NFPA), 1986 (with 1990 revisions).

H. NBS PS 1-83: Construction and Industrial Plywood; U.S. Department of Commerce, National Bureau of Standards, 1983 (with 1984 revisions).

I. NBS PS 20-70(86): American Softwood Lumber Standard; U.S. Department of Commerce, National Bureau of Standards, 1970 (amended 186).

J. NFPA WCD #1: Manual for Wood Frame Construction; National Forest Products Association (NFPA), 1988.

1.04 SUBMITTALS

A. Framing Connectors and Supports: Submit manufacturer's standard data demonstrating compliance with building code requirements.

B. Material Certificates: For dimension lumber specified by minimum allowable unit stress, submit:

1. Statement of species and grade selected for each application.

2. Grading agency's grading rules showing allowable design values accepted by the Board of Review of American Lumber Standards Committee.

C. Treated Wood: Treating plant's instructions for use, including storage, cutting and finishing.

1. Pressure preservative treatment: Treatment plant's certification of compliance with specified standards and stating process employed and preservative retention values.

a. UC2: Interior potentially damp location.
b. UC3B: Exterior not in contact with ground.
c. UC4A: Exterior in contact with ground.

1.05 QUALITY ASSURANCE

A. Lumber: Comply with NBS PS-20 and approved grading rules and inspection agencies.

B. Grade Stamps for Concealed Lumber: Each piece of lumber, applied for inspection agency and showing compliance with each specified requirement.

C. Construction Panels: Comply with NBS PS-1 where veneer plywood is specified; comply with APA PRP-108 where APA rated panels are specified; bearing APA trademark showing compliance with each specified requirement.

1.06 DELIVERY, STORAGE AND HANDLING

A. Protect wood products against moisture and dimensional changes. Support stacks at several uniformly spaced points to prevent deformation. Store stacks raised above ground. Cover to protect from rain and snow. Select and arrange cover to allow air circulation under and all around stacks to prevent condensation. Maintain and restore displaced coverings. Remove from the site any wood products that have been subjected to moisture or that do not comply with the specified moisture requirements.

PART 2 - PRODUCTS

2.01 DIMENSION LUMBER

A. Size: Provide nominal sizes indicated, complying with NBS PS-20 except where actual sizes are specifically required.

1. Surfacing: Dressed lumber (S4S).
2. Moisture Content: Kiln-dry or MC15 (15% maximum moisture content).

B. Framing: 2x2 through 4x4 and 2x6:

1. Provide lumber of any species and grade having the following design values in accordance with NFPA National Design Specification for Wood Construction:

a. Fb-single (minimum extreme fiber stress in bending): 1150 PSI
b. E (minimum modulus of elasticity): 1,300,000 PSI

C. Joist and Small Beam Framing: 2x6 through 4x16:

1. Provide lumber of any species and grade having the following design values in accordance with NFPA National Design Specification for Wood Construction:

a. Fb-single (minimum extreme fiber stress in bending: 1,000 PSI.
b. E (minimum modulus of elasticity): 1,200,000 PSI

D. Rafter Framing: 2x6 through 4x16:

1. Provide lumber of any species and grade having the following design values in accordance with NFPA National Design Specification for Wood Construction:

a. Fb-single (minimum extreme fiber stress in bending: 1000 PSI.
b. E (minimum modulus of elasticity): 1,200,000 PSI

E. Misc. Lumber: Provide dimension lumber and boards necessary for the support of work specified in other sections, whether or not specifically indicated, and including but not

limited to blocking, nailers, etc.:

1. Moisture Content: 19% maximum (S-dry)
2. Lumber: S4S, No. 2 or standard grade
3. Boards: Construction, 2 common or No. 2 grade

2.02 ENGINEERED LUMBER PRODUCTS (as applicable)

A. Laminated Veneer Lumber: Engineered lumber consisting of graded veneers laminated with waterproof adhesive and densified, and sawn into nominal sizes and dimension lumber.

1. Minimum Properties: E=1,900,000; f(b)=2,600 PSI

B. Metal Connectors: Manufactured connectors designed specifically for use with products specified above.

2.03 CONSTRUCTION PANELS

A. Roof Sheathing: N.I.C.

B. Construction Panels/Plywood: Misc. uses.

1. Electrical/telephone panel backer: APA rated sheathing, Exposure 1, Treating Grade fire-retardant treated.

C. Wall Sheathing:

1. Plywood Sheathing:

a. Grade: C-D Exposure I

2. 1/2" thick.

2.04 MISC. MATERIALS

A. Fasteners: Provide, as required by applicable codes and as otherwise indicated.

1. Provide fasteners with a hot-dip zinc coating (ASTM A153) for treated lumber and where wood is in ground contact, subjected to high relative humidity, or exposed to weather.

B. Framing Connectors and Supports: Prefabricated, formed steel units; hot-dip galvanized finish unless otherwise indicated; type and size as required; approved by applicable

codes.

1. Manufacturer's: Products of the following manufacturers, provided they comply with requirements of the contract documents, will be among those considered acceptable:

    a. Cleveland Steel Specialty Company

    b. Harlen Metal Products, Inc.

    c. Simpson Strong-Tie Company, Inc.

    d. Teco

    e. United Steel Products Company

C. Construction Panel Adhesive: Meeting the requirements of APA performance specification SFG-01.

2.05 WOOD TREATMENT BY PRESSURE PROCESS

A. Above Ground Timber: AWPB LP-2 (waterborne preservatives).

1. Kiln-dried after treatment to 19% maximum moisture content for lumber and 18% for plywood.

2. Treat the following:

    a. Wood in contact with roofing, flashing or waterproofing

    b. Wood in contact with masonry or concrete

    c. Other members indicated.

3. Fire-retardant treated plywood: AWPA C27.

2.06 AIR INFILTRATION BARRIER

A. The following products, provided they comply with requirements of the contract documents, will be among those considered acceptable:

1. "Tyvek", E.I. duPont deNemours & Company, Inc. or approved equal.

2.07 CONSTRUCTION PANEL ADHESIVE

A. Meeting the requirements of APA performance specification AFG-01.

PART 3 - EXECUTION

3.01 INSTALLATION - GENERAL

A. Arrange work to use full length pieces except where lengths would exceed commercially available lengths. Discard pieces with defects that would lower the required strength or appearance of the work.

B. Cut and fit members accurately. Install plumb and true to line and level.

C. Fasten carpentry in accordance with applicable codes and recognized standards.

D. Use fasteners of appropriate type and length. Predrill members when necessary to avoid splitting wood or masonry units.

3.02 MISC. CARPENTRY

A. Provide misc. blocking, nailers, grounds, and framing as shown and as required for support of facing materials, fixtures, specialty items, and trim. Cut and shape to the required size. Provide in locations required by other work.

1. Block all bearing and exterior walls at mid-height and as noted on the drawings
2. Provide 3/4" plywood backing for grab bar installation at barrier free baths

B. Use countersunk fasteners appropriate to applied loading.

3.03 WOOD FURRING

A. Install wood furring plumb and level; shim as necessary to bring true to plane; install closure strips at ends perpendicular to main furring direction.

3.04 WOOD FRAMING - GENERAL

A. Comply with sizes, spacing, and configurations indicated. Where not specifically indicated, comply with applicable codes and NFPA "Manual for Wood Frame Construction". Splice members only where specifically indicated or approved.

B. Space fasteners as indicated. Where not specifically indicated, comply with applicable codes and the "Recommended Nailing Schedule" of NFPA "Manual for Wood Frame Construction" and "National Design Specification for Wood Construction".

C. Fire Stops: Stops of nominal 2" thick lumber in the following typical locations, and where otherwise indicated.

1. Each floor level and ceiling of top story.

2. Concealed vertical spaces over 10' in height occurring in stud walls and partitions, including furred walls.

3. Interconnections of concealed vertical and horizontal spaces such as at soffits, drop ceilings and cove ceilings.

D. Stud Framing:

1. Plates: Double bottom plate and double top plate, 2" nominal by width of studs.

2. Corners and Intersections: Three of more studs.

   a. At walls and partitions more than 8' high, install continuous horizontal blocking of same width as studs at mid-height.

3. Openings: Frame with two or more studs at each jamb. Support headers on cripple studs.

   a. Non-load-bearing partitions: Double jamb studs and headers at least 4" deep for openings up to 3' wide, and at least 6" deep for openings over 3' wide.

   b. Load-bearing partitions: Double jamb studs for openings up to 6' wide, triple jamb studs for openings over 6' wide; headers in accordance with NFPA "Manual for Wood Frame Construction".

3.05 CEILING JOIST FRAMING

A. At openings, install double headers and trimmers of depth equal to rafters and supported with metal framing hangars.

B. Install new ceiling joists/collar beams as indicated on the structural drawings.

3.06 INSTALLATION OF CONSTRUCTION PANELS

A. General: Install construction panels in accordance with APA Design/Construction Guide "Residential and Commercial".

B. Employ the following fastening methods:

1. Screw subflooring to framing unless or as directed on drawings. Nails and staples are not permitted.

   a. Provide solid blocking under panel edges other than intact tongue and groove edges.

2. Nail wall sheathing to framing. Staples not permitted.

3. Nail underlayment to subflooring. Staples not permitted.

   a. Where underlayment will receive resilient flooring, fill and sand edge joints and any splits, open areas, or surface roughness.

4. Nail or screw miscellaneous plywood panels to supports.

END OF SECTION

SECTION 06160

SHEATHING AND WEATHER BARRIER

PART 1 – GENERAL REQUIREMENTS

1.01 GENERAL

A. The General Documents listed in the Index, including the General Conditions, Supplementary General Conditions, and General Requirements are hereby made an integral part of this section of the Specifications.

B. Equality of materials or articles other than those named or described in this section will be determined in accordance with the provisions of the Supplementary General Conditions.

C. This contractor shall review, in detail, all other sections of the Construction Specifications affecting the work of this section of the Specifications.

D. It shall be the overall responsibility of the General Contractor (selected for this project) to see that his/her Filed Sub-Bidders, non-Filed Sub-Bidders, specialty contractors and vendors receive the necessary documents and other information with which to undertake and complete this project in a first-class manner.

It shall be the responsibility of all Filed Sub-Bidders to completely familiarize themselves with the contract drawings and all sections of the contract specifications. Each Filed Sub-Bidder will also be responsible for seeing that any sub-sub-bidder(s) required to do work under their section become totally familiar with the requirements of the contract and the importance of planning and the coordinating their particular specialty into the work

1.02 SCOPE

In general, the Contractor shall supply all labor, equipment, temporary protection, tools and appliances necessary for the proper completion of the work as required in the Specifications and in accordance with good construction practice. The work under this Section generally includes the following:

A. Section Includes:

1. Wall sheathing.

2. Weather Barrier

3. Flexible Flashing at openings/penetrations in sheathing.

4. Joint Tape at Plywood Air Barrier

5. Structural Shear Wall Construction

B. Clean and restore all areas affected by the work.

1.03 ALTERNATES: There are no alternates associated with Section 06160.

1.04 RELATED WORK SPECIFIED ELSEWHERE

A. Section 06100 – Rough Carpentry
B. Section 06200 – Finish Carpentry
C. Section 07310 – Flashing
D. Section 07460 – Siding
E. Section 08300 - Doors
F. Structural Drawings

1.05 SUBMITTALS

A. Submittals shall be made in accordance with Division 1, Section 01300.

B. Submit manufacturer's and fabricator's certification that the furnished materials meet or exceed the specification requirements. Including certified test results showing compliance with the specified performance criteria.

1.06 JOB CONDITIONS

A. The Contractor shall be responsible for securing and protecting materials, equipment and tools as well as partially completed construction from damage, vandalism or abuse.

B. The Contractor shall utilize skilled and experienced specialty workers to complete the work. Experienced trade workers shall be utilized for all aspects of the work.

C. The Contractor shall provide all masking, tarps and protection to prevent damage to adjacent construction, new or existing, including landscaped and paved areas.

D. The Contractor shall patch, repair and/or replace all adjacent materials and surfaces damaged as a result of the work, at no expense to the Owner. All repair or replacement work shall match the existing in kind and appearance.

E. Coordinate the work in this section with the work in other sections to assure the orderly progress of the work.

1.07 PRE-CONSTRUCTION CONFERENCE

A preconstruction conference will be held with a representative of the Owner, Architect and all involved trades to discuss all aspects of the project. The Contractor's field representative and foreman for the work shall be in attendance.

1.08 PROTECTION OF WORK AND MATERIAL STORAGE

A. Protection of work and materials storage shall be done in accordance with Section 01600.

B. Immediately upon delivery to job site, place materials in area protected from weather and construction operations. Store materials under a protective covering to prevent the accumulation of job site dirt and debris.

C. Handle materials to prevent damage to product edges and corners.

D. Protect wood products against moisture and dimensional changes. Support stacks at several uniformly spaced points to prevent deformation. Store stacks raised above ground. Cover to protect from rain and snow. Select and arrange cover to allow air circulation under and all around stacks to prevent condensation. Maintain and restore displaced coverings. Remove from the site any wood products that have been subjected to moisture or that do not comply with the specified moisture requirements.

1.09 DIMENSIONS AND QUANTITIES

A. The Contractor shall verify dimensions and quantities in the field. The Project Plans and Drawings have been compiled from various sources and may not reflect the actual field conditions at the time of construction.

B. The Contractor is solely responsible for means and methods of construction. Make necessary investigations and take necessary precautions to properly supply, fabricate, and install work.

C. Unfamiliarity with existing project conditions will not be considered as a basis for additional compensation.

D. In case of inconsistency between Drawings and Specifications or within either document, the better quality and/or greater quantity of work shall be provided, as determined by the Owner.

1.10 WARRANTY/GUARANTEES

A. Upon completion of the work, and prior to final payment, the Contractor shall submit a Guarantee of his work to be free of defect in materials and workmanship. This Guarantee shall be for a period of two (2) years, and shall be signed by a Principal of the Contractor's firm, and sealed if a corporation.

B. Provide Manufacturer's Standard form in which manufacturer agrees to repair or replace components of sheathing system that fail due to manufacturing defects within specified warranty period.

1. For subflooring applications, manufacturer shall warrant that no additional panel joint sanding or preparation shall be required for a period not to exceed 300 days of weather exposure during construction.

2. Warranty Period – 15 years from the date of substantial completion.

1.11 CLEAN-UP

Clean-up shall be done in accordance with this Section, and with Section 01700 – Contract Close Out.

1.12 REFERENCES

A. APA AFG-01: Adhesive for Filed-Gluing Plywood to Wood Framing; American Plywood Association, 1984.

B. APA Form E30L: Residential and Commercial; American Plywood Association, 1990.

C. APA PRP-108: Performance Standard and Policies for Structural-Use Panels; American Plywood Association, 1988 (revised 1989).

D. ASTM A153-82(87): Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 1982 (reapproved 1987).

E. AWPA C27-91: Plywood - Fire-Retardant Treatment by Pressure Processes; American Wood-Preservers' Association, 1991.

F. AWPB LP-2-88: American Wood Preservers Bureau Quality Control and Inspection Procedures for Softwood Lumber, Timber and Plywood Pressure Treated with Waterborne Preservatives for Above Ground Use, 1988.

G. National Design Specification for Wood Construction; National Forest Products

Association (NFPA), 1986 (with 1990 revisions).

H. NBS PS 1-83: Construction and Industrial Plywood; U.S. Department of Commerce, National Bureau of Standards, 1983 (with 1984 revisions).

I. NBS PS 20-70(86): American Softwood Lumber Standard; U.S. Department of Commerce, National Bureau of Standards, 1970 (amended 186).

J. NFPA WCD #1: Manual for Wood Frame Construction; National Forest Products Association (NFPA), 1988.

1.13 QUALITY ASSURANCE

A. Lumber: Comply with NBS PS-20 and approved grading rules and inspection agencies.

B. Grade Stamps for Concealed Lumber: Each piece of lumber, applied for inspection agency and showing compliance with each specified requirement.

C. Construction Panels: Comply with NBS PS-1 where veneer plywood is specified; comply with APA PRP-108 where APA rated panels are specified; bearing APA trademark showing compliance with each specified requirement.

PART 2 - PRODUCTS

2.01 WOOD PANEL PRODUCTS, GENERAL

A. Plywood: Thickness and Type and specified on the Structural Drawings.

2.02 WALL SHEATHING

A. Plywood Wall Sheathing: Thickness and Type as Specified on Structural Drawings

2.03 WEATHER BARRIER

1. Manufacturer: DuPont Tyvek CommercialWrap Weather Barrier Membrane System:

a. Weather Barrier: Spunbonded polyolefin, non-woven, non-perforated, weather barrier.

Performance Characteristics:

i. Thickness: 7.1 mil

ii. Air Penetration: 0.001 cfm/ft^2 at 1.57 psf, when tested in accordance with ASTM E2178. Type I per ASTM E1677. ≤0.04 cfm/ft^2 at 75 Pa, when tested in accordance with ASTM E2357.

iii. Water Vapor Transmission: 28 perms, when tested in accordance with ASTM E96, Method B.

iv. Water Penetration Resistance: 280 cm when tested in accordance with AATCC Test Method 127.

v. Basis Weight: 2.7 oz/yd^2, when tested in accordance with TAPPI Test Method T-410.

vi. Air Resistance: Air infiltration at > 1500 seconds, when tested in accordance with the TAPPI test method T-460.

vii. Tensile Strength: 38/35 lbs/in., when tested in accordance with ASTM D882, Method A.

viii. Tear Resistance: 12/10 lbs., when tested in accordancw tiwh ASTM D 1117.

b. Seam Tape: DuPont Tyvek Tape for Commercial Applications.

c. Flashing: DuPont FlexWrap, DuPont FlexWrap NF, DuPont StraightFlash

d. Fasteners: DuPont Tyvek Wrap Caps: #4 nails with large 1" plastic cap fasteners, or 1" plastic cap staples with leg length sufficient to achieve a minimum penetration of 5/8 inch into the wood stud.

2. Manufacturer: James Hardie Building Products, Inc., "HardieWrap" Weather Barrier Membrane System:

a. Weather Barrier: Spunbonded polyolefin, non-woven, non-perforated, weather barrier. Film: Microtech Coating with micropores to balance water holdout and breathability.

Performance Characteristics:

i. Thickness: 11 mil (0.28 mm) .

ii. Air Penetration: 0.001 cfm/ft^2 at 75 Pa, when tested in accordance with ASTM E2178. Type I per ASTM E1677. ≤0.04 cfm/ft^2 at 75 Pa, when tested in accordance with ASTM E2357.

iii. Water Vapor Transmission: 15 perms, when tested in accordance with ASTM E96A.

iv. Water Penetration Resistance: 128 inches when tested in accordance with AATCC Test Method 127.

v. Basis Weight: 19.4 lbs/1000 ft^2

vi. Air Resistance: Air infiltration at > 1800 seconds/100cc, when tested in accordance with the TAPPI test method T-460.

vii. Tear Resistance: 15 to 18 lbs., when tested in accordance with ASTM D 1117.

viii. UV Stability: up to 180 days

b. Seam Tape: Hardie Wrap Tape for Commercial Applications.

c. Flashing: Hardie Wrap Pro-Flashing, Hardie Wrap Flex Flashing

d. Fasteners: 1" plastic cap staples with leg length sufficient to achieve a minimum penetration of 5/8 inch into the wood stud.

2.05 FASTENERS

A. General: Provide fasteners of size and type indicated.

1. For wall and roof sheathing panels, provide fasteners with corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.

2. Refer to Structural Drawings for fastener types, spacing and location requirements.

2.06 SEAM TAPE AT PLYWOOD SHEATHING (AIR BARRIER)

A. General: Provide sealed joints, seams, and corners at plywood sheathing panels at walls and roof to provide a continuous air barrier meeting the requirements of IECC 2012, Sections C402.4.1.1 and C402.4.1.2.1.

B. Provide peel and stick seam tape: "3M All Weather Flashing Tape – 8067", manufactured by 3M Industrial Adhesives and Tapes Division, or Architect Approved Equal.

1. Tape Thickness: 9.9 mils
2. Adhesion to OSB: ASTM D-3330 per AAMA 711-05

2.07 FLEXIBLE FLASHING AT WINDOW, DOOR AND LOUVER OPENINGS:

A. Refer to Section 07310 – Roofing and Flashing for Product Specification for Flexible Flashing.

PART 3 – EXECUTION

3.01 INSTALLATION - GENERAL

A. Securely attach to substrate by fastening as indicated, complying with the following:

1. NES NER-272 for power-driven fasteners.
2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."

B. Coordinate sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that exclude exterior moisture.

C. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

3.02 WOOD STRUCTURAL PANEL INSTALLATION

A. General: Comply with applicable recommendations in APA Form No. E30K, "APA Design/Construction Guide: Residential & Commercial."

1. Comply with "Code Plus" installation provisions in guide referenced in paragraph above.

B. Fastening Methods: Fasten panels as indicated below:

1. Wall Sheathing:

a. Nail to wood framing. Nail guns shall be set to provide a fastener head flush with the face of the sheathing panel. Recessed fastener heads and dimpled sheathing panels will not be accepted.
b. Screw to cold-formed metal framing.
c. Space panels 1/8 inch apart at edges and ends.
d. Install fasteners 3/8 inch to 1/2 inch from panel edges.
e. Space fasteners in compliance with requirements of authority having jurisdiction. **Refer to Structural Drawings for required fastening patterns and locations of shear walls and framed interior and exterior partitions.**

3.03 WEATHER BARRIER MEMBRANE JOINT-AND-PENETRATION

A. Install Weather Barrier Membrane according to manufacturer's written instructions.

B. Apply seam tape, compatible with weather barrier membrane system, to **completely seal all joints** in weather barrier and at all items penetrating weather barrier.

3.04 FLEXIBLE FLASHING INSTALLATION

A. Apply flexible flashing where indicated to comply with manufacturers written instructions.

B. After flashing has been applied, roll surfaces with a hard rubber or metal roller to ensure that flashing is fully adhered to substrate.

3.05 SEAM TAPE INSTALLATION AT PLYWOOD SHEATHING (AIR BARRIER):

A. Install seam tape at all joints, seams, corners in the air barrier per manufacturer's instructions.

B. Seal all penetrations in the non-roof areas of the air barrier per manufacturer's instructions.

C. Provide tape thickness appropriate for each condition, allow for a minimum of 2" of tape on each side of seam, or on each substrate where sealing two different materials, surfaces, planes.

D. Apply seam tape, following tape application, using a roller (rubber, wood, or steel "J" roller) apply sufficient pressure along the entire tape surface to ensure a continuous seal and to eliminate trapping air beneath the tape.

END OF SECTION

SECTION 06200

FINISH CARPENTRY

PART 1 - GENERAL REQUIREMENTS

1.01 GENERAL

A. The General Documents listed in the Index, including the General Conditions, Supplementary General Conditions, and General Requirements are hereby made an integral part of this section of the Specifications.

B. Equality of materials or articles other than those named or described in this section will be determined in accordance with the provisions of the Supplementary General Conditions.

C. This contractor shall review, in detail, all other sections of the Construction Specifications affecting the work of this section of the Specifications.

D. It shall be the overall responsibility of the General Contractor (selected for this project) to see that his/her Filed Sub-Bidders, non-Filed Sub-Bidders, specialty contractors and vendors receive the necessary documents and other information with which to undertake and complete this project in a first-class manner.

It shall be the responsibility of all Filed Sub-Bidders to completely familiarize themselves with the contract drawings and all sections of the contract specifications. Each Filed Sub-Bidder will also be responsible for seeing that any sub-sub-bidder(s) required to do work under their section become totally familiar with the requirements of the contract and the importance of planning and the coordinating their particular specialty into the work.

1.02 SCOPE

A. Section Includes:

1. Interior Wood Trim and Millwork
2. Exterior Trim as indicated on Drawings
3. Clapboard Siding
4. Composite Decking
5. Fiberglass Wall Panels

B. Related Sections:

1. Section 06100 – Rough Carpentry
2. Section 09900 - Painting

C. Products installed but not furnished under this section:

1. Section 08300 – Doors
2. Section 08700 - Hardware
3. Section 05101 – Metal Railings & Misc. Metal

D. Reference Drawings: Work shall be performed as shown on drawings listed on the ***"Schedule of Drawings***" found at the beginning of this manual after the Table of Contents.

1.03 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer: Provide millwork only from manufacturers complying with AWI Standards producing similar work for min. 5 years.

2. Installer: Employ only experienced personnel for fabrication and installation of millwork.

B. Design Criteria:

1. Reference Standards:

a. Refer to AWI Quality Standards for definition of premium, custom or economy.

b. Any item not given specific quality grade shall be custom grade.

1.04 SUBMITTALS

A. Provide submittals to form defined in Section 01300 - Submittals.

1. Shop Drawings:

a. Submit shop drawings showing detail construction of woodwork, based on drawings and modified or revised as may be required to achieve intended structural character.

b. Details: Draw at scale of min. 3" = 1'.

2. Samples: Min. 2' long x full width of item with finish on one side.

3. Certifications: Provide certificates for treated materials.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Solid Lumber Stock:

1. General:

a. Comply with AWI 100, plain sawn, S4S and work to shapes indicated unless otherwise indicated.

b. Exposed - Painted Finish: Grade II, Poplar for hardwood, white pine or white wood for softwood.

2. Preservative Treatment: Exterior Woodwork: Refer to Section 06100 - Rough Carpentry.

3. Exterior Cedar Stock: Western Red Cedar, Clear. Sizes indicated on Drawings.

B. Plywood: Types, grades and cores as indicated.

1. Medium density overlaid plywood: NBS PS 1, Special Exterior MDO

2. Plywood in concealed locations: Comply with NBS PS 1, Grade C minimum.

3. On exterior of building use exterior type plywood.

C. Medium Density Fiberboard: ANSI A208.2.

D. Fasteners:

1. Wood Screws: ANSI B18, type, size and material as required for condition of use.

2. Bolts & Nuts: ANSI B18 and ASTM A307, type, size and material as required.

3. Exterior Fasteners: ASTM A153, hot-dip galvanized or stainless steel only – No substitutions at trim locations.

E. Exterior Running Trim:

1. All exterior trim, casings, etc. to be cellular PVC.

2. All fasteners shall be stainless steel nails of a design suitable to the approved manufacturer's directives.

3. All gaps and nail holes to be addressed with compatible fillers and caulks. Installation shall be as per the approved manufacturer's directives.

F. Wood Clapboard Siding

1. Siding shall be clear vertical grain red cedar clapboards, ½" x 6", primed. Exposure as indicated on drawings.

2. Installation shall be with stainless steel nails and as per approved siding manufacturer's directives.

G. Composite Decking

1. Composite Decking shall be Trex "Transcend Series"; Color - "Gravel Path" to be confirmed by Owner and Architect, as manufactured by Trex Company, Inc.. (No substitution). Provide epoxy coated stainless steel screws.

2. Installation shall be with fasteners and methods as per approved manufacturer's directives.

H. Fiberglass Wall Panels

1. Fiberglass wall panels shall e Glaspond-P .09" thick, 4' x 8' & 4' x 10' sheets as manufactured by Crane Kemlite or approved equal. Color as selected by Owner.

2. Fiberglass panels shall be installed as per the approved manufacturer's directives to result in minimum of joints. Install manufacturer's PVC moldings at edges and joints as recommended by manufacturer.

2.02 FABRICATION

A. Standing & Running Trim:

1. Lumber:

a. Opaque Finish: AWI 300, custom grade, using softwood lumber.

2. Exterior & Interior Plywood:

b. Opaque Finish: AWI 200, Grade II, using softwood face veneer.

3. Standing Trim: Items of fixed length to include but not be limited to:
   a. Door casings
   b. Apron

4. Running Trim: Items of continuing length to include but not be limited to:
   a. Miscellaneous running trim at locations noted

PART 3 - EXECUTION

3.01 PREPARATION

A. Examine substrates and adjoining construction, and conditions under which work will be installed.

B. Do not proceed with work until conditions detrimental to proper and timely completion of work have been corrected.

3.02 INSTALLATION

A. General:

1. Verify dimensions before proceeding and obtain measurements at site for work required to be accurately fitted to other construction.

2. Coordinate work with other trades affected by this installation.

3. Give particular attention to work of supporting and attachment items so as not to delay progress.

4. Condition wood materials to average prevailing humidity conditions before installing.

5. Back prime lumber for painted finish exposed on exterior or where high moisture and humidity exists in interior.

6. Comply with Section 09900 - Painting for primers and finish coatings.

B. Standing & Running Trim:

1. Install with minimum number of joints, using full-length pieces.

2. Stagger joints in adjacent or related manner.

3. Cope at returns, miter at corners for tight fitting joints to have full surface contact.

4. Use butt joints for end-to-end joints.
5. Make exterior joints water-resistant by tight fitting.
6. Apply flat grain lumber with bark side exposed to weather.

3.03 FIELD QUALITY CONTROL

A. Tolerances:

1. Plumb & Level: 1/8" in 8'.
2. Offset in Surface Alignment: Max. 1/16".
3. Offset in Revealed Adjoining Surfaces: Max. 1.8".

END OF SECTION

SECTION 06670

CELLULAR PVC MILLWORK & TRIM

PART 1 – GENERAL REQUIREMENTS

1.01 GENERAL

A. The General Documents listed in the Index, including the General Conditions, Supplementary General Conditions, and General Requirements are hereby made an integral part of this section of the Specifications.

B. Equality of materials or articles other than those named or described in this section will be determined in accordance with the provisions of the Supplementary General Conditions.

C. This contractor shall review, in detail, all other sections of the Construction Specifications affecting the work of this section of the Specifications.

D. It shall be the overall responsibility of the General Contractor (selected for this project) to see that his/her Filed Sub-Bidders, non-Filed Sub-Bidders, specialty contractors and vendors receive the necessary documents and other information with which to undertake and complete this project in a first-class manner.

It shall be the responsibility of all Filed Sub-Bidders to completely familiarize themselves with the contract drawings and all sections of the contract specifications. Each Filed Sub-Bidder will also be responsible for seeing that any sub-sub-bidder(s) required to do work under their section become totally familiar with the requirements of the contract and the importance of planning and the coordinating their particular specialty into the work

1.02 SCOPE

In general, the Contractor shall supply all labor, equipment, temporary protection, tools and appliances necessary for the proper completion of the work as required in the Specifications and in accordance with good construction practice. The work under this Section generally includes the following:

A. Provide new cellular Exterior and Interior PVC trim, panels, ceilings, fascias, moldings, signage mounting blocks, including for signage provided and installed by Owner, and finished mounting blocks for exterior plumbing, electrical and mechanical exposed wall mounted panels in custom and standard profiles and sizes as indicated on the drawings and as specified herein and as required to properly complete the work.

B. Clean and restore all areas affected by the work.

1.03 RELATED WORK SPECIFIED ELSEWHERE

a. Section 06100 – Rough Carpentry
b. Section 06160 – Sheathing and Weather Barrier
c. Section 06200 – Finish Carpentry
d. Section 07310 – Flashing
e. Section 07100 – Waterproofing, Damp Proofing and Caulking
f. Section 09900 – Painting

1.04 SUBMITTALS

A. Attention is directed to Specification Section 01300 Submittals.

B. Attention is directed to Specification Section 01630 OR Equals

C. Submit manufacturer's and fabricator's certification that the furnished materials meet or exceed the specification requirements. Including certified test results showing compliance with the specified performance criteria.

1.05 JOB CONDITIONS

A. The Contractor shall be responsible for securing and protecting materials, equipment and tools as well as partially completed construction from damage, vandalism or abuse.

B. The Contractor shall utilize skilled and experienced specialty workers to complete the work. Experienced trade workers shall be utilized for all aspects of the work.

C. The Contractor shall provide all masking, tarps and protection to prevent damage to adjacent construction, new or existing, including landscaped and paved areas.

D. The Contractor shall patch, repair and/or replace all adjacent materials and surfaces damaged as a result of the work, at no expense to the Owner. All repair or replacement work shall match the existing in kind and appearance.

E. Coordinate the work in this section with the work in other sections to assure the orderly progress of the work.

1.06 PRE-CONSTRUCTION CONFERENCE

A preconstruction conference will be held with a representative of the Owner, Architect and all involved trades to discuss all aspects of the project. The Contractor's field representative and foreman for the work shall be in attendance.

