

PROJECT MANUAL

**TERMINAL PASSENGER CIRCULATION IMPROVEMENTS
PORTLAND INTERNATIONAL JETPORT**

PORTLAND, ME

TABLE OF CONTENTS

BID FORMS AND CONDITIONS OF CONTRACT

Section	00020	Invitation to Bid
Section	00110	Instruction to Bidders
Section	00310	Form for Bid
Section	00420	Notice of Award
Section	00531	Contract Agreement
Section	00580	Notice to Proceed
Section	00610	Performance Bond
Section	00620	Labor and Materials Payment Bond
Section	00720	General Conditions
Section	00810	Supplementary General Conditions
Section	00834	Change Order
Section	00835	Certificate of Substantial Completion of Work
Section	00836	Certificate of Final Completion of Work
Section	00837	Waiver of Lien
Section	00840	Special Conditions

DIVISION 1 - GENERAL REQUIREMENTS

Section	01010	Summary of Work
Section	01025	Measurement and Payment
Section	01027	Applications for Payment
Section	01028	Modification Procedures
Section	01030	Alternates
Section	01040	Coordination
Section	01045	Cutting and Patching
Section	01090	References
Section	01200	Project Meetings
Section	01300	Submittals and Submittal Transmittal
Section	01410	Quality Control and Testing Services
Section	01420	Mock-Ups
Section	01500	Construction Facilities and Temporary Controls
Section	01600	Material and Equipment
Section	01630	Substitutions Request Form
Section	01700	Contract Closeout
Section	01720	Project Record Documents
Section	01730	Operation and Maintenance Manuals
Section	01731	Services of Manufacturer's Representatives
Section	01740	Warranties and Bond
Section	01921	Permits and Work Allowances
Section	01925	Construction Aids
Section	01930	Barriers
Section	01940	Security

DIVISION 2 – SITE WORK

Section 02221 Selective Demolition

DIVISION 3 - CONCRETE

Section 03300 Cast-In-Place Concrete

DIVISION 4 – MASONRY

Section 04200 Unit Masonry

DIVISION 5 - METALS

Section 05300 Metal Decking
Section 05400 Cold-formed Metal Framing
Section 05500 Metal Fabrications

DIVISION 6 - WOOD AND PLASTICS

Section 06100 Rough Carpentry
Section 06402 Interior Architectural Woodwork

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

Section 07210 Building Insulation
Section 07265 Sprayed-On Fireproofing
Section 07270 Firestopping
Section 07900 Joint Sealers

DIVISION 8 - DOORS AND WINDOWS

Section 08305 Access Doors
Section 08410 Aluminum Entrances
Section 08800 Glass and Glazing

DIVISION 9 - FINISHES

Section 09215 Gypsum Veneer Plaster
Section 09250 Gypsum Drywall
Section 09300 Tile
Section 09510 Acoustical Ceilings
Section 09650 Resilient Flooring
Section 09682 Carpet Tile
Section 09900 Painting

DIVISION 10 - SPECIALTIES

Section 10400 Signage and Graphics

DIVISION 11 – EQUIPMENT – NOT USED

DIVISION 12 – FURNISHINGS – NOT USED

DIVISION 13 - SPECIAL CONSTRUCTION – NOT USED

DIVISION 14 - CONVEYING SYSTEMS - NOT USED

DIVISION 15 - MECHANICAL

Section	15000	COMMON WORK RESULTS FOR HVAC
Section	15250	HVAC INSULATION
Section	15700	HEATING, VENTILATING AND AIR CONDITIONING
Section	15710	RADIANT HEATING UNITS
Section	15800	HVAC FOR DISTRIBUTION
Section	15900	INSTRUMENTATION AND CONTROLS FOR HVAC
Section	15990	TESTING, ADJUSTING AND BALANCING FOR HVAC

DIVISION 16 - ELECTRICAL

Section	16000	BASIC ELECTRICAL MATERIALS AND METHODS
---------	-------	--

END OF TABLE OF CONTENTS

THIS PAGE IS INTENTIONALLY LEFT BLANK

SECTION 00020

INVITATION TO BID

Sealed Bids for construction of:

**Terminal Passenger Circulation Improvements
Portland International Jetport
Portland, Maine
Bid Number 608**

in accordance with Bidding and Contract Documents prepared by:

Domenech, Hicks & Krockmalnic, Inc.
155 Massachusetts Avenue
Boston, MA 02115
617-267-6408

hereinafter called the Architect, will be received by:

City Of Portland
Purchasing Office, City Hall, Room 103
389 Congress Street
Portland, Maine 04101

Attn. **Matthew F. Fitzgerald, Purchasing Agent**
(207) 874-8654

hereinafter called the "Awarding Authority", or "Owner" at the address listed above.

Sealed Bids for the above project, whose scope is described in Section 01010: Summary of Work of this construction bid, clearly marked on the outside envelope with the name of the bidder, project, title, and bid number, shall be received by the Awarding Authority at the address listed above, no later than the times and dates specified below, at which times and place they will be publicly opened and forthwith read aloud. Any bid received after the time and date specified will not be considered.

Bids: **3:00 pm**, local legal time, Thursday September 13, 2007

A bid deposit in the amount of five percent (5%) of the Bid amount, as applicable, shall be submitted with each Bid. Bid deposit shall be in the form of cash or a certified check, or a Treasurer's or Cashier's check issued by a responsible bank or trust company payable to **Awarding Authority**, or a bid bond (a) in a form satisfactory to the Awarding Authority, (b)

with a surety company qualified to do business in the State of Maine, and (c) conditioned upon faithful performance by the principal of the agreements contained in the Bid. Return of bid deposits will be in accordance with the provisions of the applicable General Laws.

The Awarding Authority will reject Bids when required to do so by the General Laws. In addition, the Awarding Authority reserves the right to waive any informalities in bidding and to reject any and all Bids if it deems it to be in the public interest to do so, and to act upon the bids and make it's award in any lawful manner.

The successful Bidder will be required to furnish Performance Bond and Payment Bond, each in the amount of 100% of the Contract Amount. The cost of such bonds shall be included in the bid price. Such bonds shall be of a surety company qualified to do business under the laws of the State of Maine.

All questions shall be directed in writing only, to the Purchasing Office at the above address and be received by **Thursday, September 6, 2007**. These may be faxed to 207-874-8652, e-mailed to mff@portlandmaine.gov or hand delivered to the Purchasing Office. Questions received after this time will not be addressed. Responses from the City that substantially alter this bid will be issued in the form of a written addendum to all bid holders registered in the Purchasing Office. Oral explanations or interpretations given before the award of the contract will not be binding.

All proposals shall be submitted on the attached form and are to remain open for sixty (60) days after their opening. Late bids, unsigned bids, bids without the required surety and/or facsimile bids will not be accepted.

The successful proposer shall agree to defend, indemnify and save the City harmless from all losses, costs or damages caused by its acts or those of its agents, and, before signing the contract, will produce evidence satisfactory to the City's Corporation Counsel of coverage for General Public and Automobile Liability insurance in amounts not less than \$500,000 per person, \$1,000,000 per occurrence for bodily injury, death and property damage, protecting the contractor and the City, and naming the City as an additional insured from such claims, and Workers' Compensation insurance. The City disclaims any and all responsibility for injury to contractors, their agents or others while examining the job or at any other time.

Copies of Contract Documents may be obtained by each Bidder from the Office of the Owner, between the hours of 8:00 AM and 4:30 PM Monday through Friday, beginning at 12:00 Noon on **Monday, August 20, 2007**, on non-refundable payment of cash or check for **\$100** per set, payable to the **Owner**. Additional copies of Contract Documents may be purchased, upon payment of **\$100**, non-refundable. A fee of \$15.00 shall be added to each set where shipping is requested.

Bidding and Contract Documents may be examined during regular office hours at the Owner's office and at the following places.

1. Portland International Jetport, 1001 Westbrook Street, Portland, ME

2. Domenech, Hicks, & Krockmalnic, 155 Massachusetts Avenue, Boston, MA

3. Becker Structural Engineers, 75 York Street, Portland, ME

The Awarding Authority is exempt from sales and federal excise tax to the extent permitted under law; bidders should not include such taxes in figuring or in references to any bid.

A **mandatory** pre-bid conference will be held at **10.00 am**, local legal time, on **Wednesday August 29, 2007 at Portland International Airport, Conference Room**. Following the pre-bid conference, there will be a tour of the sites. All bidders are invited to attend. Only those firms represented at this meeting may bid on the project.

Any inconsistency between the Invitation to Bid, Information for Bidders, Bid Forms, Conditions of the Contract, and any other Contract Documents and these statutes, or any other applicable statutes, bylaws, or regulations existing on the date on which the bids are to be received, shall not be grounds for invalidating the bidding procedures, but, where required by law, such statute, bylaw, or regulation shall be deemed to govern.

Prior to any payment by the City, the contractor will be required to supply the City with a Waiver of Lien--Material and Labor for the total awarded contract cost, guaranteeing payment in full for all labor and materials used or required in connection with the work described in this bid. The City may also require waivers of lien, signed by individual subcontractors, with requests for progress payments.

Any mechanic's lien or any other lien which may be filed against the premises which are the subject of the contract by reason of the work described herein shall be defended (by counsel reasonably acceptable to the City) and promptly discharged by the Contractor at its own expense. If the Contractor should fail either to defend the City against the lien or to discharge it, then the City may do so at the Contractor's expense. In the event of such an undertaking by the City, the Contractor will promptly reimburse the City for all its costs and expenses in so doing including, but not limited to, reimbursement of the City's reasonable counsel fees and costs which may be incurred by it in substituting a bond in place of the lien.

The contractor shall furnish all labor, materials, fixtures, supplies, equipment and transportation necessary to do the work as specified. Work shall be conducted in an orderly manner and all work shall be performed in accordance with best trade policy and in conformance with pertinent O.S.H.A., Local, State and Federal Government regulations.

The contractor shall assume all risk and bear any loss or injury to property or persons occasioned by neglect or accident during the progress of work until the same shall have been completed and accepted. The contractor shall also assume all blame or loss by reason of neglect or violation of any state or federal law or municipal rule, regulation or order.

Materials and equipment purchased for permanent installation in this project are exempt from the State of Maine Sales and Use tax and from all Federal Excise taxes. Each bidder shall take this exception into account in calculating his bid price for the work.

The contractor shall keep accurate records of all services performed under the agreement and shall submit such information to the Airport Facilities Manager monthly for work that is completed. Payment for such services shall be made to contractor not more than thirty (30) days after receipt of said forms and acceptance of the work by the Airport Facilities Manager . Progress payments will be made, less a 10% retainage, which will be held until release is authorized by the Airport Facilities Manager upon final inspection and acceptance of the work.

Pursuant to Portland City Code, the City reserves the right to cancel any contract immediately for cause, or for convenience on thirty days prior written notice to the contracted firm.

The City of Portland, Maine, reserves the right to waive any informalities in bids, to accept any bid and to reject any and all bids should it be deemed for the best interest of the City to do so. The City reserves the right to substantiate proposer's qualifications, capability to perform, availability, past performance record and to verify that bidders are current in their obligations to the City.

Matthew F. Fitzgerald
Purchasing Agent

END OF DOCUMENT

SECTION 00110

INSTRUCTIONS TO BIDDERS

1.00 COMPLEMENTARY DOCUMENT

- A. Document 00020, INVITATION TO BID, included herewith, is complementary to this document and shall be carefully reviewed by bidders for specific instructions, which are not repeated herein.

2.00 STATUTES REGULATING COMPETITIVE BIDDING

- A. Bidding procedures and award of general contract shall be in accordance with the provisions of the General Laws of the State of Maine, including all current amendments.
- B. In the event of any discrepancy or inconsistency between the provisions of these Bid and Contract Documents and the above-mentioned statutes, the provisions of the above-mentioned statutes shall govern. In such event, the application of all remaining provisions not in conflict to any circumstance other than that in which the conflict occurs shall not be affected thereby.

3.00 BIDDER'S QUALIFICATIONS

- A. **THE BIDDERS WILL NEED TO PROVIDE AN EXPERIENCE STATEMENT AND A LIST OF SIMILAR PROJECTS AND CURRENT ONGOING PROJECTS.**

4.00 INTERPRETATION OF DOCUMENTS: NOTIFICATION OF ERRORS

- A. Interpretation of the provisions of the Bid and Contract Documents will be made by the City of Portland upon written request of any bidder, provided that the City receives such request by **Thursday September 6, 2007**, and that the City considers such interpretation to be of sufficient importance. Oral or telephone interpretations will not be made, and if made, shall be strictly informal and not legally valid or binding.
- B. Such written interpretations shall be in the form of Addenda to the Bid and Contract Documents.
- C. Bidders are urged to communicate all errors and discrepancies found in the Bid and Contract Documents to the City of Portland. Telephone calls pointing out any such errors or discrepancies will be taken by the City, but only for the purpose of receiving the information in order that it may be properly processed, and not for interpretation or clarification.

5.00 EXAMINATION OF BIDDING AND CONTRACT DOCUMENTS

- A. Each Bidder shall carefully examine the Bid and Contract Documents to obtain a thorough understanding of the work of his bid in addition to work of related trades. In addition, each Bidder shall personally visit the site to thoroughly acquaint himself with the conditions as they exist thereon.
- B. Failure of any Bidder to thoroughly examine the Bid and Contract Documents or to visit and examine the site shall in no way relieve him of any obligation with respect to his bid or of any responsibility assigned him under the Contract.

6.00 MODIFICATION AND WITHDRAWAL OF BIDS

- A. Modifications or withdrawals of Bids will be permitted after submission of such bids provided clearly written, readily understandable instructions for same are received by the Awarding Authority in writing prior to time established for opening of such bids. No Bid may be withdrawn after that time, except as otherwise provided herein or by law.

7.00 ADDENDA

- A. Addenda may be required during the bidding period to modify, clarify, or interpret the Bid and Contract Documents. It is intended, but not guaranteed, that such Addenda shall be mailed or faxed by the Awarding Authority to all persons or parties to whom Bid and Contract Documents have been issued (Bidders of Record). Failure to receive such Addenda shall in no way relieve any bidder from the execution of its provisions. All bidders are cautioned to verify the number of Addenda which have been issued and to secure any needed copies from the Awarding Authority before submitting a bid.

8.00 FORM FOR BIDS

- A. The Awarding Authority will make available to every person applying therefor, a Form for Bid. Each bona fide Bidder will be furnished forms for his proposal upon request. Such forms will be made available at the Awarding Authority's office during regular office hours throughout the bidding period. Bids must be submitted on the forms provided by Awarding Authority or on forms included in the bid documents of the Project Manual.
- B. All blank spaces provided on the bid forms shall be filled in with ink or typewriter. Where space is provided, sums shall be expressed in both words and figures. In case of discrepancy between the two, the written words shall govern.
- C. No interlineations, additions, alterations, or erasures shall be made on the forms.

9.00 ALTERNATES

- A. Each Bidder shall bid on all alternates listed. In the event that any alternate does not

involve a change in the amount of the bid, the bidder shall so indicate by using the words, "No Change", in the space provided for that alternate.

- B. Bidders shall enter on the Form for Bid a single amount for each alternate, such amount to consist of the total of all the amounts for the given alternate plus the amount for work of the alternate to be performed by the General Contractor.
- C. If alternate(s) are accepted, they shall be accepted in the order listed. The low bidder will be determined on the basis of the sum of the Base Bid and the alternates accepted.

10.00 SUBMISSION OF BIDS

- A. The Bid Form shall be properly executed and enclosed with the required bid deposit in a sealed envelope plainly marked on the outside with the information stated in Document 00020, Invitation to Bid.
- B. If Bids are mailed, the above required envelope shall be enclosed in a second envelope identified with the above markings and mailed to the place of bid opening, as described in the Invitation to Bid. Mailed Bids must be received before time scheduled for opening of Bids.

11.00 PERFORMANCE AND PAYMENT BONDS

- A. The Performance and Payment Bonds required of the Contractor shall each be in the amount of 100% of the Contract Sum from a surety company qualified to do business under the laws of the State of Maine and approved by the Awarding Authority.

12.00 AWARD OF CONTRACT

- A. The Contract will be awarded to the lowest responsible and eligible bidder. The Contract award is contingent upon the City of Portland the approved funding by the City of Portland City Council.

13.00 COMMENCEMENT AND COMPLETION OF WORK

- A. The successful bidder, upon execution of the Contract Agreement, shall commence the work of the Contract within seven (7) calendar days from receipt of written Notice to Proceed issued by the Awarding Authority within fourteen (14) calendar days after said execution of the Contract Agreement, and shall thereafter diligently and continuously carry on the work in such manner as to substantially complete the work within the number of calendar days proposed by the bidder.

14.00 PROVISIONS FOR BIDDING

- A. PROPOSAL SHALL SPECIFY GROSS SUM. Each proposal shall specify the correct gross sum described for which the work will be performed according to the plans and specifications and any amendment to the specifications if the same are issued prior to the date of receipt of the proposal. The lowest bid shall be determined by the City of Portland on the basis of the gross sum for which the entire work will be performed, arrived at by a correct computation of all items specified in the proposal

AWARD OF CONTRACT. The award of contract will be made only to the lowest responsible bidder as determined under these provisions. The City of Portland reserves the right to reject any or all proposals, to waive minor informalities, to advertise for new proposals, or to proceed to do the work otherwise, if, in its opinion, the best interest of the City will thereby be promoted.

- B. The City expects to award and execute the contract for this work in the fall of 2007.

- C. DEFINITION OF TERMS: For this project, the following definitions shall apply:

(a) Calendar Day - Every day shown on the calendar.

(b) Amount of the Awarded Contract - The total lump sum set forth in the proposal by the bidder.

(c) Engineering Inspection Costs - The costs to the City for inspection of the contractor's work.

(d) Substantially complete - The work will be considered substantially complete when it has received approval by the City of Portland, the Architect, and is ready for beneficial use by the Portland International Jetport.

15.00 DELAY REMEDY

- A. In the event that the Project is delayed for any reason, the sole remedy for the Contractor, and any subcontractor, for such delay shall be an extension of the Contract Time. No party shall have any other rights or remedies against the Owner, and shall make no claim therefor.

16.00 EQUAL EMPLOYMENT AND AFFIRMATIVE ACTION

- A. The Awarding Authority is an equal opportunity employer and has an active affirmative action employment plan. The Contractor shall have an Affirmative Action Plan and shall upon request submit it to Owner's Attorney for approval before execution of the Agreement for the Project.

END OF DOCUMENT

SECTION 00310

FORM FOR BID

To the Awarding Authority:

- A. Pursuant to and in compliance with your Invitation to Bid relating thereto, the undersigned, _____ having visited the site, familiarized himself with the conditions present, and carefully examined the Contract Documents dated **August 10, 2007**, prior to closing time for receipt of Bids as prepared by the Architect,

Domenech, Hicks & Krockmalnic, Inc.
155 Massachusetts Avenue
Boston, MA 02115
617-267-6408

hereby offers and agrees to provide all labor and materials required for construction of

Terminal Passenger Circulation Improvements
Portland International Jetport
Portland, Maine
Bid Number 608

to the satisfaction of the Owner and the Architect and in accordance with the accompanying Contract Documents with all addenda, for the Contract Price specified below, subject to additions and deductions according to the terms of the Contract Documents.

- B. Total Lump Sum Price: (\$ _____)

_____ Dollars

(WRITTEN IN WORDS)

- C. ADDENDA:
This proposal acknowledges the receipt of Addenda Number(s):

Addendum No.	Dated
_____	_____
_____	_____
_____	_____

- D. CONTRACTOR'S CONDITIONS
Provide all terms and conditions associated with locking into a production slot. Include all fees, penalties and applicable timetables.

- E. The undersigned agrees that, if he/she is selected as Contractor, he/she will within five days, Saturdays, Sundays, and legal holidays excluded, after presentation thereof by the Awarding Authority, execute the Contract in accordance with the terms of this bid and furnish a performance bond and also a labor and materials payment bond, each of a surety company qualified to do business under the laws of the State and satisfactory to the Awarding Authority, and each in the sum of one hundred percent of the Contract Price, or more if so specified elsewhere in the Contract Documents, the premiums for which are to be paid by the Contractor and are included in the Contract Price.

- F. The undersigned hereby certifies that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed as indicated in Section 00841: Special Conditions of this construction bid. The work that he/she performs will comply fully with all laws and regulations applicable to awards.
- G. The Awarding Authority is exempt from sales and federal excise tax to the extent permitted under law; bidders should not include such taxes in figuring or in references to any bid.
- H. The undersigned further certifies under the penalties of perjury that this bid is in all respects bona fide, fair and made without collusion or fraud with any other person. As used in this subsection the word "person" shall mean any natural person, joint venture, partnership, corporation or other business or legal entity.
- I. Commencement and Completion of Work: The undersigned agrees to commence work on the Contract within seven (7) calendar days from receipt of written notice to proceed issued by the Owner within fourteen (14) calendar days after execution of the Contract Agreement and to thereafter diligently and continuously carry on the work.
1. The undersigned agrees to substantially complete the work in 75 calendar days.
 2. If work is not Substantially Complete within this time, undersigned agrees to pay Owner \$500.00/day in liquidated damages.
- J. Bidder understands that Owner reserves the right to reject any and all bids.
- K. The undersigned further certifies under penalties of perjury that the said undersigned is not presently debarred from doing public construction work in the State of Maine.
- L. Bidder agrees that this Bid shall be good and may not be withdrawn for a period of 60 business days after the scheduled closing for receiving bids.

Date: _____

(Name of Bidder)

Signed: _____

(Seal) By: _____
(Name and Title of Person Signing Bid)

(Business Address)

(City and State)

END OF DOCUMENT

SECTION 00420

NOTICE OF AWARD

To: _____

Project Description: Terminal Passenger Circulation Improvements, Portland International Jetport,
Portland, Maine

The OWNER has considered the Bid submitted by you for the above described Work in response to its Advertisement for Bids dated _____, 2007, and Information for Bidders.

You are hereby notified that your Bid has been accepted for items in the amount of
\$ _____

You are required by the Information for Bidders to execute the Agreement and furnish the required CONTRACTOR'S Performance Bond, Payment Bond and certificates of insurance within ten (10) calendar days from the date of this Notice to you.

If you fail to execute said Agreement and to furnish said Bonds within ten (10) days from the date of this Notice, said OWNER will be entitled to consider all your rights arising out of the OWNER'S acceptance of your Bid as abandoned. The OWNER will be entitled to such other rights as may be granted by law.

You are required to return an acknowledged copy of this Notice of Award to the OWNER.

Dated this _____ day of _____, 2007.

OWNER:

City of Portland

By: _____

Title: _____

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE OF AWARD is hereby acknowledged

by _____

this the _____ day of _____, 2007.

By _____

Title _____

END OF SECTION

SECTION 00531

CONSTRUCTION CONTRACT

THIS AGREEMENT is made this __ day of _____, 2007, by and between the **CITY OF PORTLAND**, a body politic and corporate having a place of business in the County of Cumberland, State of Maine (hereinafter "**CITY**") and _____, with a mailing address of _____ (hereinafter "**CONTRACTOR**").

W I T N E S S E T H:

WHEREAS, the **CITY** did advertise for Requests for Bids by Bid # 608 entitled: TERMINAL PASSENGER CIRCULATION IMPROVEMENTS, PORTLAND INTERNATIONAL JETPORT, PORTLAND, MAINE; and

WHEREAS, the **CONTRACTOR** did under date of _____, 2007, submit a bid for such work; and

WHEREAS, after due consideration of all of the bids the **CITY** did award the bid to the **CONTRACTOR**;

NOW, THEREFORE, in consideration of the mutual promises made by each party to the other, the parties covenant and agree as follows:

1. SCOPE OF WORK.

The **CONTRACTOR** will furnish the materials, supplies, equipment and labor (hereinafter the "Work") required to construct and complete the TERMINAL PASSENGER CIRCULATION IMPROVEMENTS, PORTLAND INTERNATIONAL JETPORT, PORTLAND, MAINE project, all as more fully set forth in:

- i. Specifications:
- ii. Drawings:
- iii. General and Supplemental Conditions
- iv. Section 00020-Invitation to Bid, and
- v. Any subsequent addenda to the above.

The **CONTRACTOR** hereby acknowledges receipt of the items described in subparagraphs i., ii., iii., iv and v. above. The Specifications, Drawings, General and Supplemental Conditions are incorporated and made a part of this Contract by reference.