1.07 PROTECTION OF WORK AND MATERIAL STORAGE

A. Protection of work and materials storage shall be done in accordance with Section 01600.

B. Immediately upon delivery to job site, place materials in area protected from weather and construction operations. Trim materials shall be stored on a flat and level surface on a full shipping pallet. Store materials under a protective covering to prevent the accumulation of job site dirt and debris.

C. Handle materials to prevent damage to product edges and corners.

1.08 DIMENSIONS AND QUANTITIES

A. The Contractor shall verify dimensions and quantities in the field. The Project Plans and Drawings have been compiled from various sources and may not reflect the actual field conditions at the time of construction.

B. The Contractor is solely responsible for means and methods of construction. Make necessary investigations and take necessary precautions to properly supply, fabricate, and install work.

C. Unfamiliarity with existing project conditions will not be considered as a basis for additional compensation.

D. In case of inconsistency between Drawings and Specifications or within either document, the better quality and/or greater quantity of work shall be provided, as determined by the Owner.

1.09 WARRANTY/GUARANTEES

A. Upon completion of the work, and prior to final payment, the Contractor shall submit a Guarantee of his work to be free of defect in materials and workmanship. This Guarantee shall be for a period of two (2) years, and shall be signed by a Principal of the Contractor's firm, and sealed if a corporation.

B. Provide cellular PVC manufacturer's 25 year warranty against defects in manufacturing that cause the products to rot, corrode, delaminate, or excessively swell from moisture.

1.10 CLEAN-UP

Clean-up shall be done in accordance with this Section, and with Section 01700.

PART 2 - PRODUCTS

2.01 MILLWORK & TRIM:

A. Material: Provide exterior trim and accessories fabricated of extruded solid cellular polyvinyl chloride (PVC) that is homogeneous and free of voids, holes, cracks, and foreign inclusions and other defects. Cellular PVC shall be of the type that has high UV resistance, is insect-proof, and can be sanded, milled and painted.
1. Provide stock and custom profiles as required to comply with details as shown or inferred on the drawings.

B. Acceptable manufacturers of PVC products: AZEK as manufactured by AZEK Building Products, Restoration Millwork by CertainTeed Corporation, Kleer Trim Board by Kleer Lumber, Inc., or Versatex Trimboards by Wolfpac Technologies.

2.02 ACCESSORY PRODUCTS

A. Structural Adhesive: Shall be a two-part structural adhesive/filler that is waterproof, has shear strength of up to 3,400 psi and has a high UV resistance. Adhesive shall be Bond & Fill STRUCTURAL by Bond & Fill, Inc. or other two-part structural adhesive as recommended by the cellular PVC manufacturer.

B. Flexible Adhesive: Provide flexible adhesive specially formulated for PVC expansion and contraction joints, must be paintable with high UV resistance. Flexible Adhesive shall be Bond & Fill FLEX manufactured by Bond & Fill, Inc. or as recommended by cellular PVC manufacturer.

C. Sealants: Sealant required incidental to trim work shall be single component polyurethane conforming to ASTM C 920, Type S, Grade NS, nonstaining, non-bleeding such as "Dymonic" by Tremco, Dynatrol II by Pecora Corp., Sika Flex 1A.

2.05 HARDWARE AND FASTENERS

A. Fasteners trim, millwork and related work shall be stainless steel, annular-threaded, ring-shank nails. Fasteners shall be 8d minimum, or of sufficient length to penetrate the receiving framing members a minimum of 1-1/2".

2.06 MILLWORK FABRICATION

A. Edges must be square; top and bottom surfaces shall be flat with no convex or concave deviation. Material shall be smooth on all surfaces, S4S.

B. Material shall have a uniform surface free from cupping, warping, and twisting.

C. All millwork and trim shall be finished smooth and free from all machine and tool marks that will show through the finish.

PART 3 - EXECUTION

3.01 INSPECTION

A. Installer of exterior trim and accessory work must examine substrate and conditions under which work is to be performed and must notify the Architect in writing of unsatisfactory conditions.

B. Do not proceed with exterior trim and accessory work and accessories until unsatisfactory conditions have been corrected in manner acceptable to installer.

C. Weather Conditions: Proceed with exterior trim and accessory work only when weather conditions are consistent with manufacturer's recommendations and when substrate is completely dry. Do not install exterior trim and accessory work on wet surfaces.

D. Installers: Installation shall be by qualified subcontractor with sufficient installation experience with projects of similar size and construction.

3.02 QUALITY STANDARDS

A. The Quality Standards of the (AWI) Architectural Woodwork Institute - File No. 300-T are hereby made a part of this Section of the Specifications, and all materials and workmanship shall conform to the "Custom Grade" requirements set forth therein, except where construction methods are detailed on the Drawings and as otherwise specified herein.

B. All millwork and trim erected in an unworkmanlike manner will be rejected and any damage or imperfections in the finish shall be repaired by refinishing or replacing the entire part as the Architect may direct.

3.03 GENERAL WORKMANSHIP

A. Due to the expansion and contraction properties of cellular PVC it is generally recommended that that this product be installed during sustained temperature conditions between 40°F and 80°F.

B. Millwork and trim shall have a minimum of splices and shall be made in as long as lengths as possible and jointed. All joints shall be scarfed, glued and fastened in accordance with the PVC manufacturer's printed instructions to minimize shrinkage.

C. Nails used to fasten standing and running trim and all PVC trim work shall be set to allow for installation of filler.

D. Where splices and joints occur, they shall be formed to provide smooth, continuous planes.

3.04 INSTALLATION

A. General: Comply with instructions and recommendations of exterior trim and accessory manufacturer.

1. Comply with manufacturer’s product catalog installation instructions and product technical bulletin instructions.

2. Cut boards using power saws equipped with carbide tipped blades.

3. Drilling and coring shall be accomplished using carbide tipped twist drill bits or hole saws. Care shall be taken to avoid frictional heat build-up.

4. Milling shall be accomplished using standard milling machines of various types with carbide tipped blades.

5. Routing shall be accomplished using standard routers used in woodworking with carbide tipped blades.

6. Edge Finishing: Edges shall be finished with various sanding or filing tools. Do not allow excessive frictional heat to build up.

7. Linear Thermal Expansion and Contraction: Allow for 1/8 inch movement for each 18 ft. board. Allow space for expansion and contraction joints at ends of the each run of millwork or trim. Joints shall be filled with 1 part polyurethane sealant as specified herein.

8. Sealing of Joints: Joints shall be scarf type and shall be glued with Adhesive as recommended by the cellular PVC manufacturer to eliminate separation of joint.

9. Nailing / Fastening: Standard nailing patterns are recommended. All pieces of millwork and trim shall be fastened to framing members with a minimum of 2 nails each. For boards wider than 8" nominal use 3 nails per each framing member.

3.05 FINISHES

A. SURFACE PREPARATION:

Painting Contractor to fill Nail holes with a two component methacrylate, poly urethane, polymer, or acrylic based caulk as recommended by the PVC Manufacturer. Use a caulk that is UV resistant.

3.06 CLEAN-UP / CLOSE-OUT

Project close out and clean-up shall be done in accordance with Section 01700 – Closeout Procedures.

END OF SECTION

SECTION 07101

WATERPROOFING, DAMPPROOFING & CAULKING

PART 1 - GENERAL REQUIREMENTS

1.01 GENERAL

A. The General Documents listed in Index, including the General Conditions, Supplementary General Conditions and General Requirements are hereby made an integral part of this section of the Specifications.

B. Equality of materials or articles other than those named or described in this section will be determined in accordance with the provisions of the Supplementary General Conditions.

C. This subcontractor shall review, in detail, all other sections of the construction specifications affecting the work of this section of the Specifications.

D. It shall be the overall responsibility of the General Contractor (selected for this project) to see that his/her Filed Sub-Bidders, non-Filed Sub-Bidders, specialty contractors and vendors receive the necessary documents and other information with which to undertake and complete this project in a first-class manner.

It shall be the responsibility of all Filed Sub-Bidders to completely familiarize themselves with the contract drawings and all sections of the contract specifications. Each Filed Sub-Bidder will also be responsible for seeing that any sub-sub-bidder(s) required to do work under their section become totally familiar with the requirements of the contract and the importance of planning and the coordinating their particular specialty into the work

1.02 DESCRIPTION WORK

A. Work Included: The scope of work, without limiting the generality thereof, consisting of furnishing all labor, materials, plant, transportation, equipment, accessories, appurtenances, and services necessary and/or incidental to the proper furnishing and installation of all waterproofing, dampproofing, and caulking work shown on the drawings, described in the Specifications or as reasonably inferred from either, in the opinion of the Architect, as being required, and includes:

1. Caulking of joints specified herein and elsewhere indicated on drawings.

2. Precompressed joint fillets.

3. Louvers and vents.

4. Caulking of all openings in exterior walls including perimeter caulking of windows, doors, louvers, thresholds, and any other openings in exterior walls.

B. Reference Drawings: Work shall be performed as shown on drawings listed on the "***Schedule of Drawings***" found at the beginning of this manual after the Table of Contents.

C. Related Work: The following items of are not included in this section and are specified under the designated sections.

1. Section 03300 - Cast-In-Place Concrete:

a. For quality of acceptable concrete finishes and additives

2. Note: Caulking of joints or spaces between pipe, conduit and pipe sleeves is included under the work of other trades installing the pipe and/or conduit.

1.03 SUBMITTALS

A. Refer to Section 01300 - Submittals for submittal provisions and procedures.

B. Samples:

1. Caulking and Filler Materials:

a. Sealant: 1/4 pint cans or tubes of each type specified, including necessary activators or catalysts.

b. Joint bead back-up material: 12 inch length.

c. Gaskets and precompressed fillers: 12" length.

d. In addition to physical samples required, submit all supporting data on each type of caulking material specified, containing chemical compositions and performance data of each.

C. Manufacturer's Data: Submit manufacturer's specifications and installation instructions for the trowel applied membrane waterproofing, sealants and other data as may be required to show compliance with the contract documents. Submit details showing flashing methods and treatments of cracks.

D. Manufacturer's Review: Before commencing work, submit written statement signed by the manufacturer stating that the Contract Documents have been reviewed with a qualified representative of the manufacturer of the waterproofing systems and sealants, and that they are in agreement that the selected materials are proper, compatible and adequate for the application shown.

1.04 GUARANTY/WARRANTY

A. Attention is directed to the provisions of the General Conditions regarding guarantees / warranties for the work.

B. The waterproofing, dampproofing and caulking subcontractor and the sealant manufacturer shall provide a written guarantee on an approved form, guaranteeing all sealant and applied membrane waterproofing work against defective material or workmanship for a period of five years.

C. Guarantee shall further state that all sealants shall be guaranteed against:

1. Adhesive or cohesive failure, when joint spacings are within the limits called for on manufacturer's data sheets.

2. Any crazing developing on the surface of the material for 5 years of outdoor exposure.

3. Any staining of adjacent surfaces by sealant or primer (yellowing, etc.)

4. Any puncture, abrasion or tear failures in self-leveling sealant installed on grade.

5. Excessive dirt pick-up, chalking or color change on surface of cured sealant.

6. Any increase or decrease in Shore A durometer in excess of 25% of readings taken one month after cure.

D. Included in the guarantee will be a provision and agreement to repair or replace at the waterproofing, dampproofing and caulking subcontractor's expense, all defective materials and workmanship which develop during the guarantee period.

1.05 ENVIRONMENTAL REQUIREMENTS

A. Weather conditions must be dry and of proper temperatures during application operations, surfaces to receive the work must be clean and dry. All such conditions shall be to manufacturer's recommendations of the product used.

1.06 DELIVERY, STORAGE & PROTECTION

A. All materials specified shall be delivered to the site in approved manufacturer's sealed containers bearing manufacturer's name and material identification.

B. Protect all adjacent work from damage by work performed under this section.

1.07 PROJECT REQUIREMENT

A. No joints in exterior masonry work, which are noted to be caulked or otherwise sealed, shall be left open during inclement weather or during non-working hours or days. Carefully coordinate work with other trades to ensure weather integrity of the building at all times. All damage incurred to the building and/or to the exterior or interior finish of the building due to the failure of the waterproofing, dampproofing and caulking subcontractor to properly protect his work shall be corrected at his expense.

PART 2 - PRODUCTS

2.01 CAULKING MATERIALS

A. General: For concealed joints provide manufacturer's standard color which has been the best overall performance qualities for the application shown. For exposed joints, the Architect will select colors from the manufacturer's standard colors unless special colors are shown or specified.

B. Type 1 Sealant: Two component chemically curing polyurethane and multi-component polytremdyne meeting fed. spec. TT-S-00227E, Class A, Type 1, manufactured by any one of the following or approved equal:

1.	Vulkem 245	Mameco International
2.	Urexpan NR-200	Pecora Corporation

C. Type 2 Sealant: Two component chemically curing polyurethane and multi-component polytremdyne meeting fed. spec. TT-S-00227E, Class A, Type 2, manufactured by any one of the following or approved equal:

1.	Vulkem 227	Mameco International
2.	Dymeric	Tremco Mfg. Co.
3.	Dynatrol II	Pecora Corporation

D. Type 3 Sealant: Single component polyurethane meeting fed. spec. TT-S-00230C, Class A, Type 2, Shore A Durometer 30 plus or minus 5, except tack-free time shall not exceed 48 hours, manufactured by any one of the following or approved equal:

1.	Vulkem 116	Mameco International
2.	Dymonic	Tremco Mfg. Co.
3.	Dynatrol I	Pecora Corporation

E. Type 4 Sealant: Fed. spec. TT-S-001543, Class B, type 2, non-sag, containing fungicide for mildew resistance, manufactured by any one of the following or approved equal:

1.	1702 Sanitary Sealant	General Electric Co.
2.	786 Mildew-Resistant Silicon Sealer	Dow Corning Corp.

F. Joint Backer Rods:

1. Closed cell polyethylene (for types 1, 2 & 3 sealants): Not less than 3 PSI for 25% compression resistance, highly resistant to petroleum oils and solvents, one of the following:

a.	Ethafoam	Dow Chemical Co.
b.	Expand-O-Foam	Williams Products, Inc.
c.	Filler Foam FF4	Progress Unlimited, Inc.
d.	Tremco Joint Backing	Tremco Mfg. Co.

2. Open cell polyurethane (for type 4 sealant): Polyurethane Foam by Williams Products, Inc. or approved equal.

3. NOTE: Select shape and size of joint filler in consultation with the manufacturer for proper performance in the specific condition of use in each case.

G. Primers & Surface Conditioners: It is the intent of this specification that all porous substrates shall be primed for maximum adhesion. A primer, as recommended by the manufacturer, shall be used on all porous substrates, unless the subcontractor is able to acquire a letter from the manufacturer stating that the conditions of the performance guarantee can be met without the use of primers. The recommended primer must be checked for possible yellowing, discoloration and dirt pick-up, when applied over the face of porous substrates. If yellowing, discoloration or dirt pick-up occurs, after exposure, the subcontractor shall take adequate precautions to prevent primer from being applied over the face of porous substrates by masking, etc.

H. Bond Breaker Tape: Pressure sensitive polyethylene tape.

2.02 PRECOMPRESSED FILLERS

A. Compressible fillers where indicated at control and expansion joints shall be preformed, compressible filler produced by combing permanently elastic, high density, open cell, polyurethane foam latex modified asphalt and shall be "Will-Seal" as manufactured by Illbruck/USA, Minneapolis, MN, "Emseal" or equal.

B. Material shall be supplied precompressed in tape form with adhesive backing on reels.

C. Installation shall be in strict accordance with the manufacturer's recommendations.

2.03 EXPANSION JOINT GASKETS

A. Preformed Neoprene Gasket: A hollow compartmentalized extrusion of neoprene, designed for compression within a joint with a minimum of air spaces, Shore A hardness of 55±5, tensile strength 2000 PSI, one of the following:

1. Compression Joint Seal , Acme Highway Product Co.
2. Delastic Preformed Seal, D.S. Brown Co.
3. Chevron Compression Seal, W.R. Grace & Co.

PART 3 - EXECUTION

3.01 APPLICATION OF CAULKING MATERIALS

A. Locations of Sealant Types:

1. Exterior Caulking:

Horizontal joints in concrete and paving. Type 1 Sealant.

Vertical joints in brick including control and expansion joints. Type 2 Sealant.

Perimeter joints of pressed metal door frames and aluminum windows. Type 2 Sealant.

Other joints occurring in exterior walls and surfaces. Types 1 and 2 Sealant as applicable for location.

2. Interior Caulking:

   Horizontal joints in concrete and quarry tile paving. Type 1 Sealant.

   Perimeter joints of pressed metal door frames and aluminum windows. Types 2 and 3 Sealant.

   Control joints. Types 2 and 3 Sealant.

   Joints between countertop and walls and in showers and other wet areas. Type 4 Sealant.

   Other joints occurring on interior surfaces. Types 1-4 Sealant as applicable for location.

B. Preliminary work: Preview of joint spacing and sizes: Sealant manufacturer shall submit a schedule showing maximum joint spacing allowable for different size joints for each type sealant to be used. This schedule is to be submitted within 10 days after award of contract, and joint sizes, etc. to be reviewed along with related shop drawings, etc. to verify conformity with manufacturer's current technical bulletins.

C. Preliminary field samples:

1. Peel Adhesion: Samples shall be installed in field on various substrates with appropriate primers. Test samples at least 10 days prior to commencing sealant work and inspect closely for adequacy of adhesion.

2. Primer Discoloration: If discoloration is indicated and considered a factor, special precautions must be taken to guard against primer being applied over any surface to remain exposed.

3. Color Selection: To be made on the job at the same time peel adhesion tests are made.

D. Condition of Surfaces:

1. Pre-Installation Meeting: Prior to the installation of sealant, and at the Architect's direction, meet at the project site to review the material selections, joint preparation, installation procedures, and coordination with other trades. Meeting shall include waterproofing, dampproofing and caulking subcontractor, general contractor, architect, manufacturer's representative, and representatives of other trades affected by the sealant installation. Examine the mock-up sample installations which have been prepared and determine and record whether everyone present is in agreement that the proposed installation are likely to perform as required.

2. Examine the substrates, adjoining construction and the conditions under which

the work is to be installed. Do not proceed with the work until unsatisfactory conditions have been corrected.

3. Examine anchorage of substrate to determine whether it is strong enough to withstand the tensile and compressive forces which will be induced by the sealant. Repair or strengthen substrate as required before proceeding with the work.

E. Preparation:

1. Clean surfaces and remove protective coatings which might interfere with bond of sealant. Do not apply sealant to joint surfaces previously treated with paint, lacquer, sealer, curing compound, water repellent or other coatings unless a laboratory test for durability of bond has been successfully completed in accordance with paragraph 4.3.9 of FS TT-S-227.

2. Joints and surfaces which are to be caulked shall be clean, dry and free of dust, loose mortar and other foreign materials.

3. Clean ferrous metals of all rust and coatings by wire brush, grinding or sandblasting. Remove oil, grease and/or temporary protective coatings with high performance cleaners, as approved by sealant manufacturer.

F. Installation:

1. Initial work shall be done under the supervision of a representative of the sealant manufacturer and job procedure methods and results are to be established.

2. All subsequent work to be performed under exact procedures established herein.

3. Thoroughly clean all joints free from loose mortar and other materials which might prevent proper adhesion.

4. After cleaning, apply primer, if required, to all joint surfaces, taking care not to stain adjacent surfaces.

5. Install joint back-up material in all joints including precompressed filler. Joint back-up material shall be placed in joints with a blunt instrument, taking care to maintain a constant uniform depth and approved joint profile. Do not stretch back-up material into joints. Back-up material shall be continuous, no voids permitted. The size of the joint backing should be determined by taking the joint width and adding 25% to assure proper compression of backer rod.

6. Install bond breaker in joints as shown and wherever recommended by the sealant manufacturer to prevent bond of the sealant to surfaces where such bond might impair the work.

7. Provide masking tapes or other precautions to prevent migration or spillage of

materials onto adjoining surfaces.

8. Apply sealant in continuous beads without open joints, voids or air pockets so as to provide a watertight and airtight seal for the entire joint length. Note: Install plastic vent tubes in joints (minimum of 2 per length of joint) in locations as directed by the sealant manufacturer and by the architect.

9. Apply sealants to the depth and width ratio recommended by the sealant manufacturer.

10. Pour self-leveling sealants in horizontal joints to a level approximately 1/16" below adjacent surfaces.

11. Misapplied sealants shall be immediately removed by methods and materials recommended by the approved sealant manufacturer.

12. Sealant shall be tooled with a dry or water wet tool only. Do not use detergents or soapy water for tooling operations. Unless otherwise indicated, sealant joints shall be given a slight concave surface. Remove masking tape immediately after tooling and/or before sealant has taken initial set.

G. Cleaning:

1. After material is applied and tooled, remove all masking and other protection and clean up any remaining defacement caused by caulking work.

2. Protect exposed horizontal sealants from damage during the construction period.

3. Remove excess sealant promptly as the work progresses and clean the adjoining surfaces marred by the work of this section.

H. Field Quality Control: After curing sealants, test joints for leaks by applying a stream of water perpendicularly from a 3/4" hose at normal city water pressure. Test the sealed joint system of not less than 5% of the construction components. Conduct tests in the presence of the architect who will determine the actual percentage of joints to be tested and the period of water flow exposure, based upon any evidence of leakage. Repair leaks or other defects and retest as directed. Repair or replace other work damaged by such leaks.

3.02 CLEANING

A. Remove unused materials, containers, and debris from the site upon completion of work. Clean and repair surfaces that are stained, marred or otherwise damaged by work under this section. Leave work in a clean and perfect condition.

END OF SECTION

SECTION 07310

FLASHING

PART 1 – GENERAL REQUIREMENTS

1.01 GENERAL

A. The General Documents listed in the Index, including the General Conditions, Supplementary General Conditions, and General Requirements are hereby made an integral part of this section of the Specifications.

B. Equality of materials or articles other than those named or described in this section will be determined in accordance with the provisions of the Supplementary General Conditions.

C. This contractor shall review, in detail, all other sections of the Construction Specifications affecting the work of this section of the Specifications.

D. It shall be the overall responsibility of the General Contractor (selected for this project) to see that his/her Filed Sub-Bidders, non-Filed Sub-Bidders, specialty contractors and vendors receive the necessary documents and other information with which to undertake and complete this project in a first-class manner.

It shall be the responsibility of all Filed Sub-Bidders to completely familiarize themselves with the contract drawings and all sections of the contract specifications. Each Filed Sub-Bidder will also be responsible for seeing that any sub-sub-bidder(s) required to do work under their section become totally familiar with the requirements of the contract and the importance of planning and the coordinating their particular specialty into the work

1.02 SCOPE OF WORK

A. The scope of work consists of the installation of all materials to be furnished under Section 07300, and without limiting the generality thereof, consists of furnishing all labor, materials, equipment, plant, transportation, rigging, staging up to 8 feet, appurtenances, and services necessary and/or incidental to properly complete all work as shown on the Construction Drawings as listed on the Schedule of Drawings, as described in the Specifications, or as reasonably inferred from either, in the opinion of the Architect.

B. Exterior Building Wall flashing and sheet metal work.

C. Flexible Flashing at door openings by Sheathing Subcontractor per Section 06160.

D. Clean and restore all areas affected by the work.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. The following related work or materials shall be provided under the designated Sections and coordinated by the Contractor:

a. Section 06100 – Rough Carpentry
b. Section 06160 – Sheathing and Weather Barrier
c. Section 06200 – Finish Carpentry
d. Section 06670 – Cellular PVC
e. Section 07100 – Waterproofing, Damp Proofing and Caulking

1.04 ALTERNATES

A. No Alternates pertaining to Section 07310.

1.05 SUBMITTALS

A. Attention is directed to Specification Section 01300 Submittals.

B. Attention is directed to Specification Section 01630 – Product Substitution Procedures for “OR Equals”

C. Submit manufacturer’s and fabricator’s certification that the furnished materials meet or exceed the specification requirements. Including certified test results showing compliance with the specified performance criteria.

D. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.

E. Samples: Submit two representative samples of each material specified indicating visual characteristics and finish. Include range samples if variation of finish is anticipated.

F. Provide copy of written request for warranty.

G. Shop Drawings: Indicate specially configured metal flashing, jointing methods

and locations, fastening methods and locations and installation details as required for warranties indicated.

1.06 GUARANTEE AND SERVICE

A. The installation of this roofing system must be in compliance with the manufacturer's specification and the shop drawings as approved by the Manufacturer. There must be no deviations made from Manufacturer's specifications or the approved shop drawings without prior written approval. *The* Contractor is responsible for meeting all criteria required to comply with the specified warranties.

B. Upon completion of the installation, an inspection must be conducted by a Technical Representative of the manufacturer to confirm that the roofing system has been installed according to the Specifications and Details.

C. Provide manufacturer's warranty against defects in manufacturing.

D. Attention is directed to the provisions of the General Conditions regarding guarantees/warranties for the work.

1.07 JOB CONDITIONS

A. The Contractor shall be responsible for securing and protecting materials, equipment and tools as well as partially completed construction from damage, vandalism or abuse.

B. The Contractor shall utilize skilled and experienced specialty workers to complete the work. Experienced trade workers shall be utilized for all aspects of the work.

C. The Contractor shall provide all masking, tarps and protection to prevent damage to adjacent construction, new or existing, including landscaped and paved areas.

D. The Contractor shall patch, repair and/or replace all adjacent materials and surfaces damaged as a result of the work, at no expense to the Owner. All repair or replacement work shall match the existing in kind and appearance.

E. Coordinate the work in this section with the work in other sections to assure the orderly progress of the work.

1.08 PRE-CONSTRUCTION CONFERENCE

A. A preconstruction conference will be held with a representative of the Owner, Architect and all involved trades to discuss all aspects of the project. The Contractor's field representative and foreman for the work shall be in attendance.

1.09 PROTECTION OF WORK AND MATERIAL STORAGE

A. Protection of work and materials storage shall be done in accordance with Section 01600.

B. Immediately upon delivery to job site, place materials in area protected from weather and construction operations. Materials shall be stored on a flat and level surface on a full shipping pallet. Store materials under a protective covering to prevent the accumulation of job site dirt and debris.

C. Handle materials to prevent damage to product edges and corners.

D. Protect all adjacent work from damage by work performed under this section.

1.10 DIMENSIONS AND QUANTITIES

A. The Contractor shall verify dimensions and quantities in the field. The Project Plans and Drawings have been compiled from various sources and may not reflect the actual field conditions at the time of construction.

B. The Contractor is solely responsible for means and methods of construction. Make necessary investigations and take necessary precautions to properly supply, fabricate, and install work.

C. Unfamiliarity with existing project conditions will not be considered as a basis for additional compensation.

D. In case of inconsistency between Drawings and Specifications or within either document, the better quality and/or greater quantity of work shall be provided, as determined by the Owner.

1.11 CLEAN-UP

Clean-up shall be done in accordance with this Section, and with Section 01700 – Contract Close Out Procedures.

1.12 ENVIRONMENTAL REQUIREMENTS

A. Weather conditions must be dry and of proper temperatures during application operations, surfaces to receive the work must be clean and dry. All such conditions shall be to manufacturer's recommendations of the product used.

1.13 QUALITY ASSURANCE

A. Comply with governing codes and regulations. Use manufacturer recommended accessories, fasteners, and adhesives for installation of the systems. Deliver, handle, and store materials in accordance with manufacturer's instructions.

B. Flashing and Sheetmetal:

1. ASTM B32 – Standard Specification for Solder Metal
2. ASTM B370 – Standard Specification for Copper Sheet and Strip for Building Construction.
3. ASTM B813 – Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube.
4. FS –O-F-506 – Flux, Soldering, Paste and Liquid
5. SMACNA – Architectural Sheet Metal Manual

1.14 TESTS

A. Construction Sealant Adhesion Tests: Periodically test sealants in place for adhesion using methods recommended by the sealant manufacturer. Promptly replace all sealant which does not adhere or fails to cure properly.

PART 2 – PRODUCTS

A. Exterior Sheet Metal Flashing and Trim: Metal counter flashing and base flashing, and exterior wall flashing.

1. 16 oz., 20 oz. Zinc/Tin Coated Copper as indicated above, or on the drawings, "Freedom Gray" by Revere Copper Products, Inc., or Architect Approved Equal.

    a. Provide cold rolled (H00), Copper Base Sheet to comply with ASTM B370, coated both sides with tin/zinc alloy.

2. Fabricated Units: Profiles in Compliance with SMACNA Sheet Metal Manual.

B. Membrane Flashing: Flexible 40 mil self-adhering rubberized asphalt sheet membrane flashing.

1. Acceptable Manufacturers: Vycor V40 by W.R. Grace & Co., TW-Thru Wall Flashing by Tamko Building Products, or Architect Approved Equal.

C. Auxiliary Materials:

1. Solder compatible with metal – provide pure tin, or lead-free, high-tin solder for Zinc/Tin Coated Copper. "Number 497" by Johnson Manufacturing or Architect Approved Equal.
2. Bituminous isolation coating.
3. Mastic and elastomeric sealants.
4. Epoxy seam sealer.
5. Rosin-sized building paper slip sheet.
6. Polyethylene underlayment.
7. Reglets and metal accessories.
8. Asphaltic roofing cement.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Flashing:

1. Zinc/Tin Coated Copper: Follow recommendations of SMACNA Sheet Metal Manual for fabrication and installation in high wind conditions.

    a. Allow for expansion. Provide expansion joints type and location per SMACNA standards.

b. Material Storage: Store all copper sheet products off the ground, in an enclosed structure so as to maintain dry conditions and exclude condensation.

   i. Handle sheets and formed shapes in a manner to reduce scratches, dents, etc. Wear gloves to minimize fingerprints during initial weathering.

c. Form exposed sheet metal work without excessive oil-canning, buckling, and tool marks, true to line and levels indicated with exposed edges folded back to form hems.

   i. Fabricate non-moving seams in sheet metal with flat lock seams.

d. Installation: Comply with industry standards, manufacturer's recommendations and instructions, details and recommendations as published in SMACNA manual.

   i. Anchor units of work securely in place by methods indicated, providing for thermal expansion of metal units; conceal fasteners and set units true to line and level as indicated

   ii. Install work with laps, joints, and seams that will be permanently watertight and weatherproof.

   iii. Install reglets to receive counterflashing in manner and by methods recommended by the manufacturer.

   iv. Solder according to manufacturer's instructions. Prior to soldering, mechanically clean surface to product a bright, unoxidized surface.

d. Protection: Protect from oils and greases, cleaning compounds, iron and steel fines and fasteners, and other construction materials that may stain or discolor copper surface. To minimize condensation or water stains, at the end of each day, remove tarps or other protections placed on copper.

e. Cleaning: Do not chemically or abrasively clean Zinc/Tin Coated Copper. If necessary, construction dirt may be washed from copper with clean, fresh water only. Do not use soaps, detergents, or other cleaning agents.

2. **Isolate dissimilar materials**. Provide separation of metal from non-compatible metal or corrosive substrates by coating concealed surfaces at locations of contact, with bituminous coating to other permanent separation as recommended by manufacturer/fabricator.

3. Install materials and systems in accordance with Manufacturer's instructions and approved submittals. Install materials and systems in proper relation to adjacent construction and with uniform appearance.

4. Provide membrane flashing at windows, doors, louvers, sills at foundations and any other location indicated on the drawings.

END OF SECTION

SECTION 08300

DOORS

PART 1 - GENERAL REQUIREMENTS

1.01 GENERAL

A. The General Documents listed in Index, including the General Conditions, Supplementary General Conditions and General Requirements are hereby made an integral part of this section of the Specifications.

B. Equality of materials or articles other than those named or described in this section will be determined in accordance with the provisions of the Supplementary General Conditions.

C. This subcontractor shall review, in detail, all other sections of the construction specifications affecting the work of this section of the Specifications.

D. It shall be the overall responsibility of the General Contractor (selected for this project) to see that his/her Filed Sub-Bidders, non-Filed Sub-Bidders, specialty contractors and vendors receive the necessary documents and other information with which to undertake and complete this project in a first-class manner.

It shall be the responsibility of all Filed Sub-Bidders to completely familiarize themselves with the contract drawings and all sections of the contract specifications. Each Filed Sub-Bidder will also be responsible for seeing that any sub-sub-bidder(s) required to do work under their section become totally familiar with the requirements of the contract and the importance of planning and the coordinating their particular specialty into the work

1.02 DESCRIPTION OF WORK

A. Work Included: The scope of work, without limiting the generality thereof, consists of furnishing all labor, materials, plant, transportation, equipment, accessories, appur-tenances, and services necessary and/or incidental to the proper completion of all steel doors and frame work shown on the drawings, described in the specifications, or as reasonably inferred from either, in the opinion of the Architect, as being required and includes:

1. Wall and floor anchors, clips, reinforcements, glazing beads, fasteners, and other related items necessary to complete each assembly.

2. Preparation of doors and frames furnished here under to receive finish hardware.

3. Exterior Fiberglass Doors & Frames
4. Interior Wood Doors and Frames

B. Related Work: The following items of work are not included in this section and are specified under the designated sections:

1. Section 08700, Hardware:
   a. Furnishing finish hardware and weather stripping.
   b. Templates for finish hardware items furnished under Section 08700.
2. Section 09900, Painting.

C. Reference Drawings: Work shall be performed as shown on drawings listed on the "***Schedule of Drawings***" found at the beginning of this manual after the Table of Contents.

1.03 SUBMITTALS

A. General: Refer to Section 01300 - SUBMITTALS for submittal provisions and procedures.

B. Shop Drawings: Submit complete shop drawings of work of this section to Architect for review:

1. Shop drawings shall show elevations of each door and frame type, and shall indicate profiles and gauges of metal, anchorage, construction, details, UL label requirements, provisions for finish hardware, glazing conditions, shop finish, and other pertinent information.

2. Identify door and frame types in relation to mark number and location. Refer to schedules and details on the drawings for designations of types, sizes, label requirements, special requirements, mark numbers and locations.

3. Provide Data: Submit complete manufacturer's product data to Architect for approval, consisting of complete specifications, test report data, installation instructions, and other pertinent technical data required for complete product and product use information.

1.04 GUARANTEE/WARRANTY

A. Attention is directed to the provisions of the CONTRACT AND GENERAL CONDITIONS regarding guarantees/warranties for the work.

B. Manufacturers shall provide their guarantees/warranties for work under this section. However, such guarantees/warranties shall be in addition to and not in lieu of all other liabilities which the manufacturer and the Contractor may have by law or by other provisions of the Contract Documents.

1.05 PRODUCT DELIVERY, STORAGE & HANDLING

A. Doors, frames, and related items shall be properly packaged and protected during shipment, handling and storage to prevent damage.

B. Materials shall be stored indoors or under cover, on raised platforms, fully protected from dirt and moisture.

PART 2 - PRODUCTS

2.01 EXTERIOR FIBERGLASS DOORS AND FRAMES

A. Acceptable Manufacturers:
   1. Edgewater FRP Door, 175 N. Western Ave., Neenah, WI 54956, ph: 920-886-1995, or Architect approved equal.

B. Fiberglass Doors: Edgewater EP Extra Heavy Duty (Premier) Series FRP Door from the "Cutting Edge" Product Line (seamless)
   1. Expanded Polystyrene Solid Foam Core
   2. Doors to have full height heavy duty vertical fiberglass stiffeners 6 inches on center.

C. Frames: Provide pultruded fiberglass frames for doors. Comply with the requirements of grade specified for corresponding doors.
   1. Frames for EP (Premier) Series Fiberglass Doors to be manufactured from 0.1875 inch (4.8 mm) thick fiberglass pultrusions. Profile must be of standard hollow type to permit installation into new concrete or block walls, as well as slip on drywall situations.
   2. Door Silencers: Except on weatherstripped frames, fabricate stops to receive three silencers on strike jambs of single door frames, and two on the heads of double door frames.
   3. Supports and Anchors: Fabricated from no less than 0.125 inch (3.18 mm) thick pultruded fiberglass material.
      a. Wall Anchors in New Steel or Wood Stud Construction: Provide multi-purpose type fiberglass anchor supports in backside of frames for

attachment from the stud wall into the frames anchor supports. This installation must take place prior to setting drywall.

D. Fabrication: Fabricate fiberglass door and frame units to be rigid, neat in appearance, and free from defects including warp and buckle. Where practical, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at Project Site.
   1. Core Construction: Manufacturer's standard core construction that complies with the following:
      a. E-P (Premier) Series to have full height vertical fiberglass stiffeners, 6 inches on center. Voids to be filled with expanded polystyrene foam.
   2. Stiles and Rails: Fabricate doors utilizing heavy duty pultruded fiberglass tubular members.
   3. Door Faces: Laminated Composite faces shall be urethane fused to the stile and rail assembly, including the vertical stiffeners and core material, utilizing a two-part 100 percent reactive urethane adhesive, and then cured under pressure until completely bonded.
   4. Clearances: Not more than 1/8" (3.2 mm) at jambs and heads, except not more than ¼ inch (6.4 mm) between pairs of doors. Not more than ¾" (19mm) at bottom, with standard being 5/8" (15.9mm) at bottom,
   5. Door Edges: Lock stile to be factory beveled 1/8" in 2" for rub- free operation. Square lock-edge will not be accepted.
   6. Tolerances: Maximum diagonal distortion – 1/16" (1.6 mm) measured with straight edge, corner-to-corner.
   7. Hardware Reinforcement: Fabricate all hardware reinforcements utilizing premium high density polyethelene (HDPE) and fiberglass blocking. Any form of wood or metal reinforcements will not be accepted.
   8. Exposed Fasteners: Unless otherwise indicated, provide all stainless steel, countersunk flat or oval heads for exposed screws and bolts.
   9. Thermal Rated (Insulating) Assemblies: At exterior locations and elsewhere shown and scheduled, provide doors fabricated as thermal insulating door and frame assemblies with an R-value of 11 – 12.
   10. Hardware Preparations: Prepare doors and frames to receive mortised and concealed hardware according to door hardware schedule and templates provided by the door hardware manufacturer. Doors and frames must be factory pre-drilled for all mortised hardware preps. Pilot and through-bolt holes for all surface mounted hardware to be drilled at the project site during installation.
   11. Glazing/Louver Stops: Manufacturer's standard two-piece PVC retainers.
      1. Provide non-removable stops on outside of exterior and on secure side of interior doors for glass, louvers, or other panels in doors.
      2. Provide screw applied removable glazing stops on inside of glass, louvers, and other panels in doors.

E. Finishes: Provide factory primed finish at doors and frames. Pre-clean and shop prime each door and frame in preparation for field painting (Gel-coated and polyurethane coated doors will not be accepted.)
   1. Door Faces: Face skins shall be smooth.

2. Frame: Finish on fiberglass frames shall match the fiberglass doors.

F. Hardware: Hardware to be furnished under Section 08700-Hardware.

2.03 EXTERIOR IMPACT RATED FIBERGLASS DOORS

A. Acceptable Manufacturers:
1. Plastpro Inc. 5200 W. Century Blvd., Ninth Floor, Los Angeles, CA 90045, ph: 310-693-8600 or Architect approved equal.

B. Fiberglass Doors: Plastpro Rustic Series
1. Model Number: DRS101, Smooth Skin, glazed, size as indicated on the drawings.
2. Construction:
a. Door Skins: High impact compression molded fiberglass reinforced material.
b. Top and Bottom Rails: Composite Material
c. Stiles: Composite material: Full length of door.
d. Extended Lockblock: 20" minimum lockblock.
e. Core: 100% CFC-free polyurethane insulation.
f. Hydroshield Technology: Water resistant construction protects doors against water infiltration on all six sides to prevent warping, delamination, corrosion, rotting, and build-up of mold and mildew.

C. Frame Construction: Composite Frames – Plastpro PF Frames: Fabricate frames from composite material.
1. Style: Standard 4 9/16" Door frame.
2. Finish: Primed

2.04 INTERIOR WOOD DOORS

A. Flush Wood Doors:

1. Manufacturers: selection based on JELD-WEN, Inc.; Industries; Architectural Door Div., Simpson Door Company , or approved equal.
2. Quality Standard: NWWDA I.S. 6.
3. Design Group: Primed, Flush
4. 1-3/4 inch thick.
5. MDF, Solid Wood Stave Core
6. Finish per section 09900 Painting
a. Pre-prime and pre-finish before final hanging

PART 3 - EXECUTION

3.01 INSTALLATION

A. Fit to frames and machine pre-fit doors for hardware to whatever extent not previously worked at factory as required to fit and uniform clearance at each edge.

B. Restore finish on edges of shop finished doors before installation, if fitting or machining is required at the job site.

3.02 ADJUST & CLEAN

A. Wood doors to comply with NWWDA I.S.-1A and specified quality standard.

B. Prefit doors to frames. Premachine doors for hardware listed on final schedules. Factory bevel doors.

C. Rehang or replace doors which do not swing or operate freely, as directed by Architect.

D. Refinish or replace doors damaged during installation, as directed by Architect.

E. Institute protective measures, as recommended and accepted by door manufacturer, to assure that wood doors will be without damage or deterioration at time of substantial completion.

END OF SECTION

SECTION 08700

HARDWARE

PART 1 - GENERAL REQUIREMENTS

1.01 GENERAL

A. The General Document listed in the Index, including the General Conditions, Supplementary General Conditions and General Requirements are hereby made an integral part of this section of the Specifications.

B. Equality of materials or articles other than those named or described in this section will be determined in accordance with the provisions of the Supplementary General Conditions.

C. This subcontractor shall review, in detail, all other sections of the construction specifications affecting the work of this section of the Specifications.

D. It shall be the overall responsibility of the General Contractor (selected for this project) to see that his/her Filed Sub-Bidders, non-Filed Sub-Bidders, specialty contractors and vendors receive the necessary documents and other information with which to undertake and complete this project in a first-class manner.

It shall be the responsibility of all Filed Sub-Bidders to completely familiarize themselves with the contract drawings and all sections of the contract specifications. Each Filed Sub-Bidder will also be responsible for seeing that any sub-sub-bidder(s) required to do work under their section become totally familiar with the requirements of the contract and the importance of planning and the coordinating their particular specialty into the work

1.02 SCOPE

A. Hardware supplier shall have in his employ a member of the American Society of Architectural Hardware Consultants (AHC), who shall prepare complete hardware and keying schedule in consultation with the Architect and/or the Owner.

B. General contractor shall be responsible for receiving, checking, storing and installation of finish hardware and toilet room accessories and providing adequate storage space for same.

C. Hardware shall comply with all applicable requirements of the Mass. Architectural Barriers Board and ADA.

D. Furnish all templates required for fabrication of doors, frames and all work incidental thereto.

E. Hardware supplier shall determine condition and material of doors and frames for application of hardware.

F. Reference Drawings: Work shall be performed as shown on drawings listed on the ***"Schedule of Drawings***" found at the beginning of this manual after the Table of Contents.

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1.03 SAMPLES

A. Submit samples of hardware whenever requested by Architect, clearly marked with manufacturer's name and number and schedule number.

1.04 SCHEDULES

A. Prepare and submit six complete schedules and three sets of cuts to the Architect for approval within 14 days after written notice of the award of contract has been forwarded to the general contractor, giving manufacturer's numbers, keying, types, sizes and installation location for all hardware required to complete the job. The Architect will check these six schedules and return one copy for make up of six complete sets for final approval. All hardware sets shall include the specification section hardware set numbers.

1.05 MARKING & PACKING

A. All packages shall be legibly labeled indicating manufacturer's numbers, types, sizes and hardware schedule reference number. All hardware shall be wrapped in paper and shall be packed in the same package as all screws, bolts and fastenings necessary for proper installation.

1.06 TEMPLATES

A. After the hardware schedule has been approved by the Architect, deliver templates to the general contractor in sufficient time so as not to impede the progress of the work. Provide all necessary templates and schedules required to fabricate and complete doors, frames and thresholds.

1.07 QUALITY

A. Hardware shall be the best quality as manufactured by the supplier of each item. All lock sets and lock-set trim shall be the product of one manufacturer for the entire project. All door closers shall be surface mounted, covered, rectangular modern type and shall be the product of one manufacturer.

1.08 KEYING & KEYS

A. All locks shall be keyed as applicable to the existing system.

B. Furnish the following quantity of keys:

Three keys for each cylinder lock

Three core keys

1.09 FINISHES

A. All hardware shall be stainless steel.

1.10 CODES & REGULATIONS

A. All hardware listed or furnished shall meet requirements of federal, state, local and handicap codes having jurisdiction over this installation. Any item furnished or installed that does not meet code requirements, shall be removed and proper items substituted at no additional cost or expense to the Owner.

B. Provide hardware for fire-rated openings in compliance with AIA (NBFU) Pamphlet No. 80 and NFPA Standard Nos. 80 and 101. This requirement takes precedence over other requirements for such hardware. Provide only hardware which has been tested and listed by UL for the types and sizes of doors required, and complies with the requirements of the doors and door frame labels.

C. Hardware requiring special throws, projections, coatings, knurling, opening and closing forces or other specific functions to meet and conform to label, life safety or access codes shall be provided.

PART 2 - PRODUCTS

2.01 FASTENERS

A. Manufacture hardware to conform to published templates, generally prepared for machine screw installation.

B. Furnish screws for installation with each hardware item. Provide Phillips flat-head screws except as otherwise indicated.

C. Finish exposed (exposed under any condition) screws to match the hardware finish, or if exposed in surfaces of other work to match the finish of such work as closely as possible, except as otherwise indicated. Screws at exterior doors to be non-ferrous metal.

D. Provide concealed fasteners for hardware units which are exposed when the door is closed, except to the extent no standard manufactured units of the type specified are available with concealed fasteners. Door closer, exit devices, and any other surface applied item on wood, mineral core, or laminated plastic fire doors shall be attached by closed head sex bolts.

PART 3 - EXECUTION

3.01 HARDWARE SETS

A. The hardware sets listed below indicate the items of hardware required for each opening. It is the bidder's responsibility to accurately furnish the proper sizes, quantities, weights and functions, as required by these specifications and as recommended by manufacturer's catalog information.

B. The following information on hardware sets is furnished as a guide only. The complete quantity requirements for each and every opening shall be the responsibility of the hardware supplier.

C. It is the intent of the hardware sets to provide hardware for all new doors. If a door is not scheduled to have hardware, it shall be provided with hardware similar to other doors or hardware as allowed by good hardware practice.

D. All lock functions shall be verified with the Architect and/or Owner prior to ordering locks.

3.02 HARDWARE SETS

A. The hardware used in the preparation of this schedule is taken from the catalogs of the following manufacturers:

Butts	Hager Hinge Company
Locks, Closers	Corbin Russwin Company
Kick Plates	Rockwood Mfg.
Stops, Silencers	H.B. Ives Company
Thresholds	National Guard Products

B. Finishes

US26D	Satin Chrome
US32D, 630	Satin Stainless Steel
689	Silver Aluminum Painted
AL	Anodized Aluminum

3.03 HARDWARE SCHEDULE

ITEM #1

3 Exterior Doors / Frames / Hardware (#02, 03 & 04)

Doors	FG	--
Frames	FG	--

Each to Receive:

1 ½ PR Butts	BB1191 4 ½" x 4 ½"	32D
1 Dead Lock	DL3017	630
1 Push Plate	70C	32D
1 Flush Pull		32D
1 Closer	DC3200 w/ hold open	689
1 Kick Plates	8" x 34" .050	32D
1 Door Stop	436	26D
1 Threshold	427E	AL
Weather stripping		Grey

ITEM #2

1 Pair Exterior Doors / Frames / Hardware (#01)

Doors	FG	--

Frames	FG	--

Each to Receive:

3 PR Butts	BB1191 4 ½" x 4 ½"	32D
1 Dead Lock	DL3017	630
2 Floor Stops	FS450	AL
2 T&B Flush Bolts	FB548 w/ Strikes	26D
1 Astragal		
2 Kick Plates	8" x 34" .050	32D
1 Threshold	427E	AL
Weather stripping		Grey

ITEM #3

2 Interior Doors / Frames / Hardware (#05 & 06)

Doors	MDF	--
Frames	Wood	--

Each to Receive:

1 ½ PR Butts	BB1191 4 ½" x 4 ½"	32D
1 Lockset	ML2055 NSA	630

END OF SECTION

SECTION 09250

GYPSUM BOARD

PART 1 - GENERAL REQUIREMENTS

1.01 GENERAL

A. The General Documents listed in the Index, including the General Conditions, Supplementary General Conditions, and General Requirements are hereby made an integral part of this section of the Specifications.

B. Equality of materials or articles other than those named or described in this section will be determined in accordance with the provisions of the Supplementary General Conditions.

C. This contractor shall review, in detail, all other sections of the Construction Specifications affecting the work of this section of the Specifications.

D. It shall be the overall responsibility of the General Contractor (selected for this project) to see that his/her Filed Sub-Bidders, non-Filed Sub-Bidders, specialty contractors and vendors receive the necessary documents and other information with which to undertake and complete this project in a first-class manner.

It shall be the responsibility of all Filed Sub-Bidders to completely familiarize themselves with the contract drawings and all sections of the contract specifications. Each Filed Sub-Bidder will also be responsible for seeing that any sub-sub-bidder(s) required to do work under their section become totally familiar with the requirements of the contract and the importance of planning and the coordinating their particular specialty into the work

1.02 DESCRIPTION OF WORK

A. Work Included: The scope of work, without limiting the generality thereof, consists of furnishing all labor, materials, plant, transportation, equipment, accessories, appurtenances, and services necessary and/or incidental to the proper furnishing and installation of all gypsum board work shown on the drawings, described in the Specifications, or as reasonably inferred from either, in the opinion of the Architect, as being required and includes:

1. Casing beads, corner beads, expansion joints and all other accessories.
2. All tape and compounds.
3. Misc. filler strips and accessories.

B. Related Work: The following items of work are not included in this section and are specified under the designated sections:

1. Rough Carpentry - Section 06100
2. Painting - Section 09900

C. Reference Drawings: Work shall be performed as shown on drawings listed on the "***Schedule of Drawings***" found at the beginning of this manual after the Table of Contents

1.03 QUALITY ASSURANCE

A. Requirements of regulatory agencies:

1. Underwriter's Laboratories, Inc.:

a. Fire hazard classification (40 U8.22)
b. Fire resistance classification (40 U18)

B. Testing:

1. Fire resistance: ASTM E119
2. Flame spread: ASTM E84

1.04 SUBMITTALS

A. Test Reports:

1. Submit copies of fire test report on fire rated gypsum wallboard assemblies.
2. Submit copies of evidence of fire hazard classification for gypsum wallboard.
3. Certified test reports of other acceptable testing which conform to ASTM E119, E84 and E90 are acceptable.

B. Certificates: Furnish manufacturer's certification that materials meet or exceed specification requirements.

C. Manufacturer's Instructions: Furnish manufacturer's printed instructions for installation

of the assemblies.

D. Submit the following samples in accordance with the provisions of the General Conditions:

1. Submit samples of catalogue cuts of all metal component parts, accessories and fasteners for Architect's approval.

2. Samples of wallboard and all other materials when requested by the Architect.

1.05 PRODUCT DELIVERY, STORAGE & HANDLING

A. Delivery & handling:

1. Deliver materials to the project site with manufacturer's labels intact and legible.

2. Handle materials with care to prevent damage.

3. Deliver fire rated materials bearing testing agency label and required fire classification numbers.

B. Storage:

1. Store materials inside under cover, stack flat off floor.

2. Stack wallboard so that long lengths are not over short lengths.

3. Avoid overloading floor system.

4. Store adhesives in dry area, provide protection against freezing at all times.

1.06 JOB CONDITIONS

A. Environmental Conditions:

1. Temperature: During cold weather, in areas receiving wallboard installation, maintain a uniform temperature in the range between 55F to 70F for 24 hours before, during and after gypsum wallboard and joint treatment application.

2. Ventilation:

a. Provide ventilation during and following adhesives and joint treatment

applications.

b. Use temporary air circulators in enclosed areas lacking natural ventilation.

c. Under slow drying conditions, allow additional drying time between coats of joint treatment.

d. Protect installed materials from drafts during hot dry weather.

B. Protection: Protect adjacent surfaces against damage and stains.

PART 2 - PRODUCTS

2.01 GENERAL

A. Wallboard may be the product of any of the following manufacturers: US Gypsum, Gold Bond, Georgia-Pacific, or approved equal.

B. Studs, tracks, and accessories may be US Gypsum, Gold Bond, Georgia-Pacific, or approved equal.

C. To establish a minimum standard of quality, names and numbers of US Gypsum have been used.

2.02 WALLBOARD

A. Wallboard shall conform to ASTM C36 and shall be 5/8” Type ‘X’ Fire-Rated, moisture and mold resistant.

2.03 ACCESSORIES

A. USG metal trim No. 200A.

B. USG corner bead - Dur-A-Bead.

C. USG control joint No. 093.

D. Sealants as required at joints with dissimilar materials.

E. 3/4" furring.

2.04 FASTENERS

A. Screws: ASTM C954 or ASTM C1002 or both with heads, threads, points and finish, as recommended by the manufacturer.

2.05 JOINT TREATMENT

A. Tape shall be "Per-A-Tape", cross fibered paper tape, manufacturer of the board.

B. Joint treatment compound shall be compatible with the tape and board. It shall be a dry mix to be mixed with water at the job site, such as Durabond 210 joint compound.

C. All tape and joint compound shall be those approved by the manufacturer of the wallboard.

PART 3 - EXECUTION

3.01 INSPECTION

A. Check framing for accurate spacing and alignment.

B. Verify that spacing of installed framing does not exceed maximum allowable for width dimension of wallboard to be used.

C. Do not proceed with installation of wallboard until deficiencies are corrected and surfaces to receive wallboard are acceptable.

D. Protrusions of framing, twisted framing members, or unaligned members must be repaired before installation of wallboard is started.

3.02 GYPSUM WALLBOARD INSTALLATION

A. Installation shall be in strict accordance with the manufacturer's printed instructions and with approved details.

B. Soffits: Apply board using maximum practical lengths with the long dimensions at right angles to the framing members. Center end joints over framing, fit joints neatly and accurately. Stagger end joints from those in adjacent fascia except at control joint locations.

C. Fascias: Except as otherwise specified herein, all 1" thick gypsum wallboard shall be installed vertically and all edges shall fit snugly into studs. All 5/8" gypsum board joints shall be centered over studs or furring. Stagger joints with respect to base layer when applying finish layer of double board walls. Joints shall not occur within 12" of openings in wallboard surfaces.

D. Fasten all wallboard by means of power driven drywall screws; locate fire rated work at 12" o.c. in the field and 8" o.c. at edges. Stagger screws in adjacent sheets on opposite sides of joints. Depress screw heads slightly below surface of the wallboard. No screws closer than 3/8" from edges and ends of the board. Where double layer wallboard application is indicated, both layers shall be applied by use of power driven screws. Strictly adhere to manufacturer's installation recommendations. Screw wallboard to ceiling track flanges.

E. Wallboard shall be cut by scoring and breaking or by saving, always working from face side.

F. Provide openings and install all access panels furnished under other sections for drywall construction. Do all required patching of drywall construction.

G. Provide control joints in walls and partitions every 30'. Furnish shop drawings for Architect's approval indicating proposed control joint locations. Control joints shall be as hereinbefore specified.

3.03 ACCESSORY APPLICATION

A. Corner Bead: Reinforce all vertical and horizontal exterior corners with corner bead fastened with screws or staples 9" o.c. on both flanges along entire length of bead.

B. Metal Trim: Where shaft wall terminates against masonry or other dissimilar material, apply metal trim over face layer edge and fasten with screws or staples spaced 9" o.c.

C. Screws: Power-drive at least 3/8" from edges or ends of gypsum panels to provide uniform dimple 1/32" deep. In gypsum base, set flush with surface without tearing face paper.

D. Control Joints: Break face layer behind joint. Attach control joint to face layer with staples spaced 6" o.c. on both flanges along entire length of joint.

3.04 JOINT FINISHING

A. Mix joint compound in strict accordance with manufacturer's recommendations.

B. Apply taping or embedding compound in a thin uniform layer to all joints and angles to be reinforced. Immediately apply Per-A-Tape reinforcing tape centered over joint and seated into compound. Sufficient compound, approximately 1/64" to 1/32", must remain under the tape to provide proper bond. Follow immediately with a thin skim coat to embed tape, but not to function as a second coat. Fold and embed tape properly in all interior angles to provide a true angle. The tape or embedding coat must be thoroughly dry prior to application of second coat.

C. Apply second coat of joint compound over embedding coat, filling panel tape flush with surface; cover tape and feather out at least 2" beyond first coat. On joints with no taper, cover the tape and feather out at least 4" on either side of tape. Allow second coat to dry thoroughly prior to application of finish coat.

D. Spread finish coat evenly over and extend at least 2" beyond second coat on all joints and feather to a smooth uniform finish. Over tapered edges, do not allow finished joint to protrude beyond plane of the surface. Apply a finish coat to cover tape and taping compound at all tapered angles and provide a true angle. Where necessary, sand lightly between coats and following the final application of compound to provide a smooth surface ready for decoration. When sanding take care not to roughen face paper.

E. Dimples at screw heads shall receive 3 coats of compound. Apply a taping or all-purpose type compound to fastener depressions as the first coat. Follow with a minimum of 2 additional coats of topping or all-purpose compound, leaving all depressions level with the plane of the surface.

F. Finishing beads and trim:

1. Apply first coat to all bead and trim and properly feather out from ground to plane of surface. Compound must thoroughly dry prior to application of second coat.

2. Apply second coat in same manner as first coat, extending compound slightly beyond onto face of panel. Compound must be thoroughly dry prior to application of finish coat.

3. Apply finish coat to all bead and trim, extending compound slightly beyond the second coat and properly feathering from ground to plane or surface. Sand finish as necessary to provide a flat smooth surface ready for decoration. When sanding take care not to roughen face paper.

G. Flanges of metal corner bead shall be concealed by at least 2 coats of compound which, when finished, shall extend approximately 8" from exposed nosing.

H. Each coat shall be sanded as necessary after compound has dried. Final coat after sanding shall leave the gypsum wallboard and treated areas smooth with joints concealed from view in the finished work. Care shall be taken not to scuff the paper surface of the board when sanding.

I. All edges and corners shall be left square, all surfaces plane, plumb, straight and true and ready for painting or other finish.

3.05 SEALING

A. At partitions indicated on drawings, do sealing work required to seal same as called for on the drawings and generally as listed below:

1. Seal all top horizontal joints along ceiling trace and all joints between gypsum wallboard work and surrounding construction.

2. Seal all joints between partitions work and adjoining gypsum wallboard panels at corners and intersections.

3. Seal full perimeters of all projections through gypsum wallboard installation, such as pipes and conduits.

4. Seal full perimeters of all frames and other items set into gypsum wallboard installation.

5. Seal in back of all control joints in gypsum wallboard work.

6. Sealant shall be done using sealant of type specified hereinbefore in strict accordance with manufacturer's printed instructions.

3.06 WORKMANSHIP

A. All drywall work shall be performed by skilled workmen in the trade and shall meet all requirements as herein specified. The subcontractor will be held strictly responsible for the results of the highest quality work conforming, where applicable, to the specified fire ratings. Unsound and unsightly work shall be removed and replaced by work satisfactory to the Architect and without additional cost to the Owner.

B. All surfaces shall be evenly applied and properly set straight and plumb and level in every direction, angles straight, true and perfect. Surfaces shall be even in color and free from stains.

C. Notify contractor and architect in writing of unsuitable conditions and do no work until same have been corrected. Commencement of work shall constitute acceptance of conditions and surfaces to which materials are to be applied under this section.

3.07 PATCHING

A. Defects or damage in the gypsum wallboard surface shall be repaired or replaced before final surface treatments or painting operations are started. The resulting repaired area shall be flat, true and plumb with adjacent surfaces and shall have a smooth surface ready for decoration.

3.08 CLEAN UP

A. After completion of the work, all remaining debris shall be removed from the building. All excess materials shall be removed and the building left broom clean at no expense to the owner.

END OF SECTION

SECTION 09705

SPECIAL FLOORING

PART 1 - GENERAL REQUIREMENTS

1.01 GENERAL

A. The General Documents listed in the Index, including the General Conditions, Supplementary General Conditions, and General Requirements are hereby made an integral part of this section of the Specifications.

B. Equality of materials or articles other than those named or described in this section will be determined in accordance with the provisions of the Supplementary General Conditions.

C. This contractor shall review, in detail, all other sections of the Construction Specifications affecting the work of this section of the Specifications.

D. It shall be the overall responsibility of the General Contractor (selected for this project) to see that his/her Filed Sub-Bidders, non-Filed Sub-Bidders, specialty contractors and vendors receive the necessary documents and other information with which to undertake and complete this project in a first-class manner.

It shall be the responsibility of all Filed Sub-Bidders to completely familiarize themselves with the contract drawings and all sections of the contract specifications. Each Filed Sub-Bidder will also be responsible for seeing that any sub-sub-bidder(s) required to do work under their section become totally familiar with the requirements of the contract and the importance of planning and the coordinating their particular specialty into the work

1.02 SCOPE

A. Section Includes:

1. Epoxy Flooring
2. 8” Epoxy Base over plywood substrate

B. Related Sections:

1. Rough Carpentry - Section 06100
2. Painting - Section 09900

C. Reference Drawings: Work shall be performed as shown on drawings listed on the ***"Schedule of Drawings***" found at the beginning of this manual after the Table of Contents

PART 2 - PRODUCTS

2.01 SYSTEM DESCRIPTION

A. Seamless flooring system and installation to be Dura-Flex Epoxy Quartz Seamless Floor Systems as manufactured by Dura-Flex, Inc. (No Substitutions)

PART 3 - EXECUTION

3.01 INSTALLATION

A. Preparation, installation and quality control shall be as per approved manufacturer's directives.

END OF SECTION

SECTION 09900

PAINTING

PART 1 - GENERAL

1.01 GENERAL

A. The General Documents listed in Index, including the General Conditions, Supplementary General Conditions and General Requirements are hereby made an integral part of this section of the Specifications.

B. Equality of materials or articles other than those named or described in this section will be determined in accordance with the provisions of the Supplementary General Conditions.

C. This subcontractor shall review, in detail, all other sections of the construction specifications affecting the work of this section of the Specifications.

D. It shall be the overall responsibility of the General Contractor (selected for this project) to see that his/her Filed Sub-Bidders, non-Filed Sub-Bidders, specialty contractors and vendors receive the necessary documents and other information with which to undertake and complete this project in a first-class manner.

It shall be the responsibility of all Filed Sub-Bidders to completely familiarize themselves with the contract drawings and all sections of the contract specifications. Each Filed Sub-Bidder will also be responsible for seeing that any sub-sub-bidder(s) required to do work under their section become totally familiar with the requirements of the contract and the importance of planning and the coordinating their particular specialty into the work

1.02 DESCRIPTION OF WORK

A. Furnish all labor, materials, services and equipment necessary for the complete application of all painting work as indicated on the drawings and as specified herein work all building and site structure:

1. All interior and exterior ferrous metals exposed to review except where completely factory finished including doors, frames, windows, handrails, bollards and guardrails as well as exposed structural items.

2. Interior and exterior non-ferrous metals only where specifically indicated to be field painted.

3. Exposed interior piping.

4. Mechanical equipment exposed unless shop finished.

5. Furnish, erect and maintain staging and scaffolding, including mechanical hoisting equipment required for the performance of painting work.

6. Primers.

7. Finish paints.

8. Back prime all exterior woodwork; including all butt ends & field cuts.

9. Caulking and filling of irregularities prior to painting.

10. Preparation of existing materials to receive paint as per approved manufacturer's directives.

B. To avoid possible confusion, examine the specifications of the various other trades and be thoroughly familiar with all of their provisions regarding painting and understand that all materials installed throughout the building that necessitate painting and which are left unfinished by the requirements of said specifications shall be painted, finished or treated to completion under this contract.