2. TIME FOR PERFORMANCE.

The **CONTRACTOR** will commence work within 10 days, after execution of this Contract by the **CITY**. The entire project shall be substantially completed in 75 calendar days as part of the General Contract's substantial completion. Time for performance may only be extended in writing by **CITY**.

3. MATERIALS.

Unless otherwise stipulated, the **CONTRACTOR** shall provide and pay for all materials, labor, water, tools, equipment, light, power, transportation and facilities necessary for the execution and completion of the Work. Material and equipment shall be new, free from defects, perfect and complete, unless otherwise stipulated.

4. CITY'S RIGHT TO TERMINATE CONTRACT.

If the **CONTRACTOR** should be adjudged a bankrupt, or if it should make a general assignment for the benefit of its creditors, or if a receiver should be appointed on account of its insolvency, or if it should persistently or repeatedly refuse or should fail, except in for cases which extension of time is provided, to supply enough properly skilled workers or proper materials or labor, or persistently disregard laws, ordinances, or otherwise be guilty of a substantial violation of any provision of the Contract, then the **CITY** may, without prejudice to any other right or remedy, and after giving the **CONTRACTOR**, and its surety, seven (7) days' written notice, terminate the employment of the **CONTRACTOR** and take possession of the Premises and of all materials, tools and appliances thereon and finish the Work by whatever method it may deem expedient. In such case, the **CONTRACTOR** shall not be entitled to receive any further payment until Work is finished. If the unpaid balance of the Contract amount shall exceed the expense of finishing the Work, including compensation for additional architectural, managerial and administrative services, such excess shall be paid to the **CONTRACTOR**. If such expense shall exceed such unpaid balance, the **CONTRACTOR** shall pay the difference to the **CITY**.

5. BONDS.

The **CONTRACTOR** shall furnish to the **CITY**, upon execution of the Contract, a Contract Performance Bond and a Contract Labor and Material Payment Bond each for the full amount of the Contract and issued by a surety company or surety companies authorized to do business in the State of Maine and approved by the **CITY**.

The Bonds shall remain in effect for one (1) year after final acceptance of the Work, and protect the **CITY's** interest in the one (1) year guaranty of workmanship and materials, and also shall insure settlement of claims, for the payment of all bills for labor, materials and equipment by the **CONTRACTOR**.

Any Mechanic's Lien or any other lien which may be filed against the Premises which are the subject of this Contract by reason of the Work described herein shall be defended (by counsel reasonably accepted to the **CITY**) and promptly discharged by the **CONTRACTOR** at its own expense. If the **CONTRACTOR** should fail, either to defend the **CITY** against the lien or to discharge it, then the **CITY** may do so at the **CONTRACTOR's** expense. In the event of such an undertaking by the **CITY**, the **CONTRACTOR** will promptly reimburse the **CITY** for all of its costs and expenses in so doing, including, but not limited to, reimbursement of the **CITY's** reasonable counsel fees, as well as costs which may be incurred by it in substituting a bond in place of the lien. This requirement is in addition to, and supersedes any conflicting condition which may appear in the General Conditions.

6. RELEASE OF LIENS.

Neither the final payment nor any part of the retained percentage shall become due until the **CONTRACTOR**, if required, shall deliver to the **CITY** a complete release of all liens which might arise from the Work, or receipts in full in lieu thereof; and if required, in either case, an affidavit reciting that so far as it has knowledge or information, the releases and receipts include all the labor and materials for which a lien might be filed. The **CONTRACTOR** may, if any subcontractor should refuse to furnish a release or receipt in full, provide a bond, satisfactory to the **CITY**, to indemnify it against any lien. If any lien should remain unsatisfied after all payments have been made, the **CONTRACTOR** shall refund to the **CITY** all monies that the latter may be compelled to pay in discharging such a lien, including all costs and reasonable attorney's fees. This requirement is in addition to and supersedes any conflicting condition which may appear in the General Conditions.

7. INDEMNIFICATION.

The **CONTRACTOR** shall indemnify and hold harmless the **CITY**, its officers and employees and agents, and the Architect and its officers, agents and employees, from and against all claims, damages, losses and expenses, including attorney's fees, arising out of or resulting from the performance of the Work, provided that any such claim, damage, loss or expense:

- a. is attributable to bodily injury, sickness, disease or death, or injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom; and
- b. is caused, in whole or in part, by any negligent act or omission of the **CONTRACTOR**, any subcontractor, anyone directly or indirectly employed by any of them, or anyone for whose act any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder.

CONTRACTOR hereby expressly agrees that it will defend, indemnify and hold the **CITY** harmless from any and all claims made or asserted by **CONTRACTOR**'s agents, servants or employees arising out of **CONTRACTOR**'s activities under this Contract. For this purpose, **CONTRACTOR** hereby expressly waives any and all immunity it may have under Maine's Workers Compensation Act in regard to such claims made or asserted by **CONTRACTOR**'s agents, servants or employees. The indemnification provided under this paragraph shall extend to and include any and all costs incurred by the **CITY** to answer, investigate, defend and settle all such claims, including, but not limited to, the **CITY**'s costs for attorneys fees, expert and other witness fees, the cost of investigators, and payment in full of any and all judgments rendered in favor of **CONTRACTOR**'s agents, servants or employees against the **CITY** in regard to claims made or asserted by such agents, servants or employees.

8. INSURANCE.

CONTRACTOR shall provide all insurance required by the General and Supplemental Conditions to this Contract.

9. PAYMENT.

- a. **CONTRACTOR** agrees to perform the Work required by this Agreement for the Contract Sum of _____ Dollars (\$_____).
- b. All applications for payment and processing of payment shall be in accordance with the terms of the General Conditions to this Contract.
- c. **CITY** shall withhold ten percent (10%) of each invoice amount as retainage until the **CONTRACTOR** certifies that the work is seventy-five percent (75%) complete. Upon verification by **CITY**'s Architect that work is seventy-five percent (75%) complete, **CITY** shall reduce the retainage amount held to five percent (5%) of the amounts invoiced.

10. ASSIGNMENT.

The **CONTRACTOR** shall not assign the Contract without the written consent of the **CITY**. The **CONTRACTOR** shall not assign any monies due or to become due to it hereunder without the previous written consent of the **CITY**.

11. USE OF PREMISES.

The **CONTRACTOR** shall confine its equipment, the storage of materials, and the operations of its workers to limits indicated by law, ordinances, permits or directions of the **CITY**, and shall not unreasonably encumber the Premises with such materials.

The **CONTRACTOR** shall not load nor permit any part of the structure to be loaded with a weight that will endanger its safety. The **CONTRACTOR** shall enforce the **CITY's** instructions regarding signs, advertisements, fires and smoking.

If any part of the structure is completed and ready for occupancy, the **CITY** may, by written and mutual consent, without prejudice to any of the workers' rights or the rights of the **CONTRACTOR**, enter in and make use of such completed parts of the structure. Such use or occupancy shall in no case be construed as any acceptance of any Work or materials.

12. WORKMANSHIP.

All workmanship, materials and equipment either at the site or intended for it, shall conform in all respects with the requirements of all of the Contract Documents.

All labor shall be performed by mechanics skilled in their respective trades.

CONTRACTOR shall guarantee the Work against any defects in workmanship and materials for a period of one (1) year from the date of the written acceptance of the project.

13. CLEANING UP.

The **CONTRACTOR** shall at all times keep the Premises free from the accumulation of waste materials or rubbish; and, at the completion of the Work, it shall remove all rubbish from and about the Project, all tools, scaffolding and surplus materials, and shall leave the Work "broom clean" or its equivalent, unless more exactly specified. In case of the failure to comply by the **CONTRACTOR**, the **CITY** may perform the clean up and deduct the costs from any monies due the **CONTRACTOR**.

14. ALTERNATE DISPUTE RESOLUTION.

If, in the performance of the Contract, there should arise a dispute between the **CITY** and the **CONTRACTOR** which can not be settled, then any such dispute shall be resolved as provided in the General Conditions to this Contract.

15. TERMINATION FOR CONVENIENCE.

The **CITY** shall have the right to terminate this Contract at any time for its convenience on prior written notice to **CONTRACTOR**. If Contract should be terminated by **CITY** for such convenience, the **CITY** shall pay **CONTRACTOR** for all Work performed and all materials purchased, pursuant to this Contract, prior to the receipt of such notice.

16. TERMINATION FOR CAUSE.

The **CITY** may terminate this Contract for cause by written notice to the **CONTRACTOR**. In the event of such termination, **CONTRACTOR** shall not be entitled to any further payment under this Contract from the date of receipt of said notice.

IN WITNESS WHEREOF, the said **CITY OF PORTLAND** has caused this Contract to be signed and sealed by Joseph E. Gray, its City Manager, thereunto duly authorized, and _____ has caused this Contract to be signed and sealed by _____, its President, thereunto duly authorized, the day and date first above written.

WITNESS:

CITY OF PORTLAND

By: _____
Joseph E. Gray
City Manager

WITNESS:

By: _____
Its President

Approved as to form:

Approved as to funds:

Corporation Counsel's Office

Budget Office

SECTION 00580

NOTICE TO PROCEED

To: _____ Date: _____

_____ Project: TERMINAL PASSENGER CIRCULATION
_____ IMPROVEMENTS AT THE PORTLAND INTERNATIONAL
_____ AIRPORT, PORTLAND, MAINE

You are hereby notified to commence Work in accordance with the Agreement dated
_____, 2007, on _____, 2007

The date of final completion of all Work is _____, 2007

OWNER:

City of Portland, Maine

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE TO PROCEED is hereby acknowledged

by _____

this the _____ day of _____, 2007

By _____

Title _____

END OF SECTION

SECTION 00610

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: That we _____

_____, as Principal
(Name of Contractor)

a _____
(Corporation, Partnership, or Individual)

hereinafter called "Principal" and _____
(Surety)

_____ of _____, State of _____,

hereinafter called the "Surety", are held and firmly bound into the **City of Portland, Maine**, hereinafter called "Owner", in the penal sum of _____

_____ Dollars (\$ _____)

in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that Whereas, the Principal entered into a certain

contract with the Owner, dated the _____ day of _____, 2007, a copy of which is hereto attached and made a part hereof for the construction of

**Terminal Passenger Circulation Improvements
Portland International Jetport
Portland, ME**

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms, conditions, and agreements of said contract during the original term thereof, and any extensions thereof which may be granted by the Owner, with or without notice to the Surety, and if he shall satisfy all claims and demands incurred under such contract, and shall fully indemnify and save harmless the Owner from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the Owner all outlay and expense which the Owner may incur in making good any default, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said Surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the work to be performed thereunder or the specifications accompanying the same shall in any way affect its obligation of this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the work or to the specifications.

PROVIDED, FURTHER, that no final settlement between the Owner and the Contractor shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, the parties to these present have duly executed in this bond on the

Signed and sealed this (5) _____ day of _____, 2007

WITNESS: CONTRACTOR _____

By _____ (L.S.)

By _____ (L.S.)

By _____ (L.S.)

WITNESS: SURETY: _____

By _____ (L.S.)

By _____ (L.S.)

APPROVED AS TO FORM _____, 2007

BY _____

NOTE: Date of Bond must not be prior to date of Contract. If Contractor is a Partnership, all partners should execute Bond.

END OF DOCUMENT

SECTION 00620

LABOR AND MATERIALS PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: That we _____

_____, as Principal
(Name of Contractor)

a _____
(Corporation, Partnership, or Individual)

hereinafter called "Principal" and _____
(Surety)

_____ of _____, State of _____,

hereinafter called the "Surety", are held and firmly bound into **City of Portland, Maine**, acting through the Administration, hereinafter called "Owner", in the penal sum of

_____ Dollars (\$ _____)

in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that Whereas, the Principal entered into a certain

contract with the Owner, dated the _____ day of _____, 2007, a copy of which is hereto attached and made a part hereof for the construction of:

**Terminal Passenger Circulation Improvements
Portland International Jetport
Portland, ME**

NOW, THEREFORE, if the Principal shall promptly make payment to all persons, firms, subcontractors, and corporations furnishing materials for or performing labor in the prosecution of the work provided for in such contract, and any authorized extension or modification thereof, including all amounts due for materials, lubricants, oil, gasoline, coal and coke, repairs on machinery, equipment and tools, consumed or used in connection with the construction of such work, and all insurance premiums on said work, and for all labor, performed in such work whether by subcontractor or otherwise, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said Surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the work to be performed thereunder or the specifications accompanying the same shall in any wise affect its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the work or to the specifications.

PROVIDED, FURTHER, that no final settlement between the Owner and the Contractor shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, the parties to these present have duly executed in this bond on this

_____ day of _____, 2007.

WITNESS: CONTRACTOR _____

By _____ (L.S.)

By _____ (L.S.)

WITNESS: SURETY: _____

By _____ (L.S.)

By _____ (L.S.)

APPROVED AS TO FORM _____, 2007

BY _____

NOTE: Date of Bond must not be prior to date of Contract. If Contractor is a Partnership, all partners should execute Bond.

END OF DOCUMENT

SECTION 00720

GENERAL CONDITIONS

The General Conditions of the Contract for Construction, AIA Document A201, Fourteenth Edition (1987), Articles 1-14 inclusive, is a part of this contract.

END OF SECTION

SECTION 00810

EXHIBIT A
SUPPLEMENTARY GENERAL CONDITIONS

THE GENERAL CONDITIONS

The "General Conditions of the Contract for Construction," AIA Document A201, Fourteenth Edition (1987), Articles 1 through 14 inclusive, is a part of this Contract.

THE SUPPLEMENTARY CONDITIONS

The following supplements modify and/or change, delete from and/or add to the General Conditions. Where any Article, Paragraph or subparagraph in the General Conditions is supplemented by one of the following paragraphs, the provisions of such Article, Paragraph, or subparagraph shall remain in effect and the supplemental provisions shall be considered as added thereto. Where any Article, Paragraph, or subparagraph in the General Conditions is amended, voided or superseded by any of the following paragraphs, the provisions of such Article, Paragraph or subparagraph not so amended, voided, or superseded shall remain in effect.

INDEX

Delete "Arbitration" and the references pertaining to it.

ARTICLE I GENERAL PROVISIONS

A. Delete the fourth sentence in Subparagraph 1. 1.2 and substitute the following:

"Except as provided in Paragraph 3.18, this Contract Document shall create a contractual relationship solely between the owner and Contractor.

B. Delete Subparagraph 1.2. 1.

C. Add the following to the end of Subparagraph 1.2.3:

"All Work mentioned or indicated in the Contract Documents shall be performed by the Contractor as part of this Contract unless it is specifically indicated in the Contract Documents that such Work is to be done by others. In the event of conflicts or discrepancies among the Contract Documents, the Documents shall be interpreted on the basis of the following priorities:

Highest Priority:	Modifications
Second Priority:	Agreement
Third Priority:	Addenda - later date to take precedence
Fourth Priority:	General Requirements - Division I
Fifth Priority:	Supplementary Conditions
Sixth Priority:	General Conditions
Seventh Priority:	Drawings and Specifications

In case of conflicts between Drawings and specifications, or within either the Drawings or specifications, the Contractor shall provide the better quality or greater quantity of work and materials unless otherwise directed by written Addendum or Change Order to the Contract."

E. Add Subparagraphs 1.2.6 through 1.2.13 as follows:

1.2.6 Where codes, standards, requirements and publications of public and private bodies are referred to in the Specifications, references shall be understood to be to the latest revision prior to the date of receiving bids, except where otherwise indicated.

1.2.7 Test boring or soil test information included with the Contract Documents or otherwise made available to the Contractor was obtained by the Owner for use by the Architect in the design of the Project or Work. The Owner does not hold out such information to the Contractor as an accurate or approximate indication of subsurface conditions, and no claim for extra cost or extension of time resulting from a reliance by the Contractor on such information shall be allowed except as provided in Subparagraph 4.3.6.

ARTICLE 2 OWNER

A. Delete everything following the words "execution of the Agreement" in the last sentence in Subparagraph 2.1.2.

B. Delete Subparagraph 2.2.1.

C. Delete Subparagraph 2.2.4 and substitute the following:

2.2.4 Information or services required of the Owner hereunder shall be furnished by the Owner with reasonable promptness after receipt from the Contractor of a request for such information or services.

D. Delete Subparagraph 2.2.5 and substitute the following:

2.2.5 The Owner will supply the Contractor with one reproducible set of the Drawings and specifications. The Contractor shall provide its Subcontractors with Contract Documents.

E. Add Subparagraph 2.2.7 as follows:

2.2.7 The Contractor shall be responsible for coordinating the schedule for testing which is mutually agreed upon by Owner, Architect and Contractor. The Owner shall be responsible for the employment of Independent Testing Laboratories (ITL). The Contractor shall bear all costs for retesting done by the Independent Testing Laboratory (ITL) due to nonconforming work.

F. In the sixth line of Subparagraph 2.3. 1, after the word "may" add the following:

", after Contractor's receipt of a seven (7) day written notice and failure by Contractor to cure,".

G. Delete the first and second sentences of Subparagraph 2.4.1 and substitute the following:

"If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a seven-day period after receipt of written notice from the Owner to begin and prosecute correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such deficiencies."

H. In the third sentence in Subparagraph 2.4. 1, delete the words "Change Order" and substitute the words "Construction Change Directive" and delete the fourth sentence.

ARTICLE 3 CONTRACTOR

A. Delete Subparagraph 3.2.1 and substitute the following:

3.2.1 Before starting the Work, and at frequent intervals during the progress thereof, the Contractor shall carefully review and compare the Contract Documents with each other and with the information furnished by the Owner pursuant to Subparagraph 2.2.2 and shall at once report to the Architect any error, inconsistency or omission the Contractor may discover. Any necessary change shall be ordered as provided in Article 7, subject to the requirements of Paragraph 1.2 and other provisions of the Contract Documents. If the Contractor proceeds with the Work without such notice to the Architect, having discovered such errors, inconsistencies or omissions, or if by reasonable review of the Contract Documents the Contractor could have discovered such, the Contractor shall bear all costs arising therefrom.

B. Add Subparagraph 3.2.4 and 3.2.5 as follows:

3.2.4 The Contractor shall give the Architect timely notice of any additional Drawings, Specifications, or instructions required to define the Work in greater detail or to permit the proper progress of the Work.

3.2.5 The Contractor shall not proceed with any Work not clearly and consistently defined in detail in the Contract Documents, but shall request additional drawings or instructions from the Architect as provided in Subparagraph 3.2.4. If the Contractor proceeds with such work without obtaining further Drawings, Specifications or instructions, the Contractor shall correct Work incorrectly done at the Contractor's own expense.

C. Delete the first sentence in Subparagraph 3.5.1 and substitute the following:

"The Contractor warrants that the materials and equipment furnished under the Contract will be new and of recent manufacture unless otherwise specified, and that all Work will be of good quality, free from faults and defects, and in conformance with the Contract Documents.

D. Delete the last two sentences in Subparagraph 3.5.1.

E. Add Subparagraphs 3.5.3 through 3.5.9 as follows:

3.5.3 In all cases in which a manufacturer's name, trade name or other proprietary designation is used in connection with materials or articles to be furnished under this Contract, whether or not the phrase "or equal" is used after such name, the Contractor shall furnish the product of the named manufacturer(s) without substitution, unless a written request for a substitute has been submitted by the Contractor and approved in writing by the Architect as provided in Subparagraph 3.5.4 and within the time limits and conforming to the procedures outlined in Section 01600 of the General Requirements.

3.5.4 If the Contractor proposes to use a material which, while suitable for the intended use, deviates in any way from the detailed requirements of the Contract Documents, the Contractor shall inform the Architect in writing of the nature of such deviations at the time the material is submitted for approval, and shall request written approval of the deviation from the requirements of the Contract Documents.

3.5.5 In requesting approval of deviations or substitutions, the Contractor shall provide, upon request, evidence leading to a reasonable certainty that the proposed substitution or deviation will provide a quality of result at least equal to that otherwise attainable. If, in the opinion of the Architect, the evidence presented by the Contractor does not provide a sufficient basis for such reasonable certainty, the Architect may reject such substitution or deviation without further investigation.

3.5.6 The Contract Documents are intended to produce a building of consistent character and quality of design. All components of the building including visible items of mechanical and electrical equipment have been selected to have a coordinated design in relation to the overall appearance of the building. The Architect shall judge the design and appearance of proposed substitutes on the basis of their suitability in relation to the overall design of the Project, as well as for their intrinsic merits. The Architect will not approve as equal to materials specified proposed substitutes which, in the Architect's opinion, would be out of character, obtrusive, or otherwise inconsistent with the character or quality of design of the Project. In order to permit coordinated design of color and finishes the Contractor shall, if required by the Architect, furnish the substituted material in any color, finish, texture, or pattern which would have been available from the manufacturer originally specified, at no additional cost to the Owner.

3.5.7 Any additional cost, or any loss or damage arising from the substitution of any material or requirement for those originally specified shall be borne by the Contractor, notwithstanding approval or acceptance of such substitution by the Owner or the Architect, unless such substitution was made at the written request or direction of the Owner or the Architect.

3.5.8 The warranty provided in this paragraph 3.5 shall be in addition to and not in limitation of any other warranty required by the Contract Documents or otherwise prescribed by law.

3.5.9 The Contractor shall procure and deliver to the Architect, no later than the date claimed by the Contractor as the date of Substantial Completion, all special warranties required by the Contract Documents. Delivery by the Contractor shall constitute the Contractor's guarantee to the Owner that the warranty will be performed in accordance with the warranty's terms and conditions.

E. Delete Subparagraph 3.6.1 and substitute the following:

3.6.1 The Owner is a non-profit organization and is exempt from all sales, consumer, use and other similar taxes as provided by law. The Contractor, Subcontractors, sub-subcontractors, material and equipment suppliers and the like, providing taxable goods for incorporation into the Work shall take this into account, so that the Owner does not pay such taxes. Obtain rebates for any taxes incorrectly paid and reimburse the Owner in the full amount on a Change Order. The Owner will provide the necessary evidence and certificates of tax exemption on request for those concerned.

F. Add subparagraph 3.9.1.1 as follows:

"3.9.1.1 The Contractor shall provide and maintain a telephone beeper for use by the Project Superintendent/Manager.

G. Add Subparagraphs 3.9.2 through 3.9.5 as follows:

3.9.2 The Contractor shall retain a competent Registered Professional Engineer or Registered Land Surveyor, acceptable to the Architect, who shall establish the exterior lines and required elevations of all buildings and structures to be erected on the site and shall establish sufficient lines and grades for the construction of associated Work such as, but not limited to, roads, utilities and site grading. The Engineer or Land Surveyor shall certify as to the actual location of the constructed facilities in relation to property lines, building lines, easements, and other restrictive boundaries.

3.9.3 The Contractor shall establish the building grades, lines, levels, column, wall and partition lines required by the various Subcontractors in laying out their Work.

3.9.4 The Contractor shall coordinate and supervise the Work performed by Subcontractors to the end that the Work is carried out between trades and that no trade, causes delay to the general

progress of the Work. The Contractor and all Subcontractors shall afford each trade, any separate contractor, or the Owner, reasonable opportunity for the installation of Work and the storage of materials.

3.9.5 The Contractor shall arrange for and conduct job meetings with the Architect and such other persons as the Architect may from time to time wish to have present. The Contractor shall be represented by a principal, project manager, general superintendent or other authorized main office representative, as well as by the Contractor's own superintendent. An authorized representative of any Subcontractor or Sub-subcontractor shall attend such meetings if the representative's presence is requested by the Architect. Such representatives shall be empowered to make binding commitments on all matters to be discussed at such meetings, including costs, payments, change orders, time schedules and manpower. All notices required under the Contract may be served on such representatives

H. Add Subparagraphs 3.10.4 and 3.10.5 as follows:

3.10.4 The Progress Schedule shall be based on an orderly progression of the Work, allowing adequate time for each operation (including adequate time for submission and review of submittals), and leading to a reasonable certainty of Substantial Completion by the date established in the Agreement. The Progress Schedule will be reviewed by the Architect for compliance with the requirements of this Article and Section 01300 and will be accepted by the Architect or returned to the Contractor for revision and resubmittal.

3.10.5 If the Architect in agreement with the owner has determined that the Contractor should be permitted to extend the time for completion as provided in Paragraph 8.3, the Progress Schedule shall be adjusted accordingly, and the dollar value of Work to be completed as of the first of each month shall be recalculated.