C. It is required that these specifications shall cover the painting and finishing throughout the entire building on wood, metal or other surfaces as to make a thoroughly complete job in every respect, whether every items is herein specifically mentioned or not. Where items are not mentioned they shall be finished the same as specified for similar work.

1.03 RELATED WORK

A. The following work is not included in this section and is to be performed under the designated sections:

1. Temporary heat and proper ventilation shall be provided by the general contractor - Section 01500.

B. Referenced Drawings: Work shall be performed as shown on drawings listed on the ***"Schedule of Drawings***" found at the beginning of this manual after the Table of Contents

1.04 WORK NOT INCLUDED

A. Do not include painting which is specified under other sections.

B. Unless otherwise indicated, painting is not required on surfaces in concealed areas and inaccessible areas such as furred spaces, pipe spaces and duct shafts.

C. Metal surfaces of anodized aluminum, stainless steel, chromium plate, copper, bronze and similar finished materials will not require painting under this section except as may be specified herein.

D. Do not paint any moving parts of operating units, mechanical or electrical parts such as valve operators, linkages, sinkages, sensing devices and motor shafts unless otherwise indicated.

E. Do not paint over any required labels or equipment identification, performance rating, name or nomenclature plates.

F. Definitions: The term "paint" as used herein means all coating systems materials including primers, emulsions, epoxy, enamels, sealers, fillers and other applied materials used as prime, intermediate or finish coats.

1.05 QUALITY ASSURANCE

A. Qualification of Manufacturer: Products used in the work of this section shall be produced by manufacturers regularly engaged in manufacture of similar items and with a history of successful production acceptable to the Architect.

B. Qualifications of Workmen:

1. Provide at least one person who shall be present at all times during execution of the work of this section, who shall be thoroughly familiar with the specified requirements and the materials and methods needed for their execution and who shall direct all work performed under this section.

2. Provide adequate numbers of workmen skilled in the necessary crafts and properly informed of the methods and materials to be used.

3. In acceptance or rejection of the work of this section, the Architect will make no allowance for lack of skill on the part of workmen.

C. Paint Coordination:

1. Provide finish coats which are compatible with the prime coats used.

2. Review other sections of these specifications as required, verifying the prime coats to be used and assuring compatibility of the total coating system for the various substrata.

3. Upon request, furnish information on the characteristics of the specific finish materials to ensure that compatible prime coats are used.

4. Provide barrier coats over non-compatible primers or remove the primer and re-prime as required.

5. Notify the Architect in writing of anticipated problems in using the specified coating systems over prime coating supplied under other sections.

1.06 SUBMITTALS

A. Manufacturers' Data: As soon as possible after award of the contract, submit:

1. Complete materials list of all items proposed to be furnished and installed under this section.

2. Manufacturers' specifications and other data required to demonstrate compliance with the specified requirements.

3. For information only, submit 2 copies of manufacturer's specifications, including paint analysis and application instructions for each material. Indicate by transmittal that a copy of each manufacturer's instructions has been distributed to the applicator.

B. Upon receipt of review comments, make all revisions and corrections and resubmit if so required.

C. Colors & Codes:

1. The Architect will furnish a schedule of colors for each area and surface. All colors shall be mixed in accordance with manufacturer's instructions.

2. Colors of priming coats, and body coats where specified, shall be lighter than those of finish coat. The Architect shall have unlimited choice of colors without extra cost.

3. Where accent and bright colors are to be selected, primer and first coats shall be white or "off white" beneath 2 coats of finish color.

4. Colors shall be pure non-fading pigments, mildewproof, sunproof, finely ground in approved medium. Colors used on concrete, masonry, plaster surfaces (as applicable) shall be limeproof. All materials shall be subject to the Architect's approval.

5. Samples of all colors, stains and finishes shall be prepared in advance of requirements so as not to delay work and shall be submitted to the Architect for approval before any work is commenced. Any work done without such approval shall be redone to Architect's satisfaction at the painting subcontractor's expense. Samples shall be on separate 8"x10"x1/8" tempered hardboard panels.

1.07 PROTECTION

A. Furnish and lay suitable drop cloths in all areas where painting is being done to protect floors and all other surfaces from damage during the work.

B. The general contractor will remove and replace all finish hardware applied to doors, cabinets, etc. Mechanical subcontractor or general contractor will remove and replace, where necessary, accessories, plates, lighting fixtures, heating units and all other finished items.

C. In no case shall the painting subcontractor attempt to paint around finish hardware or other removable items that are already fitted in place.

D. At completion of work in each area, remove all paint spots, oil and stain from all surfaces, including finish hardware.

1.08 PRODUCT HANDLING

A. Delivery of materials: Deliver all materials to the job site in original, new and unopened containers bearing the manufacturer's name and label showing at least the following information:

Name or title of the materials
Federal specification number if applicable
Manufacturer's stock number
Manufacturer's name
Contents by volume for major constituents
Thinning instructions
Application instructions

1.09 STORAGE & USE OF MATERIALS

A. All materials shall be stored in designated spaces in a manner which meets the requirements of applicable codes and fire regulations. When not in use, such spaces shall be kept locked and inaccessible to those not employed under this section. Each space shall be provided with a fire extinguisher of carbon dioxide or dry chemical type, bearing the label of the National Board of Fire Underwriters and tag of recent inspection.

B. Materials shall be delivered in sufficient quantities in advance of the time needed in order that work will not be delayed in any way.

C. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

1.10 COMPATIBILITY OF SHOP & FIELD PAINTS

A. It is essential that paints applied in the shop and in the field be mutually compatible. Shop drawings for fabricated items will indicate manufacturer and type of shop coat applied.

B. The painting subcontractor shall determine that the materials specified in the painting schedules are compatible with shop coats to which these materials are to be applied and he shall bring to the Architect's attention any condition which may require a change in the specifications before proceeding with his work. Failure to do so shall be construed as acceptance of the paints specified and the painting subcontractor shall correct at his own expense any defects in his work resulting from the sue of such materials.

1.11 JOB CONDITIONS

A. Surface Temperatures: Do not apply solvent-thinned paints when the temperature of surfaces to be painted and the surrounded air temperature are below 45F, unless otherwise permitted by the manufacturer's printed instructions as approved by the Architect.

B. Weather Conditions: Do not apply paint in snow, rain, fog and mist or when the relative humidity exceeds 85% or to damp or wet surfaces; unless otherwise permitted by the manufacturer's printed instructions as approved by the Architect. Applications may be continued during inclement weather within the temperature limits specified by the paint manufacturer during application and drying periods.

1.12 EXTRA STOCK

A. Amount: Upon completion of the work of this section, deliver to the owner an extra stock equaling 10% of each color, type and gloss of paint used on the work.

B. Packaging: Tightly seal each container and clearly label with the contents and location used.

PART 2 - MATERIALS

2.01 PAINT MATERIALS

A. General: Provide the best quality grade of the various types of coatings as regularly manufactured by paint materials manufacturers approved by the Architect. Materials not displaying the manufacturer's identification as a standard best grade product will not be

acceptable.

B. Durability: Provide paints of durable and washable quality. Do not use paint materials which will not withstand normal washing as required to remove pencil marks, ink, ordinary soil and similar material without showing discoloration, loss of gloss, staining or other damage.

C. Colors & Glosses: The Architect will select colors to be used in the various types of paint specified and will be the sole judge of acceptability of the various glosses obtained from the materials proposed to be used in the work.

D. Undercoats & Thinners: Provide undercoat paint produced by the same manufacturer as the finish coat. Use only the thinners recommended by the paint manufacturer and use only to the recommended limits. Insofar as practicable, use undercoat, finish coat and thinner material as parts of a unified system of paint finish.

2.02 APPLICATION EQUIPMENT

A. General: 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 and as approved by the Architect.

B. Compatibility: Prior to actual use of application equipment, use all means necessary to verify that the proposed equipment is actually compatible with the materials to be applied and that the integrity of the finish will not be jeopardized by use of the proposed application equipment.

2.03 PRODUCT/MATERIAL DESCRIPTION

A. Acceptable manufacturers:

1. Benjamin Moore & Company
2. California Products Company
3. Pratt & Lambert
4. Sherwin-Williams Paints (identified as S-W)
5. Or others as approved by the Architect & Owner

B. Provide best quality (first line) grade of various types of coatings as regularly manufactured by acceptable paint or coating materials manufacturers. Materials not displaying manufacturer's identification as a standard, best grade product, will not be acceptable.

C. Provide application equipment and incidentals as required for completion of work.

D. All other materials, not specifically described but required for a complete and proper installation of the work of this section, shall be new, first quality of their respective kinds and as selected by the contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

A. Inspection: Prior to installation of the work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence. Verify that painting may be completed in strict accordance with the original design and with the manufacturer's recommendations as approved by the Architect.

B. If the surfaces are not clean, smooth, thoroughly dry or if they cannot be put into proper condition to receive paint by customary, normal methods, including sanding and spackling, the painting subcontractor shall so notify the Architect in writing.

C. Discrepancies: Do not proceed in areas of discrepancy until all such discrepancies have been fully resolved.

D. The starting of work under this section will be construed as acceptance of such surfaces and any defects in work resulting from such accepted surfaces shall be corrected by the painting subcontractor at his own expense.

E. All spaces shall be broom clean and all surfaces dry before painting is started. All dust, dirt, plaster, grease and other extraneous matter affecting the finish work shall be removed.

3.02 MATERIALS PREPARATION

A. General:

1. Mix and prepare painting materials in strict accordance with the manufacturer's recommendations as approved by the Architect.

2. Store materials not in actual use 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 all materials before application to produce a mixture of uniform density and as required during the application of materials. Do not stir into the material any

film which may form on the surface. Remove the film and if necessary, strain the material before using.

3.03 SURFACE PREPARATION

A. General:

1. Perform preparation and cleaning procedures in strict accordance with paint or coating manufacturer's instruction and as herein specified for each particular substrate conditions.

2. Have removed all hardware, hardware accessories, machined surfaces, plates, lighting fixtures and similar items in place and not be finish painted. Following completion of painting of each space or area have all items removed and reinstalled.

3. Clean surfaces to be painted before applying paint or surface treatments. Remove oil and grease prior to mechanical cleaning. Program cleaning and painting so that contaminants from the cleaning process will not fall onto wet, newly painted surfaces.

B. Cementitious Materials:

1. Prepare cementitious surfaces to be painted by removing efflorescence, chalk, dust, dirt, grease and oils.

2. Determine alkalinity and moisture content of surfaces to be painted by performing appropriate tests. If surfaces are found to be sufficiently alkaline to cause blistering and burning of finish paint, correct this condition before application of paint. Do not paint over surfaces where moisture content exceeds that permitted in manufacturer's printed directions.

3. Clean concrete floor surfaces scheduled to be painted with a commercial solution of muriatic acid or other etching cleaner. Flush floor with clean water to neutralize acid and allow to dry before painting.

4. Concrete and unit masonry surfaces scheduled to receive paint finish, remove dirt, loose mortar, scale, salt, or alkali powder and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry.

5. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.

C. Gypsum Board & Plaster:

1. Gypsum Wallboard: Surfaces of gypsum wall board shall have all damaged areas cut out and patched, cracks, taped and all roughness sanded smooth. Wall board shall be brushed clean of dust before painting begins.

2. All plaster surfaces to be painted shall be given a wash of zinc sulphate solution, 2 lbs. of zinc sulphate crystals per gallon of water, to assist in neutralizing excessive lime or alkaline conditions. Allow to dry thoroughly and dust off zinc sulphate crystals before applying primer-sealer.

3. All "hot spots" in plaster which is to be painted where noticeable after application of the first coat, shall be touched-up before applying the second coat to produce an even result in the finish coat.

4. All scratches, cuts, cracks, and abrasions in plaster or drywall surfaces shall be cut out as required then filled with spackle or other approved patching plaster flush with adjoining surfaces and when dry shall be sanded and sealed before application of priming coat.

D. Wood:

1. Clean wood surfaces to be painted of all dirt, oil or other foreign substances with scrapers, mineral spirits or sandpaper. Sandpaper smooth those finished surfaces exposed to view and dust off. Scrape and clean small, dry, seasoned knots and apply a thin coat of sealer before application of priming coat. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood-filler. Sandpaper smooth when dried.

2. Prime, stain or seal wood required to be job-painted immediately upon delivery to the job. Prime edges, face, undersides, and backsides of such wood, including cabinets, counters, cases, paneling, etc.

3. Seal tops and bottoms of wood doors with a heavy coat of sealer immediately upon delivery to job.

4. Woodwork: Knots and sappy streaks shall be given 2 thin coats of orange shellac. All cracks, nail holes and surface defects, if any, shall be filled with putty after the priming coat, filler or shellac has been applied. Wood putty shall be brought up flush with the surface.

E. Ferrous Metals:

1. Clean non-galvanized or non-shop coated surfaces of oil, grease, dirt, loose mill scale and other foreign substances by solvent cleaning, in accordance with SSPC-

SP-1 or mechanical cleaning in accordance with SSPC-SP-2. Surfaces where solder flux has been used shall be cleaned with benzine.

2. Touch up shop-applied prime coats wherever damaged or bare. Clean and touch up with same type shop primer.

3. Metal, shop coated: Shop coated metal surfaces shall be cleaned of foreign matter and rough surfaces shall be removed by sanding, in accordance with SSPC-SP-2. Spot prime with same type of primer.

4. Metal Work Imperfections: Dents, cracks, hollow places, open joints and other irregularities in metal work to be painted shall be filled with metal filler which after setting shall be sanded to a smooth, hard finish in accordance with SSPC-SP-2.

5. Structural Steel Surfaces: Prepare metal surfaces for coating by removing all mill scale, rust, rust-scale, paint or foreign matter by use of abrasives in accordance with SSPC-SP-3 power tool cleaning or SSPC-SP-5 blast cleaning as required to remove contaminates.

F. Galvanized Metals:

1. Galvanized metal to be painted shall be washed with mineral spirits or other solvents as recommended by the paint manufacturer and rinsed with clean water. Metal shall be dry before paint is applied.

G. Non-Ferrous Metals:

1. Aluminum surfaces scheduled for paint finish: Remove surface contamination by steam or high pressure water. Remove oxidation with acid etch and solvent washing. Apply etching primer immediately following cleaning.

2. Copper Surfaces Scheduled for a Paint Finish: Remove contamination by steam, high pressure water or solvent washing. Apply vinyl etch primer immediately following cleaning.

3. Copper Surfaces Scheduled for a Natural Oxidized Finish: Remove contamination by applying oxidizing solution of copper acetate and ammonium chloride in acetic acid. Rub on repeatedly for required effect. Once attained, rinse surfaces with clean water and allow to dry.

3.04 APPLICATION

A. General:

1. Apply paint or coating in accordance with manufacturer's directions. Use

applicators and techniques recommended by manufacturer for type of material being applied.

2. Apply additional coats when undercoats, stains or other conditions show through final coat of paint, until paint film is of uniform finish, color and appearance.

3. Apply materials at not less than manufacturer's recommended spreading rate to establish a total dry film thickness as recommended by coating manufacturer.

4. Apply materials uniformly, show no runs, sags, crawls, holidays, or other defects.

5. Paint surfaces behind movable equipment and furniture same as adjacent exposed surfaces. Paint surface behind permanently-fixed equipment of furniture with prime coat only.

6. Paint interior surfaces of ducts where visible through registers or grilles with a flat, non-specular black paint.

7. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.

8. Finish doors on tops, bottoms and side edges the same as the faces.

9. Sand lightly between each succeeding enamel or varnish coat.

10. Omit the first coat, primer, on metal surfaces which have been shop-primed and touch-up painted.

B. Protection (Operating Units): In painting of operating units, no paint shall be applied to sliding contacts and the like where bare metals is necessary for proper operation. Any paint applied to such surfaces shall be removed.

C. Misc. Metal Items: Access doors, plates, panel boxes, steel grilles, louvers, convector covers, registers and the like shall be painted in colors selected. Plates, grilles and the like in ceilings or wall shall be painted to match ceilings or walls unless work is factory finished or noted otherwise on the drawings.

D. Heated Items: Pipes containing heat shall not be painted until system is cold and remain cold until after final coat has dried.

E. Time Between Coats: Coats shall be dry before succeed coats are applied; allow a min. of 24 hours between application on any one surface, unless otherwise specified by the manufacturer.

F. Undercoats (interior metal): Undercoats on interior metal shall be uniformly sanded to

provide a smooth, even surface for finish coats.

G. Tinting of Glass: Each coat of paint, primer, body and finish coat, shall be darker in color than the proceeding coat.

H. Prime Coats: Apply a prime coat to material which is required to be painted or finished and which has not been prime coated by product manufacturer.

I. Re-coat primed and sealed surfaces where there is evidence of suction spots or unsealed areas in first coat to assure a finish coat with non-burn-through (paint holidays) or other defects due to insufficient sealing.

J. Pigmented (opaque) Finishes: Complete cover to provide an opaque, smooth surface of uniform finish, color, appearance and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness or other surface imperfections will not be acceptable.

K. Drying:

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

2. Oil-base and oleo-resinous solvent-type paints shall be considered dry for re-coating when the paint feels firms, does not deform or feel sticky under moderate pressure of the thumb, and the application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.

L. Brush Application:

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

M. Spray Application:

1. Confine spray application to metal framework and similar surfaces where hand brush work would be inferior.

2. Where every spray application is used, apply each coat to provide the equivalent hiding of brush-applied coats. Do not double back with spray equipment for the purpose of building up film thickness of 2 coats in one pass.

N. Completed work shall match the approved samples for color, texture and coverage. Remove, refinish or repaint all work not in compliance with specified requirements. Final acceptance of colors will be from samples applied on this job.

3.05 FIELD QUALITY CONTROL

A. Testing Procedures:

1. The right is reserved by the owner to invoke the following material testing procedures at any time, and any number of times during period of field painting.

   a. Owner may engage services of an independent testing laboratory to sample paint being used. Samples of materials delivered to project site will be taken, identified and sealed and certified in presence of contractor.

   b. Testing laboratory will perform appropriate tests for any or all of the following characteristics: Abrasion resistance, apparent reflectivity, flexibility, washability, absorption, accelerated weathering, dry opacity, accelerated yellowness, re-coating, skinning, color retention, alkali resistance and quantative materials analysis.

   c. If tests results show that material being used does not comply with specified requirements, contractor may be directed to stop painting work, and remove non-complying paint; pay for testings; repaint surfaces coated with rejected paint; remove rejected paint from previously painted surfaces if, upon repainting with specified paint the 2 coatings are non-compatible.

3.06 ADJUSTMENT & CLEANING

A. Clean-Up: During the progress of work, remove from project daily all discarded paint materials, rubbish, cans and rags. Upon completion of painting work, clean paint spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surface.

B. Protection: Protect work of other trades whether to be painted or not against damage by painting and finishing work. Correct any damage by cleaning, repairing or replacing and repainting as acceptable to Architect.

C. Provide "wet paint" signs as required to protect newly painted finishes. Remove temporary protective wrappings provided by others for protection of their work after completion of painting operations.

D. At the completion of work of other trades, touch up and restore damaged or defaced painted surfaces.

E. Touch up finish coats of factory finished items that become damaged before completion of the building. Sand damaged areas smooth and apply specified primer before applying finish coat. Where touch-up cannot be done neatly and blended smooth with other finish material, repaint entire surface or panel as approved by the Architect.

3.07 COMPLETION

A. Cleaning: At the completion of the work, the painting subcontractor shall remove all his staging equipment, all debris and materials and leave the site of the work in a clean condition so far as his work is concerned.

B. Final Inspection: The painting subcontractor shall coordinate with the general contractor to protect all painted surfaces against damage until the date of final inspection of all painters work and the painting subcontractor shall be required to repaint or retouch any areas found which do not comply with the requirements of these specifications.

C. Note: Any retouch work required after painted surfaces have been accepted by the Architect shall be paid for by the general contractor.

3.08 GUARANTEE

A. All work, materials and labor performed under this section shall be guaranteed in writing to the owner by the contractor and manufacturer for a period of one year.

3.09 SCHEDULE OF FINISHES

A. General: All surfaces either interior or exterior shall have an applied finish EXCEPT:

1. Concrete, exterior, which shall have a rubbed concrete finish.

2. Items which have been factory finished. Touch up to match finish as required or paint entire item with coating to match factory finish if marring is too extensive in Architect's opinion.

3. Paint Finish Schedule:

a.	Walls: General:	Semi-Gloss
b.	Ceilings:	Flat
c.	Trim:	Semi-Gloss
d.	Doors:	Semi-Gloss

B. Exterior Painting Schedule:

1. Ferrous Metals:

   One coat - KEM Bond HS Metal Primer or

   One coat - approved shop metal primer in shop (*zinc chromate - iron oxide) or field metal primer (*zinc chromate - iron oxide)

   ***Note**: Zinc chromate - Iron Oxide Metal Primer shall conform to ASTM D478, Type I and FS-II-P-57b Type I; dry mil thickness 2.0 minimum per coat.

   Two finish coats - Industrial Alkyd Enamel, High Solids

2. Galvanized Metal: All exposed galvanized members to be painted unless noted otherwise.

   One coat - Galvite HS B50W230

   Two coats - Industrial Alkyd Enamel, High Solids, Gloss

3. Aluminum (only where specifically indicated):

   One coat - Galvite HS B50W230

   Two coats- Industrial Alkyd Enamel, High Solids, Gloss

4. Non-ferrous metals (only where specifically indicated):

   One coat - Galvite HS B50W230

   Two coats- Industrial Alkyd Enamel, High Solids, Gloss

5. Wood - Painted:

   a. Primer - 1 coat, A-100 Alkyd Exterior Wood Primer

   b. Finish - 2 coats, SuperPaint Gloss Latex House & Trim

   Note: Prior to painting thorough scrape all existing wood as applicable, free of loose, blistered, flaked, aligated or chipped paint and prime exposed wood.

6. Exterior Sheet Metal (flashings, gravel stops, roof fans, roof metal, vents, pipe risers, etc.): Same as above for all different types of metals unless factory finished with paint or membrane (touch up any marred factory finish to match factory finish).

7. Metal - Gloss: Doors & Frames (Except metal doors & frames)

a. Primer - KEM Kro Mix Universal Metal Primer B502

b. Finish - DTM Acrylic Gloss Coating B66, (2) coats

8. Pressure-Treated Wood:

a. Primer - None

b. Finish - 2 coats, Woodscapes Acrylic Solid Color Stain

C. Interior Painting Schedule: (As Applicable)

1. Concrete indicated in finish schedules to be painted:

One coat - PrepRite Block Filler, Vinyl Acrylic

Two coats - Promar 200 Interior Latex, Eggshell

2. Gypsum Board:

One coat - PrepRite 200

Two coats - Promar 200 Interior Latex, Eggshell

3. Doors - Medium density overlay

Primer - 1 coat, PrepRite Classic Interior Primer

Finish - 2 coats, Pro Classic Waterbourne Interior, Semi-Gloss

4. Ferrous items except structural steel, steel joists and metal deck.

One coat touch up, if required - primer rust inhibitive paint, non-lead or match existing primer

Primer - 1 coat, KEM Bond HS

Finish - 2 coats, DTM Acrylic Glass Coating

Note: Thoroughly clean existing surfaces to remove all rust, chipped paint, abrasions, etc.

5. Galvanized Metal:

Primer - KEM Bond HS

Finish - (2) coats, Industrial Enamel - Voc. complying

END OF SECTION

SECTION 10160

TOILET PARTITIONS

PART 1 – GENERAL REQUIREMENTS

1.01 GENERAL

A. The General Documents listed in the Index, including the General Conditions, Supplementary General Conditions, and General Requirements are hereby made an integral part of this section of the Specifications.

B. Equality of materials or articles other than those named or described in this section will be determined in accordance with the provisions of the Supplementary General Conditions.

C. This contractor shall review, in detail, all other sections of the Construction Specifications affecting the work of this section of the Specifications.

D. It shall be the overall responsibility of the General Contractor (selected for this project) to see that his/her Filed Sub-Bidders, non-Filed Sub-Bidders, specialty contractors and vendors receive the necessary documents and other information with which to undertake and complete this project in a first-class manner.

It shall be the responsibility of all Filed Sub-Bidders to completely familiarize themselves with the contract drawings and all sections of the contract specifications. Each Filed Sub-Bidder will also be responsible for seeing that any sub-sub-bidder(s) required to do work under their section become totally familiar with the requirements of the contract and the importance of planning and the coordinating their particular specialty into the work

1.02 SCOPE OF WORK

In general, the Contractor shall supply all labor, equipment, temporary protection, tools and appliances necessary for the proper completion of the work as required in the Specifications and in accordance with good construction practice. The work under this Section generally includes the following:

A. Work Included: The scope of work, without limiting the generality thereof, consisting of furnishing all labor, materials, plant, transportation, equipment, accessories, appurtenances, and services necessary and/or incidental to the proper furnishing and installation of all toilet partitions and privacy screens shown on the drawings, described in the Specifications or as reasonably inferred from either, in the opinion of the Architect,

as being required, and includes:

1. Toilet partitions, partition doors and privacy screens including installation and operating hardware.

2. Clean and restore all areas affected by the work.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Section 06100 – Rough Carpentry
B. Section 09705 – Special Flooring
C. Section 09900 – Painting

1.04 SUBMITTALS

A. Submittals shall be made in accordance with Division 1, Section 01300.

B. Submit complete shop drawings. Shop drawings shall include a completely dimensioned layout of all toilet compartments, elevations, details of construction, sizes of openings and parts, anchoring details, leveling details, color, pattern, metal thickness, adhesive, hardware, fittings and fastenings.

C. Submit the following samples: Manufacturer's standard color chips for colors and patterns of compartments and related items for selection by Architect.

D. Submit in triplicate a certificate from the compartment manufacturer properly attested, stating that the materials, construction and finish comply with the requirements of the drawings and specifications. These copies of the certificate shall be furnished by the contractor after approval of shop drawings and before installation of the compartments.

1.05 JOB CONDITIONS

A. The Contractor shall be responsible for securing and protecting materials, equipment and tools as well as partially completed construction from damage, vandalism or abuse.

B. The Contractor shall utilize skilled and experienced specialty workers to complete the work. Experienced trade workers shall be utilized for all aspects of the work.

C. The Contractor shall provide all masking, tarps and protection to prevent damage to adjacent construction, new or existing, including landscaped and paved areas.

D. The Contractor shall patch, repair and/or replace all adjacent materials and

surfaces damaged as a result of the work, at no expense to the Owner. All repair or replacement work shall match the existing in kind and appearance.

E. Coordinate the work in this section with the work in other sections to assure the orderly progress of the work.

1.06 PRE-CONSTRUCTION CONFERENCE

A preconstruction conference will be held with a representative of the Owner, Architect and all involved trades to discuss all aspects of the project. The Contractor's field representative and foreman for the work shall be in attendance.

1.07 PROTECTION OF WORK AND MATERIAL STORAGE

A. Protection of work and materials storage shall be done in accordance with Section 01600.

B. Immediately upon delivery to job site, place materials in area protected from weather and construction operations. Trim materials shall be stored on a flat and level surface on a full shipping pallet. Store materials under a protective covering to prevent the accumulation of job site dirt and debris.

C. Handle materials to prevent damage to product edges and corners.

1.08 DIMENSIONS AND QUANTITIES

A. The Contractor shall verify dimensions and quantities in the field. The Project Plans and Drawings have been compiled from various sources and may not reflect the actual field conditions at the time of construction.

B. The Contractor is solely responsible for means and methods of construction. Make necessary investigations and take necessary precautions to properly supply, fabricate, and install work.

C. Unfamiliarity with existing project conditions will not be considered as a basis for additional compensation.

D. In case of inconsistency between Drawings and Specifications or within either document, the better quality and/or greater quantity of work shall be provided, as determined by the Owner.

1.09 WARRANTY/GUARANTEES

A. Upon completion of the work, and prior to final payment, the Contractor shall submit a Guarantee of his work to be free of defect in materials and workmanship. This Guarantee shall be for a period of two (2) years, and shall be signed by a Principal of the Contractor's firm, and sealed if a corporation.

B. Provide Toilet Partition Manufacturer's 15 year warranty against corrosion, breakage and delamination of plastic material under normal conditions.

1.10 CLEAN-UP

Clean-up shall be done in accordance with this Section, and with Section 01700.

PART 2 – PRODUCTS

2.01 MATERIALS & FABRICATION

A. General:

1. Type of Partition: Solid Plastic (HDPE) Floor Mounted Overhead Braced Toilet Partitions and Urinal Screens . Urinal screens shall be wall supported. Include kit and instructions for repairs.
   a. HDPE Partitions to be tested in accordance with NFPA 286.
2. Acceptable Manufacturers:
   a. Bradmar Solid Plastic (HDPE) Series 400 Sentinel by Bradley Corporation
   b. Floor Mounted Overhead-Braced Solid Plastic Toilet Compartments by Scranton Products
   c. Polly SPR - The Corinthian Metpar Type FP-500 Overhead Braced by Metpar Corp, or Architect Approved Equal.

   Color: Architect to select from manufacturer's standard color choices.

B. Hardware & Fittings: All hardware & fittings shall be Stainless Steel.

1. Gravity hinges concealed with doors.

2. Latch, strike and bumper with rubber silencer.

3. Shoes at least 3" high.

4. Brackets: Continuous Type (full height of partition).

C. Fastenings shall be adequate to fasten joints firmly, shall be vandal-resistant and shall match hardware in finish.

D. Scope to include urinal privacy screens per plans.

2.02 INSPECTION

A. Check areas to receive compartments for correct height and spacing of support structures and plumbing fixtures that may affect quality and execution of work.

B. Commence installation of partitions when all checks have been made.

C. Start of work constitutes acceptance of job conditions.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Install toilet partitions level, plumb, true to line, to dimensions shown and put in good working order. Coordinate work with other trades. Secure pilasters and panels to walls with continuous bracket. Attachment shall be by methods appropriate to the adjoining work and drilling shall be carefully done to avoid damage to finished surfaces.

1. Seal floor coating where penetrated by floor fastenings after drilling pilot holes and cleaning them. Butter holes and insert fastening to embed them in sealant.

B. Doors shall be arranged to swing, except for handicapped compartments, and remain slightly ajar. Clearance at vertical edge of door shall be uniform from top to bottom, and shall not exceed 3/16". Carefully adjust all hardware and leave in good working order.

C. All evidence of drilling, cutting and fitting shall be concealed in the finished work. All work shall be free from dents, tool marks, warpage, buckle, open joints or other defects.

D. Clean finish surfaces, touch up all abrasions in finish and leave free of imperfections.

E. No exposed parts of the finished installation shall show any manufacturer's name or emblem.

END OF SECTION

SECTION 10523

FIRE EXTINGUISHERS AND CABINETS

PART 1 - GENERAL

1.1 SUMMARY

A. Provide fire extinguishers.

1.2 SUBMITTALS

A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.

B. Shop Drawings: Submit shop drawings indicating material characteristics, details of construction, connections, and relationship with adjacent construction.

1.3 QUALITY ASSURANCE

A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

B. Standards: UL and FM listed products, NFPA 10.

C. Regulations: ADAAG.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Manufactures: J. L. Industries, Larsen’s Manufacturing, Potter-Roemer, or approved equal.

B. Fire Extinguishers:

1. Type: Multipurpose dry chemical type.
2. Rating: Sized for project requirements.
3. Public Area Mounting: Cabinet mounted.
4. Service Area Mounting: Metal brackets.

C. **Provide Fire Extinguishers as follows: two (2) (bracket mounted) to be located in Life Guard, First Aid, Equipment and Staff Training Areas - as located by Architect and local Fire Department.**

1. **Quantity Required in Base Bid: = Two (2)**

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Coordinate with work of other sections.

B. Install fire extinguishers in mechanical and service areas with wall-hung brackets at locations and heights indicated and acceptable to authorities having jurisdiction.

C. Restore damaged finishes. Clean and protect work from damage.

END OF SECTION

SECTION 10810

TOILET ACCESSORIES

PART 1 - GENERAL REQUIREMENTS

1.01 GENERAL

A. The General Documents listed in the Index, including the General Conditions, Supplementary General Conditions, and General Requirements are hereby made an integral part of this section of the Specifications.