I. Delete Subparagraph 3.12.7 and substitute the following:

3.12.7 By approving and submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor thereby represents that the Contractor has or will have determined and verified all dimensions (including field dimensions), quantities, relationship to existing work, coordination with work to be installed later, coordination with information on previously accepted Shop Drawings, Product Data, Samples and similar submittals, and verification of compliance with an requirements of the Contract Documents. The accuracy of such information is the responsibility of the Contractor. In reviewing Shop Drawings, Product Data, Samples, and similar submittals, the Architect shall be entitled to rely upon the Contractor's representation that such information is correct and accurate.

J. Insert the following at the end of Subparagraph 3.12.9:

"Unless such written notice has been given, the Architect's approval of a resubmitted Shop Drawing, Product Data, Sample, or similar submittal shall not constitute approval of any changes not requested on the prior submittal."

K. Delete Subparagraph 3.12.11 and substitute the following:

3.12.11 When professional certification of performance criteria of materials, systems or equipment is required by the Contract Documents, the Owner shall be entitled to rely upon such certifications, and neither the Owner nor the Architect shall be expected to make any independent examination with respect thereto.

L. In the second line of Subparagraph 3.15.2, after the word "Documents," insert the following:

"after reasonable written notice from the Owner of such failure,"

ARTICLE 4 ADMINISTRATION OF THE CONTRACT

- A. Delete Subparagraph 4.1.2.
- B. Delete Subparagraph 4.1.4.
- C. Delete the second sentence in Subparagraph 4.2.7 and substitute the following:

"The Architect's action will be taken with reasonable promptness, while allowing sufficient time in the Architect's professional judgment to permit adequate review, taking into account the time periods set forth in the latest schedule prepared by the Contractor and reviewed by the Architect pursuant to Subparagraphs 8.2.4 through 8.2.10."
- D. In Subparagraph 4.2.7, in the fifth sentence, delete the words "unless otherwise specifically stated by the Architect".
- E. In Subparagraph 4.2.8 delete the following:
"Change Orders and".

Insert the following at the end of Subparagraph 4.2.8:
"and Subparagraph 7.1.2. 1. "
- F. In Subparagraph 4.2.11, in the last sentence delete the words "15 days" and substitute the following:

"seven (7) days".
- G. In Subparagraph 4.2.12 after the first sentence add the following:

"The Architect may, as the Architect judges desirable, issue additional drawings or instructions indicating in greater detail the construction or design of the various parts of the Work, such drawings or instructions may be affected by field order or other notice to the Contractor, and provided such drawings or instructions are reasonably consistent with the previous existing Contract Documents, the Work shall be executed in accordance with such additional drawings or instructions without additional cost or extension of the Contract Time. If the Contractor claims additional cost or time on account of such additional drawings or instructions, the Contractor shall give the notice provided in Subparagraph 4.3.7."
- H. In Subparagraph 4.3.3, in the first sentence change "21 days" to "7 days".

At the end of the second sentence in Subparagraph 4.3.3, add the following:

"within 7 working days and quantification of the claims made within 15 working days."

Delete the last sentence in Subparagraph 4.3.3 and substitute the following:

"Any change or addition to a previously made claim shall be made by timely written notice in accordance with this Subparagraph 4.3.3."
- I. In Subparagraph 4.3.4, in the first sentence delete the words "including arbitration".
- K. In Subparagraph 4.3.6 change "21 days" to the following:

"seven (7) days".

After the fourth sentence add the following:

Written notice of the claim must be made within seven (7) working days with quantification of the claim submitted within 15 working days.

Delete Subparagraph 4.3.7 and substitute the following:

4.3.7 If the Contractor claims that any acts or omissions of the Owner or the Architect, including any instructions or orders, whether oral, written, by Drawings, or otherwise, involve extra cost or time, and the Contractor has not received a written acknowledgment by the Owner or Architect that extra payment will be made or time extended on account thereof, the Contractor shall promptly (but within seven (7) days) so notify the Architect in writing of such claim and shall not proceed with the Work relating to such claim until the Contractor has received a further written order to proceed in accordance with Paragraph 4.4 except, as provided in Paragraph 10.3, in the case of an emergency affecting life or property. No claim by the Contractor on account of such acts, omissions, instructions or orders shall be valid unless the Contractor has so notified the Architect, before proceeding, and has received the further written order to proceed.

"The Contractor shall have the burden of demonstrating the effect of the claimed delay on the Contract Time, and shall furnish the Architect with such documentation relating thereto as the Architect may reasonably require, demonstrating the change to the project end date due solely to the inclusion of the delaying activity."

L. Add the following to the end of Clause 4.3.8.2:

Delaying weather is extreme weather, as defined by the National Weather Service in Gray, Maine. If another contractor works in similar conditions, no delay will be granted.

The contractor must consider weather in the schedule by adding durations to those activities which are weather dependant and occurs during seasons when weather may be an issue.

M. In Subparagraph 4.4.4 in the first sentence, delete the words "but subject to arbitration".

Replace 4.5 ARBITRATION with

4.5 DISPUTE RESOLUTION

4.5.1 Contract Performance During Dispute Resolution

During dispute resolution proceedings the Owner and Contractor shall comply with Subparagraph 4.3.4

4.5.2 Dispute Resolutions

The Owner and Contractor mutually desire to avoid construction disputes. When such disputes are unavoidable, however, they agree to participate in good faith dispute resolution processes described below in an effort to obtain fast, fair, and cost effective resolutions.

4.5.2.1 Partnering

The parties recognize partnering as a useful dispute avoidance and resolution process and agree to participate in that process, including a dispute review board.

4.5.2.2 Non-binding Mediation

In the absence of a dispute review board or in the event a dispute should remain unresolved, the parties agree to participate in non-binding mediation, pursuant to the Construction Industry Mediation Rules of the American Arbitration Association.

4.5.2.3 Waiver of Jury Trial

In the event any dispute between the parties should not be resolved by the alternate dispute methods provided herein, then the parties hereby knowingly, willingly, and voluntarily waive any right which they may have to trial by jury. They agree that any such proceeding shall be heard before a single judge of the Maine Superior Court or the United States District Court.

ARTICLE 5 SUBCONTRACTORS

- A. Delete Subparagraph 5.4.2.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

- A. Delete Subparagraph 6.2.5.
- B. In Subparagraph 6.3.1 in the fifth line after the word "Owner" add the following:
"after written notice".

ARTICLE 7 CHANGES IN THE WORK

- A. In Article 7 delete the words "a reasonable allowance for overhead and profit" wherever they occur and substitute the following:
"an amount for overhead and profit in accordance with the schedule set forth in subparagraph 7.3.3.2".
- B. Add Clause 7.1.2.1 as follows:
7.1.2.1 The Architect may issue Bulletins. A Bulletin is either:
a) a clarification to the Contract Documents, in accordance with Subparagraph 4.212, or
b) a minor change in the Work in accordance with paragraph 7.4, or
c) proposed extra Work resulting in an adjustment to the Contract Sum and/or Contract Time.

Upon receipt of a Bulletin, the Contractor shall review it promptly; if a Bulletin is determined by the Contractor to be a clarification to the Contract Documents or a minor change in the Work, the Contractor shall proceed in accordance with Paragraph 7.4. If the Bulletin is determined by the Contractor to be extra Work resulting in an adjustment to the Contract Sum and/or Contract Time, the Contractor shall not proceed with the Work described in the Bulletin, unless specifically authorized to do so in writing, but shall submit a detailed estimate in accordance with new Subparagraphs 7.3.1.1 and 7.3.3.

- C. Add Subparagraph 7.1.5 as follows:
In order to facilitate checking for quotations of extras or credits, all proposals, except those so minor that their propriety can be seen by inspection, shall be accompanied by a complete itemization of costs including labor, materials and subcontracts. Where major cost items are Subcontracts, they shall be itemized also. In no case will a change involving over \$600.00 be approved without such itemization.
- D. Delete Subparagraph 7.2.2.

E. Add Clause 7.3.1.1 as follows:

7.3.1.1 Upon request of the Owner or the Architect, the Contractor shall without cost to the Owner submit to the Architect, in such form as the Architect may require, an accurate written estimate of the cost of any proposed extra Work or change. The estimate shall indicate the quantity and unit cost of each item of materials, and the number of hours of work and hourly rate for each class of labor, as well as the description and amounts of all other costs chargeable under the terms of this Article. Unit labor costs for the installation of each item of materials shall be shown if required by the Architect. The Contractor shall promptly revise and resubmit such estimate if the Architect determines that it is not in compliance with the requirements of this Article, or that it contains errors of fact or mathematical errors. If required by the Architect, in order to establish the exact cost of new Work added or of previously required Work omitted, the Contractor shall obtain and furnish to the Architect bona fide proposals from recognized suppliers for furnishing any material included in such Work. Such estimates shall be furnished promptly so as to occasion no delay in the Work, and shall be furnished at the Contractors expense. The Contractor shall state in the estimate any extension of time required for the completion of the Work if the change or extra work is ordered.

F. Delete Subparagraph 7.3.3 and substitute the following:

7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods, as selected by the Owner.

- (a) By Cost and Percentages estimated by the Contractor as provided in Clause 7.3.1.1 and accepted by the Owner; the Contractor's estimate shall become a fixed price which shall not be changed by any variation in the actual cost of executing the Work covered by the change.
- (b) By actual Cost determined after the Work covered by the change is completed, plus Percentage.

G. Add Subparagraphs 7.3.3.1, 7.3.3.2, 7.3.3.3, and 7.3.3.4 as follows:

7.3.3.1 As used in this paragraph, 'Cost' shall mean the estimated or actual net increase or decrease in cost to the Contractor, Subcontractor, or Sub-subcontractor for performing the Work covered by the change, including actual payments for materials, equipment rentals, expendable items, wages and associated benefits to workmen and to supervisors employed full time at the site, insurance, bonds and other provable direct costs, but not including any administrative, accounting or expediting costs, or other indirect or overhead costs, or any wages or benefits of supervisory personnel not assigned full time to the site, or any amount for profit or fee to the Contractor, Subcontractor or Sub-subcontractor.

7.3.3.2 "Percentage" shall mean an allowance to be added to or subtracted from the cost in lieu of overhead and profit and of any other expenses which is not included in the Cost of the Work covered by the change, as defined above. When, in the reasonable judgement of the Architect, a series of Construction Change Directives or Change Orders effect a single change, Percentage shall be calculated on the cumulative net increase or decrease in Cost, if any.

- 1. Percentage for a Sub-subcontractor shall be 10 percent of any net increase or decrease of Cost of any Work performed by the Sub-subcontractor's own forces plus 5 percent of any aggregate net increase in Cost of any work performed for the Sub-subcontractor by other contractors.
- 2. Percentage for a Subcontractor shall be 10 percent of any net increase or decrease of Cost of any Work performed by the Subcontractor's own forces plus 5 percent of any aggregate net increase in Cost of any work performed for the

Subcontractor by other Subsubcontractors.

3. The Percentage for the Contractor shall be 10 percent of any net increase or decrease of Cost of any Work performed by the Contractor's own forces plus 5 percent of any net increase or decrease in the Cost for all other Work covered by the change.

7.3.3.3 If the Owner elects to determine the cost of the Work as provided in method (a) using unit prices stated in the Contract Documents or subsequently agreed upon, the unit prices shall be subject to Subparagraph 7.1.4. Notwithstanding the inclusion of unit prices in the Contract Documents, it shall be the Owner's option to require the Cost of any given change to be determined by one of the other methods stated in 7.3.3. If the owner elects to determine Cost of the change work by unit prices and the nature of the work is such that its extent cannot readily be measured after the completion of such work or any subsequent work, the Contractor shall keep daily records, available at all times to the Architect for inspection, of the actual quantities of such work put in place, and delivery receipts or other adequate evidence, acceptable to the Architect, indicating the quantities of materials delivered to the site for use in such unit price work, and distinguishing such from other similar material delivered for use in work included in the base Contract Sum. If so required by the Architect, materials for use in unit price work shall be stored apart from all other materials on the Project.

7.3.3.4 If the Owner elects to determine the cost of the Work as provided in methods (c) or (d) of Subparagraph 7.3.3 or if the method of determining the cost has not been established before the work is begun, the Contractor shall keep detailed daily records of labor and materials costs applicable to the work.

- H. In Subparagraph 7.3.7 at the end of the second sentence, add the following:

"and agreed to by the Owner."

ARTICLE 8 TIME

- A. Add Subparagraph 8.1.5 as follows:

"The term "working day" shall mean any calendar day except Saturdays, Sundays, and legal holidays at the jurisdiction of the Project."

- B. Add Subparagraphs 8.2.4 through 8.2.10 as follows:

8.2.4 Promptly after award of the Contract, but prior to the second Application for Payment, the Contractor shall submit to the Architect a Progress Schedule as described in this Subparagraph and General Requirements Section 01300, "Submittals." The schedule shall show for each class of work included in the Schedule of Values, the percentage completion to be obtained and the total dollar value of work to be completed as of the first of each month until Substantial Completion. All calculations shall be on the basis of work in place, but not including the value of materials delivered but not in place.

- C. In Subparagraph 8.3. 1, delete the words "pending arbitration" in line seven. Delete the words "Change Order" in line 9 and substitute "'Construction Change Directive.'" Add the following to the end of Subparagraph 8.3.1:

"If the Contract Time is extended pursuant to this Subparagraph, such extension shall be the exclusive remedy of the Contractor, and said Contractor shall not be entitled to recover damages from the Owner, or the Architect."

- D. Delete Subparagraph 8.3.3.

ARTICLE 9 PAYMENTS AND COMPLETION

- A. In Subparagraph 9.1.1, change "total" in line two to "maximum."
- B. In Subparagraph 9.2.1 in the first line delete the words "Before the first Application for Payment" and substitute the following:

"Promptly after award of the Contract but before the second Application for Payment"

Add at the end of the first sentence of Subparagraph 9.2. 1:

"and shall be revised if later found by the Architect to be inaccurate."

Add after the word "schedule" in the last sentence of Subparagraph 9.2.1:

"shall be coordinated with the progress schedule and".
- C. Delete the first twelve words of the first sentence of Subparagraph 9.3.1 and substitute "At the time or times established in the Agreement". After the first sentence of Subparagraph 9.3. 1, add "The format and number of copies of such Applications for Payment shall be as directed by the Architect".
- D. Delete Clause 9.3.1.1 and change Subparagraph 9.3.1.2 to 9.3.1.1
- E. Add Subparagraphs 9.3.1.2, 9.3.1.3, as follows:

9.3.1.2 The Owner will pay 90 percent of the amount due the Contractor on account of progress payments.

9.3.1.3 The Owner shall make Progress Payments and Final Payment within 30 days of application date.
- F. Add Subparagraph 9.3.4 as follows:

9.3.4 Each Application for Payment or periodic estimate requesting payment shall be accompanied by a waiver of liens from each Subcontractor and Contractor. Such waiver shall be in a form acceptable to the Owner.
- G. In Subparagraph 9.5. 1, at the end of item 2. add the words:

"for which the Contractor is not entitled to a Claim as provided herein or which are not covered by insurance".

In Subparagraph 9.5.1, change item 6. and add new items 8. and 9. as follows:

"6. reasonable evidence that the Work will not be completed within the Contract Time,"

"8. a lien or attachment is filed contrary to Subparagraph 4.5.9; or

9. failure of mechanical trade or electrical trade subcontractors to comply with mandatory requirements for maintaining record drawings. The Contractor shall check record drawings each month. Written confirmation that the record drawings are current will be required by the Architect before approval of the Contractor's monthly payment requisition."

H. Delete Subparagraph 9.6.3.

I. Delete Subparagraph 9.6.4 and substitute the following:

9.6.4 Neither the Owner nor Architect shall have an obligation to pay or to see to the payment of money to a Subcontractor, Sub-subcontractor or material supplier.

J. Delete Subparagraph 9.6.5.

K. Delete the words "or awarded by arbitration" from line 6 of Subparagraph 9.7.1.

L. Add at the end of Subparagraph 9.8.1:

"and only minor items which can be corrected or completed without any material interference with the Owner's use of the Work remain to be corrected or completed."

M. Delete Subparagraph 9.8.2 and substitute the following:

9.8.2. When the Contractor considers that the Work, or a portion thereof designated in the Contract Documents for separate completion, is substantially complete and the premises comply with Subparagraph 3.15. 1, the Contractor shall submit to the Architect (1) a list of items to be completed or corrected, (2) all special warranties required by the Contract Documents, endorsed by the Contractor and in a form reasonably acceptable to the Architect and (3) the permits and certificates referred to in Subparagraph 13.5.4. The failure to include any items on the list mentioned in the preceding sentence does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract documents. When the Architect on the basis of an inspection determines that the Work or designated portion thereof is substantially complete and the other conditions have been met, the Architect will then prepare a Certificate of Substantial Completion which shall establish the Date of Substantial Completion, shall state the responsibilities of the Owner and the Contractor for security, maintenance, heat, utilities, damage to the Work, and insurance, and shall fix the time within which the Contractor shall complete the items listed therein. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate for Substantial Completion. The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of the responsibilities assigned to them in such Certificate.

Delete Subparagraph 9.9.1 and substitute the following:

9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage. Such partial occupancy or use may begin whether or not the portion is substantially complete, provided that the respective responsibilities of the Owner and Contractor with respect to payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work, insurance, indemnification, correction of the Work, and warranties shall be established by agreement of the Owner and Contractor or, absent such agreement shall be determined by the Architect subject to the right of either party to contest such determination.

Delete the second sentence in Subparagraph 9.10.2 and substitute the following:

"If the Contractor fails to furnish such releases or waivers as the Owner reasonably requires to satisfy the Owner that there are no outstanding liens, the Owner may require the Contractor, as a condition of final payment and at the Contractor's expense, to furnish a bond satisfactory to the Owner to indemnify the Owner against any such liens."

At the end of Subparagraph 9.10.2 add the following:

"Final payment for a given Work Category constituting the entire unpaid balance for the Subcontract amount may be paid by the Owner to the Contractor following receipt of both the final Certificate for Payment from the Architect and the Final Lien Waiver from the Subcontractor and the Contractor. The Final Lien Waiver shall be submitted by the Subcontractor and Contractor on the form acceptable to the Owner. Final payments to the Subcontractor shall be made by Contractor after payment has been received by the Contractor.

P. Add Paragraph 9.11 as follows:

9.11 STORAGE OF MATERIALS OFF SITE

9.11.1 The Contractor, his Subcontractors, and Sub-subcontractors shall obtain prior written approval from the Owner for permission to store materials to be incorporated in the Work, for which Progress Payments will be requested, at off-site locations. Any and all charges for storage, including insurance, shall be borne solely by the Contractor. Before approval, Owner will require proper proof of insurance naming the Owner as an additionally insured party, and letter in which is furnished:

1. The name of the Contractor and/or Subcontractor or Subordinate Subcontractor leasing the storage area,
2. The location of such leased space,
3. The leased area: the entire premises of certain areas of a warehouse giving the number of floors or portions thereof,
4. The date on which the material is first stored,
5. The value of the material stored,
6. Transfer of Title to the Owner, Right of Entry and Removal.

9.11.2 The Contractor, his Subcontractors and Subordinate Subcontractors shall notify the Contractor and the Owner to inspect, at least once each month, the materials being stored at any location.

9.11.3 The Contractor, his Subcontractors and Subordinate Subcontractors shall mark each sealed carton with the name and address of the Project, the Contractor and Owner.

9.11.4 A perpetual inventory shall be maintained for all materials held in storage for which payment has been requested.

9.11.5 Payment for materials stored off site shall be at the sole discretion of the owner. Any additional costs to the Owner resulting from storage of material off site for which payment is requested, such as, but not limited to, travel expenses and time for inspectors, shall be backcharged to, and paid by, the Contractor.

9.11.6 Transfer of Title to the Owner, Right of Entry and Removal.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

- A. Delete the words "or in accordance with final determination by the Architect on which arbitration has not been demanded" in the last sentence in Subparagraph 10.1.2.
- B. Delete the words "asbestos and polychlorinated biphenyl (PCB's)" and the words "asbestos or polychlorinated biphenyl (PCB's)" in Subparagraphs 10.1.2, 10.1.3, and 10. 1.4 and substitute the words "unsafe materials"

C. Add Subparagraph 10.1.5

10.1.5 If reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance encountered but not created on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to the Owner and Architect in writing. The Owner, Contractor and Architect shall then proceed in the same manner described in Subparagraph 10.1.2. The Owner shall be responsible for obtaining the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to verify that it has been rendered harmless.

D. Delete the word "and" at the end of the Clause 10.2.1.2.

E. Add the word "and" to the end of the Clause 10.2.1.3.

F. Add Clause 10.2.1.4 as follows:

10.2.1.4 Any other property of the Owner, whether or not forming part of the Work, located at the site or adjacent thereto in areas to which the Contractor has access.

G. In Subparagraph 10.2.5, in two places after the word "10.2.1.3", add the words ", and 10.2.1.4".

H. Add Subparagraphs 10.2.8 through 10.2.11 as follows:

10.2.8 During the progress of the Work and at all times prior to the date of Substantial Completion or occupancy of the Work by the Owner, whichever is earlier, the Contractor shall provide temporary heat, ventilation, and enclosure, adequate to permit the Work to proceed in a timely fashion, and to prevent damage to completed Work or Work in progress, or to materials stored on the premises. The permanent heating and ventilation systems may be used for these purposes when available.

ARTICLE 11 INSURANCE AND BONDS

A. Delete Subparagraph 11.1.2 and substitute the following:

Prior to commencement of any work under this Contract and until completion and final acceptance of the work, the Contractor and each and every Subcontractor of the Contractor shall, at its sole expense, maintain the following insurance on its own behalf, and furnish to the City of Portland, certificates of insurance evidencing same and reflecting the effective date of such coverage as follows:

The term "Contractor & Subcontractor" as used in this insurance rider, shall mean and include Contractors and Subcontractors of every tier.

1. Workers Compensation and Occupational Disease Insurance, statutory coverage, with \$100,000 limit for Employer's Liability coverage.
2. Commercial General Liability with a combined Bodily Injury and Property Damage limit of \$ 400,000 Coverage should include Contractual Liability, Broad Form Property Damage, "X,C&U" coverage where applicable, Personal Injury Liability, Independent Contractors. All coverage to be provided on an "occurrence" basis with licensed, admitted carriers approved by the City.
3. Commercial Automobile Liability, including all owned, non-owned and hired vehicles, with a

combined limit of \$400,000 for Bodily Injury or Property Damage.

4. The certificate for above insurance shall each contain the provision that:

This insurance will not be cancelled, materially changed or not renewed without a thirty (30) day advance written notice to the City of Portland, Portland, ME.
5. The amount of insurance contained in aforementioned insurance coverages, shall not be construed to be a limitation of the liability on the part of the Contractor or any of its Subcontractors.
6. The Contractor shall file certificates of insurance prior to the commencement of work and/or payment with the City of Portland which shall be subject to the City of Portland and approval of adequacy of protection and the satisfactory character of the Insurer. The carrying of the insurance described shall in no way be interpreted as relieving the Contractor of any responsibility for liability under this Contract.
7. Prior to commencement of any work under this Contract and until completion and final acceptance of the work, the Contractor at its sole expense will provide and maintain the following insurance for the City of Portland, itself, and Subcontractors performing work or services in connection with the project.

"Bulder's Risk/All Risk" Property Insurance on the project and all materials, equipment and supplies located at the project site which are to become a permanent part of the construction, while awaiting erection and until completion of erection. Coverage is provided on a replacement cost basis.
8. The carrying of the insurance described shall in no way be interpreted as relieving the Contractor of any responsibility for liability under this Contract.
9. Any policies effected by the Contractor on its Owned and/or Rented Equipment and Materials shall contain a provision requiring the insurance carriers to waive their rights of subrogation against the City of Portland, and all other indemnities named in the Contract.
10. Should the Contractor or a Subcontractor engage a Subcontractor, the same conditions will apply under this contract to each Subcontractor, however, the Subcontractor shall be required to maintain limits of liability not less than Four Hundred Thousand Dollars (\$400,000) per occurrence and in the aggregate, with said limits applicable on a per project basis, or such greater limits as may be required by the Contractor.
11. Certificates of Liability for each policy should be required to be provided to the City before work is commenced. City of Portland should appear as Additional Insured in all cases and the certificate should provide for notice of cancellation, material change or non-renewal to the City at least thirty (30) days prior to the cancellation, change or non-renewal.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

- A. At the end of Subparagraph 12.2.2 add the following:

"For the purpose of establishing the guarantee period, the Date of Substantial Completion shall be deemed to occur when Certificates of Substantial Completion have been issued for all Work. In the case of Owner use and/or occupancy of a portion of the Work (including mechanical or electrical equipment) prior to completion of this phase of the Project, the guarantee period for said portion of Work shall commence upon the date of Owner occupancy."

ARTICLE 13 MISCELLANEOUS PROVISIONS

- A. Add Subparagraph 13.2.2 as follows:
- B. Delete Subparagraph 13.4.2 and substitute the following:
- 13.4.2 No consent or waiver, express or implied, by the Owner or the Architect to, or of, any breach of any covenant, condition or duty of the Contractor shall be construed as a consent to or waiver of any other breach of the same or any other covenant, condition or duty.
- C. In the last sentence of Subparagraph 13.5.2, after the word "costs" add the following: "and changes to the Contract Time".
- D. Delete Subparagraph 13.5.4 and substitute the following:
- 13.5.4 The Contractor shall obtain and deliver promptly to the Architect any occupancy permit and any certificates of final inspection of any part of the Contractor's work and operating permits for any mechanical apparatus, such as elevators, escalators, boilers, air compressors, etc., which may be required by law to permit full use and occupancy of the premises by the Owner. Receipt of such permits or certificates by the Architect shall be a condition precedent to Substantial Completion of the Work.
- F. Delete Paragraph 13.7.
- G. Add Paragraph 13.8 as follows:
- 13.8 EQUAL OPPORTUNITY
- 13.8.1 The Contractor shall maintain policies of employment as follows:
1. The Contractor and his Subcontractors shall not discriminate against any employee or applicant for employment because of race, religion, color, sex or national origin. The Contractor shall take affirmative action to insure that applicants are employed, and that employees are treated during employment without regard to their race, religion, color, sex or national origin. Such action shall include, but not be limited to, the following employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination, rates of pay or other forms of compensation, and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the policies of non-discrimination.
 2. The Contractor and his Subcontractors shall, in all solicitations for advertisements for employees placed by them or on their behalf, state that all qualified applicants will receive consideration for employment without regard to race, religion, color, sex or national origin.
- H. Add Paragraph 13.9 as follows:

ARTICLE 14 TERMINATION OF THE CONTRACT

- A. In Subparagraph 14.1.2 in the first fine delete the word "above, and after the word "exists" add the following:
- "it as stated in Subparagraph 14.1.1,".
- In Subparagraph 14.1.2 in the fourth line after the word "executed" add the following:
"termination and cancellation costs, "

- B. In Subparagraph 14.2.2 in the first sentence delete the words "above" and "upon certification by the Architect that sufficient cause exists to justify such action".

In Subparagraph 14-2.2 in the first line after the word "exist" add the following:

"as stated in Subparagraph 14.2. 1, ".

- C. Delete Paragraph 14.3 and substitute the following:

14.3 TERMINATION BY THE OWNER FOR CONVENIENCE

14.3.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

14.3.2 Upon receipt of written notice from the owner of such termination for the Owner's convenience, the Contractor shall:

1. Cease operations as directed by the Owner in such notice;
2. Take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
3. Except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

14.3.3 In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment from the Owner on the same basis provided in Subparagraph 14.1.2.

Add ARTICLE 15 - OTHER CONDITIONS OF THE CONTRACT

15.1 Typographical errors in application for Payments or Change Orders shall not be grounds for additional payments.

15.2 If Section 952 of the Omnibus Reconciliation Act of 1980 is found to apply to this contractual relationship, it is agreed that the following Access to Records provision applies.

1. Until the expiration of four years after the furnishing of the services provided under this Contract, the Contractor will make available to the Secretary, U. S. Comptroller General, and their representatives, this Contract and all books, and documents and records necessary to certify the nature and extent of the costs for those services. If the Contractor carries out the duties of the Contract through a subcontract worth \$10,000.00 or more over a twelve month period with a related organization the subperiod will also contain the access clause to permit access by the Secretary, Comptroller-General, and their representative to the related organization's books and records.

15.3 It is the intent of the parties hereby to comply with the provisions of Section 1861(v) (1) (1) of the Social Security Act.

END OF SECTION

SECTION 00834

CHANGE ORDER

ORDER NO:

DATE OF ISSUANCE:

PROJECT: Terminal Passenger Circulation Improvements

OWNER: City of Portland

OWNER'S PROJECT NO:

ARCHITECT: DOMENECH, HICKS, & KROCKMALNIC

ARCHITECT'S PROJECT NO: _____

CONTRACTOR:

CONTRACT FOR:

ORIGINAL PRICE: \$

The following changes are hereby made to the Contract Documents:

DESCRIPTION:

JUSTIFICATION:

This change results in an (increase) (decrease) (unchanged) Contract Price of.....\$ _____

Current Contract Price adjusted by previous Change Orders\$ _____

The new Contract Price including this Change Order will be
.....\$ _____

Change to Contract Time: The Contract Time will be (increased) (decreased) (unchanged) by _____

calendar days.

The date of completion of all work will be _____(date).

Approvals Required:

Requested by: _____
(OWNER, ARCHITECT, CONTRACTOR)

Recommended by: _____
(ARCHITECT'S Signature)

Ordered by: _____
(OWNER/Authorized Representative's Signature)

Accepted by: _____
(CONTRACTOR'S Signature)

END OF SECTION

SECTION 00835

CERTIFICATE OF SUBSTANTIAL COMPLETION OF WORK

OWNER'S Project No. ___ ARCHITECT'S Project No. ____

Project: Construction of Terminal Passenger Circulation Improvements

CONTRACTOR _____ Contract Date

Contract for Construction of Terminal Passenger Circulation Improvements

=====
Project or Specified Part Shall Include

DEFINITION OF SUBSTANTIAL COMPLETION

The date of Substantial Completion of a Project or specified part of a Project is the date when the construction is sufficiently completed, in accordance with the Contract Documents, so that the Project or specified part of the Project can be utilized for the purpose for which it was intended.

To: City of Portland, Maine

And To

(CONTRACTOR)

Date of Substantial Completion

The Work performed under this contract has been inspected by authorized representatives of the OWNER, CONTRACTOR and ARCHITECT, and the Project is hereby declared to be substantially completed on the above date.

A tentative list of items to be completed or corrected is appended hereto. The failure to include an item on it does not alter the responsibility of the CONTRACTOR to complete all the Work in accordance with the Contract Documents.

City of Portland _____
OWNER

AUTHORIZED REPRESENTATIVE DATE

DOMENECH, HICKS & KROCKMALNIC
ARCHITECT

AUTHORIZED REPRESENTATIVE DATE

=====

The CONTRACTOR accepts the above Certificate of Substantial Completion and agrees to complete and correct the items on the tentative list.

CONTRACTOR

AUTHORIZED REPRESENTATIVE DATE

=====

EXCEPTIONS AS TO GUARANTEES AND WARRANTIES:

ATTACHMENTS:

END OF SECTION

SECTION 00836

CERTIFICATE OF FINAL COMPLETION OF WORK

CONTRACT NO. _____ AGREEMENT DATE _____

CONTRACT DESCRIPTION: Terminal Passenger Circulation Improvements

FINAL COMPLETION DATE PER AGREEMENT AND CHANGE ORDERS _____

FINAL CERTIFICATION OF CONTRACTOR

I hereby certify that the Work as identified in the Final Payment Request for construction Contract Work dated _____, represents full compensation for the actual value of Work completed. All Work completed conforms to the terms of the Agreement and authorized changes.

Date

CONTRACTOR

Signature

Title

FINAL CERTIFICATION OF ARCHITECT

I have reviewed the CONTRACTOR'S Final Payment Request dated _____ and hereby certify that to the best of my knowledge, the cost of the Work identified on the Final Estimate represents full compensation for the actual value of Work completed and that the Work has been completed in accordance with the terms of the Agreement and authorized changes.

Date

DOMENECH, HICKS AND KROCKMALNIC
ARCHITECT

Signature

Title

FINAL ACCEPTANCE OF OWNER

I, as representative of the OWNER, accept the above Final Certifications and authorize Final Payment in the amount of \$_____. The guaranty for all Work completed subsequent to the date of Substantial Completion, expires one (1) year from the date of this Final Acceptance.

City of Portland

Date

OWNER

Authorized Representative

Signature

END OF SECTION

SECTION 00837

WAIVER OF LIEN
MATERIAL OR LABOR

State of MAINE

County of CUMBERLAND

To all whom it may concern:

Whereas _____ the undersigned has been employed to furnish for the project known as **Terminal Passenger Circulation Improvements, Portland International Jetport**

City of Portland County of Cumberland
State of Maine

Know then for know ye that _____ the undersigned for _____ and in consideration of the sum of \$ _____ and other good and valuable consideration the receipt whereof is hereby acknowledged, do hereby waive and release from any and all, or claim the right to lien on said above described project under the status of the State of _____.

Relating to Mechanic's Lien on account of Labor or Material or both furnished or which may be furnished by the undersigned to or on account of said _____ for said building and premise.

Given under _____ my hand and seal this _____ day of _____, 20____.

Notarized: _____ this _____ day of _____, 2007

My commission expires _____ .

END OF SECTION

SECTION 00840

SPECIAL CONDITIONS FOR GENERAL CONTRACT

PART 1 GENERAL

1. REQUIREMENTS INCLUDED

1.01 General project:

The intent of this project is to improve public circulation conditions inside the Portland International Jetport Terminal.

2. Construction Schedule:

2.01 Construction shall be performed in accordance with the Contract Drawings and Specifications, with modifications as approved by the Architect as necessary throughout the progress of the work. The construction schedule shall be designed to provide the minimum interference with airport operations and to extend from 7.30 PM until 5.00 AM.

2.02 It is the sole responsibility of the Contractor to complete each work area within the allotted time frame as designated on the work schedules. The Contractor shall submit his/her work schedule for the upcoming week to the Resident Engineer 48 hours prior to the weekly meetings. Failure to submit this work schedule shall result in the cancellation of the weekly meeting and no work approved for the following week. No time extensions or additional costs will be considered by the Owner when this type of delay occurs.

2.03 The Contractor is required to provide sufficient labor, materials, and equipment to complete the project within the allotted time frame as designated on the work schedule.

3. Restriction on the Use of Grounds:

3.01 The Contractor shall confine its operations to the actual work sites, access routes and storage areas designated by the City's Facility Department or by its designee.

3.02 The Contractor shall have sole responsibility for providing all materials, equipment, or tools and any storage required will be at the Contractor's own risk. The Owner will not assume responsibility for any loss of materials, equipment, or tools stored on its property.

3.03 All roads and haul routes used by the Contractor shall be maintained and kept clean during the course of the work. Any damage to existing surfaces, caused by the Contractor's operations shall be repaired and the areas involved restored to their previous condition, without cost to the Owner. Construction hours

4. Vehicle Traffic Control and Access:

4.01 All vehicles, storage of materials and debris, and the operations of the Contractor in connection with the activities under this Section shall be confined to limits of the contract as shown on the drawings or as otherwise provided herein.

4.02 No arrangements for parking of personal vehicles will be made and employees are encouraged to take public transportation. Arrangements for temporary storage or parking of Contractor's trucks and other vehicles must be made in advance through the Architect.

- 4.03 Contractor shall arrange, provide, and maintain all safety barricades, temporary work enclosures and posting of safety/hazard signs in the work areas.
- 4.04 The work shall be conducted in a manner that will not interrupt or interfere with daily operations of the Portland International Jetport, the Jetport's lease holders, or with the orderly and safe passage of the general public.

5. Safety Summary and Airport Operations

- 5.01 The Contractor shall assume full responsibility and liability for compliance with all applicable standards and regulations pertaining to accident prevention, life, health and safety of all persons on the construction site, as well as the preventing damage to materials, supplies, and equipment. The Contractor will hold the City harmless for any action, error, or omission on the Contractor's part, by the Contractor's employees or the Contractor's subcontractors that result in illness, injury or death.

The Contractor shall coordinate activities so as to ensure and identify specific operations that must be performed in accordance with special safety requirements and standards. Specific operations include, but are not limited to, the following:

Erection, inspection and maintenance of hand rails, barricades, nets, scaffolds, shoring, and warning signs.

Training and use of signalmen.

Certification of machine and equipment operators.

Ensure adequate sanitary facilities. Determine employee's physical qualification to assume their assigned duties.

- 5.02 The Contractors responsibilities:

The Contractor is responsible for the safety of all persons exposed to the site operation.

The Contractor shall provide first aid materials and resources, and shall post emergency phone numbers and procedures for the treatment of personnel in a conspicuous place. In addition, the Contractor shall clearly identify and maintain fire lanes and emergency exit routes. Further, the Contractor shall provide fire prevention plans and equipment along with the training of personnel in the use of said plans and equipment.

The Contractor shall provide personal protective equipment such as hardhats, eye protection, ear protection, etc., to personnel as required.

The Contractor shall also be responsible for general housekeeping and associated removal of trash that could possibly contribute to a safety hazard.

The Contractor shall provide proof of manufacturer's warranties and/or inspection for all equipment to be utilized on the job site prior to its being made operational.

- 5.03 Accident investigation and reporting:

The Contractor shall report all accidents resulting in disabling or fatal injuries along with those involving damage to property, materials, supplies and/or equipment. A standard

form will be furnished to the Contractor along with instructions on how to prepare and submit a report for each reportable accident occurring on the project site.

- 5.04 Normal airport operations will be conducted on the airfield during construction and the work shall be performed in such a manner as not to interfere with the necessary operation of the airport. The Contractor shall take all precautions necessary to ensure the safety of operating aircraft as well as his/her own equipment and personnel.

6. Airport Security Requirements

- 6.01 The City of Portland is the operator of the Portland International Jetport. As the operator, the City is responsible for ensuring compliance all of the security requirements as described in 49 Code of Federal Regulations (CFR) Part 1542. Security at the Portland International Jetport is necessary due to the sensitive and critical nature of civil aviation operations. The Contractor shall be required to properly train and badge its employees in accordance with the City of Portland's Security Training Curriculum.

- 6.02 The Contractor shall provide qualified security personnel at all airfield gates utilized during the construction for the duration of the work. Security personnel will restrict access to the AOA as required under 49 CFR Part 1542. Security personnel shall be trained and badged as noted in paragraph 6.1.

- 6.03 The Contractor shall submit a detailed safety and security plan covering all construction activities in or adjacent to AOA's for review and approval by Jetport Operations prior to the start of construction.

- 6.04 All Contractor vehicles and equipment shall be equipped with orange and white checkered flags and/or roof mounted amber colored strobe lights.

7. Hoisting Equipment and Machinery

- 7.01 All hoisting equipment and machinery required for the proper and expeditious execution and progress of the work shall be furnished, installed, operated and maintained in a safe condition by the Contractor and each Subcontractor for its own use. Written notification of deliveries must be provided to the Architect 72 hours in advance by the Contractor and each Subcontractor. Written approval must be obtained from the Architect at least 72 hours prior to delivery of cranes or hoists to the project.

- 7.02 Before any crane, pile drivers, or similar equipment can be utilized on the AOA or in landside areas affecting aircraft safety as defined by FAA regulations or the Jetport's Aviation Operations, the Contractor shall get approval from the Jetport Operations Department. The Contractor shall provide the Jetport with proposed heights/operating areas, and operating schedules of all cranes, pile drivers, and similar equipment. All tall equipment shall either have booms lowered or shall be moved out of areas affecting aircraft operations when not in operation or when directed for safety reasons. Such equipment shall, at all times, be provided with flags (international orange and white checkered) and obstruction lights at their tallest points and subject to approval by the FAA and Jetport Operations prior to erection.

- 7.03 The contractor shall obey all instruction as to the operation and routes to be taken by equipment traveling on Jetport property. Any signs, lights, signals, markings, traffic control and other devices which may be required by the Jetport shall be provided and maintained by the Contractor during the course of the work, subject to the approval of the Architect. No aircraft pavement or navigation aid currently lighted shall be left unlighted overnight unless closed to all airport operations. The Contractor shall check all temporary lighting to assure its operating condition before leaving the job each day.

SECTION 01010

SUMMARY OF WORK

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Contract Conditions, and other Technical Specifications Sections apply to work of this Section insofar as applicable.

1.02 PROJECT IDENTIFICATION AND REQUIREMENTS

- A. Project Identification: The name of the Project on Contract Documents is Terminal Passenger Circulation Improvements, Portland International Jetport, Portland, Maine.
- B. Scope: The work of this CONTRACT, for the Terminal Passenger Circulation Improvements includes, but is not limited to, the construction of:
1. New handicap ramps at Continental and JetBlue entrances
 2. Removal of interior partitions at Continental entrance in location of old car rental counter
 3. Raising of a part of the first level depressed floor by four feet
 4. Demolition of the existing second level snack bar and a ceiling reconstruction in this area
 5. Construction of new meeter/greeter area in first level location of raised floor
 6. Provision of certain utilities for new snack bar/restaurant on lower level.
- C. Permits: The Contractor shall obtain and pay for all utility permits and fees, and City Road opening Permits. Fees from Central Maine Power and Verizon shall be paid directly by the Owner.

1.03 WORK UNDER OTHER CONTRACTS

- A. Briefly without limitation, the work of this Contract includes coordination with other contractors performing the following work under separate contracts with the Owner:
- B. Work of Other Contracts:
1. The City of Portland may have other Contractors working on various projects at the Portland International Jetport. The Contractor shall fully coordinate his work with that of other Contractors.

1.04 CONTRACT AND CONTRACT PROVISIONS

- A. Contract Coordination: Briefly without limitation, the work of this Contract includes coordination with other contractors performing work under separate contracts with the Owner.

1.05 CONTRACTOR'S USE OF PREMISES

- A. Contractor shall have complete and exclusive use of designated areas of the premises for execution of the Work. Contractor's use of premises is limited only to the Owner's right to perform work with his own forces. Contractor lay down areas shall be coordinated with the Facilities Department at the Portland International Jetport
- B. Contractor's hours of construction in the open/public areas shall be 7:30 PM to 5:00 AM with the intent not to interfere with airport operations at peak morning and evening periods. Coordinate use of premises under direction of Architect and Owner.
- C. Assume full responsibility for the protection and safekeeping of Products under this Contract, stored on the site.
- D. Move any stored Products, under Contractor's control, which interfere with operations of the building owner, building manager, Owner, or separate contractor.
- E. Obtain and pay for the use of additional storage or work areas needed for operations.
- F. Coordinate construction areas with all affected utility companies, rental car agencies, Lease holders, and airfield operations over the life of the contract.

1.06 OWNER'S OCCUPANCY

- A. Partial Owner Occupancy: The Owner reserves the right to place and install equipment in completed areas of the building prior to Substantial Completion, provided that such occupancy does not interfere with completion of the Work.
 - 1. Execute Certificate of Substantial Completion for each specific Portion of the Work prior to Owner occupancy.

1.07 OWNER-FURNISHED PRODUCTS

- A. Products furnished and paid for by the Owner, described in Specification Sections, as determined at a later date.
- B. Owner's Responsibilities:
 - 1. Arrange for testing by an independent materials firm.
 - 2. Inspect deliveries jointly with Contractor.
 - 3. Submit claims for transportation damage.
- C. Contractor's Responsibilities:

1. Designate delivery date for each Product in the Construction Schedule.
2. Review shop drawings, product data, and samples.
3. Receive and unload Products at the site.
4. Promptly inspect products jointly with Owner, record shortages, damaged, or defective items.
5. Handle Products at the site, including uncrating and storage.
6. Protect Products from exposure to elements, from damage.
7. Assemble, install, connect, adjust, and finish Products, as stipulated in the respective Section of Specifications.
8. Repair or replace items damaged by Contractor.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

SECTION 01025

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.01 PROCEDURES

- A. The CONTRACTOR shall be paid on a lump sum basis and in accordance with the progress schedule and schedule of values on the basis of actual work accepted until the work item is completed. Upon completion of the item, one hundred percent (100%) of the lump sum price may be paid, less retained amounts.
- B. All units of measurement shall be standard United States convention as applied to the individual items of work as specified and as interpreted by the ARCHITECT.
- C. At the end of each day's work or at other frequencies determined by all parties, the CONTRACTOR'S superintendent or other authorized representative of the CONTRACTOR may meet with the Resident Project Representative and determine the quantities of unit price and/or lump sum price work accomplished and/or completed during the work day.
- D. Once, and only once, each month the CONTRACTOR will prepare and sign an Application for Payment, and submit the original and seven (7) copies for review and signature of the Resident Project Representative and the ARCHITECT'S Construction Project Manager. These completed forms will provide the basis upon which payment will be made to the CONTRACTOR.

1.02 SCOPE OF PAYMENT

Payments to the CONTRACTOR will be made for the actual lump sum items performed and accepted in accordance with the Contract Documents.

- B. No payment of any Application for Payment or of any retained percentage shall relieve the CONTRACTOR of the obligation to repair or replace any defective parts of the construction or to be responsible for all damage due to such defects during the construction period or the one-year correction period.

1.03 PARTIAL PAYMENTS

- A. Partial payments shall be made monthly as the work progresses. All partial invoices and payments shall be subject to correction in the final Application for Payment.

1.04 PAYMENT FOR MATERIAL DELIVERED

- A. When requested by the CONTRACTOR, and at the discretion of the OWNER, payment may be made for all or part of the value of acceptable, non-perishable materials and equipment which are to be incorporated into the Work, which have not been used and which have been delivered to the construction site, and placed in a storage area acceptable to the OWNER. The Application for Payment shall be accompanied by such data, satisfactory to the OWNER, that will establish the OWNER'S title to the material and equipment and protect the OWNER'S interest therein, including insurance. Each subsequent Application for Payment shall include an affidavit of the CONTRACTOR stating that all previous progress payments received on account of the Work have been applied to

discharge in full, all of the CONTRACTOR'S obligations reflected in prior Applications for Payment. The OWNER shall have the right to deduct from the next progress payment an amount equal to payment for said material and/or equipment if reasonable and adequate proof is not submitted.

- B. Materials and equipment, when so paid for by the OWNER, shall become the property of the OWNER and in the event of default on the part of the CONTRACTOR, the OWNER may use, or cause to be used, these materials and equipment in the construction of the Work. The CONTRACTOR shall be responsible for any damage to, or loss of, these materials and equipment. The amount paid by the OWNER shall reduce the estimated amounts due the CONTRACTOR as the material is incorporated into the Work.
- C. No partial payment shall be made for fuels, supplies, lumber, false work, or other expendable or temporary materials, or on temporary structures of any kind which are not a permanent part of the Contract.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.01 GENERAL

- A. The items of work required by the General Conditions – Section 00720, Special Conditions – Section 00840, and Division 1 – General Requirements shall not be measured and paid separately, except as expressly indicated therein, but shall be included in the lump sum prices bid for each item.
- B. The payment for various lump sum items listed below shall include all materials, labor, tools, equipment, and incidental work necessary to complete the item in accordance with the plans and specifications whether or not the particular work is mentioned in the following paragraphs.

3.02 MEASUREMENT AND PAYMENT

- A. Measurement shall be on a lump sum basis for the improvements of the Passenger Circulation in the Terminal building and other work required for this project.
- B. Payment shall be on a lump sum basis, complete for all labors, materials, tools, and equipment necessary for the successful completion of the Project. Payment shall include all work shown on the drawings that is necessary for the building and associated structures to become fully operational.

END OF SECTION

SECTION 01027

APPLICATION FOR PAYMENT

PART 1 GENERAL

1.01 SUMMARY

- A. This Section specifies administrative and procedural requirements for submitting the following:
 - 1. Schedule of values.
 - 2. Applications for Payment.

1.02 RELATED REQUIREMENTS

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
 - 1. Document 00531, AGREEMENT; Agreement between Owner and Contractor.
 - 2. Document 00720, GENERAL CONDITIONS and Document 00810, MODIFICATIONS TO GENERAL CONDITIONS; Progress Payments, Retainages, and Final Payment.
 - 3. Section 01700, CONTRACT CLOSEOUT; Final payment.