B. Equality of materials or articles other than those named or described in this section will be determined in accordance with the provisions of the Supplementary General Conditions.

C. This contractor shall review, in detail, all other sections of the Construction Specifications affecting the work of this section of the Specifications.

D. It shall be the overall responsibility of the General Contractor (selected for this project) to see that his/her Sub-Contractors, specialty contractors and vendors receive the necessary documents and other information with which to undertake and complete this project in a first-class manner.

It shall be the responsibility of all Sub-Contractors to completely familiarize themselves with the contract drawings and all sections of the contract specifications. Each Sub-Contractor will also be responsible for seeing that any sub-sub-contractor(s) required to do work under their section become totally familiar with the requirements of the contract and the importance of planning and the coordinating their particular specialty into the work.

1.02 DESCRIPTION OF WORK

A. Work Included: The scope of work, without limiting the generality thereof, consists of furnishing all labor, materials, plant, transportation, equipment, accessories, appurtenances, and services necessary and/or incidental to the proper furnishing and installation of all toilet accessory work shown on the drawings, described in the Specifications, or as reasonably inferred from either, in the opinion of the Architect, as being required and includes:

1. Grab Bars.
2. Toilet Paper Dispensers (N.I.C.)
3. Mirrors.

4. Sanitary Napkin Disposal (N.I.C.)
5. Baby Changing Stations.
6. Coat Hooks

B. Reference Drawings: Work shall be performed as shown on drawings listed on the ***"Schedule of Drawings***" found at the beginning of this manual after the Table of Contents.

1.03 SUBMITTALS

A. General: Refer to Section 01300 - Submittals, for submittal provisions and procedures.

B. Product Data: Submit complete manufacturer's product data to designer for approval, consisting of complete specifications, test report data, installation instructions, and other pertinent technical data required for complete product and product use information.

C. Submit a complete schedule of accessories, giving quantities and location of each item.

D. At time of submission of accessory schedules, and before any material is ordered, the accessory supplier shall submit for the designer's review, a complete line of samples. Samples shall be plainly marked, giving the accessory number used in the schedule, the manufacturer's numbers, types and sizes.

E. Samples shall remain with the designer until delivery of all other accessories to the project is complete and shall then be incorporated in the work or rendered to the supplier or mutually agreed.

1.04 DELIVERY, STORAGE & HANDLING

A. Deliver items to site in ample time to avoid delay in job progress and at such times as to permit proper coordination of the various parts.

B. All accessories shall be delivered to the site in manufacturer's original packages which shall be legibly marked with labels indicating the manufacturer's numbers, types, and accessory item.

C. Each accessory item shall be wrapped together with all screws, bolts, and fastenings necessary for its proper installation.

D. Delivery of accessories to the building shall be made in accordance with the general contractor's instructions.

E. The general contractor shall received, check against invoices, and store all toilet accessories at the job.

F. The general contractor shall furnish the supplier of the accessories with receipts for all accessories received, and shall send copies of these receipts to the designer.

G. The general contractor shall designate lockable storage space for all accessories. The general contractor shall be responsible for all items of accessories after receipt from the supplier. The general contractor after receipt of items shall replace all lost or damaged hardware at his own expense without additional cost to the Awarding Authority.

1.05 GUARANTEES

A. Attention is directed to provisions of the GENERAL CONDITIONS regarding guarantees and warranties for work under this contract.

B. Manufacturers shall provide their guarantees for work under this section. However, such guarantees shall be in addition to and not in lieu of all other liabilities which manufacturers may have by law or by other provisions of the Contract Documents.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Toilet accessories shall comply with all requirements specified herein and shall be as noted on Drawing Schedule. (Note: Bobrick models are included for design intent; substitutions of equals must be reviewed and approved by the Architect/Owner)

PART 3 - EXECUTION

3.01 INSTALLATION

A. After receipt of accessories, the general contractor shall assign the installation of all accessory items as shown on the drawings and specified herein. Carefully review the drawings to establish quantities of each type required.

B. Include all fastening and attachment devices suitable for surface to which accessory will be applied. Installation shall be in strict compliance with manufacturer's written instructions.

C. Height, location, quantities, and placement of all accessories shall be as per ADA and Architectural Access Board applicable requirements.

END OF SECTION

SECTION 15400

PLUMBING

INDEX

SECTION 15400

PLUMBING
(Filed Sub-bid Required)

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. The BIDDING REQUIREMENTS, CONTACT FORMS and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1- GENERAL REQUIREMENTS shall be included in, and made a part of this section.

B. Work of this section requires Filed Sub-Bids and is governed by the provisions of the Massachusetts General Laws (MGL), Public Bidding Law – Chapter 149, Sections 44A to 44J inclusive, as amended, and applicable Sections of the MGL, Public Contract Law – Chapter 30.

C. Sub-Bids for work under this section shall be for the complete work and shall be filed in a sealed envelope with the Awarding Authority at a time and place as stipulated in Invitation to Bid and Instructions to Bidders.

D. Sub-Bids for work under this Section shall be for the complete work and shall be filed in a sealed envelope with the Awarding Authority at a time and place as stipulated in INVITATION TO BID and INSTRUCTIONS TO BIDDERS.

1. The following shall appear on the upper left hand corner of the envelope:

   NAME OF SUB-BIDDER: _____
   SUB-BID FOR TRADE: TITLE.

2. Each Sub-Bid submittal for work under this Section shall be on forms furnished by Awarding Authority, as bound herein, accompanied with the required bid deposit in compliance with MGL c149, Section 44B in the amount of 5 percent of Filed Sub-Bid.

E. Sub Sub-Bid Requirements: In accordance with Massachusetts General Law, Chapter 149, Section 44F, as amended, The Filed Sub-Bidder shall list in "Form for Sub-Bids" the name and bid price of each person, firm or corporation performing each class of work or part thereof for which the Section of the Specifications for that Sub-Trade require such listing.

1. This filed trade requires that the following classes of work be listed in under the conditions indicated herein.

a. Insulation 2.8

1.02 SUMMARY

A. Work in this Section includes all labor, materials, equipment and services necessary to furnish completely and install all PLUMBING SYSTEMS, as indicated on the Drawings and specified herein, and in general, is as follows:

1. Complete interior sanitary (soil, waste and vent) systems, as indicated on the drawings.
2. Complete cold water distribution system.
3. Complete interior hot water distribution system.
4. All plumbing fixtures, trim and fixture supports.
5. All valves (interior) and wall hydrants.
6. Insulation for piping and equipment.
7. Access panels for all valves, drains and equipment.
8. Testing, sterilization, guarantees and record drawings.
9. All hangers, inserts, sleeves, expansion loops, expansion compensators, anchors, guides, strainers, gauges, thermometers plus all related accessories required for a complete installation for each system, as specified herein and/or indicated on the Drawings.
10. All operating and maintenance manuals, certification letters and Certificates of Approval.
11. All supplementary steel for piping and equipment supports.
12. Valved connections for systems and equipment furnished under other Sections of the Specifications.

1.03 WORK NOT INCLUDED

A. The following related work shall be performed by the designated trades and under the listed SECTION:

1. Cutting and patching.
   Note: The General Contractor shall accurately drill all 4" diameter and larger cutouts where required for all piping sleeves. All cutouts smaller than 4" diameter shall be by the Plumbing Contractor.
2. Excavation and backfill shall be performed by the General Contractor.
3. Wiring of equipment requiring power connections and furnished by the Plumbing Contractor and starting devices for all motors incidental to the Plumbing Systems shall be furnished and installed by the Electrical Contractor: ELECTRICAL, SECTION 16000.
4. Painting of piping, fittings, coverings, hangers, supports and all equipment not specifically specified to be painted by the Painting Contractor: PAINTING, SECTION 09900.
5. Electricity and water for all tests and temporary operation of Plumbing Systems: TEMPORARY FACILITIES AND CONTROLS, SECTION

01500.

6. Equipment access panels for Plumbing equipment shall be furnished by the Plumbing Contractor and installed by the General Contractor.

1.04 INTENT

A. All work shall be in accordance with the arrangement, details and locations, as indicated on the Contract Drawings, Reference Drawings and any supplemental addenda, bulletins or drawings issued by the Architect. Layouts are diagrammatic and final arrangement of equipment shall suit field conditions. Install all necessary fittings and equipment offsets required to meet job conditions. The Drawings are not intended to be scaled, but shall be followed with sufficient accuracy to coordinate with other work and structural limitations. Work installed in a manner contrary to that shown on the Drawings, or interfering with the work of another trade, shall be removed and reinstalled when so directed by the Architect. Discrepancies and questionable points shall be immediately reported to the Architect for clarification.

1.05 CODES, REGULATIONS AND STANDARDS

A. All work shall be installed in conformance to the governing Codes, Regulations and Ordinances. It shall be the responsibility of this Contractor to familiarize himself with all governing Codes, Regulations and ordinances and report any non-compliance of the Plans and Specifications to the Architect, prior to entering into a contract. All the above requirements shall take precedence over the Plans and Specifications. These requirements are minimum criteria and no reductions permitted by Code will be allowed without written permission of the Architect.

B. All workmanship, methods and materials shall meet the highest standards of the trade and, in general, shall conform to the standards of the following associations:

American National Standards Institute (ANSI)
American Society of Mechanical Engineers (ASME)
National Board of Fire Underwriters (NBFU)
National Fire Protection Association (NFPA)
National Electrical Manufacturers Association (NEMA)
Occupational Safety and Health Act (OSHA)
Underwriters' Laboratories (U.L.)
American Society of Testing Materials (ASTM)
National Sanitation Foundation (NSF)
Massachusetts Plumbing and Gas Code
Massachusetts State Building Code, NFPA 1
Town of Barnstable, Regulations and Ordinances
Americans with Disabilities Act (ADA)

1.06 DRAWINGS AND CONFLICTS IN THE WORK

A. The Drawings and Specifications are intended to be complementary. Any materials shown or specified in one, but not in the other, reasonably implied and usually included under good industry practice and/or required by applicable Codes and Regulations for the proper and safe completion and operation of the work described herein, shall be furnished and installed by this Contractor at no additional cost to the Owner. Drawings show general arrangement of equipment and are not intended to indicate the exact dimensions of runs.

1.07 EXCHANGE OF INFORMATION AND COORDINATION

A. All systems and equipment covered by this Section of the Specifications shall not be installed in congested and problem areas without first coordinating the installation of same with the other trades and the General Contractor. This Contractor shall, at his own expense, relocate all equipment installed in congested or problem areas should they interfere with the proper installation of the equipment to be installed by other trades and by the General Contractor.

B. Particular attention shall be directed to the coordination of Systems with all equipment of other trades installed in the ceiling areas. Coordinate, with the other trades, the elevations of all equipment in ceiling areas to insure adequate space for the installation of fixtures before said equipment is installed.

C. Furnish to the General Contractor and all other Contractors all information relative to the portion of the installation specified in this Section that will affect them, sufficiently in advance, so that they may plan their work and installations accordingly.

D. In the case of failure on the part of this Contractor to give proper information, as indicated above, sufficiently in advance, this Contractor will pay for all back charges incurred by the General Contractor and other Contractors for the modification and/or relocation of any portion of the work already performed by them in conjunction with this Contract due to this Contractor's delay or for having given incorrect information.

E. Obtain from the other trades, all information relative to the work covered by this Section of the Specifications, which this Contractor is to execute in conjunction with the installation of their respective equipment.

F. In the event that conflicts, if any, cannot be settled rapidly and amicably between the affected trades with work proceeding in a workmanlike manner, then the Architect shall decide which work is to be relocated and his judgment shall be final and binding.

1.08 WORKMANSHIP

A. The entire work provided in this Specification shall be constructed and finished, in every respect, in a workmanlike and substantial manner. It is not intended that the Drawings show every detail, but this Contractor shall furnish and install all such parts as may be necessary to complete the work in accordance with the best trade practice and to the satisfaction of the Architect and the Owner. The Owner shall have the right to reject any part of the work in case the workmanship is not of satisfactory quality and this Contractor shall replace same with acceptable work at his own expense.

1.09 SITE INVESTIGATION

A. It shall be the responsibility of the Bidders to acquaint themselves with the available information, before submitting their bid. Bidders must visit the site and acquaint themselves with the existing conditions and shall study all Architectural, Structural, Mechanical and Electrical Drawings, as well as the Specifications. The Bidders shall fully inform themselves of all local and state Code requirements. Extra compensation will not be given for obvious conflictions apparent at the time of the start of the project.

1.10 TAXES AND INSURANCE

A. This Contractor shall include in his bid, applicable federal, state and local taxes and the premiums of the insurance required by the General Conditions of the Contract.

1.11 PERMITS AND INSPECTIONS

A. This Contractor shall obtain and pay for all the permits required for this Section of the work. He shall also obtain and pay for all the inspections and tests required. Defects discovered in work, materials and/or equipment shall be replaced at no cost to the Owner, and the inspection and test shall be repeated. When work is completed, this Contractor shall furnish a Certificate of Inspection and Approval, to the Owner, before final payment of the Contract will be allowed.

1.12 CONTRACT COST BREAKDOWN

A. At the start of construction, submit a breakdown of material and labor costs to aid the Architect in determining the value of the work installed, as the job progresses. The cost breakdown shall itemize categories of materials or portions of systems, as may be the case, to place a value on the work as it is installed.

B. No requisitions will be paid until after the breakdown is delivered to the Architect.

1.13 GUARANTEE

A. Unless otherwise noted, all materials, items of equipment and workmanship furnished under this Section shall carry the standard warranty against all defects in material and workmanship for a period of not less than one (1) year from the date of final acceptance of the work. Any fault due to defective or improper material or workmanship which may develop within that period, shall be made good, forthwith, by and at the expense of this Contractor, including all other damage done to areas, materials and other systems resulting from this failure.

B. This Contractor shall guarantee that all elements of the Systems are of sufficient capacity to meet the specified performance requirements as set forth herein or as indicated.

C. Upon receipt of notice from the Owner of failure of any part of the Systems during the guarantee period, the affected part or parts shall be promptly replaced by this Contractor, at no charge to the Owner.

D. This Contractor shall furnish, before the final payment is made, a written guarantee covering the above requirements.

1.14 MATERIALS

A. Materials shall be the best of their respective kinds and in full accord with the most modern mechanical construction. All materials shall be new.

B. All materials necessary to make the installation complete in every detail shall be furnished and installed under this Contract, whether or not specifically shown on the Drawings or specified herein.

C. It is the intent of the Specifications that one manufacturer be selected, not a combination, for any particular classification of materials.

D. Where materials, equipment, apparatus or other products are specified by manufacturer, brand name, type or catalog number, such designation is to establish the standard of desired quality and style and shall be the basis of the bid.

1.15 MATERIALS AND EQUIPMENT HANDLING

A. This Contractor shall do all handling of his materials and equipment and the resulting cleanup, at his expense, in a safe and satisfactory manner. Special attention shall be paid to the protection of life and property and the equipment or apparatus handled, and any corresponding damages shall be replaced, repaired or paid for by this Contractor, as approved by the Architect. This Contractor shall provide all rigging, hoisting and staging required to complete the work of this Section, unless specifically noted otherwise.

1.16 MAINTENANCE AND PROTECTION OF MATERIALS

A. This Contractor shall be responsible for the maintenance and protection, from loss or damage of all causes, of all equipment, materials and tools supplied by him and stored or installed on the job site, until final acceptance of the project by the Owner.

B. This Contractor shall store his materials and equipment in the location designated by the Owner and maintain the storage area in a safe condition.

C. This Contractor shall clean, patch and repair any material and finishes of the building or its contents damaged during the execution of this Contract.

1.17 SHOP DRAWINGS AND MATERIAL SCHEDULE

A. Submit complete Shop Drawings in accordance with provisions of the General Conditions and of the Supplementary General Conditions.

B. Within 30 days after the date of Notice to Proceed and before purchasing any materials or equipment, submit to the Architect for approval, a complete list of the names of manufacturers of all equipment proposed to fulfill the work of this Section. After the list has been processed by the Architect, submit complete Shop Drawings of all equipment and materials. Do not order any material or equipment until approval has been obtained from the Architect.

C. The approval of equipment and materials does not relieve this Contractor from the responsibility of Shop Drawings errors in details, sizes, quantities and dimensions which deviate from the Specifications, Contract Drawings and/or job conditions as they exist.

D. If apparatus or materials are substituted by this Contractor for those specified, and such substitution necessitates changes in any mechanical or electrical equipment, or alteration to connections, piping, supports, or construction, same shall be provided. This Contractor is to assume the cost and entire responsibility thereof. The Architect's permission to make such a substitution shall not relieve this Contractor from full responsibility for the work.

E. Changes to work already performed, made necessary by delays in Shop Drawing approvals, are the responsibility of this Contractor.

1.18 RECORD DRAWINGS

A. The Architect will provide two (2) sets of black or blue line on white drawings to the General Contractor for the purpose of maintaining record drawings, one set of which shall be maintained at the site and on which, at all times, shall be accurately, clearly and completely shown the actual installation of all work of this SECTION. At the completion of the contract, this Contractor shall submit to the General Contractor a complete set of record drawings showing all "As Built" conditions. After checking the aforementioned drawings, the General Contractor shall certify that they are complete and correct and shall submit the record drawings to the Architect. The Architect may have his Consulting Engineers review the drawings to determine if the installations, as shown thereon, are complete and accurate.
Each drawing shall be marked "RECORD DRAWING" and dated. Availability of record drawings shall be prerequisite to scheduling a final inspection of this contract and said drawings and original contract documents will be used in checking completion of the work. Non-availability of record drawings or inaccuracies therein may be grounds for cancellation and postponement of any scheduled inspection by the Owner and shall be a condition precedent to final payment until such time as the discrepancy has been corrected.

B. The record drawings required to be furnished under the terms of this Contract are:

Section	Reference Section	Drawings Required
PLUMBING	15400	P0.1, PD1.1, P1.1

1.19 OPERATING INSTRUCTIONS AND MAINTENANCE MANUALS

A. Provide operating instructions to the Owner's designated representative, with respect to operating and maintenance procedures, for all equipment and systems installed. The cost of up to eight (8) hours of instruction shall be included in the Contract Price.

B. At the completion of the project, turn over to the Architect, three (3) complete manuals containing the following:
   1. Complete shop drawings of all equipment.
   2. Operation description of all Systems.
   3. Names, addresses and telephone numbers of all suppliers of the products, materials, equipment and Systems.
   4. Guarantees on all products, materials and equipment.
   5. Preventive maintenance instructions for all Systems.
   6. Spare parts list of all System components.

C. Each manual shall be typewritten and bound under one (1) hard cover and will be reviewed by the Architect. The manuals shall be clearly and permanently identified on the cover with the name of the project.

D. Upon completion of the instructions, this Contractor shall obtain a letter of acceptance of the instructions as being complete from the Owner. Submit a copy of said letter to the Architect.

1.20 CLEANING OF SYSTEMS

A. Before the Systems are accepted, all equipment shall be thoroughly cleaned, so that no dirt, dust or other foreign matter will be deposited and be detrimental to the operation of the Systems.

B. After the installation is complete, equipment with factory finished surfaces shall be cleaned and damaged or scratched spots shall be touched up with the same type and color paint applied at the factory.

C. All equipment that is to receive finish paint by the Painting Contractor, shall be cleaned by this Contractor and left ready to have surfaces prepared to receive paint.

1.21 RUBBISH REMOVAL

A. At the completion of the work, or when ordered by the General Contractor or the Architect, this Contractor shall remove from the property, all the rubbish or waste material belonging to him. Keep the job site free from accumulation of waste material and rubbish; premises must be maintained in a clean condition.

1.22 TEMPORARY STRUCTURES

A. This Contractor shall provide, on the premises and where directed by the Architect, shall maintain in good condition, and shall remove when directed, suitable and substantial watertight sheds in which he shall store all his materials and equipment.

1.23 TEMPORARY SERVICES

A. All water, electricity, and sanitary facilities required for safe and efficient construction during normal working hours shall be furnished in accordance with the General Requirements.

1.24 COORDINATION DRAWINGS

A. This Contractor shall be responsible to develop and furnish all required information on the coordination drawings required under DIVISION 1 of the specifications. Contractor shall coordinate the elevations and locations of all his systems with the work of other trades.

1.25 TESTS

A. Furnish all labor, materials, instruments, supplies and services and bear all cost for the accomplishment of the tests herein specified. Correct all defects appearing under test, repeat the tests until no defects are disclosed and leave the equipment clean and ready for use.

B. Perform any tests, other than herein specified, which may be required by legal Authorities or by Agencies to whose requirements this work is to conform.

C. Dispose of test water and wastes after tests are complete, in a manner satisfactory to the Architect and in accordance with governing regulations.

1.26 EQUIPMENT ACCESS REQUIREMENTS

A. All work shall be installed so that all parts requiring inspection, operation, maintenance and repair are readily accessible. Minor deviations from the Drawings may be made to accomplish this, but changes of magnitude shall not be made prior to written approval from the Architect.

B. Furnish access panels in walls and ceilings at locations indicated on the Drawings, or as required to permit access for adjustment, removal and the replacement and servicing of all equipment, and all other items requiring maintenance and adjustments. Access panels shall be installed by the General Contractor.

C. Coordinate the exact location of access panels in all finished spaces with the Architect.

1.27 MOTOR CHARACTERISTICS

A. Unless otherwise indicated, motors for equipment specified under this Section shall be furnished and installed by the Plumbing Contractor and shall be as follows:
   1. Motors 1/3 HP and smaller shall be wound for 120 volts, single phase, 60 cycle AC service.

B. Unless otherwise specified, all motor starters shall be furnished and installed by the Electrical Contractor.

1.28 WIRING DIAGRAMS

A. This Contractor shall furnish wiring diagrams for all equipment furnished under this Section for which wiring is to be installed by the Electrical Contractor.

1.29 CROSS CONNECTIONS

A. No plumbing fixtures, devices or piping shall be installed which will provide a cross or interconnection between a water distributing supply and the drainage system.

1.30 CLEANING AND FLUSHING

A. All equipment and piping, including all traps and cleanouts, shall be cleaned to the satisfaction of the Architect.

B. The domestic water piping system shall be sterilized in accordance with the following:

1. The entire water distribution system including all cold water and hot water lines shall be thoroughly sterilized with a solution containing not less than 50 parts per million of available chlorine. The chlorinating materials shall be either liquid chlorine, or calcium hypochlorite, or chlorinated lime. The sterilizing solution shall be allowed to remain in the system for a period of eight (8) hours during which time all valves and faucets shall be opened and closed several times. After sterilization, the solution shall be flushed from the system with clean water until the residual chlorine content is not greater than 0.2 parts per million, unless otherwise directed.
2. After construction is complete, at least four (4) weeks prior to occupancy, the domestic water system of the building shall be tested by state-approved firm for the level of lead. The system shall be tested at a minimum of five (5) locations in the building, as directed by the Board of Health. Testing shall be done after system has been chlorinated and all fixtures have been thoroughly flushed for at least three (3) days. A written report of the test results shall be provided to the Owner within seven (7) days of the test. All cost associated with this testing and flushing shall be included in this contractor's base bid price.

1.31 PROCEDURE FOR TESTING

A. This Contractor shall perform all tests in accordance with Paragraph 1.25 of this Section of the Specifications. Partial tests shall be made, as required, by the progress of the work.

B. Test all piping and connections and make watertight before applying insulation and

before concealment, as outlined in the following:

1. Sanitary, Waste and Vent Systems Piping
   a. All piping shall be tested with water and proved tight to the satisfaction of the Architect and/or Plumbing Inspector before piping is covered and fixtures connected.
   b. Before the installation of fixtures and traps, close all openings of system and fill piping with water to roof and allow to stand for at least 30 minutes until a thorough inspection has been made, after which, if the lines prove tight, the water shall be drawn off and trenches backfilled and fixtures connected.
2. Water Systems
   a. All water piping shall be tested to a hydrostatic pressure of 150 psig. All piping shall be proved tight at this pressure before trenches are backfilled. Water piping, if in any way concealed by structural work, shall be tested to the aforesaid pressure and proved tight before pipes are concealed. These test pressure shall be held for a period of not less than one (1) hour. The Plumbing Contractor shall make all repairs and alterations in the piping systems necessary to meet the test.

PART 2 - PRODUCTS

2.01 INSTALLATION REQUIREMENTS

A. This Contractor shall comply with all the rules, Codes, Ordinances, regulations and requirements of all legally constituted Authorities having jurisdiction over the whole or any part of the work herein specified. Regulations supplement this Specification and shall take precedence in any case of conflict.

B. All equipment and materials furnished in connection with the installation shall be new and furnished in accordance with the requirements of the standards outlined in Paragraph 1.05 and they shall be of the best grade and quality of their respective kinds, free from natural, manufacturing or construction flaws, defects or irregularities and finish, fittings and workmanship shall be equal to the highest commercial grade.

C. Castings of all metals, of all kinds, shall be clean, smooth, close grained, of uniform thickness and free from all defects such as sandholes, blisters or cracks.

D. Before the installation will be accepted, the Plumbing Contractor shall have every portion of his work in a first-class working condition.

E. Where installing any of the apparatus herein called for, sufficient clearance shall be allowed to permit the removal and replacing of parts that may require future removal for repairs and replacement.

2.02 PIPE AND FITTINGS

A. Soil, Waste and Vent Piping

1. Piping materials for sanitary systems inside the building, above the floor slab, including soil, waste and vent piping, unless otherwise noted, shall be standard weight coated hubless cast iron equal to "no-hub" system. Pipe fittings, couplings and gaskets shall be manufactured in strict accordance with the Cast Iron Soil Pipe Institute's Standard No. 301 and approved for use in Massachusetts. The pipe shall be cast in one piece and with gasket positioning lugs. The pipe shall be legibly marked on the barrel with the manufacturer's name and/or trademark.
2. Piping material for all systems below the floor slab or below grade shall be service weight cast iron soil pipe with hub joints, coated with tar and asphaltum.
3. Vent piping 2" and smaller shall be standard weight galvanized steel or wrought iron with screwed fittings. Waste pipe above ground may be Type "M" copper tubing with solder joint sweat drainage fittings, Schedule 40 galvanized or wrought iron pipe.
4. Indirect waste piping shall be Type "K" copper tubing with sweat solder joint drainage fittings.

B. Water Piping

1. All water piping inside the building, except as hereinafter specified, shall be Type "L" hard-drawn copper tubing, as manufactured by Bridgeport Brass, American Brass, Revere Copper and Brass Company, or approved equal, with solder joints, seamless cast bronze or wrought copper fittings. Water piping buried underground shall be Type "K" soft-temper copper tubing with compression-type cast bronze fittings.
2. All water system components shall be certified lead free in accordance with NSF/ANSI and EPA requirements..

2.03 JOINTS AND COUPLINGS

A. Soil, Waste and Vent Piping Joints

1. Couplings on all hubless cast iron piping shall consist of a stainless steel shield, band and tightening device, and a neoprene gasket assembled at the factory as a complete unit. Couplings shall be marked with manufacturer's name and number and shall meet ASTM C564 Specifications.
2. Joints for service weight cast iron pipe below ground shall be made with resilient rubber gaskets.
3. All joints in threaded pipe shall be American National taper screw threads. Apply graphite and oil compound to the male threads only.
4. Joints between steel, wrought iron and cast iron shall be made with Manhoff

Fitting screwed into threaded pipe and caulked into the cast iron pipe.

5. Every connection between drainage pipes and water closets, floor outlet service sinks, pedestal urinals, and earthenware trap standards or other fixtures with floor outlet, shall be made with brass, wrought copper, hard lead, iron or plastic flanges that are caulked, soldered or screwed to the drainage pipe. The fixture shall be bolted to the flanged connection, with an approved gasket, washer or setting compound between the fixture and the flange. Only brass or stainless steel nuts and bolts shall be used. The floor flange shall be fastened to a structurally firm base. The use of commercial putty or plaster as a setting compound is prohibited.

B. Water Piping Joints

1. Copper tubing and sweat fittings shall be assembled with 95-5, lead free, tin and antimony solder composition with a 1000ºF melting point and a non-corrosive flux.
2. All copper piping 1-1/2" and larger shall have all tubing and fittings tinned prior to assembly.
3. Joints between copper tubing and iron pipe or at connections to tanks shall be made with a combination iron and brass flange with composition gasket and iron bolts.

2.04 VALVES

A. General

1. Furnish and install valves, where indicated on the Drawings or specified, so located that they may be operated, repaired or replaced with a minimum effort and repacked under pressure.
2. The basic system of valves (i.e., gate, globe, check for water service) shall be one manufacturer.
3. Valves shall be Apollo, Jenkins or Walworth.

B. Water System Valves

1. Furnish and install valves, where indicated on drawings or specified, so located that they may be operated, repaired or replaced with a minimum effort and repacked under pressure.
2. The following list of valves is intended only as a guide for type and quality to this Contractor:

Ball Valves	3" and smaller	Apollo #70-200
Check Valves	3" and smaller	Apollo 61Y Series
Drain-off Valves		Apollo #78-204

3. All fixture supplies and supplies to equipment not already furnished as such shall have angle or straight compression stops, unless otherwise specified.
4. Drain valves shall be installed to drain the water from all sections of the hot water and cold water piping. Furnish and install 1/2" all brass plug cocks with hose connections on each drain.

2.05 PIPE HANGERS, SUPPORTS AND CHANNELS

A. All piping shall be rigidly supported from the building structure by means of approved hangers and supports. Pipes shall be supported so as to maintain the required grading and pitching of lines, to prevent vibration and to secure piping in place; they shall be arranged so as to provide for proper expansion and contraction of pipe.

B. Spacing of hangers for horizontal piping shall be in accordance with the following:

1. Cast Iron Soil Pipe - 5'-0" at the hubs for 5' lengths, and for 10' lengths use 1 hanger at the hub and 1 at mid-point of the length.
2. Copper Tubing - 6'-0" o.c. for 1-1/4" and smaller. 10'-0" o.c. for 1-1/2" and larger.
3. Threaded Steel Pipe - 10'-0" o.c.

C. If Codes having jurisdiction require closer spacing, the hanger spacing shall be as required by Code in lieu of the foregoing. Provide hangers at all changes in direction and on both sides of concentrated loads (valves, strainers, regulators, etc.).

D. Hangers shall be adjustable clevis hangers. Hanger rods shall have machine threads. Malleable iron brackets of approved type shall be used along the walls.

E. Hangers shall be Grinnell Company, Carpenter and Patterson or Fee and Mason.

F. Wire and strap hangers will not be permitted in this installation.

G. Friction clamps shall be installed at the base of all plumbing risers and at each floor.

H. Where three or more pipes are running parallel, gang type hangers may be used in lieu of the aforementioned clevis hangers. These hangers shall be sized to provide the insulation protectors as hereinafter specified. Separable saddles shall be used for each pipe on gang hangers. Where saddle slips are installed for uninsulated copper piping, they shall be constructed of 16 gauge (minimum) copper.

I. Field painting or spraying of hangers, rods and nuts in lieu of copper plating will not be acceptable.

J. All vertical lines, drops and runouts, including insulated pipes, shall be supported by split-ring extension type hangers or equal. These hangers shall be copper-plated when used on uncovered copper tubing. Supports on insulated piping shall be sized to fit the outside diameter of the pipe insulation. Hangers shall be placed in the horizontal line near the riser and at ten foot (10') intervals or at each floor slab.

K. All horizontal piping shall be suspended from the building by mild galvanized steel rod connecting the pipe hanger to inserts, beam clamps, angle brackets and lag screws, as required by the building construction, in accordance with the following:

PIPE SIZE (inches)	ROD DIAMETER (inches)
3/4 - 2	3/8
2-1/2 - 3-1/2	1/2
4 - 8	3/4

L. Hanger rods for other installations shall be sized in accordance with recommended load capacities of Specification ASTM A107.

M. All hangers on insulated lines shall be sized to fit the outside diameter of the pipe insulation. Provide pipe covering protection saddles at all hangers on insulated lines of sheet metal, 16 gauge, and twelve inches (12"), minimum length, and shall cover 180 degrees of arc (lower quadrants) on the covering at all hangers on insulated piping systems.