1.03 SCHEDULE OF VALUES

- A. Timing: Submit Schedule of Values allocated to the various portions of the Work within ten days after award of Contract.
- B. When requested by Architect, submit substantiating data supporting the values submitted.
- C. Intent: Unless objections are stated by Architect, the Schedule of Values will be used as the basis for the Contractor's Applications for Payment.
- D. Form and Content of Schedule of Values: Type schedule on 8-1/2 in. x 11 in. white paper. Contractor's standard forms and automated printout will be considered for approval by Architect upon Contractor's request. Identify schedule with title of Project and location, Architect's project number, name and address of Architect, name and address of Contractor, Contract designation, and date of submission.
 - 1. Line Item Categories: Follow the Table of Contents of Project Manual for major category items.
 - 2. List installed value of component parts of the Work in sufficient detail to serve as a basis for computing values for progress payments during construction.
- E. Sub-Values: For each major line item, list sub-values of major products or operations under the item.
- F. Overhead and Profit: For the various portions of the Work, include a directly proportional amount of the Contractor's overhead and profit.
- G. Stored Material: Payments for stored material will be at the sole discretion of the Owner. If required, Contractor will be responsible for all costs of travel and lodging for Architect,

Engineers, and Owner to offsite storage locations. For items on which progress payments will be requested for stored materials, break down the value into the following sub-values:

1. The cost of material, delivered and unloaded at Project site, with taxes paid.
2. Installation cost including overhead and profit.
3. Insurance certificate, transfer of title, and photos.

H. The sum of all values listed in the schedule shall equal the total Contract Sum.

1.04 APPLICATION FOR PAYMENT

A. Format: Submit itemized applications typed on AIA Document G702, Application and Certificate for Payment, and continuation sheets AIA Document G703.

B. Provide itemized data on continuation sheet. Format, schedules, line items and values shall match those of the Schedule of Values accepted by Architect.

C. Initial Application for Payment: Administrative actions and submittals that must precede submittal of initial application for payment, include the following:

1. List of subcontractors, suppliers, and fabricators.
2. Schedule of values.
3. Progress schedule.
4. Submittal schedule.
5. Copies of permits and other communications from authorities.
6. Performance bond and payment bond.
7. Unit price schedule (if required).

D. Preparation of Application for Payment: Execute each Application for Payment consistent with previous applications and payments certified by Architect and paid for by Owner. Review application with Architect/Engineer, on site, prior to submittal. Provide partial lien waivers for Work in progress, and full lien waivers for completed Work; for all subcontractors and suppliers. Fill in required information, including Change Orders information executed prior to date of submittal of this application. Fill in summary of dollar values to agree with respective totals indicated on continuation sheets. Execute certification with signature of responsible officer of Contractor. Fill out continuation sheets as follows:

1. Fill in total list of scheduled component items of Work, with item number and scheduled dollar value for each item.
2. Fill in dollar value in each column for each scheduled line item when work has been performed or products stored. Round off values to nearest dollar, or as specified for Schedule of Values.
3. List each Change Order executed prior to date of submission at end of continuation sheets. List by Change Order Number, and description, as if an original item of work.

E. Substantiating Data for Progress Payments: When Owner or Architect requires substantiating data, submit suitable information with cover letter, identifying Project name, Architect's Project number, application number and date, and detailed list of enclosures. Submit one copy of data and cover letter for each copy of application.

1. For stored products, identify Item number and identification as shown on application along with description of specific material.

- F. Application for Payment at Substantial Completion: Following issuance of the Certificate of Substantial Completion, submit an Application for Payment. Show on this Application for Payment any Certificates of Partial Substantial Completion issued previously for Owner Occupancy of portions of the Work. Administrative actions and submittals that must precede submittal of this Application for Payment, include the following:
1. Occupancy permits.
 2. Warranties.
 3. Test/adjust/balance records.
 4. Maintenance and operation instructions.
 5. Meter readings.
 6. Final cleaning.
 7. Application for reduction of retainage.
 8. Consent of surety.
 9. Notification of shifting insurance coverages.
 10. Final progress photographs.
 11. List of incomplete Work, recognized as exceptions to Architect's Certificate of Substantial Completion.
- G. Preparation of Final Application for Payment: Fill in Application form as specified for progress payments. Use continuation sheet for presenting the final statement of accounting as specified in Section 01700, CONTRACT CLOSEOUT. Administrative actions and submittals that must precede submittal of final Application for Payment, include the following:
1. Completion of Project closeout requirements.
 2. Completion of incomplete Work.
 3. Assurances that unsettled claims will be settled.
 4. Transmittal of Project record documents to Owner.
 5. Proof that taxes, fees, and similar obligations have been paid.
 6. Removal of temporary facilities and services.
 7. Removal of surplus materials, rubbish, and similar elements.
 8. Change lock cylinders or cores.
- H. Submittal Procedure: Submit Monthly Application for Payment to Architect at intervals stipulated in the Agreement, and as follows:
1. Number of Copies: Seven (7) copies of each Application.
 2. When Architect finds Application properly completed and correct, he will transmit Certificate for Payment to Owner.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01028

MODIFICATION PROCEDURES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Contract Conditions, and other Technical Specifications Sections apply to work of this Section insofar as applicable.

1.02 WORK INCLUDED

- A. This Section specifies administrative and procedural requirements required for handling modifications to the Contract Documents, including, but not limited to:
 - 1. Preliminary procedures.
 - 2. Documentation of proposals and claims.
 - 3. Architect's Supplemental Instructions.
 - 4. Proposal Request (PR).
 - 5. Construction Change Directive (CCD).
 - 6. Change Order (CO).

1.03 RELATED REQUIREMENTS

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
 - 1. Section 01300, SUBMITTALS.
 - 2. Section 01600, MATERIAL AND EQUIPMENT; Substitutions.
 - 3. Section 01700, CONTRACT CLOSEOUT.

1.04 DEFINITIONS

- A. Change Order (CO):
 - 1. Definition: See General Conditions.
 - 2. Form: Unless otherwise indicated, form shall be AIA Document G701, Change Order.
- B. Construction Change Directive (CCD):
 - 1. Definition: A written order to the Contractor, signed by Architect which amends the Contract Documents as described, and authorizes Contractor to proceed with a

-
- change which affects the Contract Sum or the Contract Time, for inclusion in a subsequent Change Order.
 - 2. Form: Unless otherwise indicated, form shall be AIA Document G714, Construction Change Directive.
- C. Architect's Supplemental Instructions:
- 1. Definition: A written order, instructions, or interpretations, signed by Architect making minor changes in the Work not involving a change in Contract Sum or Contract Time.
 - 2. Form: As stipulated by the Architect.
- D. Proposal Request (PR):
- 1. Definition: A request to the Contractor, signed by the Architect, for submission of an itemized quotation for changes in the Contract Sum or Contract Time. This is not a Change Order or a direction to proceed with the Work.
 - 2. Form: Unless otherwise indicated, form shall be AIA Document G709, Proposal Request.

1.05 PRELIMINARY PROCEDURES

- A. Architect may initiate change by submitting a Proposal Request (PR) to Contractor. Request will include:
- 1. Detailed description of the Change, Products, and location of the change in the Project.
 - 2. Supplementary or revised Drawings and Specifications.
 - 3. The projected time span for making the change, and a specific statement as to whether overtime work is, or is not, authorized.
 - 4. A specific period of time during which the requested price will be considered valid.
 - 5. Such request is for information only, and is not an instruction to execute the changes, nor to stop Work in progress.
- B. Contractor may initiate changes by submitting a written notice to Architect, containing:
- 1. Description of the proposed changes.
 - 2. Statement of the reason for making the changes.
 - 3. State of the effect on the Contract Sum and the Contract Time.
 - 4. Statement of the effect on the work of separate contractors.
 - 5. Documentation supporting any change in Contract Sum or Contract Time, as appropriate.

1.06 CONSTRUCTION CHANGE AUTHORIZATION

-
- A. In lieu of Proposal Request, Architect may issue a Construction Change Directive for Contractor to proceed with a change for subsequent inclusion in a Change Order.
 - B. Directive will describe change in the Work, both additions and deletions, with attachments of revised Contract Documents to define details of the change, and will designate the method of determining any change in the Contract Sum and any change in Contract Time.
 - C. Architect will sign and date the Construction Change Directive and send it to the Owner for authorization for the Contractor to proceed with the changes.
 - D. Once authorized by the Owner, the Architect will send the Construction Change Directive to the Contractor. Contractor shall sign and date the Construction Change Directive to indicate agreement with the terms therein.

1.07 DOCUMENTATION OF PROPOSALS AND CLAIMS

- A. Support each quotation for a lump-sum proposal, and for each unit price which has not previously been established, with sufficient substantiating data to allow Architect to evaluate the quotation.
- B. On request provide additional data to support time and cost computations including, but not limited to:
 - 1. Labor required.
 - 2. Equipment required.
 - 3. Products required.
 - a. Recommended source of purchase and unit cost.
 - b. Quantities required.
 - 4. Taxes, insurance, and bonds.
 - 5. Credit for work deleted from Contract, similarly documented.
 - 6. Overhead and profit.
 - 7. Justification for any change in Contract Time.
- C. Support each claim for additional costs, and for work done on a time-and-material/force account basis, with documentation as required for a lump-sum proposal, plus additional information:
 - 1. Name of the Owner's authorized agent who ordered the work, and date of the order.
 - 2. Dates and times work was performed, and by whom.
 - 3. Time record, summary of hours worked, and hourly rates paid.
 - 4. Receipts and invoices for:
 - a. Equipment used, listing dates and times of use.
 - b. Products used, listing quantities.
 - c. Subcontracts.

- D. Document requests for substitutions for Products as specified in Section 01600, MATERIAL AND EQUIPMENT.

1.08 PREPARATION OF CHANGE ORDERS

- A. Unless otherwise indicated, Architect will prepare each Change Order.
- B. Form: Unless otherwise indicated, Change Order form shall be AIA Document G701.
- C. Change Order will describe changes in the Work, both additions and deletions, with attachments of revised Contract Documents to define details of the change.

1.09 LUMP-SUM/FIXED PRICE CHANGE ORDER

- A. Content of the Change Orders will be based on either:
 - 1. Architect's Proposal Request and Contractor's responsive Proposal as mutually agreed between Owner and Contractor.
 - 2. Contractor's Proposal for a change, as approved by Architect.
- B. Owner and Architect will sign and date the Change Order as authorization for the Contractor to proceed with the changes.
- C. Contractor shall sign and date the Change Order to indicate agreement with the terms therein.

1.10 TIME AND MATERIAL/FORCE ACCOUNT CHANGE ORDER/CONSTRUCTION CHANGE DIRECTIVE

- A. Architect will issue a Construction Change Directive directing Contractor to proceed with the changes.
- B. At completion of the change, Contractor shall submit itemized accounting and supporting data as provided in the Article "Documentation of Proposals and Claims" of this Section.
- C. Architect will determine the allowable cost of such work, as provided in the AGREEMENT.
- D. Architect will sign and date the Change Order to establish the change in Contract Sum and in Contract Time.
- E. Contractor will sign and date the Change Order to indicate their agreement therewith.

1.11 CORRELATION WITH CONTRACTOR'S SUBMITTALS

- A. Periodically revise Schedule of Values and Request for Payment forms to record each change as a separate item of Work, and to record the adjusted Contract Sum.
- B. Periodically revise the Construction Progress Schedule to reflect each change in Contract Time.
 - 1. Revise subschedules to show changes for other items of work affected by the changes.
- C. Upon completion of work under a Change Order, enter pertinent changes in Record Documents.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01030

ALTERNATES

PART 1 GENERAL

1.01 SUMMARY

- A. For each of the alternates Scheduled at the end of this Section, state the amount in the proposal to be added to or deducted from the Contract Sum for the work.

1.02 ALTERNATES

- A. Definition: "Alternates" are alternate products, materials, equipment, systems, methods, units of work or major elements of the construction, which may, at the Owner's option and under the terms established by the Contract or Agreement, be selected for the work in lieu of the corresponding requirements of the Contract Documents. Selection may occur prior to the Contract Date, or may, by the Agreement, be deferred for possible selection at a subsequent date.
- B. Alternate Requirements: A Schedule of Alternates is included at the end of this Section. Each alternate is defined using abbreviated language, recognizing that the Contract Documents define the requirements. Coordinate related work to ensure that work affected by each alternate is complete and properly interfaced with work of each selected alternate.
- C. Provide written proposals for each alternate on the Bid Form for Owner's consideration. Each proposal amount shall include the entire cost of the alternate portion of the work including overhead, profit, and other costs including cost of interfacing and coordinating the alternate with related and adjacent work.
- D. Selection of Alternates: Selection of alternates to be included in the work will be by the Owner.
- E. Notification: Immediately following award of Contract, prepare and distribute to each entity a notification of status of each alternate. Indicate which alternates have been accepted, rejected, or deferred for consideration at a later date. Include full description of negotiated modifications to alternates, if any.

1.03 DESCRIPTION OF ALTERNATES

- A. Add Alternate No. 1: As directed by the Architect.

PART 2 PRODUCTS - Not Used.

PART 3 EXECUTION - Not Used.

END OF SECTION

SECTION 01040

COORDINATION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Contract Conditions, and other Technical Specifications Sections apply to work of this Section insofar as applicable.

1.02 WORK INCLUDED

- A. This Section specifies supervisory and administrative requirements for coordination of Work, including, but not limited to:
 - 1. Coordination of work of employees and subcontractors.
 - 2. Coordination Drawings.
 - 3. Expedition of Work to assure compliance with schedules.
 - 4. Coordination of Work with that of other contractors and work by Owner.
 - 5. Compliance with orders and instructions of Architect or Owner.
 - 6. Coordination of work with affected utility companies.
 - 7. Coordination with airport operations.
 - 8. Coordination with Avis Rental Car and other rental car agencies.
 - 9. Coordination of work with airport Lease holders and their operations.

1.03 RELATED REQUIREMENTS

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
 - 1. Section 00840, SPECIAL CONDITIONS.
 - 2. Section 01045, CUTTING AND PATCHING.
 - 3. Section 01200, PROJECT MEETINGS.
 - 4. Section 01300, SUBMITTALS.
 - 5. Section 01500, CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS.
 - 6. Section 01700, CONTRACT CLOSEOUT.

1.04 COORDINATION BY CONTRACTOR

- A. Coordinate the Work of the Contract, including utility and electrical work, and other subcontractors. Anticipate areas where the installation of utilities and electrical work will be restricted, congested, or difficult. Consult various affected subcontractors, utility companies, and end users.

- B. Coordinate all Airfield Operation Area work with the Jetport Operations Department and those affected by the work.
- C. Coordinate modifications to the Control Tower fence and access gate with Tower personnel.

1.05 COORDINATION DRAWINGS

- A. General: Submit Coordination Drawings for areas where close and careful coordination of trades is required. The Contractor shall be fully responsible for coordinating trades, coordinating construction sequence and schedules, and coordinating actual installed location and interface of work.
- B. Timing: Prior to fabricating materials or beginning work, supervise and direct the creation of one complete set of Coordination Drawings showing complete coordination and integration of work.
- C. Intent: Coordination Drawings are for the Contractor's use during construction and are not to be construed as replacing Shop Drawings or Record Drawings. Architect's review of submitted Coordination Drawings shall not relieve Contractor from his overall responsibility for the coordination of work of the Contract.
- D. Contractor Review and Submission: The Contractor shall carefully review, modify and approve Coordination Drawings in cooperation with subcontractors to assure conflicts are resolved before work in field is begun and to ensure location of work exposed to view is as indicated or as approved by Architect. The Contractor shall stamp, sign, and submit Coordination Drawing originals to Architect for review and approval following specified procedures and policies for "Submittals". Do not commence work in these areas until Coordination Drawings have been received and reviewed by Architect.
- E. Distribution: When Coordination Drawings have been completed and approved by all parties, make prints and copies and distribute to Owner, subcontractors, suppliers, fabricators, and other parties requiring information from Coordination Drawings for proper coordination and performance of Work. Print copies of Coordination Drawings from approved reproductions, only.

1.06 EXISTING UTILITIES

- A. The Contractor shall notify public and private utility companies as required by law in advance of construction so that existing utilities may be accurately located and identified by the appropriate agency or utility. Comply with the requirements of the "Dig Safe" Maine.
- B. Give advance notice to public and private utility companies as required by law, and provide proper disposition, subject to Architect approval of existing pipe lines, conduits, sewers, drains, poles, wiring, and other utilities that interfere with work, whether or not they are specifically indicated on Drawings. The Contractor shall

immediately notify Architect and appropriate authorities when coming across an unknown utility line, and await decision as to how to dispose of same. When an existing utility line must be cut and plugged or capped, moved, or relocated, or has become damaged, the Contractor shall notify Architect and utility company involved, and assure protection, support, or moving of utilities to adjust them to new work. The Contractor shall be responsible for damage caused to existing, active utilities under work of this Contract, whether or not such utilities are indicated on Drawings, including resultant damages or injuries to persons or properties.

- C. Provide temporary utility connections as indicated in the project construction drawings.
- D. Phasing of the utility relocations is generally shown in the construction drawings. A detailed phasing plan shall be submitted by the contractor for review and approval prior to construction. The phasing plan shall detail the progress of the work, affected utilities, interruptions to utility service, and effects to traffic and other airport operations.
- E. Provide stub connections for tie-ins to be completed under other contracts. Provide swing ties to locate stub connections.
- F. The utility lines and other underground structures shown on the Contract Drawings have been compiled from field surveys and record, but the accuracy of the locations shown and the completeness of information is not guaranteed.
- G. The Contractor shall check and verify the location of all existing utilities both underground and overhead before proceeding to begin the work or to order materials. Excavation shall be in accordance with all statutes, ordinances, rules and regulations of any city, state or Federal Agency that may be applicable. Any damage to the existing utilities caused by negligence on the part of the Contractor, and any other costs arising out of said excavation or by reason thereof, shall be repaired immediately by the Contractor at no additional expense to the Authority.
- H. All known underground utility lines, drains and pipe lines are shown on the Contract Drawings. Should any phase of the work require excavating under existing utilities or otherwise endanger their support, the Contractor shall furnish and install at his/her own expense such temporary supports as may be required to prevent damage to or interruption of the utility or utilities involved. The required work involves excavating and constructing building foundations in close proximity to the existing utilities. Extreme care shall be used in working in areas where buried utilities are known to exist. Excavation in these areas shall be by hand. The Contractor shall have on the site, at all times, proper equipment for locating buried cable and such cable shall be located by hand-dug test pits before power equipment is permitted to work in the area. All existing underground utilities uncovered shall be located by the Contractor and noted on the Record Drawings. The Record Drawings shall note the type of utility, material, size, elevation, and horizontal position.

-
- I. Should any other underground utility conflict be encountered, the Architect and the Owner may make a field check and direct such additional procedure as may be necessary to maintain or eliminate the interfering utility.
 - J. The Contractor shall be familiar with all utilities in the project area. Exploratory excavations shall be made to locate utilities that may be affected by the work, as directed by the Architect and the Owner. It is the Contractor's responsibility to locate and mark out these existing utilities to the best of his ability prior to beginning any excavation. No excavation shall commence until the Architect is satisfied that the Contractor has made every effort available to him to locate and mark out existing utilities. These efforts shall include, but will not be limited to, opening manholes, handholes, and light bases to determine the orientation of existing circuits, measuring cable insulation resistances and using a utility locator device capable of locating both metallic and nonmetallic utilities. The Contractor shall have an underground utility cable tracer located on-site and utilized on the site for the duration of the Contract. Once all existing utilities have been located and marked on the ground, the Contractor shall hand excavate all material in the vicinity of the known existing utility. Contractor shall be responsible for repairing any damaged utility immediately at his own expense.
 - K. Any electrical work performed must be coordinated with the Jetport Facilities Department in advance. If power is shut off because of work being performed by the Contractor, it is the responsibility of the Contractor to witness the shut-off by City personnel, as well as energizing of the system by City personnel. At no time will the Contractor be allowed to independently interrupt any electrical service or communications service. The Contractor shall not leave the work area until all electrical and/or communications work has been inspected by the Architect and returned to full operation.

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

END OF SECTION

SECTION 01045

CUTTING AND PATCHING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Contract Conditions, and other Technical Specifications Sections apply to work of this Section insofar as applicable.

1.02 WORK INCLUDED

- A. This Section specifies administrative and procedural requirements for cutting, fitting, and patching work, including attendant excavation and backfill, required to complete the Work or to:
 1. Make its several parts fit together properly.
 2. Uncover portions of the Work to provide for installations of ill-timed work.
 3. Remove and replace defective work.
 4. Remove and replace work not conforming to requirements of Contract Documents.
 5. Remove samples of installed work as specified for testing.
 6. Provide routine penetrations of non-structural surfaces for installation of piping, ductwork, and conduit.

1.03 RELATED REQUIREMENTS

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
 1. Section 01010, SUMMARY OF WORK; Description of Project.
 2. Section 01040, COORDINATION.
 3. Section 01600, MATERIAL AND EQUIPMENT; Substitutions and product options.

1.04 QUALITY ASSURANCE

- A. Permission to patch any items of work does not imply a waiver of the Owner or Owner's Representative's right to require complete removal and replacement in said areas and of said items if, in Owner or Owner's Representative's opinion, patching does not satisfactorily restore quality and appearance of work.

- B. Requirements for Structural Work: Do not cut-and-patch structural work in a manner resulting in a reduction of load-carrying capacity or load/deflection ratio.
- C. Operational and Safety Limitations: Do not cut-and-patch operational elements and safety-related components in a manner resulting in a reduction of capacities to perform in the manner intended or resulting in decreased operational life, increased maintenance, or decreased safety.
- D. Visual Requirements: Do not cut-and-patch work that is exposed on exterior or in occupied spaces of building, in a manner resulting in reduction of visual qualities or resulting in substantial evidence of cut-and-patch work, both as judged solely by the Owner or Owner's Representative. Remove and replace work judged by the Owner or Owner's Representative to be visually unsatisfactory.

1.05 SUBMITTALS

- A. Submit a written request to Owner or Owner's Representative well in advance of executing any cutting or alteration which affects:
 - 1. Work of Owner or separate contractor.
 - 2. Structural value or integrity of any element of the Project.
 - 3. Integrity or effectiveness of weather-exposed or moisture-resistant elements or systems.
 - 4. Efficiency, operational life, maintenance, or safety of operational elements.
 - 5. Visual qualities of sight-exposed elements.
- B. Request shall include:
 - 1. Identification of the Project.
 - 2. Description of affected work.
 - 3. The necessity for cutting, alteration, or excavation.
 - 4. Effect on work of Owner or any separate contractor, or on structural or weatherproof integrity of Project.
 - 5. Description of proposed work:
 - a. Description of why cutting-and-patching cannot (reasonably) be avoided.
 - b. Scope of cutting, patching, alteration, or excavation.
 - c. How it will be performed.
 - d. How structural elements (if any) will be reinforced.
 - e. Trades who will execute the work.
 - f. Products proposed to be used.
 - g. Extent of refinishing to be done.
 - h. Approximate dates of the work, and anticipated results in terms of variations from the work as originally completed (structural, operational, visual, and other qualities of significance).

6. Alternatives to cutting and patching.
 7. Cost proposal, when applicable.
 8. Written permission of any separate contractor whose work will be affected.
- C. Should conditions of Work or the schedule indicate a change of products from original installation, the Contractor shall submit request for substitution as specified in Section 01600, MATERIAL AND EQUIPMENT.
- D. Submit written notice to Owner or Owner's Representative designating date and time the work will be uncovered.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Except as otherwise indicated or authorized by the Owner or Owner's Representative, provide materials for cutting-and-patching which will result in equal-or-better work than the work being cut-and-patched, in terms of performance characteristics and including visual effect where applicable. Comply with the requirements, and use materials identical with the original materials where feasible and where recognized that satisfactory results can be produced thereby.
- B. Comply with specifications and standards for each specific product involved.

PART 3 EXECUTION

3.01 INSPECTION

- A. Inspect existing conditions of Project, including elements subject to damage or to movement during cutting and patching.
- B. After uncovering work, inspect conditions affecting installation of Products, or performance of work.
- C. Report unsatisfactory or questionable conditions to Owner or Owner's Representative in writing; do not proceed with work until Owner or Owner's Representative has provided further instructions.

3.02 PREPARATION

- A. Provide adequate temporary support as necessary to assure structural value or integrity of affected portion of Work.
- B. Provide devices and methods to protect other portions of Project from damage.

- C. Provide protection from elements for that portion of the Project which may be exposed by cutting and patching work, and maintain excavations free from water.

3.03 PERFORMANCE

- A. Execute cutting and demolition by methods which will prevent damage to other work, and will provide proper surfaces to receive installation of repairs.
 - 1. In general, where mechanical cutting is required, cut work with sawing and grinding tools, not with hammering and chopping tools. Core drill openings through concrete work.
 - 2. Comply with the requirements of applicable sections of Division 2 - SITEWORK where cutting-and-patching requires excavating and backfilling.
- B. Execute excavating and backfilling by methods which will prevent settlement or damage to other work.
- C. Employ original installer or fabricator to perform cutting and patching for:
 - 1. Weather-exposed or moisture-resistant elements.
 - 2. Sight-exposed finished surfaces.
- D. Execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances, and finishes.
- E. Restore work which has been cut or removed; install new products to provide completed Work in accordance with requirements of Contract Documents.
- F. Fit work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- G. Patch with seams which are durable and as invisible as possible. Comply with specified tolerances for the work.
- H. Restore exposed finishes of patched areas; and, where necessary extend finish restoration onto retained work adjoining, in a manner which will eliminate evidence of patching.
 - 1. Where patch occurs in a smooth painted surface, extend final paint coat over the entire unbroken surface containing the patch.
- I. Refinish entire surfaces as necessary to provide an even finish to match adjacent finishes:
 - 1. For continuous surfaces, refinish to nearest intersection.
 - 2. For an assembly, refinish entire unit.

END OF SECTION

SECTION 01090

REFERENCES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Contract Conditions, and other Technical Specifications Sections apply to work of this Section insofar as applicable.

1.02 WORK INCLUDED

- A. This Section identifies abbreviations and acronyms and includes definitions of words and phrases used in Contract Documents, definitions of standard Specification language, and explanation of Specification format and content.

1.03 QUALITY ASSURANCE

- A. Application: When a standard is specified by reference, comply with requirements and recommendations stated in that standard, except when requirements are modified by the Contract Documents, or applicable codes establish stricter standards.
- B. Publication Date: The publication in effect on the date of issue of Contract Documents, except when a specific publication date is specified.

1.04 ABBREVIATIONS AND NAMES OF ORGANIZATIONS

- A. Obtain copies of referenced standards direct from publication source, when needed for proper performance of Work, or when required for submittal by Contract Documents. For abbreviations not listed, and for addresses and phone numbers, refer to the "Encyclopedia of Associations", published by Gale Research Co., Inc., available in most public libraries.

AA	Aluminum Association
AABC	Associated Air Balance Council
AAMA	American Architectural Manufacturers Association
AASHTO	American Association of State Highway and Transportation Officials.
ACI	American Concrete Institute
ADC	Air Diffusion Council
AGC	Associated General Contractors of America
AI	Asphalt Institute
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AMCA	Air Movement and Control Association

ANSI	American National Standards Institute
ARI	Air-Conditioning and Refrigeration Institute
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASPA	American Sod Producers Association
ASTM	American Society for Testing and Materials
AWI	Architectural Woodwork Institute
AWPA	American Wood-Preservers' Association
AWS	American Welding Society
AWWA	American Water Works Association
CDA	Copper Development Association
CRSI	Concrete Reinforcing Steel Institute
CSI	Construction Specifications Institute
EJMA	Expansion Joint Manufacturer's Association
FGMA	Flat Glass Marketing Association
FM	Factory Mutual System
FS	Federal Specification
GA	Gypsum Association
IEEE	Institute of Electrical and Electronics Engineers
IMIAC	International Masonry Industry-All Weather Council
ISA	International Society of Arboriculture
MIL	Military Specification
ML/SFA	Metal Lath/Steel Framing Association
NAAMM	National Association of Architectural Metal Manufacturers
NCMA	National Concrete Masonry Association
NEBB	National Environmental Balancing Bureau
NEMA	National Electrical Manufacturers' Association
NFPA	National Fire Protection Association
NHDOT	New Hampshire Department of Transportation
NRCA	National Roofing Contractors Association
NSWMA	National Solid Waste Management Association
NTMA	National Terrazzo and Mosaic Association
NWMA	National Woodwork Manufacturers Association
PCA	Portland Cement Association
PCI	Prestressed Concrete Institute
PS	Product Standard
SCPI	Structural Clay Products Institute

SDI	Steel Deck Institute
SDI	Steel Door Institute
SIGMA	Sealed Insulating Glass Manufacturers Association
SJI	Steel Joist Institute
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
SPRI	Single Ply Roofing Institute
SSPC	Steel Structures Painting Council
TAS	Technical Aid Series
TCA	Tile Council of America, Inc.
UL	Underwriters' Laboratories, Inc.
WCLIB	West Coast Lumber Inspection Bureau

1.05 DEFINITIONS

- A. General: Basic Contract definitions are included in the AGREEMENT.
- B. Indicated: The word "indicated" refers to graphic representations, notes or schedules on Drawings, Paragraphs or schedules in Specifications, and similar requirements in Contract Documents. Terms such as "shown", "noted", "scheduled", and "specified" are used to help locate a reference. No limitation on location is intended except as specifically noted.
- C. Directed: Terms such as "directed", "requested", "authorized", "selected", "approved", "required", and "permitted", are hereby defined as "directed by Architect", "requested by Architect", "authorized by Architect", etc. No implied meaning shall be interpreted to extend the Architect's responsibility into the Contractor's area of construction supervision.
- D. Approved: The term "approved" when used in conjunction with the Architect's action on the Contractor's submittals, applications, and similar requests, is limited to the duties and responsibilities of the Architect as stated in the AGREEMENT. Such approval shall not release the Contractor from responsibility to fulfill Contract requirements unless otherwise provided in the Contract Documents.
- E. Furnish: Supply and deliver to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- F. Install: Operations at Project site, including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- G. Provide: To furnish and install, complete and ready for intended use.

- H. Installer: The Contractor or entity engaged by the Contractor, either as an employee, subcontractor, or sub-subcontractor for performance of a particular construction activity, including installation, erection, application, and similar operations. Installers are required to be experienced in the operations they are engaged to perform.

1.06 SPECIFICATION FORMAT AND CONTENT

- A. Specification Format: These Specifications are organized into Divisions and Sections based on the Construction Specifications Institute's 16 Division format and Masterformat numbering system.
- B. Specification Content: These Specifications use certain conventions in the use of language and the intended meaning of certain terms, words, and phrases when used in particular situations or circumstances. These conventions are explained as follows:
 - 1. Abbreviated Language: Language used in Contract Documents is abbreviated. Implied words and meanings will be appropriately interpreted. Singular words will be interpreted as plural, and plural words interpreted as singular where applicable.
 - 2. Imperative Language: In general, imperative language is used in the Specifications. Except where specifically indicated otherwise, the subject of imperative statements is the Contractor. At certain locations in the text, for clarity, subjective language is used to describe responsibilities to be fulfilled indirectly by the Contractor, or others when so noted.

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

END OF SECTION

SECTION 01200

PROJECT MEETINGS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Contract Conditions, and other Technical Specifications Sections apply to work of this Section insofar as applicable.

1.02 WORK INCLUDED

- A. This Section specifies administrative and procedural requirements for project meetings, including but not limited to:
 - 1. Pre-Construction Meeting.
 - 2. Pre-Installation Conference.
 - 3. Progress Meetings.
 - 4. Coordination Meetings.
 - 5. Special Meetings.
- B. Representatives of contractors, subcontractors, and suppliers attending meetings shall be qualified and authorized to act on behalf of the entity each represents.
- C. Architect may attend meetings to ascertain that Work is expedited consistent with Contract Documents and construction schedules.

1.03 RELATED REQUIREMENTS

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
 - 1. Section 01040, COORDINATION
 - 2. Section 01300, SUBMITTALS.
 - 3. Section 01700, CONTRACT CLOSEOUT.

1.04 PROJECT MEETINGS, GENERAL

- A. Agendas: Agendas for Project Meetings shall be prepared by the Architect. Distribute copies to parties in attendance. For meetings involving the contractor his/her employees, and subcontractors, agendas shall be prepared by the contractor.
- B. Meeting Notices: Prepare and distribute written notices of Project Meetings four working days in advance of each meeting.

- C. Arrangements: Make physical arrangements for Project Meetings, including but not limited to:
 - 1. Arranging space and seating.
- D. Preside at Project Meetings.
- E. Minutes: Record minutes of Project Meetings, including procedures and decisions. Written minutes of all project meetings called for by the Architect will be distributed by the Architect. Minutes of all other meetings shall be prepared by the Contractor.
- F. Distribution of Minutes: Reproduce and distribute copies of Project Meeting minutes within three working days after each meeting to participants of meeting, to parties affected by decisions made at meetings, and to Architect.

1.05 PRE-CONSTRUCTION MEETING

- A. Schedule within 15 days after date of Notice to Proceed.
- B. Location: A central site, convenient for all parties, designated by Architect.
- C. Attendance: Require and notify the following to attend
 - 1. Architect and his Professional Consultants.
 - 2. Contractor's Superintendent.
 - 3. Major subcontractors.
 - 4. Major suppliers.
 - 5. Utility Company representatives.
 - 6. Others as appropriate, including but not limited to, Rental Car Agencies, APCOA, Airfield operations, Portland Fire Department, Lease holders, etc.
- D. Suggested Agenda:
 - 1. Submittal of executed bonds and insurance certificates.
 - 2. Execution of Contract.
 - 3. Distribution of Contract Documents.
 - 4. Submittal of list of Subcontractors, list of products proposed for installation, schedule of values, and progress schedule.
 - 5. Project Coordination, including designation of responsible personnel.
 - 6. Projected Construction Progress Schedules.
 - 7. Critical work sequencing.
 - 8. Major equipment deliveries and priorities.
 - 9. Submittal of list of products proposed for substitution under Section 01600 - Product Option and Substitution.
 - 10. Procedures and processing of:
 - a. Field decisions.
 - b. Proposal Requests.

- c. Submittals.
 - d. Change Orders.
 - e. Application for Payment.
 - f. Testing and quality control
 11. Certified payroll requirements for CONTRACTOR and Subcontractors.
 12. Adequacy of distribution of Contract Documents.
 13. Procedures for maintaining Record Documents.
 14. Safety and first-aid procedures.
 15. Security procedures.
 16. Housekeeping procedures.
 17. Coordination with other contracts and/or work.
 18. Use of premises by OWNER and CONTRACTOR.
 19. Construction facilities and controls provided by CONTRACTOR.
 20. Construction facilities and controls provided by OWNER.
 21. Temporary utilities provided by OWNER.
 22. Field engineering.
 23. Preconstruction/Preblast Survey.
 24. Major equipment deliveries and priorities.
 25. Project inspection.
 26. Labor requirements.
 27. Requirements of railroads, highway departments, other agencies and utility companies.
 28. Rights-of-way and easements.
 29. Winter maintenance.
 30. Requirements for start-up of equipment.
 31. Inspection and acceptance of equipment put into service during construction period.
 32. Substantial completion of Work.
 33. Final completion of Work.
- 1.06 PRE-INSTALLATION CONFERENCES
- A. Conduct pre-installation conferences at site prior to construction activities which require coordination. Installers, manufacturer's representatives, and fabricators of materials or systems affected shall be required to attend. Advise Architect of scheduled meeting dates.
 - B. Do not allow affected work to proceed if the conference cannot be successfully concluded. Initiate actions necessary to resolve impediments to performance of the work and reconvene the conference at the earliest feasible date.
- 1.07 PROGRESS MEETINGS
- A. Schedule regular periodic meetings, as required. Initially weekly meetings will be held to coordinate work activities.
 - B. Hold called meetings as required by progress of the Work.

- C. Location of the meetings: Project field office of Contractor.
- D. Attendance: Require and notify the following to attend:
 - 1. Architect, and his professional consultants as needed.
 - 2. Subcontractors, as appropriate to the agenda.
 - 3. Suppliers, as appropriate to the agenda.
 - 4. Utility Company representatives, as appropriate to the agenda.
 - 5. Others, as appropriate to the agenda.
- E. Suggested Agenda:
 - 1. Review and approval of minutes of previous meeting.
 - 2. Review of Work progress since previous meeting.
 - 3. Field observations, problems, conflicts.
 - 4. Problems which impede Construction Progress Schedule.
 - 5. Review of off-site fabrication, and delivery schedules.
 - 6. Corrective measures and procedures to regain projected schedule.
 - 7. Revisions to Construction Progress Schedule.
 - 8. Progress schedule during succeeding work period.
 - 9. Coordination of schedules.
 - 10. Review submittal schedules; expedite as required.
 - 11. Maintenance of quality standards.
 - 12. Pending changes and substitutions.
 - 13. Review proposed changes for:
 - a. Effect on Construction Progress Schedule and on completion date.
 - b. Effect on other contracts of the Project.
 - 14. Other business.

1.08 COORDINATION MEETINGS

- A. Conduct Coordination Meetings as necessary to properly coordinate the trades. Require representation of parties involved in coordination or planning of activities involved.

1.09 SPECIAL MEETINGS

- A. Conduct Special Meetings as required throughout the course of the Work. Special meeting issues may include, but are not limited to:
 - 1. Safety issues.
 - 2. Security issues.
 - 3. Labor issues.
 - 4. Special schedule issues.

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Contract Conditions, and other Technical Specifications Sections apply to work of this Section insofar as applicable.

1.02 WORK INCLUDED

- A. This Section specifies administrative and procedural requirements for submittals required for performance of Work, including:
1. Progress schedules.
 2. Submittal schedule.
 3. Shop drawings.
 4. Product data.
 5. Samples.
 6. Progress reports.
 7. Construction photographs.
- B. Administrative Submittals: Refer to requirements specified in other Division 1 Specification Sections, and other Contract Documents, for administrative submittals, including:
1. Permits.
 2. Applications for payment.
 3. Performance and payment bonds.
 4. Insurance certificates.
 5. List of subcontractors.
 6. Partial Lien Waivers.

1.03 RELATED REQUIREMENTS

- A. Examine Contract Documents for requirements that affect Work of this Section. Other Specification Sections that directly relate to Work of this Section include, but are not limited to:
1. Section 01010, SUMMARY OF WORK.
 2. Section 01040, COORDINATION; Coordination drawings.
 3. Section 01050, FIELD ENGINEERING; Survey and layout data submittals.
 4. Section 01410, TESTING LABORATORY SERVICES; Testing Laboratory reports.

5. Section 01600, MATERIAL AND EQUIPMENT; Manufacturer's instructions.
6. Section 01600, MATERIAL AND EQUIPMENT; Contractor's list of Products.
7. Section 01700, CONTRACT CLOSEOUT; Closeout submittals.

1.04 SUBMITTAL PROCEDURES

- A. Coordination of Submittals: Coordinate timing of submittals with construction activities. Transmit submittals well enough in advance of performance of Work to avoid delays. Coordinate submittals of related elements of Work.
 1. Architect may reject, or withhold action on submittals requiring coordination with other submittals until related submittals are received.
- B. Processing of Submittals: Allow sufficient review time to ensure installation will not be delayed because of time required to process submittals. Minimum processing times are as follows:
 1. Review by Architect: Allow ten business days for review and processing.
 2. Review by Architect and Consultant: Allow ten business days for review and processing of submittals by Architect, and an additional five business days for review by each consultant.
 3. Reprocessing of Submittals: For submittals not approved initially, allow ten business days for review and reprocessing of submittals by Architect, and an additional five business days for review by each consultant.
 4. No extension of Contract Time will be authorized due to failure to transmit submittals sufficiently in advance of scheduled performance of Work.
- C. Contractor's Preparation of Submittals: Place permanent label or title block on each submittal for identification. Indicate Project Name, Architect's Project Number, Specification Section number and title, date of submittal, name and address of Architect, name and Address of Contractor, name and address of subcontractor and/or supplier, name of manufacturer, Drawing number and detail reference.
 1. Contractor's Review and Action Stamp: Provide suitable space on label or title block for Contractor's review and action stamp. Stamp and sign each submittal to show Contractor's review and approval prior to transmittal to Architect. Submittals not signed and stamped by Contractor will be returned without action.
 2. Architect's Review and Action Stamp: Provide minimum 4 in. x 4 in. space on label or title block for Architect's review and action stamp. Deliver submittals to both Domenech Hicks & Krochmalnic, Inc., Architects (DHK), 155 Massachusetts Avenue, Boston, MA 02115 and Dufresne-Henry, Inc., (D-H) 22 Free Street, Portland, Maine 04101-3900, unless otherwise directed.
 3. Modify and customize submittals as required to show interface with adjacent work and attachment to building.
- D. Transmittal of Submittals: Transmit each item with Architect-accepted transmittal form. Identify Project, Contractor, subcontractor, major supplier; identify pertinent

Drawing sheet and detail number, and Specification section number, as appropriate, on transmittal form.

1. Source: Submittals received from sources other than Contractor will be returned without action.
2. Deviations from Contract Documents: When products, materials, or systems submitted deviate from Contract Documents, record deviations clearly on transmittal form, or separate attached sheet.

- E. Comply with progress schedule for submittals related to Work progress.
- F. After Architect reviews submittal, revise and resubmit as required. Identify changes made since previous submittal.
- G. Distribute copies of reviewed submittals to concerned persons. Instruct recipients to promptly report inability to comply with provisions.

1.05 PROGRESS SCHEDULE

- A. Timing: Submit progress schedule within 30 calendar days of Award of Contract.
- B. Requirements Included:
1. Procedures for preparation and submittal of construction Progress Schedules and periodic updating.
- C. Format:
1. Prepare Schedules as a critical path method charting (CPM) with separate node for each major portion of Work or operation, identifying first work day of each week and identifying each portion of the Work that is critical to timely project completion. All project scheduling shall be prepared using critical path method analysis.
 2. Sequence of Listings: The chronological order of the start of each item of Work.
 3. Scale and Spacing: Provide space for notations and revisions.
 4. Sheet Size: Multiple of 24 x 36 inches.
- D. Content:
1. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction and total activity duration.
 2. Identify each item by major specification section number.
 3. Specifically identify activity predecessors (i.e., which activities must be completed before following activity can start).
 4. Identify work of separate stages or separate floors, and other logically grouped activities.

5. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the last day of each month.
6. Provide separate schedule of submittal dates for shop drawings, product data and samples, and dates reviewed submittals will be required from Architect. Show decision dates for selection of finishes.
7. Coordinate content with Payment Items.
8. CONTRACTORS shall not engage in float manipulations which have the net effect of sequestering float time. Examples of networking techniques disallowed under this provision includes such strategies as extending time duration estimates, and scheduling items required for final completion as though they were prerequisites to substantial completion.
9. Schedule must identify length of work week; length of work day; and anticipated holidays.

E. Revisions To Schedules:

1. Architectural: Submit one reproducible and one black line print of each sheet to DHK and one black line print of each sheet to D-H.
2. Consultants: For shop drawings that require Consultant's review, submit one reproducible and one black line print of each sheet to DHK and one reproducible and two black line prints of each sheet to D-H.
3. Provide narrative report to define problem areas, anticipated delays, and impact on Schedule. Report corrective action taken, or proposed, and its effect.

F. Submittals:

1. Submit initial schedules at the preconstruction conference. After review, resubmit required revised data within ten (10) days.
2. Submit revised progress schedules for review and approval, at a minimum, with each application for payment, or whenever, in the Architect's opinion, sufficient progress slippage warrants a more timely update.
3. Submit six (6) copies; three (3) copies which will be retained by Architect; the other three (3) copies will be returned to the CONTRACTOR.

G. Distribution:

1. Distribute copies of reviewed schedules to job site file, subcontractors, suppliers, and other concerned entities.
2. Instruct recipients to promptly report, in writing, problems anticipated by projections shown in schedules.

1.06 SUBMITTAL SCHEDULE

- A. Timing: Prepare and issue complete Submittal Schedule no later than ten working days after Architect accepts Progress Schedule.

-
- B. Preparation: Coordinate Submittal Schedule with Progress Schedule, and Schedule of Values.
 - C. Content of Submittal Schedule: Prepare schedule in order by Specification Section. Provide the following information for each submittal:
 - 1. Scheduled date of initial submittal.
 - 2. Specification Section number.
 - 3. Submittal type.
 - 4. Name of subcontractor or supplier.
 - D. Distribution: Print and distribute Submittal Schedule to Architect, subcontractors, and other parties affected. Post copies in field office.
 - E. Revisions: Update and reissue Submittal Schedule monthly in conjunction with Application for Payment.
- 1.07 SHOP DRAWINGS
- A. Provide accurately prepared, large scale and detailed shop drawings prepared specifically for this Project on reproducible sheets. Show adjacent conditions and related work. Show accurate field dimensions where appropriate. Identify materials and products shown. Note special coordination required. Standard information prepared without specific reference to Project is not considered shop drawings.
 - B. Shop drawings include fabrication and installation drawings, setting diagrams, schedules, patterns, templates, and similar drawings.
 - C. Show every component of fabricated item, notes regarding manufacturing process, coatings and finishes, identifying numbers conforming to Contract Documents, (i.e. stair numbers, door numbers, etc.) dimensions, and appropriate trade names. Show anchorage and fastening details, including type, size and spacing. Show material gage and thickness. Indicate welding details and joint types.
 - D. Shop Drawing Sheet Size: Except for templates, patterns, and other full-size drawings, submit shop drawings on sheets at least 8-1/2 in. x 11 in., but no larger than 36 in. x 48 in.
 - E. Submittal Quantities: Submit shop drawings in following quantities:
 - 1. Architectural: Submit one reproducible and one black line print of each sheet to DHK and one black line print of each sheet to D-H .
 - 2. Consultants: For shop drawings that require Consultant's review, submit one reproducible and two black line prints of each sheet to DHK and submit one reproducible and two black line prints of each sheet to D-H.

1.08 CONTRACTOR REVIEW

- A. Review submittals prior to transmittal; determine and verify field measurements, field construction criteria, manufacturer's catalog numbers, and conformance of submittal with requirements of Contract Documents.
- B. Coordinate submittals with requirements of Work and of Contract Documents.
- C. Sign and date each sheet of shop drawings and product data, and each sample label to certify compliance with requirements of Contract Documents. Notify ARCHITECT in writing at time of submittal, of any deviations from requirements of Contract Documents.
- D. Do not fabricate or ship products or begin work which requires submittals until return of submittal that ARCHITECT has reviewed and approved.
- E. CONTRACTOR shall check and verify all field measurements and shall be responsible for prompt submission of all shop and working drawings so that there shall be no delay in the Work.
- F. CONTRACTOR shall be responsible for the delays and/or additional expenses that result from the CONTRACTOR'S failure to submit a complete submittal and/or to identify portions of the submittal that do not conform to the specifications.

1.09 SUBMITTAL REQUIREMENTS

- A. Transmit submittals with required submittal form included herewith, in accordance with the Progress Schedule and in such sequence as to avoid delay in the Work.
- B. Apply CONTRACTOR'S stamp, signed certifying to review, verification of products, field dimensions and field construction criteria, and coordination of information with requirements of Work and Contract Documents.
- C. Coordinate submittals into logical groupings to facilitate interrelation of the several items:
 - 1. Finishes which involve ARCHITECT selection of colors, textures, or patterns.
 - 2. Associated items which require correlation for efficient function or for installation.
- D. Submit shop drawings as indicated in paragraph 1.07 E. The Architect will return three marked up shop drawings to the CONTRACTOR.
- E. Submit product data as indicated in paragraph 1.15 D. The Architect will return three marked up product data to the CONTRACTOR.
- F. Submit number of samples required by individual specification sections.

- G. Submit to ARCHITECT using transmittal form provided in this Section. Identify Project by title and number. Identify work and product by specification section and paragraph number. ARCHITECT will designate a submittal number upon receipt.
- H. Review by ARCHITECT of any deviation in material, workmanship or equipment proposed subsequent to approval of the shop drawings, samples or design data shall be requested in writing by the CONTRACTOR.

1.10 RESUBMITTALS

- A. Make resubmittals under procedures specified for initial submittals; identify changes made since previous submittal.
- B. The ARCHITECT will review each submittal and the first resubmittal without cost to the CONTRACTOR. The CONTRACTOR, shall reimburse the OWNER for all subsequent resubmittal reviews.

1.11 ARCHITECT REVIEW

- A. ARCHITECT will respond to submittals with reasonable promptness.
- B. Submittals will be reviewed in accordance with paragraph 1.19 of this section:

1.12 DISTRIBUTION

- A. Duplicate and distribute reproductions of shop drawings, copies of product data, and samples, which bear ARCHITECT'S stamp to job site file, Record Documents file, the OWNER, the Maine Department of Environmental Protection, subcontractors, suppliers, other affected contractors, and other entities requiring information.

1.13 SCHEDULE OF SUBMITTALS

- A. Shop drawings, product data and sample submittals shall be made in a timely and logical fashion taking into account work scheduling and job progress.
- B. It is the CONTRACTOR'S responsibility to prepare, coordinate, and review all submittals prior to delivery to ARCHITECT. The ARCHITECT will review each submittal and the first resubmittal at no cost to the CONTRACTOR. The CONTRACTOR shall reimburse the OWNER for all reasonable costs associated with the ARCHITECT'S, and his consultants, review of each subsequent resubmittal.