N. Remove rust from all ferrous hanger equipment immediately after erection.

O. Miscellaneous trapeze hangers for pipe supports with inserts and steel for interior plumbing stack and riser supports indicated shall be provided by this Contractor.

P. Piping at all equipment and control valves shall be supported to prevent strains or distortions in the connected equipment and control valves. Piping shall be supported to allow for removal of equipment, valves and accessories with a minimum of dismantling and without requiring additional support after these items are removed.

Q. All factory fabricated channels with related accessories for piping supports shall be Unistrut Corporation or approved equal. Channels and fittings shall be constructed of bonderized steel, coated with a corrosion-resistant primer and ovenbaked. All other related accessories (nuts, bolts, rollers, washers, couplers, springs, etc.) shall be electro-galvanized finished.

R. All piping installed under this Section of the Specifications shall be independently supported from the building structure and not from piping, ductwork or conduit of other trades. All supplementary steel, including factory fabricated channels required to meet the requirements specified herein, shall be furnished and installed by this Contractor.

2.06 ACCESS PANELS

A. Furnish access panels for installation by the General Contractor in walls and ceilings at locations as required to permit access for adjustment, removal and replacement of all equipment, such as valves, traps, vacuum breakers, and all other items requiring maintenance and adjustment.

B. All access panels shall be located in closets, storage rooms and/or other non-public areas, in a workmanlike manner, positioned so that the junction can be easily reached, and the size shall be sufficient for this purpose (minimum 16" x 16"). When access panels are required in corridors or other habitable areas, they shall be located as directed by the Architect.

C. Access panels shall be of steel, prime painted and furnished with cylindrical lock, and all necessary installation hardware as manufactured by "Milnor," Miami-Carey, Walsh-Hannon-Gladwin, Inc., "Way-Loctor" or approved equal. All access panels shall be constructed with 1-1/2 hour fire rating and shall bear the U.L. label insuring the fire-rated construction. All panels shall be flush mounted and shall be hinged with a frame that is compatible with the surface they are mounted in.

D. Access panels Shop Drawings shall be submitted to the Architect for approval.

2.07 PIPE SLEEVES

A. General

1. All pipe sleeves shall be furnished and set by this Contractor. Their location and setting shall be carefully coordinated with the requirements or limitations of the structural member they are passing through. Any conflict arising shall be solved by utilizing the best trade practices.

B. Sleeves and plates shall be black steel, Schedule 40, in accordance with A.S.T.M. Specifications A-120.

C. They shall be provided at all joints where pipes pass through concrete or masonry. They shall be sized so as to provide for pipe covering and for lateral expansion.

D. The ends shall be flush with the surfaces, except in floors, where it is possible for water to accumulate, such as toilets, janitor's closets, etc., in which cases, they shall terminate one inch (1") above the finish floor.

E. Where pipes pass through partitions, ceilings and furring (plaster and glazed tile), furnish and install No. 24 gauge galvanized iron sleeves, over which furnish and install cast metal floor plates of the escutcheon type, designed to cover the sleeves and to remain in permanent position.

F. Space between all pipes and sleeves shall be packed with graphite packing, and sealed at the ends with fire-rated sealant.

G. Furnish labor to set and fasten all sleeves before the floors and walls are finally constructed.

H. Provide chromium-plated escutcheon plates at all exposed locations in finished rooms where pipes pass through walls, floors and ceilings.

2.08 INSULATION

A. All piping and equipment installed under this Contract shall be covered as follows:

Piping or Apparatus	Insulation
All cold water and hot water Piping above slab	I.P.S. 1/2" to 8" - 1" fiberglass heavy density snap-on type
All valves and fittings on insulated lines	Pre-molded PVC covers packed to 1" thickness
All supplies and wastes associated with handicapped lavatories and sinks	Molded closed-cell vinyl insulation equal to Handi-Lav-Guard Model #103
All cold water, hot water and Trap primer piping below slab or in masonry walls	3/4" closed-cell neoprene insulation

B. Apply all insulation over clean, dry surfaces with all joints firmly butted together. Perform all tests prior to covering.

C. All fiberglass insulation shall be furnished with factory-applied, all-purpose, vinyl-coated and embossed vapor barrier laminate with pressure sealing lap adhesive seam. Openings, joints, and end strips shall be sealed against moisture penetration with vapor barrier cement.

D. Insulation shall be as manufactured by Gustin-Bacon Manufacturing Company, Owens-Corning Fiberglass Corporation, or Johns-Manville, and shall be applied by skilled insulation mechanics employed by an insulation contractor.

E. All insulation shall run continuously through walls and ceilings.

2.09 CLEANOUTS

A. Cleanouts shall be installed where indicated on the drawings and/or where required in soil, waste, vent and storm pipes. Cleanouts shall be installed at the base of all risers and at each change of direction.

B. Cleanout plugs shall be heavy cast brass of the screwed type, full size up to and including four inches (4").

C. Cleanouts shall be same size as pipe for piping up to four inches (4") in size and not less than four inches (4") for piping larger than four inches (4").

D. For piping running under floor slab, cleanouts shall be brought up to just under the floor slab level.

E. Access cover for concrete floor type cleanouts shall be J.R. Smith 4023 bronze top; tile floor type shall be J.R. Smith 4143; carpeted floor type shall be J.R. Smith 4023-Y.

F. Access to cleanouts in walls shall be provided by an access panel.

G. All cleanout access covers shall be manufactured by J.R. Smith, Zurn or Josam.

2.10 TRAPS

A. Furnish and install traps with cleanouts on all fixtures and equipment requiring connection to the sanitary system of the same size and material as the pipe in which they occur.

B. Traps installed on threaded pipe shall be recessed drainage pattern.

C. Fixture traps shall be self-scouring and shall have no interior partitions except where such traps are integral with the fixture. Slip joints or coupling may be used on the trap inlet or within the trap seal of the trap if a metal-to-metal ground joint is used. Each fixture trap, except a trap that is cast integrally or in combination with the fixture in which the trap seal is readily accessible or except when a portion of the trap is removable for cleaning purposes, shall have an accessible cleanout plug of ample size that is protected by the water seal.

D. Fixture traps shall be made of cast brass with wall thickness of not less than 0.1 inch. All exposed traps shall have a polished chrome finish.

E. Strainers, C.O. plugs, tailpieces, waste arms, and overflows and any other similar fixture to trap connection when of metal, shall be made of brass or other approved non-corrosive metal, not less than 17 gauge thickness.

F. Traps shall be set level with respect to their water seals.

2.11 UNIONS AND NIPPLES

A. Union connections installed on brass pipe two inches (2") in diameter and smaller shall be brass composition "E" in strict accordance with Federal Specification WW-U-516.

B. Piping shall be installed with unions properly spaced to permit alterations and repairs.

C. All connections between copper tubing and galvanized tanks or piping shall be made with dielectric unions.

D. All close and shoulder nipples shall be of corresponding materials as the pipe and shall be extra heavy design.

2.12 SHOCK ABSORBERS

A. Furnish and install, where shown on the Drawings or as required by Code, shock absorbers properly sized and in accordance with Plumbing and Drainage "Standard P.D.I. WH201." These units shall be equal to the Smith "Hydrotrols" type unit.

B. All shock absorbers must be located behind access panels or in readily accessible areas.

C. Installation of shock absorbers shall conform to manufacturer's recommendations.

2.13 VACUUM BREAKERS

A. Approved vacuum breakers shall be installed with any plumbing fixture or equipment in which the potable supply outlet may be submerged and which cannot be protected by the minimum air gap. This includes all fixtures with hoses or a means for attaching hoses.

B. All vacuum breakers shall be certified by a recognized testing laboratory acceptable to the Administrative Authority.

C. Vacuum breakers shall be installed with the critical level at least six inches (6") above the fixture they serve and on the discharge side of any control valve.

2.14 PIPING ACCESSORIES

A. Vacuum reliefs shall be Watts Regulator Company #36 or approved equal.

B. Thermometers shall be 4-1/2 inches in diameter, and angle with a range of 40ºF. to 240ºF., as manufactured by Albert A. Weiss and Son, Inc. Include thermometer well.

C. Pressure and temperature relief valves shall be ASME Rated, temperature relief 210ºF., double Btu rated, self-closing, as manufactured by Watts Regulator Company or approved equal.

D. Pressure gauges shall be four inches (4") in diameter with a range of 0 to 150 psi, as manufactured by U.S. Gauge.

2.15 VENTS THROUGH THE ROOF

A. All pipes extending through the roof for the sanitary system shall be the same material as the piping system. Vents shall be of size indicated on the Drawings and extended at least 18 inches above the roof, ending in the top of pipe, which will be flashed by the General Contractor. Any vent pipe within 25'-0" of an outdoor air intake shall extend a minimum of 2'-0" above the air intake.

2.16 DRAINS

A. Drains shall be provided as indicated on the Drawings. Furnish and install all floor drains. Plumbing Contractor shall be responsible of the proper location of the various sizes and types of drains furnished by him.

B. Drains in waterproof floors shall have galvanized iron clamping rings with six (6) pound lead flashing to bond nine inches (9") in all directions. Drains shall be checked with Architect's drawings to determine depth of the flashing collar. Provide auxiliary inlet fitting for trap primer connection with all drains, as indicated on the drawings.

C. Floor drain shall be equal to J.R. Smith 2010-A-ARIO- B-V.

2.17 EQUIPMENT CONNECTIONS

A. Certain equipment will be furnished and installed by others. They will be provided with strainers, tailpieces, waste valves and faucets for installation by the Plumbing Contractor. The Plumbing Contractor shall also furnish and install traps, drains, stop valves, water piping and waste piping, as specified herein, to all kitchen and cooking equipment.

B. Exposed waste piping shall be chromium-plated with cast brass fittings and chromium-plated globe pattern with wheel handle.

2.18 PLUMBING FIXTURES

A. Furnish and install all fixtures including supports, connections, fittings and any incidentals to make a complete installation.

B. Supply escutcheons which are not furnished with plumbing fixtures.

C. Faucets and all exposed fittings shall be chromium-plated.

D. Fixtures shall bear manufacturer's guarantee label or trademark indicating "first quality." Acid-resisting enameled ware shall bear the manufacturer's symbol

signifying acid-resisting material.

E. Architect shall be final judge as to whether fixtures fulfill the requirements of the Specifications and as to whether they are of suitable quality.

F. Manufacturer - Fixtures shall be Kohler, American Standard or Toto. Flush valves to be Sloan-Royal, Toto or Moen. Toilet seats to be Church, Beneke or Bemis. Carriers and drainage fittings to be J.R. Smith, Zurn or Josam. Shower unit, Acorn, Bradley or Equal.

G. The color of all fixtures shall be white.

H. Fixtures shall be in accordance with the following schedule:

P-1 & P-1H Water Closet (Standard & Handicapped)
Kohler model K-4325 white, wall hung 1.6 GPF, Vitreous china water closet with elongated bowl, siphon jet, 1-1/2 inch top spud, K-4731-C heavy duty seat.
Sloan model 953-1.6-FW concealed water closet flush valve, ADA compliant, 1 inch I.P.S. angle stop, adjustable tailpiece, vacuum breaker, FW fixture wall actuator (HY-33-A), contractor to coordinate exact size and location of access panel for valve maintains.
Standard fixture's shall be set on an adjustable type combination fixture support and drainage fittings with foot support of type suitable to meet building construction and set to rim at 15 inches above floor.
Handicapped fixture to be same except to be mounted at 17 inches to the rim of the fixture.

P-2 & P-2H Urinal (Standard & Handicapped)
Kohler K-4972-ET, vitreous china, 1-1/4 inch spud, 1.0 GPF, white.
Sloan model 992-1-FW concealed urinal flush valve, ADA compliant, 1 inch I.P.S. angle stop, adjustable tailpiece, vacuum breaker, FW fixture wall actuator (HY-33-A), contractor to coordinate exact size and location of access panel for valve maintains.
Standard fixture's shall be set on an adjustable type combination fixture support and drainage fittings with foot support of type suitable to meet building construction and set to rim at 24 inches above floor.
Handicapped fixture to be same except to be mounted at 16 inches to the rim of the fixture.

P-3 & P-3H Lavatory (System)
Bradley series SS-2N-IR-NSD, color by architect, ADA, ANSI and UFAS compliant, three station unit, continuous bowl is constructed of vandal resistant terreon solid surface, plug in with infrared controls, no soap dispenser, standard flow rate of .5 GPM, 1 ½ inch NPT drain stub to 2 inch out at wall.
C.P. ½-inch angle supplies and stops.

C.P. 1 ½ inch cast brass adjustable P-trap with cleanout plug.
Coordinate exact location of GFCI outlet with electrician.
Provide wall bracket for unit mounting.

P-4 Mop Service Basin
Fait Products model MSB 2424, molded stone, one piece, 10 inch high walls, service faucet model 830-AA with vacuum breaker, pail hook, ¾ inch threaded spout, hose and hose bracket model 832-AA, mop hanger model 889-CC, drain connection model QDC-3XH.

P-5 Sink (First Aid Room)
Existing sink to be reused, provide new chair carrier to match building construction.
Chicago faucet model 786-ABCP manual faucet, 5 ¼ inch swing gooseneck spout.
1.5 GPM vandal proof aerator, 4 inch vandal proof wrist blade handles.
C.P. 3/8 inch angle supplies and stops.
C.P. 1 ½ inch cast brass adjustable P-trap with cleanout plug and C.P. cover tube.

P-6 Shower (Beach Tower)
Shower Tower Unit (4 person), bottom supply, single tempered water supply, flow control 2.5 GPM. Shower head mounted at 6 feet,

2.19 WALL HYDRANTS

A. Furnish and install, where indicated on the Drawings and mounted at elevations indicated on the Drawings, wall hydrants equal to the following unit: Single Temperature unit to be J.R. Smith Figure 5609-NB bronze hydrant with nickel/bronze face and hose connection having an integral vacuum breaker. Unit to have removable brass "T" handle.

2.20 WATER METER

A. This Contractor shall be responsible to connect to the existing water meter located in pit.

B. This Contractor shall be responsible to coordinate all work with the General Contractor to insure proper installation of service, location, sleeves, bracing and

other items necessary to provide complete connection to the existing meter. The cost of all labor and materials not included in the work done by the General Contractor, but required for a first-class installation, shall be the responsibility of this Contractor.

C. This contractor shall coordinate with the Water Department to confirm the existing water meter is up to town standards and can handle the new building flow. This Contractor shall be responsible to obtain all information pertaining to the required setting and piping arrangement required for the meter by the Barnstable Water Department. All incidental items required for a complete, first-class installation by the Water Department shall be the responsibility of this Contractor.

2.21 VALVE TAGS, NAMEPLATES AND CHARTS

A. All valves on pipes of every description shall have neat circular brass valve tags of at least 11/2" in diameter, attached with brass hook to each valve stem. Stamp on these valve tags in letters as large as practical (1/2" minimum) the number of the valve and the service, such as "H.W.", "C.W." for hot water and cold water respectively. The numbers of each service shall be consecutive.

B. All valves on tanks and pumps shall be numbered by 3" red metal discs with white numbers 2" high secured to stem of valves by means of brass hooks or small solid-link brass chain.

C. These numbers shall correspond to numbers indicated for valves on the RECORD DRAWINGS and on two printed detailed lists. These printed lists shall state the numbers and locations of each valve and the fixture or group of fixtures which it controls, and other necessary information such as requiring the opening or closing of another valve or valves, when any one valve is to be opened or closed.

D. These printed lists shall be prepared in form to meet approval of the Architect. Lists shall be framed under glass and hung as directed by the Architect.

E. Nameplates, catalog numbers, and rating identification shall be securely attached to electrical and mechanical equipment with screws or rivets. Adhesives or cements will not be permitted.

2.22 PIPE IDENTIFICATION

A. All piping concealed above ceiling spaces and exposed in all mechanical spaces shall have markers applied 20 feet on center and on both sides of wall penetrations and at access panel locations. Markers shall be applied after final finish of pipe covering is complete. All markers shall indicate direction of flow, description of pipe contents, and shall be of colors as specified herein.

B. Markers for piping up to six inches in diameter, including covering, shall be equal to Seton Type SNA snap-on markers. Markers for 6-inch diameter and larger, including

covering, shall be equal to Seton Type STR strap-on markers with stainless steel spring fasteners. Markers on vertical lines shall be mounted as high as possible.

C. Pipe markers shall be as follows:

PIPING SYSTEM	MARKING COLOR	BACKGROUND
Non-potable Water	Unsafe Water	Yellow
Domestic Cold Water	Cold Water	Green
Domestic Hot Water	Domestic Hot Water	Green
Waste	Waste	Blue
Vent	Vent	Blue

2.23 DOMESTIC WATER HETAER

A. This contractor shall furnish and install, complete in every respect, one (1) electric water heater as detailed on the drawings. Heater shall be equal to an Hubbell commercial 40 gallon model E30, 4.5KW with upper and lower element, SL hydrastone cement lined tank, 240 volt, 1 phase, 60Hz. Combination temperature and pressure gauge, 2.5 dail. Tank shall have ASME stamp and National Board stamp, approved by the Mass State Plumbing Board.

2.24 DOMESTIC WATER TEMPERING VALVE

A. This contractor shall furnish and install, as detailed on the drawings, one (1) domestic water tempering valve, equal to Leonard type TM-186-26-REC-LF-Top, With ¾ inch inlet and outlet, integral check stops with stainless steel recessed cabinet, min. flow 1.0 GPM to 26 GPM.

PART 3 - EXECUTION

3.01 OPERATION AND START-UP

A. This Contractor shall furnish all labor, materials and equipment necessary to place

the equipment into operation and then start and operate all systems to demonstrate the fitness of the installation.

B. Prior to start-up, the Plumbing Contractor shall check all systems for completeness, provide lubrication, clean and flush all piping and equipment, perform pressure tests, chemical treatment, and make all other adjustments necessary for start-up.

C. This Contractor may start portions of the systems as the work progresses; however, all systems which are normally operating simultaneously must be so operated upon completion of the work.

3.02 LOCATION OF FIXTURES AND EQUIPMENT

A. The Architect will establish the exact location of all fixtures, equipment and devices to be located in finished spaces of the building. Such precise locations are, for the most part, indicted on the Architectural plans of the various spaces, and it shall be the responsibility of this Contractor to obtain instructions from the Architect for the location of any items whose location is not specifically given on the Architectural Drawings. Any work installed contrary to the Architectural Drawings, or without the prior approval of the Architect, shall be relocated and any necessary changing or patching of the surrounding work shall be done at the expense of the Contractor.

3.03 COORDINATION

A. The structure and its appurtenances, clearances and the related systems, such as plumbing, fire protection, heating, ventilation and electric, have been planned to be adequate and suitable for the installation of equipment specified under this Section. The Owner will not assume any increase in cost caused by differing requirements peculiar to a particular make or type of equipment and any such incidental cost shall be borne by this Contractor. He shall be responsible for the proper installation and location of his required sleeves, chases, inserts, etc., and see that they are set in the forms before the concrete is poured. He shall be responsible for his work and equipment furnished and installed by him until the completion and final acceptance of this Contract, and he shall replace any work which may be damaged, lost or stolen, without additional cost to the Owner.

B. Cutting and Patching - It shall be the duty of this Contractor to consult with and give to the General Contractor the exact location and size of all openings and full information as to cutting and patching necessary for the same. In the event the Plumbing Contractor fails to provide sleeves, inserts and templates or fails to notify other Contractors well in advance of his requirement, he shall be responsible for paying for all cutting and patching made necessary by his failure to do so.

C. In the event there is a conflict or inadequate space for the proper installation of Plumbing equipment, this Contractor shall prepare a scaled (1/4" - 1'-0" min.) composite sketch showing the building structure and all equipment and items affecting the installation, to clearly identify the areas of conflict. This Contractor shall submit four (4) copies of the sketch, along with a written explanation of the problem, to the Architect for his review and determination on what action to take to resolve the conflict.

D. It shall be the duty of this Contractor to furnish full information to all trades relative to the work they are to do in connection with work under this Section. This includes data for wiring, including wiring diagrams, equipment foundations, pipe connections, etc. furnished under other Sections.

3.04 PAINTING

A. This Contractor shall apply one (1) coat of anti-rust paint and one (1) coat of flat black enamel to all support steel, hangers and other steel or iron elements of the Plumbing System, furnished by him, which will be enclosed or above ceilings when the project is completed.

B. Paint shall be omitted from all items with a galvanized finish.

C. All surfaces to be painted shall be free of dirt, scale, rust, grease and oil. Rust spots are to be wire brushed. Ambient temperature shall be in accordance with paint manufacturer's requirements when painting is being performed.

D. This Contractor shall touch up, with spray paint, all scratched or damaged surfaces of equipment with factory finish. Spray paint shall be the same color and type as factory finish.

E. The Painting Contractor shall paint all mechanical equipment, enclosures, covers, panels, insulation, conduit and other equipment exposed to view, except factory finished items. Care shall be taken not to paint over equipment nameplates. This Contractor shall leave surfaces to be painted ready to receive paint. The Painting Contractor shall apply paint in accordance with the Painting and Finishing portion of this Specification. Colors shall be selected by the Architect.

3.05 PROTECTION OF SYSTEMS

A. Materials, fixtures and fittings shall be properly protected and all pipe openings shall be temporarily closed so as to prevent obstructions and damage. All plumbing fixtures (i.e., water closets, lavatories, and urinals) shall be boxed over and all other fixtures protected with pasted-on paper. Post notice prohibiting the use of the fixtures prior to completion. Take precaution to protect all materials.

3.06 SANITARY DRAINAGE SYSTEMS

A. Sanitary
   1. Provide complete interior sanitary drainage systems as indicated on the Drawings, connecting to all plumbing fixtures, floor drains and equipment.

B. Indirect Waste Piping Systems
   1. Furnish and install complete indirect waste piping systems, as indicated on the drawings, connecting to fixtures and equipment, discharging through an air gap into trapped floor drains or fixtures.

C. General
   1. Soil, waste, vent and water piping shall be installed, as indicated on the Drawings, properly secured to the building structure. All piping above slab shall be secured with iron hangers. Extend to roof all lines of soil, waste and vent piping in stacks with all branches and fittings required and with extension through roof, as required by the Commonwealth of Massachusetts Plumbing Code. Where an end circuit vent pipe from any fixture or line of fixtures is connected to a vent line serving other fixtures, the connection shall be at least three feet (3') or sufficiently above the floor on which the fixtures are located, to prevent use of the vent line as a waste line.
   2. All changes in pipe size and direction on soil connections and waste lines shall be made with Y's and 45-degree fittings or 45-degree combination fittings shall be used wherever possible. All offsets shall be made at an angle of not more than 45 degrees.
   3. All fixtures and drains shall be separately trapped and all traps shall be vented, unless otherwise indicated on the drawings, for fixtures or drains in battery vent systems.
   4. This Contractor shall flush the sanitary piping with water in sufficient volume to obtain free flow through line. Remove all obstructions and correct all defects discovered.
   5. All cast iron pipes shall be free from sand holes, cracks or other defects and shall be of uniform weight, size and thickness, installed concealed in finished areas, as required to provide adequate waste from fixtures, evenly pitched and properly secured with iron hangers.
   6. All piping three inches (3") or less in diameter shall be installed with a pitch of not less than 1/4 inch per foot; larger than three inches (3") in diameter shall be installed with a pitch of not less than 1/8 of an inch per foot.
   7. The building drain shall leave the building where shown on the Drawings, and shall be provided with a full four inch (4") cleanout accessible from the building interior.
   8. Prior to commencement of work, this Contractor shall verify with the General Contractor all inverts and direction of lines leaving the building.

9. Furnish and install a complete system of vent piping to vent all stacks, fixtures, traps and appliances, as indicated on the Drawings and/or required to meet the Plumbing Code. All vent piping shall be concealed, where possible, with the horizontal pipe pitching back toward fixtures to allow condensation to drain. Vent stacks passing through the roof shall extend 18 inches above the roof, and shall be a minimum size of two inches (2") in diameter. The vent shall be located at least eight feet (8') back of roof edges (offset, as required).

3.07 DOMESTIC WATER SYSTEM

A. Provide a complete interior domestic water system to service all fixtures, systems, equipment and points requiring domestic water throughout the project. Systems shall include connection to water lines, all valves, all piping, insulation, gauges, all control devices, equipment bases and all other related controls and accessories specified herein and/or indicated.

B. Installation

1. Branch lines from service or main lines shall be taken off the top of main as indicated, using such cross-over fittings as may be required by structural or installation conditions. All service pipes, fittings and valves shall be kept a sufficient distance from other work and not less than 1/2 inch between finished coverings on the different services.
2. Provide shock absorbers at hot water heater and at all locations indicated on the Drawings. Provide access panels at all concealed shock absorbers.
3. Pipes shall be run parallel and graded evenly to drainage points. There shall be a 1/2 inch drain valve at each low point in piping so that all parts of the systems can be drawn off.
4. Provide valves on all risers to groups of fixtures and wherever shown on the Drawings. Valves in pipe spaces shall be made accessible by the use of access panels.
5. Cast brass or bronze unions shall be installed in the water system at the connections to all equipment so that they may be conveniently disassembled.
6. Pipe shall be cut accurately to measurements established at the site and shall be worked into place without springing or forcing.
7. Air chambers shall be provided at the top of supplies to each plumbing fixture or series of fixtures, not protected by a shock absorber.
8. No piping shall be installed in a manner to permit back siphonage or any flow of water from sanitary or drainage systems into water service or distribution piping under any conditions.
9. Air gaps, open end of funnel drains and approved vacuum breaking devices shall be provided as required and as approved by the Inspector of Plumbing. Piping to hose end faucets or hose end fittings or any fixtures where water supply outlet is below the fixture overflow rim shall have vacuum breakers.

10. Where flanges are installed on the systems, red rubber gaskets shall be installed between each pair of flanges.
11. Heating of piping to eliminate the installation of fittings will not be permitted.
12. Piping systems shall be kept clean during all phases of work. Open ends of incomplete piping shall be protected to prevent the entrance of foreign materials.
13. Furnish and install a copper-plated friction clamp on all cold water supplies to each water closet.
14. Provide suitable means of thermal expansion for all hot water piping, using swing joints, expansion joints or expansion loops, and long-turn-offsets as required. Piping connections to equipment shall be provided with unions or flanges to permit alterations and repairs.

END OF SECTION

SECTION 15600

HEATING, VENTILATING AND AIR CONDITIONING

INDEX

SECTION 15600

HEATING, VENTILATING AND AIR-CONDITIONING

PART 1 - GENERAL

1.00 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 1 - GENERAL REQUIREMENTS, which are hereby made a part of this Section of the Specifications.

B. Reference to Drawings: Work to be performed is shown on Drawings numbered M1.1.

1.01 SCOPE

A. Work in this Section includes all labor, materials, equipment and services necessary to furnish completely and install all HEATING, VENTILATING AND AIR CONDITIONING SYSTEMS, as indicated on the Drawings and specified herein, and in general, is as follows:

1. Exhaust fans and louvers for toilet exhaust.
2. Testing and balancing.

1.02 WORK NOT INCLUDED

A. The following items of work are not included in this Section and are specified under the designated SECTIONS:

1. SECTION 01010 - SUMMARY OF WORK
   a. Cutting and patching.
2. SECTION 09900 - PAINTING
   a. Field painting, except as noted otherwise.
3. SECTION 07310 - Flashing and counter-flashing of roof penetrations.
4. SECTION 15400 - PLUMBING
   a. Domestic water heater.
   b. Domestic water piping.
5. SECTION 16100 - ELECTRICAL
   a. Power wiring.
   b. Starters and disconnects where not furnished integral with equipment.
   c. Wiring of smoke detectors.

1.03 INTENT

A. All work shall be in accordance with the arrangement, details and locations, as indicated on the Contract Drawings, Reference Drawings and any supplemental addenda, bulletins or drawings issued by the Architect. Layouts are diagrammatic and final arrangement of equipment shall suit field conditions. Install all necessary fittings and equipment offsets required to meet job conditions. The Drawings are not intended to be scaled, but shall be followed with sufficient accuracy to coordinate with other work and structural limitations. Work installed in a manner contrary to that shown on the Drawings, or interfering with the work of another trade, shall be removed and reinstalled when so directed by the Architect. Discrepancies and questionable points shall be immediately reported to the Architect for clarification.

1.04 CODES, REGULATIONS AND STANDARDS

A. All work shall be installed in conformance to the governing Codes, Regulations and Ordinances. It shall be the responsibility of this Contractor to familiarize himself with all governing Codes, Regulations and ordinances and report any non-compliance of the Plans and Specifications to the Architect, prior to entering into a contract. All the above requirements shall take precedence over the Plans and Specifications. These requirements are minimum criteria and no reductions permitted by Code will be allowed without written permission of the Architect.

B. All workmanship, methods and materials shall meet the highest standards of the trade and, in general, shall conform to the standards of the following associations:

AABC	Associate Air Balance Council
ADC	Air Diffusion Council
AMCA	Air Moving and Conditioning Association
ANSI	American National Standards Institute
ARI	Air Conditioning & Refrigeration Institute
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society of Testing Materials
AWG	American Wire Gauge
AWS	American Welding Society
FS	Federal Specifications
IEEE	Institute of Electrical and Electronic Engineers
NEC	National Electrical Code
NEMA	National Electrical Manufacturer Association
NEBB	National Environmental Balancing Bureau
NFPA	National Fire Protection Association
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
UL	Underwriters Laboratories, Inc.

1.05 DEFINITIONS

A. "HVAC" as used hereinafter in this SECTION shall mean "Heating, Ventilating and Air Conditioning."

B. "HVAC Contractor" as used hereinafter in this SECTION shall mean the "Heating, Ventilating and Air Conditioning Contractor."

C. "Concealed" shall be defined as areas where piping is located in chases, shafts, pipe tunnels, and above furred ceilings.

D. "Piping" shall mean, in addition to pipe, all fittings, valves, hangers, and other accessories relating to such piping systems.

E. "Provide" shall mean "provided complete in place," that is, "furnished and installed."

1.06 RECORD DRAWINGS

A. The General Contractor shall provide two (2) sets of black or blue line on white drawings to this Contractor to maintain and submit record drawings, one set of which shall be maintained at the site and on which, shall, at all times, accurately, clearly and completely show the actual installations in accordance with the requirements of this SECTION. At the completion of the Contract, this Contractor shall submit to the General Contractor a complete set of record drawings showing all "as-built" corrections. After checking the above drawings, the General Contractor shall submit the record drawings to the Architect who shall verify the record drawings in the field and shall certify thereon that the installations as shown thereon are complete and accurate. After verification, this Contractor shall submit to the Architect reproducible record drawings in time to be used for the final inspection for acceptance of the project. Availability of record drawings shall be a prerequisite to scheduling a final inspection of this Contract and said drawings and original contract documents will be used in checking completion of the work. Non-availability of record drawings or inaccuracies therein may be grounds for cancellation and postponement of any scheduled final inspection by the Owner until such time as the discrepancy has been corrected.

B. The record drawings required to be furnished under this SECTION are of Drawings numbered M1.1.

1.07 DRAWINGS AND CONFLICTS IN THE WORK

A. The Drawings and Specifications are intended to be complementary. Any materials shown or specified in one, but not in the other, reasonably implied and usually included under good industry practice and/or required by applicable Codes and Regulations for the proper and safe completion and operation of the work described herein, shall be furnished and installed by this Contractor at no additional cost to the

Owner. Drawings show general arrangement of equipment and are not intended to indicate the exact dimensions of runs.

1.08 EXCHANGE OF INFORMATION AND COORDINATION

A. All systems and equipment covered by this Section of the Specifications shall not be installed in congested and problem areas without first coordinating the installation of same with the other trades and the General Contractor. This Contractor shall, at his own expense, relocate all equipment installed in congested or problem areas should they interfere with the proper installation of the equipment to be installed by other trades and by the General Contractor.

B. Furnish to the General Contractor and all other Contractors all information relative to the portion of the installation specified in this Section that will affect them, sufficiently in advance, so that they may plan their work and installations accordingly.

C. In the case of failure on the part of this Contractor to give proper information, as indicated above, sufficiently in advance, this Contractor will pay for all back-charges incurred by the General Contractor and other Contractors for the modification and/or relocation of any portion of the work already performed by them in conjunction with this Contract due to this Contractor's delay or for having given incorrect information.

D. Obtain from the other trades, all information relative to the work covered by this Section of the Specifications, which this Contractor is to execute in conjunction with the installation of their respective equipment.

E. In the event that conflicts, if any, cannot be settled rapidly and amicable between the affected trades with work proceeding in a workmanlike manner, then the Architect shall decide which work is to be relocated and his judgment shall be final and binding.

1.09 WORKMANSHIP

A. The entire work provided in this Specification shall be constructed and finished, in every respect, in a workmanlike and substantial manner. It is not intended that the Drawings show every detail, but this Contractor shall furnish and install all such parts as may be necessary to complete the work in accordance with the best trade practice and to the satisfaction of the Architect and the Owner. The Owner shall have the right to reject any part of the work in case the workmanship is not of satisfactory quality and this Contractor shall replace same with acceptable work at his own expense.

1.10 TAXES AND INSURANCE

A. This Contractor shall include in his bid, applicable federal, state and local taxes and

the premiums of the insurance required by the General Conditions of the Contract. This Project is not exempt from Massachusetts State Sales Tax.

1.11 PERMITS AND INSPECTIONS

A. This Contractor shall obtain and pay for all the permits required for this Section of the work. He shall also obtain and pay for all the inspections and tests required. Defects discovered in work, materials and/or equipment shall be replaced at no cost to the Owner, and the inspection and test shall be repeated. When work is completed, this Contractor shall furnish a Certificate of Inspection and Approval, to the Owner, before final payment of the Contract will be allowed.

1.12 CONTRACT COST BREAKDOWN

A. At the start of construction, this Contractor shall submit a breakdown of material and labor costs to aid the Architect in determining the value of the work installed, as the job progresses. The cost breakdown shall itemize categories of materials or portions of systems, as may be the case, to place a value on the work as it is installed.

B. No requisitions will be paid until after the breakdown is delivered to the Architect.

1.13 GUARANTEE

A. Unless otherwise noted, all materials, items of equipment and workmanship furnished under this Section shall carry the standard warranty against all defects in material and workmanship for a period of not less than one (1) year from the date of final acceptance of the work. Any fault due to defective or improper material or workmanship which may develop within that period, shall be made good, forthwith, by and at the expense of this Contractor, including all other damage done to areas, materials and other systems resulting from this failure.

B. This Contractor shall guarantee that all elements of the Systems are of sufficient capacity to meet the specified performance requirements as set forth herein or as indicated.

C. Upon receipt of notice from the Owner of failure of any part of the Systems during the guarantee period, the affected part or parts shall be promptly replaced by this Contractor, at no charge to the Owner.

D. This Contractor shall furnish, before the final payment is made, a written guarantee covering the above requirements.

1.14 MATERIALS

A. Materials shall be the best of their respective kinds and in full accord with the most modern mechanical construction. All materials shall be new.

B. All materials necessary to make the installation complete in every detail shall be furnished and installed under this Contract, whether or not specifically shown on the Drawings or specified herein.

C. It is the intent of the Specifications that one manufacturer be selected, not a combination, for any particular classification of materials or systems.

D. Where materials, equipment, apparatus or other products are specified by manufacturer, brand name, type or catalog number, such designation is to establish the standard of desired quality and style and shall be the basis of the bid.

1.15 MATERIALS AND EQUIPMENT HANDLING

A. This Contractor shall do all handling of his materials and equipment and the resulting cleanup, at his expense, in a safe and satisfactory manner. Special attention shall be paid to the protection of life and property and the equipment or apparatus handled, and any corresponding damages shall be replaced, repaired or paid for by this Contractor, as approved by the Architect. This Contractor shall provide all rigging, hoisting and staging required to complete the work of this Section, unless specifically noted otherwise.

1.16 MAINTENANCE AND PROTECTION OF MATERIALS

A. This Contractor shall be responsible for the maintenance and protection, from loss or damage of all causes, of all equipment, materials and tools supplied by him and stored or installed on the job site, until final acceptance of the project by the Owner.

B. This Contractor shall store his materials and equipment in the location designated by the Owner and maintain the storage area in a safe condition.

C. This Contractor shall clean, patch and repair any material and finishes of the building or its contents damaged during the execution of this Contract.

1.17 SHOP DRAWINGS AND MATERIAL SCHEDULE

A. Submit complete Shop Drawings in accordance with provisions of the General Conditions and of the Supplementary General Conditions.

B. Within 30 days after the date of Notice to Proceed and before purchasing any materials or equipment, this Contractor shall submit to the Architect for approval, a complete list of the names of manufacturers of all equipment proposed to fulfill the work of this Section. After the list has been processed by the Architect, submit complete Shop Drawings of all equipment and materials. Do not order any material or equipment until approval has been obtained from the Architect.

C. The approval of equipment and materials does not relieve this Contractor from the responsibility of Shop Drawings errors in details, sizes, quantities and dimensions which deviate from the Specifications, Contract Drawings and/or job conditions as they exist.

D. If apparatus or materials are substituted by this Contractor for those specified, and such substitution necessitates changes in any mechanical or electrical equipment, or alteration to connections, piping, supports, or construction, same shall be provided. This Contractor shall assume the cost and entire responsibility thereof. The Architect's permission to make such a substitution shall not relieve this Contractor from full responsibility for the work.

E. Changes to work already performed, made necessary by delays in Shop Drawing approvals, are the responsibility of this Contractor.

1.18 CLEANING OF SYSTEMS

A. Before the Systems are accepted, all equipment shall be thoroughly cleaned, so that no dirt, dust or other foreign matter will be deposited and be detrimental to the operation of the Systems.

B. After the installation is complete, equipment with factory finished surfaces shall be cleaned and damaged or scratched spots shall be touched up with the same type and color paint applied at the factory.

C. All equipment that is to receive finish paint by the Painting Contractor shall be cleaned by this Contractor and left ready to have surfaces prepared to receive paint.

1.19 RUBBISH REMOVAL

A. At the completion of the work, or when ordered by the General Contractor or the Architect, this Contractor shall remove from the property, all the rubbish or waste material belonging to him. Keep the job site free from accumulation of waste material and rubbish. Premises must be maintained in a clean condition.

1.20 MOTORS AND STARTERS

A. Motors for all equipment under this SECTION shall be quiet in operation and shall be guaranteed to run without objectionable noise or vibration.

B. Motors smaller than one-half (1/2) horsepower shall be wound for 120 volts, single phase, 60 hertz.

C. Motors one-half (1/2) horsepower and larger shall be wound for 208 volt, three phase, 60 hertz unless otherwise noted.

D. Starters provided for all equipment shall be provided by the Electrical Contractor.

PART 2 - PRODUCTS

2.01 FANS (PROPELLER)

A. Propeller fans shall be of sizes, type and capacities indicated on the drawings. Equipment shall be as manufactured by Greenheck, Cook, or Acme.

B. Equipment shall include direct connected motor and fan unit mounted on heavy steel frame and square sheet metal panel with fan guard and motorized discharge damper assembly, except where gravity activated backdraft dampers are indicated elsewhere in this specification or drawings. Motors shall be totally enclosed type. Discharge dampers shall be multi-blade aluminum with felted edges mounted on welded steel angle frame. Damper motors shall be same voltage as drive motor voltage. Entire assembly shall be factory prime coated and painted.

C. Provide OSHA type blade guards for all exposed blades to protect personnel where indicated on the drawing schedules and for all fans located less than 7'0" of the finished floor.

2.02 LOUVERS

A. Louvers shall be of the sizes and locations indicated on the drawings and types as specified herein. Louvers shall be as manufactured by Airolite, Greenheck, Air Balance, Inc., or Construction Specialties.

B. This Contractor shall be responsible for furnishing and installing all louvers for work under this section. This Contractor shall coordinate all through-wall openings for this equipment with the General Contractor. Louvers shall be securely installed in building walls, caulked both sides on perimeters and sheet metal attached with gasketing as required to suit design. Caulking color shall match existing building and be rubber base type.

C. "Stormproof" air intake louvers shall be Airolite 4 inch Type K638 and exhaust louvers shall be Airolite 4 inch Type K666, constructed of Type 6063-T5 aluminum, both with matching blade spacing and 1/2 inch expanded aluminum screens and drain holes. Provide intermediate aluminum support channels not less than 3 feet on centers.

D. Where louvers are noted to be drainable type louvers, they shall be of type and size noted on drawings and furnished with 1/2 inch expanded aluminum screens.

E. Provide entire aluminum assemblies in three-coat, fluoropolymer color, to be selected and approved by the Architect from manufacturer's standard range of colors and gloss.
   1. Surfaces to be acid chromate-fluoride-phosphate pre-treated.

2. Provide manufacturer's standard three-coat, thermo-cured system composed of specially formulated inhibitive primer, fluorocarbon color coat and clear fluorocarbon topcoat, with both color coat and clear topcoat containing not less than 70 percent polyvinyl resin by weight; complying with AAMA 605.2.
3. Provide with five (5) year warrantee.

2.03 AUTOMATIC TEMPERATURE CONTROLS

A. Digital Time Clocks:
1. ATC contractor shall furnish, install and wire digital time clocks to control exhaust fan, EF-1.
2. ATC contractor shall provide all wiring between exhaust fans and digital time clocks.
3. Exhaust fans shall operate on an occupied/unoccupied cycle as programmed into the digital time clocks to coincide with the bathhouse operating hours.

PART 3 - EXECUTION

3.01 SLEEVES AND OPENINGS

A. Openings for rectangular ducts passing through walls, slabs, partitions and other building construction shall be framed or boxed by the General Contractor. Openings shall provide for not less than 1/2 inch clearance around duct and insulation. Round ductwork shall be provided with sleeves as described herein for piping.

B. The HVAC contractor shall be responsible for providing all sleeves and for providing to the General Contractor all locations and dimensions of sleeves and openings. The HVAC Subcontractor shall bear the cost of all modifications required as a result of not providing the General Contractor with the proper information or for not verifying correctness during installation.

C. Rectangular duct penetrations into the finished spaces shall be provided with 28 gauge stainless steel strips fastened rigidly to building construction with stainless steel fasteners. Strips shall be sized to fit the outside flat frame dimensions of duct and insulation (if any) and cover the framed opening.

3.02 TESTING AND BALANCING OF AIR HANDLING SYSTEMS

A. The systems described above shall be tested and adjusted to deliver the required volume of air. This shall be done by means of adjusting the exhaust fans' solid state speed control.

END OF SECTION

SECTION 16000

ELECTRICAL

INDEX

SECTION 16000

ELECTRICAL

(Filed Sub-Bid Required)

PART 1 GENERAL

1.1 GENERAL PROVISIONS

A. The BIDDING REQUIREMENTS, CONTRACT FORMS and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1- GENERAL REQUIREMENTS shall be included in, and made a part of this section.

B. Work of this section requires Filed Sub-Bids and is governed by the provisions of the Massachusetts General Laws (MGL), Public Bidding Law – Chapter 149, Sections 44A to 44J inclusive, as amended, and applicable Sections of the MGL, Public Contract Law – Chapter 30.

C. Sub-Bids for work under this section shall be for the complete work and shall be filed in a sealed envelope with the Awarding Authority at a time and place as stipulated in Invitation to Bid and Instructions to Bidders.

D. Sub-Bids for work under this Section shall be for the complete work and shall be filed in a sealed envelope with the Awarding Authority at a time and place as stipulated in INVITATION TO BID and INSTRUCTIONS TO BIDDERS.

1. The following shall appear on the upper left hand corner of the envelope:

NAME OF SUB-BIDDER: _____
SUB-BID FOR TRADE: TITLE.

2. Each Sub-Bid submittal for work under this Section shall be on forms furnished by Awarding Authority, as bound herein, accompanied with the required bid deposit in compliance with MGL c149, Section 44B in the amount of 5 percent of Filed Sub-Bid.

1.2 SCOPE OF WORK

A. The scope of work consists of the installation of all materials to be furnished under this Section, and without limiting the generality thereof, consists of furnishing all labor, materials, equipment, plant, transportation, rigging, staging, appurtenances and services necessary and/or incidental to properly complete all electrical work as shown on the Drawings, as described in the

Specifications, or as reasonably inferred from either, in the opinion of the Architect as being required.

B. The work of this Section includes:
   1. Grounding.
   2. Sleeves, Inserts and Openings.
   3. Pullboxes, Junction Boxes and Wireways.
   4. Conduit.
   5. Wire and Cable.
   6. Electrical Supporting Devices.
   7. Outlet Boxes and Accessories.
   8. Wiring Devices and Plates.
   9. Lighting Fixtures and Lamps.
   10. Disconnect Switches.
   11. Fuses.
   12. Thermal Switches.
   13. Access Panels.

C. The Electrical Subcontractor shall be responsible for all cutting related to the work of this Section except in finished surfaces. Patching is the responsibility of the trade effected.
   1. For coordination of cutting and patching refer to Section 01 31 00, Project Management and Coordination.
   2. For cutting and patching Specifications, refer to Section 01 73 00, Execution.

1.3 RELATED WORK SPECIFIED ELSEWHERE

A. The following related work or material shall be provided under the designated Divisions:
   1. Excavation, backfill, pumping, and shoring: Division 31, “Earthwork.”
   2. Concrete work: Division 03, “Concrete.”
   3. Flashing and counterflashing for all roof openings: Division 07, “Thermal and Moisture Protection.”
   4. Field Painting: Division 09, “Finishes.”
   5. Specialty Equipment: Division 11, “Equipment.”
   6. Elevator: Division 14, “Conveying Systems.”
   7. Plumbing Equipment: Section 15400, “Plumbing.”
   8. HVAC Equipment: Section 15500, “HVAC.”
   9. Door Hardware: Section 08 71 10.
   10. For restrictions concerning the hanging of materials, piping, mounts, brackets, hangers, hooks and other items from metal decking. Steel Decking, Section 05 31 00.

1.4 DEFINITIONS

A. "E.C." or "Contractor" as used herein after in this Section shall mean the "Electrical Subcontractor," i.e., the filed bid Subcontractor under this Section 16000.

B. "Concealed" shall be defined as areas where conduit and wiring is located in chases, walls, partitions, shafts, and above finished ceilings.

C. "Underground" shall mean conduit and wiring exterior to or within the Building that is buried. All other conduit and wiring shall be considered "exposed."

D. "Exposed" shall mean conduit and wiring run on the surface of the Building construction.

E. "Conduit" shall mean in addition to conduit, all fittings, hangers and other accessories relating to such conduit systems.

F. "Provide" shall mean "provided complete in place," that is, "furnished and installed."

1.5 EXAMINATION OF SITE AND CONTRACT DOCUMENTS

A. Bidders are advised to visit the site and inform themselves as to conditions under which this work will be performed. Failure to do so will, in no way, relieve the successful bidder from the responsibility of furnishing any materials or performing any work in accordance with the true intent and meaning of the Drawings and Specifications.

B. No claim for extra compensation will be recognized if difficulties are encountered which an examination of the site conditions and contract documents prior to executing the contract would have revealed.

C. The Electrical Subcontractor shall be responsible for ordering and furnishing the correct quantity of material required. Routing and equipment arrangements shown on the Drawings are approximate only and are not warranted to be accurate.

D. Arrangements shall be made with the Owner prior to the visit for inspection of the existing Buildings.

1.6 RECORD DRAWINGS

A. General: Refer to Division 1, General Requirements, Section 01 78 00, Closeout Submittals for Requirements.

B. The Record Drawings required to be furnished under this Section are of

the "E" Series Drawings.

1.7 SHOP DRAWINGS

A. General: Refer to Division 1, General Requirements, Section 01 33 00, Submittal Procedures, for submittal provisions and procedures.

B. In accordance with Division 1, General Requirements, submit to the Architect for approval complete sets of detailed information consisting of manufacturer's' bulletins, capacities, Shop Drawings, and parts lists of all material to be provided for this project.

C. Any manufacturer's names and/or model numbers identified herein are intended to assist in establishing a general level of quality, configuration, functionality, and appearance required. This is NOT a proprietary Specification unless otherwise noted and it should be noted that or approved equal applies to all products denoted herein. It is understood that all manufactures will have minor variations in configuration, appearance, and product Specifications and such minor variations shall not eliminate such manufacturers as an approved equal. It is the intent of this Specification to encourage open and competitive involvement from multiple manufacturer's that are able to supply similar products.

1.8 CODES, REGULATIONS AND PERMITS

A. All work done under this Section shall conform to the Codes and regulations governing such work as follows:
1. ANSI American National Standards Institution
2. ASTM American Society for Testing Materials
3. CS Commercial Standards
4. FS Federal Specifications
5. IEEE Institute of Electrical and Electronic Engineers
6. IES Illuminating Engineering Society
7. NEC National Electrical Code
8. Massachusetts Electrical Code
9. NECA National Electrical Subcontractors Association
10. NEMA National Electrical Manufacturer's Association
11. NFPA National Fire Protection Association
12. UL Underwriters Laboratory
13. NESC National Electrical Safety Code
14. IPCEA Insulated Power Cable Engineers Association
15. EEI Edison Electrical Institute
16. EIA Electronic Industry Association
17. All Local Governing Codes.

B. Give notices, file plans, obtain and pay for permits and licenses and obtain

necessary approvals from authorities having jurisdiction. Permits shall be secured through the City. Deliver certificates of inspection to Architect. No work shall be covered before examination and approval by Architect, inspectors and authorities having jurisdiction. Imperfect or condemned work shall be replaced with work conforming to requirements, without extra cost to Owner, subject to the approval of the Architect. If work is covered before due inspection and approval, the Electrical Subcontractor shall pay costs of uncovering the installed work, whether it meets contract requirements or not. Refer to Section 00 21 13 Instruction to Bidders and General Conditions Contract for Construction Services for payment of fees.

1.9 INTENT

A. It is not intended that the Drawings show every conduit, fitting and appurtenance. All such parts necessary for the complete execution of the work, in accordance with the best practices of the trade and to the satisfaction of the Architect shall be provided whether these parts may have been specifically mentioned or not, or indicated on the Drawings.

1.10 DRAWINGS AND SPECIFICATIONS

A. The Drawings and Specifications are complementary each to the other, and any labor or material called for by either, whether or not by both, or necessary for the successful operation of any components shall be furnished and installed.

B. Before installing any work, verify that it does not interfere with the clearances required for other work. Installed work which interferes with existing necessary services shall be modified as directed by the Architect, at no additional cost to the Owner.

C. Be familiar with the Drawings and Specifications of all other trades to prevent interferences and assure complete coordination.

1.11 GIVING INFORMATION

A. Keep fully informed as to the shape, size and position of all openings and foundations required for all apparatus furnished under this Section and give full information to the General Contractor sufficiently in advance of the work, so that all such openings and foundations may be built in advance. Furnish all sleeves and supports herein specified, so the General Contractor may install same in place.

B. In the case of failure to give proper information as noted above, assume the cost of having necessary changes to the work made by the General Contractor.

1.12 OBTAINING INFORMATION

A. Obtain detailed information from the manufacturers of apparatus which is to be provided, for the proper methods of installation. Obtain all information from the General Contractor and other Subcontractors which may be necessary to facilitate the work and the completion of the whole project.

B. Electrical Subcontractor shall inspect the site associated with this project prior to submitting his bid and shall investigate all conditions under which this work will be performed. This shall include determination of exact locations of items indicated as existing on the Drawings. Such existing locations are diagrammatic and shall not be construed as exact enough to use for equipment and labor estimating purposes. Failure to inspect existing conditions or to fully understand the work which is required shall not excuse the Electrical Subcontractor from his obligation to supply and install work in accordance with the Specifications and Drawings and under all existing site conditions. It shall be the responsibility of the Electrical Subcontractor to investigate and locate all existing underground utilities which may conflict with the installation of this electrical work. Coordinate elevations of conduits required to be installed under this Contract to avoid interference with any existing underground utilities.

1.13 MATERIALS AND EQUIPMENT

A. All materials and equipment furnished under this Section shall be new and of the best grade for the service intended. The manufacturers mentioned in the Specifications are intended to indicate the quality desired. Any substitutions shall be approved by the Architect as herein provided by the “or equal” clause, in addition to meeting the limitations of space and capacity shown or specified. Re-built materials and equipment will not be accepted.

1.14 ELECTRICAL CHARACTERISTICS

A. In general, and unless specifically indicated otherwise in the Specifications or noted on the Drawings, all new Building service, heating, ventilating, air conditioning and plumbing equipment shall be of the following characteristics:
   1. Motors up to and including 1/3 HP shall be suitable for 120 volt, single phase operation.
   2. Motors larger than 1/3 HP shall be suitable for 240 volt, single phase operation.

1.15 TEMPORARY LIGHT AND POWER

A. Provide capacity from existing building power distribution and pay all expenses related thereto.

B. Refer to Division 1, Section 01 50 00 for requirements.

1.16 OPERATIONS AND MAINTENANCE MANUALS

A. At least two (2) months prior to the time of turning over this contract to the Owner for use and occupancy or substantial completion, secure and deliver to the Architect three (3) complete indexed files containing approved operating and maintenance manuals, Shop Drawings and other data as follows:
   1. Operation description of all systems.
   2. Complete Shop Drawings of all equipment.
   3. Preventive maintenance instructions for all systems.
   4. Spare parts lists of all system components.
   5. Names, addresses and telephone numbers of all suppliers of the systems.

B. Non-availability of operating and maintenance manuals or inaccuracies therein may be grounds for cancellation and postponement of any scheduled final inspection by the Owner until such time as the discrepancy has been corrected and/or retainage of sufficient monies to prepare same.

C. Provide qualified trained personnel to insure proper operation of the systems and to train the Owner's operating and maintenance personnel in the proper operation and maintenance of the systems. Instruction period shall be five (5) eight-hour days.
   1. Training of the Tenant’s and Building Owner’s operation and maintenance personnel is required in cooperation with the Tenant’s and Building Owner’s Representatives. Provide competent, factory authorized personnel to provide instruction to operation and maintenance personnel concerning the location, operation and troubleshooting of the installed systems. The instruction shall be scheduled in coordination with the Tenant’s and Building Owner’s Representative after submission and approval of formal training plans.

1.17 GUARANTEE AND SERVICE

A. The Electrical Subcontractor shall guarantee the performance of the installation and all equipment included in this Section in writing for one year from the date of final acceptance of same. Should any defects in materials or workmanship appear during this period, they shall be corrected or replaced by the Electrical Subcontractor to the satisfaction of the Architect, and at no additional expense to the Owner.

1.18 DEBRIS REMOVAL AND CLEAN-UP

A. The Electrical Subcontractor shall, at the end of each day’s work, remove waste materials and debris resulting from the installation of the electrical

system. The Electrical Subcontractor shall deposit such waste and debris in a dumpster on- site. Dumpster shall be provided by the General Contractor. The General Contractor shall be responsible for the emptying of dumpster when required.

B. The Electrical Subcontractor shall, at the completion of his work, remove from the property all tools, equipment and surplus materials resulting from the installation of the electrical system.

PART 2 PRODUCTS

2.1 NAMEPLATES

A. Nameplates shall be furnished and installed on the junction boxes, cabinets for all special purpose switches, motor disconnect switches, and other controls furnished under this Contract, to designate the equipment controlled and function.

B. Nameplates shall be laminated white bakelite with 1/4" high black recessed letters. Nameplates shall be securely attached to the equipment with galvanized screws or rivets. Adhesives or cements will not be permitted.

C. Power branch circuit junction boxes shall be identified with circuit's panel(s) orgin and circuit number(s) by means of black fibre pen.

D. All pull boxes and junction boxes shall be identified as to system and function by means of black fibre pen.

2.2 PULL BOXES, JUNCTION BOXES AND WIREWAYS

A. Pull boxes shall be of code gauge galvanized steel with screw covers to match. Pull boxes and wireways shall be as shown on Drawings and/or comply with the National Electrical Code and/or job conditions, with steel barriers separating systems.

B. Wireways shall be of code gauge steel, baked enamel manufactured standard sections and fittings, with combination hinged and screw covers, as manufactured by Square D "Square-Duct," Bee Line, Cope or equal.

C. Conductors passing through pull boxes and wireways shall be identified to indicate their origin and termination. Provide nameplates for all pull boxes.

D. Weatherproof junction boxes installed in grade shall be polymer concrete with gasketed cover, minimum 6" X 8" as manufactured by Quazite, Nordic Fiberglass, High Line Products, or approved equal.

2.3 OUTLET BOXES AND ACCESSORIES

A. Outlet boxes and accessories shall be as manufactured by Steel City, Appleton, Raco, or equal.

B. Lighting outlets in concrete ceilings, walls and columns shall be 4" octagonal rings, 4" deep with round bottom plate. Where concrete slab is less than 5" thick, boxes shall be 2-1/2" deep.

C. For wood framing and furred ceilings use 4" octagonal outlet boxes, bar hangers and covers. 4-11/16" boxes and covers shall be used where 1" conduit is involved.

D. Where outlets occur in beams or ribs of pan type concrete construction, a 4" shallow pan outlet, 3/4" deep, shall be used with conduit entering the back of the box.

E. All fixture outlet boxes shall have 3/8" solid make fixture studs and all auxiliary fixture stems shall be supported from 3/8" male fixture studs.

F. All outlets in walls other than lighting outlets in concrete shall be Series 52171, 4" square boxes with single of 2- gang raised covers, Series 52C50, of the proper depth required for the particular wall construction and finish. Where the wall construction or finish will not permit a neat cut around the raised cover, Series GW235 boxes shall be used.

G. Outlets in 2" partitions shall be 4" square, 1-1/4" deep, with raised cover.

H. Outlet boxes for weatherproof concealed work and exposed rigid conduit work shall be suitable cast or malleable iron conduit fittings, Crouse-Hinds Company, Appleton, Killark, or equal, and shall have threaded conduit hubs.

2.4 CONDUIT

A. Electric metallic tubing shall be electrogalvanized or sherardized steel and the rigid steel conduit shall be hot-dipped galvanized or sherardized, inside and outside, manufactured by one of the following: Pittsburgh Standard, Republic Steel Corp., Allied Tube and Conduit Corp. or equal.

B. Flexible metal conduit shall be galvanized steel and shall contain a separate copper grounding conductor. Liquid-tight flexible metal conduit shall be similar, but shall also have an extruded moisture and oil proof outer jacket of polyvinyl chloride plastic.

C. Non-Metallic Conduit (NMC): Rigid polyvinyl chloride (PVC) shall be

Schedule 40, rated for use with 90 degree conductors, UL rated or approved equal, conforming to industry standards and NEMA TC-2, NEMA TC-3, Fed. Spec. W-C-1094, and UL 651.

D. Rigid steel conduit fittings, couplings and connectors shall be threaded and shall be galvanized or cadmium plated. Conduit fittings and outlet boxes shall be held in place by fittings of a type approved by the Architect. Steel supports or racks shall be galvanized steel channel and fittings, Unistrut, Kindorf or Husky Products Company, or equal.

E. Couplings and connectors for electric metallic tubing shall be galvanized steel of the compression type other than the identer type and with insulated throat or set-screw type.

F. Steel support rods or support bolts for conduits shall be 1/8" diameter for each inch or fraction thereof of diameter of conduit size, but no rod or bolt shall be less than 1/4" in diameter.

G. Conduit shall be supported from the Building structure, and shall be independent of ducts, pipes, ceilings and their supporting members.

2.5 WIRE AND CABLE

A. Wiring shall be a minimum of #12 AWG solid, except motor control circuit wiring and fire alarm system wiring may be #14 AWG. Wiring for 120V branch circuits which exceed a distance of 100' from the panel to the last outlet shall be #10 AWG, 200 ft. from the panel to the last outlet shall be #8 AWG and 300 ft. from the panel to the last outlet shall be #6 AWG minimum, wiring for 277V branch circuits which exceed a distance of 200' from the panel to the last outlet or light fixture shall be #10 AWG, and 300 ft. from the panel to the last outlet or light fixture shall be #8 AWG minimum. The Electrical Subcontractor shall be required to perform voltage drop calculations on all branch circuits in which the actual proposed routing of the circuit exceeds 100 ft. to insure a maximum voltage drop of 3% is not exceeded. Wire sizes shall be increased to maintain the maximum 3% voltage drop.

B. Wires and cables shall be single conductor, except as otherwise specified or indicated on Drawings. Wires of sizes #8 AWG and larger shall be stranded. Wires of sizes smaller than #8 AWG shall be solid. Conductors shall be of soft drawn copper and shall have a conductivity of not less than 98% of the ANSI Standard for annealed copper. If, in the opinion of the Architect, the order and delivery time of solid conductors in the smaller sizes will delay progress of the installation, the Electrical Subcontractor may use stranded conductors instead of solid. If this permission is granted, pressure type connectors (not wire nuts) shall be used in making all such conductor splices, and particular care shall be taken when cutting insulation from ends of conductors not to score or sever

conductor strands. Pressure type connectors shall also be used at all terminals.

C. Wire shall be Type THWN-2, XHHW or approved equal, rated 90 degrees C. minimum and suitable for wet and dry locations.

D. MC cable may be used for branch circuit wiring only, where run concealed, where allowed by Code and approved by the Authority Having Jurisdiction. Type MC cable shall be supported and secured at intervals not exceeding six feet.

E. Wire and cable shall be by one of the following: Phelps Dodge Copper Products Corp., General Cable Co., AFC Cable Systems, Triangle Conduit and Cable Co., or equal.

F. Terminal lugs and splice connectors shall be of an ampacity equal to the circuit on which they are utilized.

G. All wiring where run in environmental air plenums shall conform to Article 300-22 of the National Electrical Code.

H. Wiring shall be supported from the Building structure, and shall be independent of ducts, pipes, ceilings and their supporting members.

2.5 WIRING DEVICES

A. Light Switches
1. All local wall switches shall be of the flush quiet toggle type, single pole, double pole, three-way or four-way, and as manufactured by Pass and Seymour, Inc., Hubbell, Leviton Manufacturing Co., or equal.
2. All switches shall be suitable for the control of tungsten filament lamps, and shall carry the proper marking of the Underwriters' Laboratories.
3. Local switches shall be installed in such a position that they shall bear evenly and truly, and be secured on the axis of the supporting members.
4. Under no circumstances are wooden wedges, shims or blocks to be used in truing up local switches. Should the outlet box in any case come too far back of the finished surface, recess boxes and screws of the proper length to reach the box shall be used of such a size as to form a shoulder at exactly the proper point to retain the switch in position.
5. Switches shall be equal to the following:
Single Pole Pass and Seymour 20 AC-1 (20 AMP-1P)
Double Pole Pass and Seymour 20 AC-2 (20 AMP-1P)
Three-Way Pass and Seymour 20 AC-3 (20 AMP-1P)
Four-Way Pass and Seymour 20 AC-4 (20 AMP-1P)
Switch with pilot light Pass and Seymour 20 AC-1-CPL (20 AMP-1P)

Key switches shall be equal to corresponding switches above.

6. Dimmer switches shall be slide control dimmers with preset, Pass and Seymour, Leviton Manufacturing Company, Lutron, Wattstopper or equal, rated for 2000 watt, 120 volt AC operation.
7. Color of switches shall be white, unless otherwise noted.