1.14 REVIEW QUALIFICATION

- A. Regardless of corrections made or acceptance of such drawings by the ARCHITECT, the CONTRACTOR will nevertheless be responsible for the accuracy of such drawings and for their conformity to the Contract Documents. The CONTRACTOR shall notify the ARCHITECT in writing of any deviations at the time he furnishes such drawings.

1.15 PRODUCT DATA

- A. Definition: Product data includes manufacturer's standard published literature, such as installation instructions, catalog cuts, color charts, rough-in diagrams and wiring diagrams. When product data must be prepared specifically because standard published data is not suitable for use, submit as shop drawing.
- B. Preparation: Mark each copy of product data to show applicable choices and options. Where published product data includes information on several products and choices, mark copies to clearly indicate information applicable to this Project.
- C. Do not submit product data until compliance with requirements of Contract Documents has been confirmed.
- D. Submittal Quantities: Submit product data in following quantities:
 - 1. Architectural Work: Submit number of copies required by Contractor, plus additional two copies to DHK, and one additional copy to D-H.
 - 2. Consultant's Work: Submit number of copies required by Contractor, plus an additional two copies to DHK and one additional copy to D-H. Forward copy of transmittal to Consultant. Consultant's review and comments will be made on copies returned to DHK, who will forward them to the Contractor.
- E. Installer Copy: Verify that installer of Work possesses a current copy of Architect-approved product data prior to installation.

1.16 SAMPLES

- A. Submit samples identical with materials and products to be installed. Where indicated, prepare samples to match Architect's sample. Label sample with description, source, manufacturer's name, and catalog number. Submit samples along with certifications that products comply with referenced standards.
- B. Architect's Review: Architect will review samples for confirmation of visual intent, color, pattern, texture, and type. Architect will not test samples for compliance with other specified requirements, which shall remain exclusive responsibility of Contractor.
- C. Submittal Quantities: When variation in color, pattern, or texture can be expected in finish work, submit multiple samples (minimum of three) to show approximate limits of variations. Submit samples in following quantities:
 - 1. Initial Selection: For initial selection of color, texture, and pattern, submit one full set of manufacturer's available samples.
 - 2. Verification Samples: Submit three sets of samples selected. One set will be returned to Contractor for use at Project Site for quality control comparisons.

-
- D. Distribution: Distribute additional sets of approved samples to subcontractors, suppliers, installers, and others required for proper performance of Work. Indicate distribution on transmittal forms.

1.17 DAILY PROGRESS REPORTS

- A. Daily construction Progress Reports will be provided by the Architect/Engineer on site representative. Record following information concerning events on Project Site:
 - 1. List of subcontractors at site.
 - 2. General weather conditions.
 - 3. Accidents and unusual events.
 - 4. Meetings and significant decisions.
 - 5. Orders and requests by governing authorities.
 - 6. Change orders received.
 - 7. Equipment or system tests and start-ups.
 - 8. Partial completions and occupancies.
 - 9. Authorized substantial completions.
- B. Distribution: Distribute copies to DHK, D-H, and owner weekly.

1.18 CONSTRUCTION PHOTOGRAPHS

- A. General: Employ competent photographer to take construction record photographs monthly during course of Work.
- B. Provide photographs taken monthly, and at completion of major stages of construction, including:
 - 1. Site clearing.
 - 2. Site grading.
 - 3. Excavations.
 - 4. Pavements and curbing.
 - 5. Foundations.
 - 6. Framing.
 - 7. Enclosure of building, including roofing.
 - 8. Exterior curtain wall system and glazing.
 - 9. Interior partitions and framing.
 - 10. Major equipment installations.
 - 11. Interior finishes.
 - 12. Landscaping.
- C. View and Quantities Required: At each specified time, photograph Project from three different views approved by Architect. Provide three prints of each view.
- D. Negatives: Negatives shall remain property of photographer. Require that photographer maintain negatives for two years from Date of Substantial Completion of Project.

- E. Costs of Photography: Pay costs for specified photography and prints. Parties requiring additional photography or prints will pay photographer directly. Furnish additional prints to Owner and Architect at commercial rates applicable at time of purchase.
- F. Prints: Provide 8 in. x 10 in. black and white prints on single weight print paper, neutral black image tone, with white base. Provide smooth surface, glossy finish.
- G. Identify each print on back, listing name of Project, orientation of view, date and time of exposure, name and address of photographer, and numbered identification of exposure.
- H. Techniques: Provide factual presentation, with correct exposure and focus, with high resolution and sharpness, maximum depth-of-field, and minimum distortion.
- I. Views Required: Illustrate condition of construction and state of progress. At successive periods of photography, take at least one photograph from same overall view as previously. Consult with Architect at each period of photography for instructions concerning views required.
- J. Delivery of Prints: Deliver prints as soon as processed, one set each to DHK, D-H, and Project Record File.

1.19 ARCHITECT'S ACTION

- A. General: Architect will review submittals, stamp and indicate action, and return to Contractor. Architect will review submittals for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. Architect's review and approval of submittals shall be held to limitations stated in the AGREEMENT. In no case shall approval or acceptance by Architect be interpreted as release of Contractor of responsibility to fulfill requirements of Contract Documents. No acceptance or approval of submittals, nor any indication or note marked by Architect on submittals, shall constitute authorization for increase in Contract Sum.
- B. Action Stamp: Architect will stamp each submittal with an action stamp. Stamp will indicate action taken as follows:
 - 1. "APPROVED": No corrections, no marks: Resubmission not required.
 - 2. "APPROVED AS NOTED": Minor amount of corrections; all items can be fabricated without further corrections to original submittal; checking is complete and all corrections are deemed obvious without ambiguity. Resubmission not required.
 - 3. "REVISE AS NOTED AND RESUBMIT": Minor corrections required; items noted shall not be fabricated until further corrections of original submittal is completed and Architect-approval is obtained; checking is complete; clarify details

of items noted by checker for approval; items without marks may be fabricated without further submittal. Resubmission required.

4. "REJECTED - RESUBMIT": Submittal does not conform to Contract Documents, and requires too many corrections, or is rejected for other justifiable reasons. Architect will state reasons for rejection. Correct and resubmit. Do not fabricate.
5. "REVIEW NOT REQUIRED AS NOTED": Submittal does not require review for reasons stated.

C. Other Action: Submittal for information or record purposes will be returned with no action marked.

D. Required Resubmittals: Make corrections or changes to submittals required by Architect and resubmit until approved. Revise initial shop drawings or product data, and resubmit as specified for initial submittal. Indicate changes made other than those requested by Architect. Submit new samples as required for initial submittal.

1.20 DISTRIBUTION BY CONTRACTOR

- A. Distribution: When submittal is marked "APPROVED" or "APPROVED AS NOTED", make prints and copies and distribute to Architect, subcontractors, suppliers, fabricators, and other parties requiring information from submittal for proper coordination and performance of Work. Print copies of shop drawings from approved reproducible only.

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

END OF SECTION

SUBMITTAL TRANSMITTAL Date: _____

To: Architect Name
 Architect Address
 Architect City, State, Zip

Re: Project Name
 Project City/Town, Project State

From: _____ Supplier: _____
 _____ Address: _____
 _____ _____

Submittal Enclosed:

Quantity	Spec Section and/or Dwg. No.	Description
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Certification:

Article 3.12 of General Conditions. This Contractor certifies that the system or product as submitted, is in accordance with the Contract Documents, all field dimensions have been verified or corrected, and that any deviations existing between these drawings and the Contract Documents are listed below. The Contractor further certifies that these products or assemblies shall be installed in conformance with the Contract Documents except for exceptions as specifically listed below.

Contractor Signature: _____ Copy to: _____

SECTION 01410

QUALITY CONTROL AND TESTING SERVICES

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes administrative and procedural requirements for quality-control and testing services.
- B. Quality-control services include inspections, tests, and related actions, including reports performed by Contractor, by independent agencies, and by governing authorities. They do not include contract enforcement activities performed by Architect.
- C. Inspection and testing services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with Contract Document requirements.

1.02 REQUIREMENTS

- A. Employment of inspection and testing services shall in no way relieve Contractor's obligations to perform the Work of the Contract.
- B. In addition to the Contract's testing, the Owner reserves the right, at his sole discretion, to select and pay for the services of an Independent Testing Laboratory to perform specified services and testing as may be in the Owner's best interest.
- C. Contractor shall cooperate with the inspection and testing services to facilitate the execution of the quality control activities.

1.03 RELATED REQUIREMENTS

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
 - 1. Conditions of the Contract: Inspections and testing required by laws, ordinances, rules, regulations, orders or approvals of public authorities.
 - 2. Section 03300, CAST-IN-PLACE CONCRETE
 - 3. Section 04200, UNIT MASONRY
 - 4. Section 05120, STRUCTURAL STEEL

5. Section 05300, METAL DECK
6. Section 05411, LIGHT GAUGE METAL FRAMING
7. Section 07255, CEMENTITIOUS FIREPROOFING
8. Other sections of specifications, as indicated: Certification of products.

- B. Refer to Maine State Building Code for quality, workmanship and requirements for all materials.

1.04 RESPONSIBILITIES

- A. Contractor Responsibilities: Unless otherwise indicated as the responsibility of another identified entity, Contractor shall provide inspections, tests, and other quality-control services specified elsewhere in the Contract Documents and required by authorities having jurisdiction. Costs for these services are included in the Contract Sum. Contractor's quality control responsibilities are specified in, but not limited to, the following Sections:

Section 02200, EARTHWORK
Section 03450, ARCHITECTURAL PRECAST CONCRETE
Section 07410, METAL PANELS
Section 07530, SINGLE-PLY MEMBRANE ROOFING
Section 07900, SEALANTS
Section 09900, PAINTING

1. Where individual Sections specifically indicate that certain inspections, tests, and other quality-control services are the Contractor's responsibility, the Contractor shall employ and pay a qualified independent testing agency to perform quality-control services. Costs for these services are included in the Contract Sum.
2. Where individual Sections specifically indicate that certain inspections, tests, and other quality-control services are the Owner's responsibility, the Owner will employ and pay a qualified independent testing agency to perform those services.
 - a. Where the Owner has engaged a testing agency for testing and inspecting part of the Work, and the Contractor is also required to engage an entity for the same or related element, the Contractor shall not employ the entity engaged by the Owner, unless agreed to in writing by the Owner.
3. The costs of the following tests and inspections shall be accounted for separately and reported to the Owner.
 - a. Tests and inspection of materials and workmanship not conforming to contract requirements.
 - b. Tests and inspection necessitated by any other noncompliance with contract requirements.
 - c. Acceptance tests for materials because of changes in properties or changed sources.

- d. Costs of inspector's time and expenses wasted because of cancellations or delays of the work.
 - e. Tests and services of inspectors required by a public Owner.
- B. Retesting: The Contractor is responsible for retesting where results of inspections, tests, or other quality-control services prove unsatisfactory and indicate noncompliance with Contract Document requirements, regardless of whether the original test was Contractor's responsibility.
1. The cost of retesting construction, revised or replaced by the Contractor, is the Contractor's responsibility where required tests performed on original construction indicated noncompliance with Contract Document requirements.
- C. Associated Services: Cooperate with agencies performing required inspections, tests, and similar services, and provide reasonable auxiliary services as requested. Notify the agency sufficiently in advance of operations to permit assignment of personnel. Auxiliary services required include, but are not limited to, the following:
1. Provide access to the Work.
 2. Furnish incidental labor and facilities necessary to facilitate inspections and tests.
 3. Take adequate quantities of representative samples of materials that require testing or assist the agency in taking samples.
 4. Provide facilities for storage and curing of test samples.
 5. Deliver samples to testing laboratories.
 6. Provide the agency with a preliminary design mix proposed for use for materials mixes that require control by the testing agency.
 7. Provide security and protection of samples and test equipment at the Project Site.
- D. Duties of the Testing Agency: The independent agency engaged to perform inspections, sampling, and testing of materials and construction specified in individual Sections shall cooperate with the Architect and the Contractor in performance of the agency's duties.
1. The Testing Laboratory shall make all necessary arrangements with the General Contractor to insure the presence of the required inspectors at all contract operations specified to be included under the Testing and Inspection Agreement. The General Contractor shall notify the Testing Laboratory a reasonable time in advance (not less than 24 hours) of the time when operations requiring inspection or testing are scheduled to start.
 2. Provide necessary personnel, equipment and facilities for tests and inspection. Personnel shall be experienced and competent in their particular specialties.
 3. The Testing Laboratory shall conduct its work so as not to cause delay in the progress of construction. Any non-compliance with the Contract Documents shall be immediately reported to the General Contractor and the Architect.

4. The agency shall notify the Architect and the Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
5. Nothing herein specified permits the Testing Laboratory to allow the General Contractor to deviate from the requirements of the Contract Documents.
6. The agency is not authorized to release, revoke, alter, or enlarge requirements of the Contract Documents or approve or accept any portion of the Work.
7. The agency shall not perform any duties of the Contractor.

E. Coordination: Coordinate the sequence of activities to accommodate required services with a minimum of delay. Coordinate activities to avoid the necessity of removing and replacing construction to accommodate inspections and tests.

1. The Contractor is responsible for scheduling times for inspections, tests, taking samples, and similar activities.
2. A complete set of Drawings and Specifications for the project work will be made available by the Owner at the project site. The Testing Laboratory personnel shall become thoroughly familiar with all provisions of these documents which apply for the testing and inspection services.

1.05 SUBMITTALS

- A. Qualifications: Submit qualifications of testing laboratories proposed for use for approval.
- B. Schedule: Submit a schedule of required tests and inspections for review.
- C. Reports: Unless the Contractor is responsible for this service, the independent testing agency shall submit a certified written report, in duplicate, of each inspection, test, or similar service to the Architect. If the Contractor is responsible for the service, submit a certified written report, in duplicate, of each inspection, test, or similar service through the Contractor.

1. Submit additional copies of each written report directly to the governing Owner, when the Owner so directs.
2. Report Data: Written reports of each inspection, test, or similar service include, but are not limited to, the following:
 - a. Date of issue.
 - b. Project title and number.
 - c. Name, address, and telephone number of testing agency.
 - d. Dates and locations of samples and tests or inspections.
 - e. Names of individuals making the inspection or test.
 - f. Designation of the Work and test method.
 - g. Identification of product and Specification Section.
 - h. Complete inspection or test data.

- i. Test results and an interpretation of test results.
- j. Ambient conditions at the time of sample taking and testing.
- k. Comments or professional opinion on whether inspected or tested Work complies with Contract Document requirements.
- l. Name and signature of laboratory inspector.
- m. Recommendations on retesting.

1.06 QUALITY ASSURANCE

- A. Qualifications for Service Agencies: Engage inspection and testing service agencies, including independent testing laboratories, that are prequalified as complying with the American Council of Independent Laboratories' "Recommended Requirements for Independent Laboratory Qualification" and that specialize in the types of inspections and tests to be performed.

1. Each independent inspection and testing agency engaged on the Project shall be authorized by authorities having jurisdiction to operate in the state where the Project is located.

- B. Engage inspection and testing services agencies, including independent testing laboratories, which are prequalified as complying with applicable provisions of ACIL Ref. 1 and requirements of local, state, and federal authorities having jurisdiction, and which specialize in the types of inspections and tests to be performed. Qualifications of laboratories shall be based on industry standards established for the particular work and materials requiring testing or inspection, including but not limited to the following:

1. ASTM C 1077.
2. ASTM D 3666.
3. ASTM D 3740.
4. ASTM E 329.
5. ASTM E 543.

- C. Wherever the source or characteristics of materials change or the quality of materials provided indicates lack of compliance with contract requirements, full or partial acceptance tests shall be performed as directed by the Architect.

1.07 LIMITATIONS OF OWNER OF INSPECTION AND TESTING SERVICES

- A. Inspection and testing services are not authorized to:

1. Release, revoke, alter, or enlarge on requirements of Contract Documents.
2. Approve or accept any portion of the Work, except as specifically authorized by the specifications.
3. Perform any duties of the Contractor.

1.08 CONDUCT OF INSPECTIONS AND TESTS

- A. The Contractor shall notify the Owner, Architect, and Testing Laboratory a minimum of 72 hours before the performance of work to permit the proper conduct of Owner-authorized inspections and tests.
- B. Representatives of Testing Laboratory shall inspect the manufacture, assembly, and placement of materials as required and as authorized by the Owner, and shall report their findings to the Architect, Owner, and Contractor.
- C. Work shall be checked as it progresses, but failure to detect any defective work or materials shall in no way prevent later rejection when such defect is discovered nor shall it obligate the Owner to accept such work.

1.09 TESTS REQUIRED

- A. General Construction Tests: More detailed testing requirements are given in individual Specification Sections. The Owner shall retain the right to make any additional tests the Architect deems necessary or appropriate. The Contractor is responsible for providing his own tests to determine that materials meet specified requirements. The scope of tests required and paid for by the Owner (unless otherwise noted below) shall include as a minimum the following:
 - 1. Earthwork: Lab tests to determine suitability of all fill materials shall be paid for by Contractor. Owner reserves the right to retain and pay for his own testing for checking purposes.
 - 2. Earthwork: Proctor tests for compaction.
 - 3. Asphalt Concrete Paving: Field and lab tests for asphalt paving.
 - 4. Concrete Paving and General Concrete Work: Concrete mix design testing shall be paid for by Contractor. Owner reserves the right to retain and pay for his own testing for checking purposes
 - 5. Concrete Paving and General Concrete Work: Concrete test cylinders as specified in Section 03300, CONCRETE.
 - 6. Masonry Mortar: Three cylinders tested for compressive strength at 10 days; ASTM C 91 tests.
 - 7. Metals: Strength; dimension; coating thickness; bolt torque; welding X-ray or ultrasonic tests.
 - 8. Wood: Moisture content; treatment retention; strength; dimension.
 - 9. Sealants: Chemical analysis; adhesive strength; compatibility with adjacent materials; elasticity.
 - 10. Paints and Finishes: Chemical analysis; coating thickness.

- B. Plumbing: At least the following tests shall be performed. Conform to requirements specified in individual Division 15 Specification Sections. The test shall be performed and paid for by the subcontractor and witnessed by the Contractor and Owner's on site representative:
1. Water supply piping hydrostatic pressure test.
 2. Sanitary piping test before fixture installation: Cap pipes and fill to highest point in system.
 3. Plumbing fixture operation.
- C. Fire Protection System: At least the following tests shall be performed. Conform to requirements specified in individual Division 15 Specification Sections. The test shall be performed and paid for by the subcontractor and witnessed by the Contractor and Owner's on site representative:
1. Fire protection system flushed and pressure tested.
- D. HVAC Testing: All HVAC work shall be tested by an independent testing and balancing agency. Conform to requirements specified in individual Division 15 Specification Sections. The tests shall be performed and paid for by the subcontractor and witnessed by the Contractor and Owner's Representative. Adjustments shall be made by the subcontractor as directed by the Owner. At least the following tests will be performed:
1. Piping hydrostatic tests.
 2. Air and water balancing.
 3. Thermostat control monitoring and testing.
 4. Boiler efficiency testing.
- E. Electrical Power System Testing: At least the following tests shall be performed. Conform to requirements specified in individual Division 16 Specification Sections. The tests shall be performed and paid for by the subcontractor and witnessed by the Contractor and Owner's on-site representative:
1. Polarity tests.
 2. Operation of all circuits.
 3. Testing of emergency system.
 4. Security systems.
 5. Generation system.
 6. Grounding systems.
 7. Voice/Video/Data networking testing.

- F. Electrical Lighting System Testing: Conform to requirements specified in individual Division 16 Specification Sections. At least the following tests shall be performed and paid for by the subcontractor:
1. Operation of every component of entire system.
- G. Fire Alarm System Testing: At least the following tests will be performed. Conform to requirements specified in individual Division 16 Specification Sections. The test shall be performed and paid for by the subcontractor and witnessed by the Contractor and Owner's on site representative:
1. All smoke and heat detectors.
 2. Proper operation as required by authorities having jurisdiction.
- H. Local Owner Inspections: The Contractor is also responsible for coordinating and cooperating with local requirements for inspections.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 TESTING AND INSPECTION

- A. The Testing Laboratory shall maintain and distribute continuous record of the quality of materials and workmanship under its control, and certify that such materials and workmanship meet the contract requirements.
- B. The inspection and control shall be performed under the direction of the Structural Engineer of Record through the Architect.
- C. The duties of the Testing Laboratory shall include:
1. Tests and certification of materials or components designated to be tested at place of fabrication or at the job site.
 2. Supervision and certification of fabrication and erection of materials designated to be inspected.
 3. Acceptance testing of concrete design mixes.
 4. Submission of reports:
 - a. Copies of each report of plant and field inspection shall be made and distributed within 3 days. Copies of each report of tests shall be distributed within 2 days of the performance of tests. Results of tests showing non-conformance to contract requirements shall be advised to the Architect and General Contractor by phone on the same day.

- b. Distribution of one copy of each report shall be as follows: Owner, Architect, Structural Engineer, General Contractor, Inspectional Services.
- c. All reports shall include accurate and unambiguous descriptions of the source of the materials and their location in the structure.

3.02 QUALITY CONTROL FOR CONCRETE

- A. Provide inspection and testing as specified in Section 03300, CAST-IN-PLACE CONCRETE.

3.03 QUALITY CONTROL FOR UNIT MASONRY

- A. The structural inspections listed below shall be required for masonry construction.

INSPECTION OR TEST	REFERENCED CRITERIA	
	ACI 530/ASC4/ TMS 402	ACUI 530.1 ASCE 6/TMS 602
1. Material		Sec. 2.2
2. Masonry Strength		Sec. 1.6
3. Construction Operations: a. Proportioning, mixing consistency of mortar and grout. b. Application of mortar grout and masonry units c. Condition, size, location and spacing of reinforcement d. Protection of masonry during cold weather (temperature below 40 degrees F) or hot weather (temperature above 100 degrees F). e. Anchorage	Chapter 8 Sec 4.2; 5.14	Sec. 2.3; 2.5; 4.2.2 Sec. 2.3.2.2; 2.3.2.3
4. Inspection of welding of reinforcement, grouting, consolidation and reconsolidation for buildings assigned to Seismic Performance Category C or D in accordance with 780 CMR 1612.1.7.	Note b.	Note b.

Note a: The specific standards reference are those listed in Appendix A.

Note b: Referenced criteria not applicable.

3.04 QUALITY CONTROL FOR STRUCTURAL STEEL

- A. Inspection of structural steel will be directed at verifying that inspection required to be carried out by the Contractor's testing and quality control personnel, as specified in the Contract Documents, has been completed.
- B. Inspection of Fabricators: Where fabrication of structural load-bearing members and assemblies is being performed on the premises of a fabricator's shop, structural inspection of the fabricated items shall be required. The fabricated items shall be inspected as required by 780 CMR 1705.0 and as required elsewhere in 780 CMR.
 - 1. Fabrication procedures: The special inspector shall verify that the fabricator maintains detailed fabrication and quality control procedures which provide a basis for inspection control of the workmanship and the fabricator's ability to conform to approved drawings, project specifications and referenced standards. The special inspector shall review the procedures for completeness and adequacy relative to the code requirements for the fabricator's scope of work.
 - 2. Procedures implementation: The structural inspector shall verify that the fabricator is properly implementing the fabrication and quality control procedures outlined in 780 CMR 1705.4.1.
- C. Field Inspection of Structural Steel: This inspection will be on a full-time basis while structural steel is being erected, as requested by the Structural Engineer of Record, and will include the following:
 - 1. Proper erection of all pieces.
 - 2. Proper fit of bolts, including nicking of threads.
 - 3. Plumbness.
 - 4. Proper installation of high-strength bolts, including checking of impact wrenches.
 - 5. Weld visual inspection.
 - 6. Comparison with approved Shop Drawings.
 - 7. Examination of erector's quality control and testing records for compliance with Contract Document.
 - a. Inspection and Testing of High-strength Bolts:
 - i). The visual examination of all joints to ascertain that bolts and washers are properly installed and have been tensioned.
 - ii). Tightness of bolts shall be checked by using a manual torque wrench in accordance with the requirements of Contract Documents. As a minimum check one bolt per connection or ten percent (10%) of the bolts involved. If these tests indicate that proper tension in the bolts is not being achieved, then the frequency of the tests shall be increased in consultation with the structural engineer.
 - b. Inspection and Testing of Welding:

- i). Verify the certification papers of each welder and his qualifications for the particular welding positions in which he will work on the structure. Establish and record each welder's symbol. The Testing Laboratory may reject a welder's work and call for a retest at any time there is doubt of the quality of work.
- ii). Welds shall be examined visually, for structural steel, steel deck, and studs. Surfaces to be welded and all filler metal shall be carefully inspected. Surface preparations, fit-up, and cleanliness of surfaces shall be noted. Electrodes shall be checked for size, type and condition. Preheating of steel and heating of electrodes shall be noted when required.
- iii). Check that all welds have been marked with the welder's symbol; mark all welds requiring repairs or rewelding; make a reinspection of corrected work; maintain a written record of all welds. Welds shall be tested where required by Contract Documents.
- iv). Welds required to be tested by the Contractor shall be inspected by the Testing Laboratory and verify that all welds have been performed and tested in accordance with the Contract Documents.
- v). Testing of welds in the field shall consist of
 - a). Visual inspection of all welds
 - b). 10% testing of all fillet welds
 - c). 100% testing of all penetration welds
- c. Inspection and Testing of Shear Connectors:
 - i). All headed stud shear connectors shall be checked for the following indications of an insufficient weld:
 - a). Less than 360 degree fillet, voids, undercuts, or insufficient penetration.
 - b). Burn-off (reduction in length after welding) less than 1/8 inch.
 - c). Cold appearance of the weld.
 - ii). If, after welding of any shear connectors, visual inspection indicates any of the imperfections listed above or any other questionable appearance, such stud shall be struck hard with a three-pound hammer and bent 15 degrees off perpendicular to beam and toward nearest end of beam. Studs which fail this test, as provided in the AWS Code, shall be replaced. Studs which show no sign of failure after this test may be left in bent position if not portion of the stud is less than one inch from a proposed concrete surface.
- d. Wall panels and Veneers: Structural inspection is required for exterior wall panels and their attachment to the building.
- e. Light Gauge Metal Framing: Structural inspection is required for light gauge metal framing systems for roofs, floors, and load-bearing curtain walls that have a story height greater than ten feet.