B. Receptacles

1. Duplex receptacles shall be grounding type, rated 20 amperes, 125 volts. Receptacles shall be back and side wired with screw type terminals or pressure type, screwless terminals having suitable conductor release arrangement.
2. Special receptacles for single equipment, where required, shall have additional grounding leg and shall be of capacity for the equipment to be connected.
3. In general, convenience receptacle circuits shall be independent of lighting circuits and shall not be controlled by lighting circuit breaker switches or lighting switches, unless specifically indicated on the Drawings.
4. Receptacles shall be as follows, or as manufactured by Hubbell, Leviton Manufacturing Co., or equal:
    a. Normal circuit duplex receptacles - Pass and Seymour 5362 (Provide child proof tamper resistant receptacles in the Child Development Areas or Rooms).
    b. GFCI duplex receptacles installed on the exterior of the Building shall be "Weather Resistant" Type.
5. USB Charger Devices shall be as follows, or as manufactured by Hubbell, or equal:
    a. 20 amp, 2 USB chargers and duplex tamper resistant receptacle (3.0 amp) – USB20X2W.
    b. 20 amp, 4 USB charger receptacle (5.0 amp) – USB4W.
6. GFCI Receptacles
    a. Non-feed through type GFCI unit may be selected where no protection of downstream receptacles is required. General Description: Straight blade, non-feed-through-type. Comply with NEMA WD 1, NEMA WD 6, UL 498, Federal Specification W-C-596, and UL943, Class A. Include indicator light that is lighted when device is tripped. Must have Self-test feature (conducts an automatic test every three seconds, ensuring ground fault protection. If ground fault protection is compromised, power to the receptacle must be discontinued.
    b. Duplex GFCI Convenience Receptacles, 125 V, 20 A. Comply with NEMA WD1, NEMA WD6 configuration 5-20R, UL 498, Federal Specification W-C-596 and UL943, Class A, and include indicator light that is

lighted when device is tripped. Conducts an automatic test every three seconds, ensuring ground fault protection. If protection is lost, power to the unit is disconnected and indicator light flashes indicating that the unit should be replaced.

a. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following: Products:
b. Subject to compliance with requirements, provide one of the following:
    i. Pass & Seymour; 2097, 2097 (NAFTA Compliant), PT2097 (use with PTRA6STRNA prewired pigtail connector), PT2097NA (NAFTA Compliant - use with PTRA6STRNA prewired pigtail connector), or equal.
    ii.

7. Color of receptacles shall be white, unless otherwise noted.

2.6 WIRING DEVICE PLATES

A. All device plates shall be Specification Grade, .032" thick, Type 430, stainless steel, brushed finish. Plates shall be of appropriate type and size for all wiring and control devices.

B. Plates shall be set so that all edges are in contact with the mounting surface. Plaster fillings will not be allowed. Multi-device locations shall have one common device plate.

C. Nameplate designation for device plates shall be engraved directly on plates and filled in black.

D. Device plates shall be by the same manufacturer as devices.

E. All receptacle device plates for circuits other than 120V, 2 wire, shall be engraved with 1/4" high letters, filled black, indicating voltage characteristics of the outlet.

F. Plates for surface type boxes shall not overlap boxes and shall be designed for use with surface boxes.

H. Device plates for weatherproof receptacles shall be clear Polycarbonate "In-Use" type, pad lockable.

2.7 LIGHTING FIXTURES

A. Furnish all labor, materials and equipment required for a complete installation of lighting equipment specified on the lighting fixture schedule. This shall include plaster frames for all recessed fixtures whether or not itemized or specified on lighting fixture schedule which appears on Drawings.

B. Electrical Subcontractor shall assume all responsibility for the safe handling of all lighting fixtures which are furnished under this Section and other accessories and lamps until the final inspection has been made by the Architect.

C. Special fittings and materials that may be required to support fixtures shall be supplied as well as supports or grounds required to secure surface or pendant mounted fixtures on suspended ceilings unless otherwise noted. Fixtures shall be supported from the Building structure, and shall be independent of ducts, pipes, ceilings and their supporting members. This support shall be in addition to regular fixture support bars, and saddles. Fluorescent fixtures mounted in association with suspended or integrated ceiling systems shall be supported above ceiling by threaded 1/4" diameter continuous galvanized steel hanger rods or #12 jack chain. Each such fixture shall have two supports per fixtures. Where duct work, pipes, type of Building construction materials and structural framing members provide obstructions or difficult support means, hanger rods shall be used in association with horizontal sections of steel support channels in an approved manner. Steel support channels shall be Unistrut, Kindorf, Huskey Products, or equal. Rigid steel conduit may be used instead of steel support channels for size and method of support. Exact mounting height of all stem supported lighting fixtures shall be determined on the job by Architect.

D. Ballasts for fluorescent fixtures shall be the series type, classified for sound rating A, be CBM rated and shall have automatic resetting thermal protection as per latest Class P requirements as set forth by Underwriters Laboratories, 800 m.A. ballasts shall be sound rated Class B, and 1,500 m.A. ballast shall be a minimum sound rating of Class C.

E. Ballasts shall be of the normal power factor type unless otherwise noted. Proper ballast shall be furnished and installed for all lighting fixtures normally designed for operation with ballasts, whether or not such ballasts are specifically itemized on fixture schedule. This shall include not only fluorescent type fixtures but also all other fixtures employing high intensity discharge lamps.

F. Ballasts for fluorescent or other high intensity discharge lamps used outdoors shall be of the low temperature type, designed for operation down to a temperature of minus 20 degrees F.

G. If fluorescent fixtures operate improperly due to overheating, Electrical Subcontractor shall furnish and install ballast heat radiators to alleviate the condition, at no cost to the Owner.

H. Furnish and install a complete set of new lamps for all fixtures. Lamps shall be General Electric, Philips, or Osram/Sylvania. The Electrical Subcontractor shall furnish to the Owner, at the completion of the project, spare lamps equal to 10% of the installed quantity for each type of lamp installed.

I. Fixtures, part or parts thereof (including lamps) determined defective upon completion of electrical installation shall be replaced by Electrical Subcontractor, at no cost to Owner.

J. Consult with General Contractor regarding arrangement of framing members to permit centering of recessed fixtures.

K. Consult with Ceiling Subcontractor and coordinate fixture locations and supports with suspended ceiling system.

L. Electrical Subcontractor shall be responsible for furnishing the specified recessed fixtures with proper mounting arrangement to be compatible with the type of ceiling construction in which fixture is to be mounted. If necessary, the type mounting arrangement shall be changed from that specified or indicated on fixtures schedule to conform to this requirement, at no additional cost to Owner. Submission of Shop Drawings of such recessed fixtures shall be interpreted to indicate that Electrical Subcontractor has verified ceiling construction, type and material with the Architect for the various areas of the project in which these fixtures shall be mounted. Shop Drawings of such fixtures shall be accompanied by a written statement indicating Electrical Subcontractor has verified such mounting arrangements with Architect and the date verified.

M. All suspended lighting fixtures shall be hung in association with improved aligner type hangers, except where noted.

N. In addition to fixture supports, surface mounted lighting fixtures shall be secured to surface which they mount at a minimum of two points on fixture housing to prevent rotation or movement of fixture out of its normal position of alignment.

O. After installation and lamping of permanent lighting fixtures and with approval of the Architect, these fixtures may be used for lighting, and will not require re-lamping prior to completion of project, except where lamps are faulty or burnt out.

P. Lamping color temperature shall be 3500°K for interior lighting fixtures,

unless otherwise noted.

Q. Lamping color temperature shall be 4100°K for exterior lighting fixtures, unless otherwise noted.

R. Lamps which are to be dimmed shall be provided with minimum 100 hours of burn in time; Electrical Subcontractor shall not install lamps in dimmable lighting fixtures until this process is completed.

S. Lighting fixtures with multi wattage ballasts and drivers shall be labeled from the factory for the wattage specified to ensure compliance with Energy Code calculations.

T. All lighting fixtures that utilize LED (light emitting diodes) lamp sources shall be Energy Star rated or DLC (Designlights Consortium) qualified product listed, a kelvin temperature as scheduled having a color rendering index of 80 minimum and minimum L70 lifetime rating of 50,000 at 25°C ambient. LED array and driver packages shall have published IESNA LM-79 and LM-80 testing data as a standard manufactured offering. Individual component testing will not be accepted. LM-79 must be conducted at a laboratory listed in the U.S. Department of Energy's LED Lighting Facts approved testing laboratories list. Testing must be conducted within the accreditation effective and expiration dates detailed for a given laboratory. In-house LM-80 reporting of LED array from LED manufacturer will be accepted.

U. Where lighting fixtures other than the specified products are provided, the Electrical Subcontractor shall provide light level calculations in accordance with IESNA standards to justify that substituted fixtures are of equal performance to the specified products (applies to all lighting fixtures in all spaces).

2.8 ELECTRICAL SUPPORTING DEVICES

A. All conduit and fittings on all work are to be secured by one or more of the following:
   1. Masonry - metal clips secured by toggle bolts or lead expansion sleeves.
   2. Woodwork - metal clips secured by wood screws.
   3. Bar joists - wedge hangers.
   4. Flanged beams - flange clips.

B. All pipe hangers and equipment supports shall be constructed and installed in accordance with Seismic Zone requirements as outlined in the State Building Code. The Electrical Subcontractor shall submit one (1) copy of Shop Drawings and calculations detailing seismic hanger restraints to the local Building Authority and Architect, along with a letter of compliance signed by a

registered structural engineer confirming that the piping hangers meet State Seismic Code requirements. Cable provided for seismic systems shall be color-coded and pre-stressed.

2.9 DISCONNECT SWITCHES

A. The Electrical Subcontractor shall furnish and install disconnecting means to comply with the National Electrical Code for all motors. Disconnect switches shall be fused or unfused as shown on the Drawings, NEMA Type HD safety switches for heavy duty, with interlocking cover, side operated with provisions for padlocking the switch handle in the off position.

B. All motor isolating switches indicated on the Drawings shall be rated in horsepower, and shall be rated for the voltage of the motor and shall be furnished and installed at the motor location whether or not the motor is within sight of the motor feeder disconnecting means.

C. Disconnect switch enclosures shall be of the proper NEMA type for the intended location as defined by NEMA and shall be phosphate coated or equivalent code gauge galvanized sheet steel with USAFI No. 24 dark gray baked enamel finish.

D. Disconnect switches shall bear the Underwriters' Laboratories label and be manufactured by Square D Company, Eaton/Cutler-Hammer, Siemens, or equal.

2.10 FUSES

A. General
1. Furnish and install a complete set of fuses for all fusible equipment on the project as specified by the Electrical Drawings. Final tests and inspection shall be made prior to energizing the equipment. This shall include tightening all electrical connections and inspecting all ground conductors. Fuses shall be as manufactured by Mersen, Cooper Bussman, and Littelfuse, or equal.

B. Mains, Feeders and Branch Circuits
1. Fused circuits rated 601 amperes and above shall be protected by current-limiting Class L A4BQ fuses. Fuses shall be time delay and shall hold 500% of rated current for a minimum of 4 seconds, clear 20 times rated current in .01 seconds or less and be UL listed and CSA certified with an interrupting rating of 200,000 RMS symmetrical amperes.
2. Fused circuits rated 600 amperes or less shall be protected by current-limiting Class RK1 time delay A2D (250V) or A6D (600V) or Class J time delay AJT fuses. Fuses rated 8 amperes and above shall have the

Smart Spot blown fuse indicator. This indicator shall provide guidance for ascertaining if the opening was caused by an overload or a short circuit. No holes are permitted in the fuse body for the indicator function. Fuses shall hold 500% of rated current for a minimum of 10 seconds (30A, 250V Class RK1 case size shall be a minimum of 8 seconds) and shall be UL listed and CSA certified with an interrupting rating of 200,000 RMS symmetrical amperes.

3. Metal end caps of fuses rated 61 through 600 amperes shall be electrically connected to the fuse blades to facilitate safe voltage testing during OSHA required LOTO (lock out/tag out) procedures.

C. Motors and Motor Controllers

1. Motor Protection

a. All individual motor circuits shall be protected by Class RK1, Class J, or Class L time delay fuses.

- Motors under 10 H.P. ATDR fuses (Class CC) may be used on motors rated less than 10 H.P. at 480VAC and rated less than 5 H.P. at 240VAC. Fuse holders for Class CC fuses shall incorporate blown fuse indication.

b. Fuse sizes for motor protection shall be chosen from tables published for the appropriate fuse. Heavy load and maximum fuse ratings are also shown for applications where typical ratings are not sufficient for the starting current of the motor.

APPLICATION INFORMATION

LOW VOLTAGE FUSES FOR MOTOR PROTECTION

Three Phase Motor Fuse Selection UL Classes RK5, RK1, J, CC and L

MOTOR HP	FULL LOAD AMPERES	RECOMMENDED FUSE AMPERE RATING MOTOR ACCELERATION TIMES								
		MINIMUM 2 SECS.	TYPICAL 5 SECS.	HEAVY LOAD OVER 5 SECS.	MINIMUM 2 SECS.	TYPICAL 5 SECS.	HEAVY LOAD OVER 5 SECS.	MINIMUM 2 SECS.	TYPICAL 5 SECS.	HEAVY LOAD OVER 5 SECS.
460V		RK5–TRS (Tri-onic®)/RK1–A6D			J–AJT			UL CLASS CC ATDR		
1/2	1.1	1-4/10	1-6/10	2	1-1/2	1-6/10	2	3	3-1/2	4-1/2
3/4	1.6	2	2-1/4	2-8/10	2	2-1/4	2-8/10	3-1/2	5	6-1/4
1	2.1	2-1/2	3-2/10	4	2-1/2	3-2/10	4	5	6-1/4	9
1-1/2	3	3-1/2	4-1/2	5-6/10	3-1/2	4-1/2	5-6/10	6	9	12
2	3.4	4	5	6	4	5	6	8	10	12
3	4.8	5-6/10	7	9	6	8	9	12	15	17-1/2
5	7.6	10	12	15	10	12	15	15	25	30
7-1/2	11	15	17-1/2	20	15	17-1/2	20	25	30	-
10	14	17-1/2	20	25	17-1/2	20	25	30	-	-
15	21	25	30	40	25	30	40	-	-	-
20	27	35	40	50	35	40	50	-	-	-
25	34	40	50	60	40	50	60	-	-	-
30	40	50	60	70	50	60	70	-	-	-
40	52	70	80	100	70	80	100	-	-	-
50	65	80	100	125	80	100	125	-	-	-
60	77	100	125	150	100	125	150	-	-	-
75	96	125	150	175	125	150	175	-	-	-
100	124	175	200	225	175	200	225	-	-	-
125	156	200	225	300	200	225	300	-	-	-
150	180	225	250	350	225	250	350	-	-	-
200	240	300	350	450	300	350	450	-	-	-
250	302	400	450	600	400	450	600	-	-	-
300	361	450	600	-	450	600	-	-	-	-
		CLASS L–A4BT								
300	360	–	601	650						
400	477	–	800	900						
500	590	–	1000	1100						

Minimum - This sizing is recommended if motor acceleration times do not exceed 2 seconds. Minimum sizing with RK1, RK5, and Class J fuses will provide overload relay back up protection but may not coordinate with some NEMA Class 20 overload relays. Minimum sizing is generally not heavy enough for motors with code letter G or higher.

Typical - Suggested for most applications. Will coordinate with NEMA Class 20 overload relays. Suitable for motor acceleration times up to 5 seconds.

Heavy Load - Maximum fuse size in accordance with Table 2. If this fuse size is not sufficient to start the load, RK1, RK5, and J time delay fuse size may be increased to a maximum of 225% of full load amperes. Class CC fuses may be increased to 400% of full load amperes. The Heavy Load column should be used for Design E and high efficiency Design B motor fuse sizing.

2. Motor Controllers
   a. IEC style and NEMA style motor controllers shall be protected from short circuits by time delay fuses. Controllers and fuses shall be coordinated for Type 2 protection of the motor controllers based upon the motor controller manufacturer's published recommendations. The fuses shall be Class RK1 A2D (250V) or A6D (600V) or Class J AJT, Class CC ATDR or Class L A4BQ.
3. AC and DC Variable Speed Drives
   a. AC and DC drives not internally protected by high speed fuses shall be provided branch circuit protection by High Speed Class J (HSJ) fuses. Class J time delay AJT fuses are an acceptable alternative to the HSJ in by-pass applications.

D. Other Equipment
   1. Lighting and control circuits rated 600VAC and less shall be protected by Class CC time delay ATDR or ATQR fuses, sized according to the Drawings.
   2. Switchboards, panelboards, and load centers shall utilize fully rated and listed components. Series rated overcurrent protective devices are not acceptable.

E. Labeling
   1. Industrial control panel labels shall include a SCCR (short circuit current rating) and shall specify the overcurrent protection device upon which this rating is based as per the National Electrical Code.
   2. Switchboards, panelboards, industrial control panels, and motor control centers shall include a label warning qualified personal of the potential arc flash hazard. The label shall be visible with equipment door closed.

F. Spares
   1. Spare fuses amounting to 10% (minimum three) of each type and rating shall be supplied. These shall be turned over to the Owner upon project completion. Fuses shall be contained and cataloged within the appropriate number of spare fuse cabinets (no less than one), located per Drawings. Spare fuse cabinets shall be equipped with a key lock handle, be dedicated for storage of spare fuses and shall be ATFC.

G. Execution
   1. To prevent mechanical damage to fuses; main, feeder, and branch circuit fuses are to be removed from equipment during transit and re-installed when equipment is to be energized.
   2. As installed Drawings, showing actual fuses installed, shall be submitted to the Engineer after completion of the project.
   3. Fuseholders capable of accepting Class H fuses are not acceptable.

H. Substitution
   1. Fuse sizes indicated on Drawings are based on fuse performance and selectivity ratios. Alternative submittals to furnish materials other than those specified shall be submitted to the Engineer along with short circuit, selective coordination, and arc flash hazard studies.
   2. Performance of any fuses submitted for substitution shall have:
      a. Indication integral with the fuse so that it indicates the voltage transient when the fuse is opened. This is a relative measure of how severe the fault was and gives information to the maintenance people to make them more efficient. No holes are permitted in the fuse body for the installation of indicators.
      b. Only the listed UL categories must be used, in order to reduce the possibility of arc flash injuries. Class RK5 and Class H are

prohibited and could cause major liability should an arc flash occur.

c. All end-caps of fuses must be electrically connected to the fuse blades to prevent misreading of electrical testers during the required OSHA LOTO (Lock-Out Tag-Out) procedures. Misreading on the LOTO final voltage check could cause hazardous shock.

2.11 THERMAL SWITCHES

A. Thermal switches shall be NEMA Type 1 toggle switch for normal duty with thermal overload relay. Switch enclosures shall be of a type approved for the location and atmosphere in which it is mounted. Thermal switches shall be installed where called for or where required by Code. Thermal switches shall be provided with pilot where called for on the Drawings.

B. Thermal switches shall be as manufactured by Square D, Eaton, Siemens, or equal.

2.12 ACCESS PANELS

A. Provide access panels for access to concealed junction boxes and to other concealed parts of system that require accessibility for operation and maintenance. In general, electrical work shall be laid out so access panels are not required.

B. Access panels shall be located in a workmanlike manner in closets, storage rooms, and/or other non-public areas, positioned so that junction can be easily reached and size shall be sufficient for purpose (minimum size 12” x 16”). When access panels are required in corridors, lobbies, or other habitable areas, they shall be located as directed by the Architect.

C. Access panels shall be as specified under Section 08 31 00, Access Panels and Doors.

PART 3 EXECUTION

3.1 INSTALLATION REQUIREMENTS

A. All equipment mentioned in these Specifications or those on the Drawings shall be furnished new except where noted and completely installed and adjusted and left in a clean, safe and satisfactory condition, ready for operation and all supplies, appliances, and connections of every sort and description necessary to the operation of the equipment shall be furnished and installed to the satisfaction of the Architect and Owner.

B. The Owner will not be responsible for materials and equipment until they have been tested and accepted.

3.2 CLEANING, ADJUSTING AND TESTING

A. At the completion of the work, all parts of the installation shall be thoroughly cleaned. All devices, equipment, conduits, and fittings shall be completely cleaned of grease, metal cuttings, dirt which may have accumulated during construction, and protection covers. Any discoloration or damage to parts of the Building, its finish or furnishings due to failing to properly clean the electrical system shall be repaired by the Electrical Subcontractor without cost to the Owner.

B. The Electrical Subcontractor shall test all work and equipment as directed by the Architect and by Authorities Having Jurisdiction, furnish all equipment, necessary personnel and the electrical power.

C. The entire installation shall be tested for shorts, grounds and open circuits and all defects shall be corrected before acceptance of his work. All work shall be demonstrated to be in proper operating condition to the complete satisfaction of the Architect and Owner.

D. Coordinate all start up, operation and testing activities with the Project Manager and General Contractor.
   1. Electrical Subcontractor tests shall be scheduled and documented.

3.3 SLEEVES, INSERTS AND SUPPORTS

A. The Electrical Subcontractor shall lay out and install his work in advance of the pouring of concrete floors and walls.

B. Furnish and install all inserts, conduit hangers, anchors and steel supports necessary for the support and installation of all electrical equipment.

C. Where openings are required in walls and floors for the passing of raceways, ducts or busways, the Electrical Subcontractor shall furnish the General Contractor with the necessary information regarding dimensions and locations so that he may install suitable concrete stops to provide these openings. Such openings shall be by the General Contractor in such a manner so as not to interfere with the fireproof integrity of the Building.

D. The Electrical Subcontractor will be held responsible for the location of and maintaining in proper position, sleeves, inserts and anchor bolts supplied and/or set in place by him. In the event that failure to do so requires cutting and patching of finished work, such work shall be done at the Electrical Subcontractor's expense by the General Contractor.

3.4 EQUIPMENT CONNECTIONS

A. The Electrical Subcontractor shall provide all connections to all equipment requiring electrical service, including power cables, branch circuit extensions, fire alarm cables, motors, controllers, lighting fixtures and all other equipment and systems specified or shown on the Drawings.

3.5 MOTOR AND CONTROL WIRING

A. The Electrical Subcontractor shall provide all wiring, including conduit, wire, junction boxes, disconnecting switches, and overcurrent protection, to and between all motors, starters, control devices and related electrical equipment whether specified or shown under Section 16000 or other Sections, except where such items are factory wired as well as factory mounted on the driven equipment.

B. Unless otherwise specified, the Electrical Subcontractor shall mount and align all starters, control devices, safety switches, power factor correction capacitors and other related electrical equipment whether specified in this or other Divisions of this Specification, except where such items are factory mounted on the driven equipment. The Electrical Subcontractor shall determine the correct rotation of any equipment connected to a polyphase motor and connect motor for this rotation before equipment is started.

C. Unless otherwise specified, all wiring to motors, control equipment and related electrical equipment shall run in rigid conduit or EMT, with flexible metal conduit connections or liquid- tight flexible connections where specified elsewhere. Conduits shall be large enough to accommodate motor branch circuits and grounding conductors whether or not so indicated on Drawings. Wire sizes shall be as shown or to comply with the National Electrical Code.

3.6 HVAC WIRING

A. Wiring for low voltage temperature control equipment is included under Section 15500.

3.7 GROUNDING

A. Grounding methods shall be in accordance with the Massachusetts Electrical Code Article 250 and Local Utility Company Regulations.

B. The required equipment grounding conductors and straps shall be sized in compliance with National Electrical Code and shall be provided with green insulation equivalent to the insulation on the associated phase conductors.

C. Flexible metallic conduit equipment connections utilized in conjunction with branch circuits shall be provided with suitable green insulated grounding conductors connected to approved grounding terminals at each end of the flexible conduit.

D. The neutral conductor of all circuits shall have an identifying marking preferable a covering of white, readily distinguishable from the other conductors. This wire shall be unbroken from the distribution switch to the outlet.

E. Each Electrical expansion fitting shall be provided with a bonding jumper.

3.8 CONDUIT WORK

A. All wiring shall be installed in heavy wall rigid steel unless otherwise noted below and run concealed except as indicated on the Drawings. Branch circuit wiring in hung ceilings, furred spaces or exposed may be installed in electrical metallic tubing. Panelboard feeders may be run in electrical metallic tubing except panelboard feeders run underground or in concrete slabs shall be in heavy wall rigid steel conduit as specified above or PVC. All exposed conduit in spaces indicated as mechanical rooms and where installed exposed below the 8' level elsewhere on the project shall be rigid steel conduit. Conduit extensions in metal partitions may be made with flexible metal conduit, with grounding conductor.

B. Connections to portable and permanently mounted motorized equipment and motors, as well as the equipment housing, shall be made with approved liquid tight flexible metal conduit. Flexible connections shall be a maximum of 18” long and with grounding conductor. Flexible connections shall be used prior to attachment to equipment housings.

C. Conduit ends shall be cut square, threaded and reamed to remove burrs and sharp edges. Field threads shall be of the same type and have the same effective length as factory cut threads. Excessive exposed threads will not be allowed. Turns, wherever required in exposed conduit runs shall be made by the use of factory-made bends, or field made bends. Condulets, or in the event of a multiplicity of conduits making the same turn, a steel junction box with a removable steel cover may be used. Offsets and bends for changes in elevation of exposed conduit runs shall be made at walls or beams and not in open spaces between walls or beams. Conduits shall be routed so as not to interfere with the operation of maintenance of any equipment. The entire job shall be done in a neat and workmanlike manner. Steel supports or racks shall be galvanized steel channel and fittings, Unistrut, Kindorf, Husky Products Company, or equal.

D. All conduit work shall be carefully cleaned and dried inside before the

installation of conductors. Wire shall not be pulled into conduit system until Building is completed. Plug conduit ends to exclude dust, moisture, plaster or mortar while Building is under construction. No lubricants or cleaning agents which might have a deleterious effects on conductor coverings shall be used for Drawing conductors into raceways.

E. Drawings, in relation to routing of conduits, are diagrammatic. The number and size of conduits and wire shall be furnished and installed as indicated by the Drawings. Conduits shall be routed in the field so as to be coordinated with the Building structure. Concealed conduit shall be as short and direct as possible. Exposed conduit shall be run in straight lines parallel to walls, beams and columns and with right angle bends and threaded conduit fittings. All conduit in concrete slabs shall be run above bottom steel reinforcing, below top reinforcing and column ties. Conduits passing through floors, walls and beams shall be of such size, number and in such locations so as not to impair the strength of the construction. At time of roughing conduits in concrete slab area, prior to pouring of slab, the Electrical Subcontractor shall consult the Structural Engineer for coordination and approval of size, spacing and method of conduit installation in slabs and walls, as well as penetration of such. Particular attention shall be given to the installation of conduits at grouped areas, such as panelboard, cabinet and pull box entrances.

F. All metal conduit buried in the earth or fill shall be coated with two coats of heavy asphalt paint over its entire length, including couplings.

G. Raceways in ceiling spaces shall be routed in such an approved manner as to eliminate or minimize the number of junction boxes required, but also shall be routed in an orderly and organized manner. Support rods and clamps shall be furnished and installed as directed by the Architect. Support of conduits by use of wire is strictly prohibited. Conduits shall be supported and secured by conduit support devices.

H. Where rigid metal conduit is threaded in the field, a standard conduit cutting die providing 3/4” taper per foot shall be employed. Threadless coupling shall not be used on rigid metal conduit except where specifically allowed by the Architect. Running threads shall not be used on rigid metal conduit.

I. Conduit work shall be installed in such a manner to keep exposed threads to an absolute minimum, and in no case shall more than three threads be left exposed after the conduit work is made up tight. This requirement applies to all conduit work, including conduit buried in earth or fill or in concrete.

J. Minimum size conduit shall be 1/2” nominal trade size.

K. A minimum 3/16” diameter twisted nylon plastic type fish cord shall be furnished and installed in all empty raceways. Provide a tag on each end of

fish cord indicating the location of the other end.

3.9 WIRE AND CABLE

A. Wiring for all branch circuits and feeder circuits shall be color coded as follows:

1. Single phase, 240/120 volts:

Phase	Color
A	Black
B	Red

2. Connections to terminal shall be arranged Phase A and Bfrom left to right.
3. Signal system shall be color coded differently from electrical systems described above.
4. For large size conductors available only in black, use colored plastic tape at all ends and where connections and splices are made for the specified color code identification. Tape shall be wrapped around the conductor three complete turns.

B. In each case, the phase wires shall be connected to the phase supply mains in proper rotation to assure a balanced condition on the panel. The circuit numbers assigned on the Drawings are used for convenience only and need not designate the circuit on the panel to which that circuit may be connected. However, the circuit numbers and circuit description are required to be typewritten on the panelboard directory at the conclusion of the work, and shall represent the circuits as actually connected to the panelboard.

C. Joints and splices shall be made in an approved manner and shall be equivalent, electrically and mechanically, to the conductor insulation. Solid conductors shall be spliced with approved wiring connectors. Conductors of Size No. 8 AWG and larger shall be connected by use of solderless pressure connectors; these joints and splices shall be taped with one wrap of varnish cambric tape and then a minimum of three wraps of No. 88 Scotchbranch (3M Company) all-weather vinyl plastic electrical tape, or equal Permacel or Plymouth Company. Each wrap of tape shall be half-lapped. Conductors of Size No. 4 AWG or larger shall have two coats of insulating varnish applied over the tape.

D. Switch leg wiring shall be the same color as the phase conductor from which it is supplied.

3.10 INSTALLATION OF OUTLETS

A. If any discrepancy is found to exist between the electrical plans and any other Drawings associated with the project, notify the Architect at once and have location verified before outlets are installed. Any reasonable change in

location of outlets and equipment prior to roughing shall not involve additional expense to the Owner.

B. Consult with the Ceiling Subcontractor regarding the centering of outlets in ceiling tile.

C. Whenever outlets of any system are installed in brick, masonry or concrete construction, furnish and install the necessary boxes and conduit in connection therewith so that the General Contractor may build them in as the work progresses. Box offsets shall be made at all outlets to provide for proper adjustment to finished surfaces.

D. Through-wall boxes will not be permitted. Outlet boxes shall not be mounted back to back, but shall be staggered a minimum of 12" on center.

E. Knockouts in any boxes shall not be left open and all boxes not having equipment mounted on them shall be provided with blank covers.

F. Bar hanger type outlets shall be used in hollow framed partitions other than those of the masonry or construction block type, with bar hanger supported from two partition studs. Bar hangers shall be secured to metal type partition studs with self- threading metal screws, or drill through hangers with caddy (or equal) clips shall be used.

3.11 FIRE STOPPING

A. Electrical installations in hollow spaces, vertical shafts and ventilation or air handling ducts shall be so made that the possible spread of fire or products of combustion will not be substantially increased. Openings around electrical penetrations through fire-resistance rated walls, partitions, floors or ceilings shall be firestopped using approved methods to maintain the fire-resistance rating. Refer to Section 07 84 00 for Firestopping. All fire stopping material and installation will be by the General Contractor.

3.12 SPECIAL COORDINATION INSTRUCTIONS

A. Coordination with the work of other trades is referred to within various parts of this Section. The following special instructions shall also be carefully noted:

1. The Electrical Subcontractor shall obtain from the HVAC Engineer copies of all Shop Drawing prints showing the ductwork installation as it will be put in place on the project. These Drawings shall be thoroughly checked by the Electrical Subcontractor and the routing of all conduits and installation of all outlets and electrical equipment shall be coordinated with the ductwork so as to prevent any installation conflict. Such coordination shall be done prior to roughing-in conduits,

outlets and electrical equipment.

2. Locations of all wall outlets shall be verified with the Architect prior to roughing in conduits. Refer to details and wall elevations on the Architectural Drawings; mounting heights indicated on these Architectural Drawings and/or specific dimensional information given to the Electrical Subcontractor by the Architect shall take precedence over such information indicated on the Electrical Drawings.
3. Refer to all other Drawings associated with this project. Any equipment which requires an electrical supply circuit, switch, controls and connections, even though not indicated on the Electrical Drawings, shall be furnished and installed as directed by the Architect. Locations of lighting fixtures shall conform to the architectural reflected ceiling plans.
4. Refer to Architectural Drawings for areas in which the concrete slab is poured on grade. In these areas a moisture proofing membrane will be installed on the grade fill or earth prior to pouring of slab. Electrical conduits shall be so installed, where possible, to avoid the necessity of penetrating this moisture proofing membrane. Such penetration of the membrane shall only be made when specifically allowed by the Architect, and shall be made only at locations directed by the Architect.

3.13 PROJECT CLOSEOUT

A. A certificate of completion shall be issued by the Electrical Subcontractor indicating that the installation is in conformance with the Construction Documents and all applicable Local, State and Federal Statutes and Codes. Final inspection by the Engineer shall be conducted after receipt of the Certificate of Completion. At minimum, life safety items shall be 100% complete including emergency lighting systems, the fire alarm system, and the emergency standby system before the Electrical Subcontractor request for final inspection. If final inspection by the Engineer proves that the emergency lighting systems, the fire alarm system, and the emergency standby system are not 100% complete, the Engineer will backcharge the Electrical Subcontractor at his hourly rate for re-inspection.

END OF SECTION