3.05 QUALITY CONTROL FOR STEEL DECK AND SHEAR CONNECTORS

- A. Inspection of steel deck and shear connectors will be directed at verifying that the Contractor's testing and quality control, as specified in the Contract Documents, has been completed.
- B. Field Inspection of Steel Deck: This inspection will be on a full-time basis while steel deck and shear connectors are being erected, as requested by the Structural Engineer of Record, and will include the following:
 - 1. Proper erection of all pieces.
 - 2. Proper gage and coating.
 - 3. Weld visual inspection.
 - 4. Metal fasteners and side lap connections.
 - 5. Examination of erector's quality control and testing records for compliance with Contract Document.
 - a. Inspection and Testing of Shear Connectors
 - i). All headed stud shear connectors shall be checked for the following indications of an insufficient weld:
 - a). Less than 360 degree fillet, voids, undercuts, or insufficient penetration.
 - b). Burn-off (reduction in length after welding) less than 1/8 inch.
 - c). Cold appearance of the weld.
 - ii). If, after welding of any shear connectors, visual inspection indicates any of the imperfections listed above or any other questionable appearance, such stud shall be struck hard with a three-pound hammer and bent 15 degrees off perpendicular to beam and toward nearest end of beam. Studs which fail this test, as provided in the AWS Code, shall be replaced. Studs which show no sign of failure after this test may be left in bent position if no portion of the stud is less than one inch from a proposed concrete surface.

3.06 QUALITY CONTROL FOR WALL PANELS AND VENEERS AND LIGHT GAUGE METAL FRAMING

- A. Structural inspection is required for exterior wall panels and their attachment to the building.
- B. Structural inspection is required for light gauge metal framing systems for roofs, floors, and load-bearing curtain walls that have a story height greater than ten feet.
- C. Check components for size and configuration material grade against approved shop drawings.
- D. Visually examine welds and metal fasteners for conformance with referenced standards.

3.07. QUALITY CONTROL FOR SPRAYED FIREPROOFING

- A. Provide inspection and testing for the sampling and testing of sprayed fire protection including thickness, density, and bonding strength in accordance with project specifications and as follows:
 - 1. Verify applied thickness and density meets fire rating requirements.
 - 2. Verify installation meets approved test reports and acceptable sample installation.
 - 3. Samples: Inspect a maximum of six locations of one square foot each for each 5,000 square foot of fireproofing area, in accordance with ASTM E 605.
 - a. The required thickness of sprayed fireproofing shall be met at every test probe. Average thickness shall not be used in determining satisfactory installation.

3.08 REPAIR AND PROTECTION

- A. General: Upon completion of inspection, testing, sample taking and similar services, repair damaged construction and restore substrates and finishes. Comply with Contract Document requirements for "Cutting and Patching."
- B. Protect construction exposed by or for quality-control service activities, and protect repaired construction.
- C. Repair and protection is Contractor's responsibility, regardless of the assignment of responsibility for inspection, testing, or similar services.

END OF SECTION

SECTION 01420

MOCK-UPS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Contract Conditions, and other Technical Specifications Sections apply to work of this Section insofar as applicable.

1.02 WORK INCLUDED

- A. General: Provide and coordinate mock-up assemblies at Project site for Architect review and acceptance, in accordance with requirements of the Contract Documents. Refer to individual Specification Sections for mock-up requirements. Generally, without limitation, mock-ups on site include the following:

- 1. Mock-ups of individual pieces of the work, as specified within individual Specification Section.

- B. It shall be the responsibility of the Contractor to coordinate the work of the related Specification Sections so that each mock-up meets the specified requirements.

1.03 RELATED WORK

- A. Examine Contract Documents for requirements that affect Work of this Section. Other Specification Sections that directly relate to Work of this Section include, but are not limited to:

- 1. Section 01410, QUALITY CONTROL AND TESTING SERVICES; inspection and testing.
- 2. Section 01500, CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS; temporary enclosures.
- 3. Individual Specification Sections that specify field mock-ups of individual pieces of the Work.
- 4. Individual Specification Sections that specify field mock-ups of exterior wall Work.

1.04 SUBMITTALS

- A. Shop Drawings of Mock-Ups: Provide large scale shop drawings for fabrication, installation and erection of all parts of each mock-up. Provide plans, elevations, and details of anchorage, connections and accessory items.

- B. Photographs of Mock-Ups: Submit photographs of mock-ups after completion of installation and acceptance of each mock-up.
- C. Samples: Refer to individual Specification Sections for submittal requirements of mock-up components and coordinate accordingly.

1.05 QUALITY ASSURANCE

- A. Design Modifications: Make design modifications to work only as required to meet performance requirements and to coordinate the work. Indicate proposed design modifications on shop drawings. Maintain original design concept without altering profiles and alignments indicated.

PART 2 PRODUCTS

2.01 MATERIALS AND PRODUCTS

- A. Provide materials, components, and products for exterior wall assembly mock-up and for specified interior construction components as specified in individual Specification Sections.

PART 3 EXECUTION

3.01 GENERAL

- A. Refer to PART 3, EXECUTION portions of the various Specification Sections for specific requirements regarding condition of surfaces, erection, and erection tolerances.

3.02 FIELD MOCK-UP OF INTERIOR CONSTRUCTION

- A. Obtain Architect acceptance of visual qualities prior to commencing work that individual mock-up is intended to represent. Protect and maintain approved mock-ups throughout the work of the Contract. Locate mock-ups at the Project site as directed by Architect. Provide a field mock-up for each of the following:

1. Acoustically treated wall in the Car Rental Facility above the counter area, size approximately 12 ft. high by 12 ft. wide including one regular window

- B. Interior Construction Mock-ups: Provide mock-ups of various interior construction as indicated or as specified in the applicable Specification Section, as directed by the Architect

3.03 OTHER MOCK-UPS

- A. Provide mock-ups of types and sizes required by individual Specification Sections to evaluate and set the standard of quality for that work. Obtain Architect acceptance of visual qualities prior to commencing work that individual mock-up is intended to represent. Protect and maintain approved mock-ups throughout the work of the Contract. Locate mock-ups at the Project site as directed by Architect.
 - 1. Provide as many mock-ups as required until Architect approval has been received.
 - 2. When indicated in individual Specification Sections, approved mock-ups may be incorporated into the finish work.

3.04 REMOVAL AND DISPOSAL

- A. Demolish and remove mock-ups from site at the completion of the Project. Legally dispose of demolished mock-up materials.

END OF SECTION

SECTION 01500

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Contract Conditions, and other Technical Specifications Sections apply to work of this Section insofar as applicable.

1.02 WORK INCLUDED

- A. This Section specifies construction facilities and temporary controls, including, but not limiting to:
 - 1. Temporary utilities.
 - 2. Temporary construction and support facilities.
 - 3. Temporary signage.
 - 4. Security and protection facilities.
 - 5. Architect/Engineer on site representative trailer.

- B. Contractor shall pay for all costs related to temporary facilities and utility service including but not limited to temporary heat, water, power, and other utilities.

1.03 RELATED REQUIREMENTS

- A. Examine Contract Documents for requirements that affect the Work of this Section. Other Specification Sections that directly relate to Work of this Section include, but are not limited to:
 - 1. AGREEMENT; Conditions of the Contract.
 - 2. Section 01010, SUMMARY OF WORK.

1.04 SUBMITTALS

- A. Schedule: Submit a schedule indicating implementation and termination of each temporary utility within fifteen days of date established for Commencement of the Work.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of authorities having jurisdiction, codes, utility companies, OSHA, and industry standards including, but not limiting to:
 - 1. NFPA 241.

2. NFPA 70.
3. ANSI A10.
4. NECA NJG-6.

- B. Electric Service: Comply with NEMA, NECA, and UL standards and regulations for temporary electric service. Install service in compliance with NFPA 70.
- C. Inspections: Arrange for authorities having jurisdiction to inspect and test temporary utilities prior to use. Obtain required certifications and permits.

1.06 PROJECT CONDITIONS

- A. Temporary Utilities: At earliest feasible time, when acceptable to Architect, change from use of temporary service to use of permanent service.
- B. Conditions of Use: Maintain temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do not overload temporary facilities. Do not allow hazardous, dangerous, or unsanitary conditions to develop on site.

PART 2 PRODUCTS

2.01 MATERIALS, GENERAL

- A. Materials may be new or used, but must be adequate in capacity for the required usage, must not create unsafe conditions, and must not violate requirements of applicable codes and standards.
- B. Lumber and Plywood: Provide materials that conform to requirements below:
1. Signs and Directory Boards: Provide exterior grade, Medium Density Overlay (MDO) plywood, conforming to USDC PS1, of size and thickness indicated.
 2. Fences, Vision Barriers, and Safety Barriers: Provide exterior grade, C-D veneered plywood.
- C. Gypsum Wallboard: Provide gypsum wallboard and metal framing systems for temporary offices and partitions.

2.02 TEMPORARY UTILITIES

- A. Scope: Temporary utility work includes, but is not limited to:
1. Electric power and light.
 2. Telephone service.
- B. Temporary Electric Power and Light: Arrange with utility company to provide service required for power and lighting. Pay costs for service and for power used.

1. Provide circuit and branch wiring, with area distribution boxes located so power and lighting is available throughout construction by use of construction-type power cords.
2. Provide adequate artificial lighting where natural light is not adequate for work, and for areas accessible to public.
3. Work shall meet applicable requirements of NFPA 70 and Division 16 - ELECTRICAL.

C. Temporary Telephone Service: Arrange with local telephone company to provide direct line telephone service at construction site for personnel and employees and for Architect. Pay costs for installation, maintenance, and removal, and pay service charges for local calls. Toll charges shall be paid by party who places call. Service required shall include:

1. One direct line instrument in Contractor Field Office.
2. One direct line for facsimile (Fax) machine in Contractor Field Office.
3. Other instruments at the option of the Contractor, or as required by regulations.

2.03 TEMPORARY CONSTRUCTION AND SUPPORT FACILITIES

A. Scope: Temporary construction and support facilities include, without limitation:

1. Temporary heat.
2. Field offices and storage sheds.
3. Engineer/Architect's Field office
4. Sanitary facilities.
5. Temporary enclosures.
6. Construction aids.
7. Temporary elevator use.
8. Waste disposal services.
9. Water control.
10. Rodent and pest control.
11. Pollution and dust control.

B. Temporary Heat and Ventilation: Provide temporary heat and ventilation required to maintain adequate environmental conditions to facilitate progress of Work, to meet manufacturers' specified minimum installation conditions, and to protect materials and finishes from damage due to temperature and humidity.

1. Ventilate enclosed areas for curing of installed materials, to disperse humidity, and to prevent hazardous accumulations of dust, fumes, vapors, and gases.
2. Portable heaters shall be standard approved units with controls.
3. Pay costs of installation, maintenance, operation, removal, and fuel consumed.

C. Contractor's Field Offices and Sheds: Prior to installation of offices and sheds, consult with Architect on location, access, and related facilities. Provide field offices and sheds as follows:

1. Construction: Provide structurally sound, weathertight units, with floors raised above ground. At Contractor's option, portable or mobile buildings may be used. Mobile units, when used, shall be modified for office use.
 2. Temperature and Moisture Transmission Resistance: Compatible with occupancy and storage requirements.
 3. Contractor's Office and Facilities: Size units as required for general use and to provide space for project meetings.
 4. Furnishings in Meeting Area: Provide conference table and chairs for at least ten people. Provide racks and files for Project Record Documents in, or adjacent to, the meeting area.
 5. Other furnishings: Contractor's option.
 6. Miscellaneous Items: Provide one 10 in. outdoor type thermometer.
 7. Storage Sheds: Provide types and sizes required to meet requirements of various trades and to adequately store and handle products. Provide heating and ventilation necessary to comply with manufacturer's product data and with code requirements for products stored.
- D. Engineer/Architect's Field Office: Prior to installation of office, consult with Architect on location, access, and related facilities. Provide field office as follows:
1. A separate structure for sole use of ENGINEER/ARCHITECT, with secure entrance doors and three keys.
 2. Area: 350 contiguous square feet minimum, with minimum dimension ten (10) feet. Floor area to be contained in one (1) independent unit.
 3. Lavatory: Built-in private sink with hot and cold potable running water and toilet with cold water connection, both fully connected to a temporary sewer system.
 4. Windows:
 - a. Minimum: three (3), with a minimum total area of ten percent (10%) of floor area.
 - b. Operable sash and insect screens.
 - c. Locate to provide view of construction areas.
 5. Furnishings:
 - a. Standard size desks with three (3) drawers, one (1) desk per occupant.
 - b. One (1) drafting table: 39 inches x 72 inches x 36 inches high, with one (1) equipment drawer. Locate table oriented in relation to the site at a window with a view of the site.
 - c. One (1) metal, double-door storage cabinet, or closet.
 - d. One (1) plan rack to hold a minimum of six (6) racks of project drawings.
 - e. Standard four-drawer legal-size metal filing cabinet with locks and keys; one (1) filing cabinet per occupant.
 - f. Six (6) linear feet of bookshelves.
 - g. Three (3) swivel arm chairs.
 - h. Two (2) straight chairs.
 - i. One (1) drafting table stool.
 - j. One (1) waste basket per desk and table.

- k. One (1) tackboard, 36 inches x 30 inches.
 - l. One (1) plain paper copier including all required supplies for operation for the duration of the project.
 - m. One (1) facsimile machine (Fax) including all required supplies for operation for duration of project.
 - n. One (1) indoor thermometer and one (1) 10-inch outdoor thermometer.
 - o. One (1) wall mounted standard pencil sharpener.
 - p. One (1) electric calculator with display and paper tape and with addition, subtraction, multiplication and division functions.
 - q. One (1) 3-hole paper punch.
 - r. One (1) hand stapler and a full box of refills.
 - s. One (1) conference table and chairs for at least eight (8) persons.
 - t. Racks and files for Project Record Documents in, or adjacent to, meeting area.
 - u. Four (4) cubic foot refrigerator.
6. Services (for the duration of the project):
- a. Lighting: fifty (50) foot-candles at desk top height.
 - b. Exterior lighting at entrance door.
 - c. Automatic, permanently installed, heating and mechanical cooling equipment (12,000 BTU AC unit) to maintain comfort conditions.
 - d. Minimum of four (4) 120 volt duplex electric convenience outlets, at least one (1) on each wall.
 - e. Electric distribution panel: Two (2) circuits minimum, 120 volt, 60 hertz service.
 - f. Drinking water cooler using commercially supplied, sanitary sealed bottled water.
 - g. Telephone: One (1) direct line instrument and connections for facsimile machine.
 - h. Toilet paper and hand towels for lavatory.
- E. Sanitary Facilities: Provide and maintain clean portable toilet facilities. Do not use permanent facilities within the building unless permitted by Architect in writing.
- 1. If use of permanent facilities is permitted, maintain washrooms in clean and sanitary condition and supply exhaustible materials such as soap, hand towels, and toilet tissue.
- F. Temporary Enclosures: Provide temporary weathertight enclosures of exterior walls as Work progresses. Design and construct temporary enclosures to provide acceptable working conditions, to provide weather protection for materials, to allow effective temporary heating, and to prevent entry of unauthorized persons.
- 1. Provide temporary exterior doors with self-closing hardware and padlocks.
 - 2. Design enclosures to be removable to allow handling of materials.

- G. Construction Aids: Provide construction aids and equipment required by personnel to facilitate execution of the Work; scaffolds, staging, ladders, stairs, ramps, runways, platforms, railings, hoists, cranes, chutes, and other such facilities and equipment.
1. Refer to respective sections for particular requirements for each trade.
 2. When permanent stair framing is in place, provide temporary treads, platforms, and railings, for use by construction personnel.
- H. Waste Disposal: Maintain all areas under Contractor's control free of extraneous debris. Initiate and maintain a specific program to prevent accumulation of debris at construction site, storage and parking areas, or along access roads and haul routes.
1. Provide containers for deposit of debris.
 2. Prohibit overloading of trucks to prevent spillage on access and haul routes.
 3. Provide periodic inspection of traffic areas to enforce requirements.
 4. Schedule periodic collection and disposal of debris.
 5. Provide additional collections and disposals of debris whenever the periodic schedule is inadequate to prevent accumulation.
- I. Water Control: Provide methods to control surface water to prevent damage to Project, site, and adjoining properties. Control fill, grading, and ditching to direct surface drainage away from excavations, pits, tunnels, and other construction areas; and to direct drainage to proper runoff.
1. Provide, operate, and maintain hydraulic equipment of adequate capacity to control surface and water.
 2. Dispose of drainage water in a manner to prevent flooding, erosion, or other damage to any portion of the site or to adjoining areas and properties.
- J. Pollution Control: Provide methods, means, and facilities required to prevent contamination of soil, water, or atmosphere by the discharge of noxious substances from construction operations. Provide equipment and personnel, perform emergency measures required to contain any spillage and to remove contaminated soils or liquids.
1. Excavate and legally dispose of any contaminated earth off-site, and replace with suitable compacted fill and topsoil.
 2. Take special measures to prevent harmful substances from entering public waters.
 3. Prevent disposal of wastes, effluents, chemicals, or other such substances adjacent to streams, or in sanitary or storm sewers.
 4. Provide systems for control of atmospheric pollutants.
 5. Prevent toxic concentrations of chemicals.
 6. Prevent harmful dispersal of pollutants to atmosphere.
- K. Dust Control: Provide positive methods and apply dust control materials to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into the atmosphere.

L. Tree and Plant Protection:

1. Preserve and protect existing trees and plants designated to remain at site, and those adjacent to site.
2. Consult with Architect, and remove agreed-on roots and branches which interfere with construction.
3. Carefully supervise excavating, grading and filling, and subsequent construction operations, to prevent damage.
4. Replace, or suitably repair, trees and plants designated to remain which are damaged or destroyed due to construction operations.
5. Relocate trees and plants to the designated area on Jetport property as directed by the Architect and or owner

M. Erosion Control

1. Plan and execute construction and earth work by methods to control surface drainage from cuts and fills, and from borrow and waste disposal areas, to prevent erosion and sedimentation.
 - a. Minimize areas of exposed bare soil.
 - b. Provide temporary control measures such as berms, dikes and drains.
2. Construct fill and waste areas by selective placement to eliminate surface silts or clays which will erode.
3. Periodically inspect earthwork to detect any evidence of the start of erosion. Apply corrective measures as required to control erosion.
4. Construct sediment basins, diversion ditches, hay bale dikes or such other erosion control devices to control runoff from any area subject to erosion during construction. All such precautionary measures including, but not limited to, construction of sediment basins, diversion ditches, benches, berms or hay bale dikes or laying fiber matting on slopes until vegetation is established, shall be at no extra cost to the OWNER.
5. Comply with all local, state and federal permits and requirements.
6. Provide Hay Bales around all catch basins and culverts in or downhill of the construction area. Hay bales and cost of cleaning catch basins and culverts shall be paid for by the CONTRACTOR.
7. The CONTRACTOR shall keep all trenches stabilized during non-working hours. The CONTRACTOR shall place approved crushed gravel in the trench every night. The CONTRACTOR shall furnish and install crushed stone or other approved material in the trench to stabilize it as directed by the Architect.

N. Traffic Safety

1. Schedule construction and place excavated material so that vehicular and pedestrian traffic may be maintained at all times. The CONTRACTOR shall be responsible for obtaining required state and local highway opening/curb cut permits prior to commencing construction of work in a highway.
2. Traffic shall be protected by barricades, warning and advance warning signs. The placement and materials shall be in general compliance with the U.S. Department of Transportation's Manual on Uniform Traffic Control Devices, latest edition, and be subject to the approval of the OWNER and Architect. If the CONTRACTOR'S operations cause traffic hazards, the CONTRACTOR shall repair the road surface, provide temporary ways, erect barricades or fences and/or take other safety measures in accordance with local, state and federal regulations.
3. The CONTRACTOR shall provide experienced flagpersons as directed by the Architect.

2.04 TEMPORARY SIGNAGE

- A. Scope: Temporary signage includes, but is not limited to:
 1. Project identification sign.
 2. Other signage as required in the Contract Documents.
- B. Project Identification Signs: Provide one painted sign, of not less than 32 sq. ft. area, with painted graphic content to include, title of Project, name of Owner, name of Owner's Representative, and name of Contractor. Sign design shall be approved by the Architect.
- C. Sign Painter: Professional with minimum five years experience in type of work required.
- D. Finishes, Painting: Adequate to resist weathering and fading for scheduled construction period.
- E. Sign Structure and Framing: New or used, wood or metal, in sound condition structurally adequate to work and suitable for specified finish.
- F. Sign Surfaces: Exterior softwood plywood with medium density overlay, standard 4 ft. x 8 ft. sheets.
- G. Thickness: As required by standards to span framing members, to provide even, smooth surface without waves or buckles.
- H. Rough Hardware: Galvanized steel or cadmium plated.
- I. Paint: Exterior quality.

1. Use Bulletin colors for graphics.
2. Colors for structure, framing, sign surfaces, and graphics: As selected by the Architect.

2.05 SECURITY AND PROTECTION FACILITIES

- A. Scope: Security and protection facilities includes, but is not limited to:
1. Temporary fire protection.
 2. Barricades, warning signs, lights.
 3. Temporary flagmen and traffic control.
 4. Temporary access routes.
 5. Temporary site control fence.
 6. Security procedures.
- B. Temporary Fire Protection: Provide and maintain suitable fire protection equipment and services. Establish procedures for fire protection for welding and other potentially hazardous construction operations. Ascertain and comply with requirements of Project insurance carrier, City of Portland Fire Department and the State of Maine Fire Marshal. Permanent fire protection system may be activated to meet these requirements. Replace fusible link heads and other expended or discharged components at time of Substantial Completion.
1. Locate temporary portable fire extinguishers in convenient locations, not less than one extinguisher per floor.
 2. Store combustible materials in containers in fire-safe locations.
 3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways, and other access routes.
- C. Barricades, Warning Signs, and Lights: Provide and maintain barricades, warning signs, warning lights, railings, walkways, and the like. Paint signs and barricades with appropriate colors, graphics, and warnings to inform public and job-site personnel of hazards.
- D. Access Roads: Locate roads, drives, walks, and parking facilities to provide uninterrupted access to construction offices, mobilization areas, work and storage areas, and other areas required for execution of the Contract.
1. Location : as designated; consult with Architect regarding any desired deviation therefrom.
 2. Maintain traffic areas free as possible of excavated materials, construction equipment, Products, snow, ice, and debris.
 3. Keep fire hydrants and water control valves free from obstruction and accessible for use.
 4. Provide, operate, and maintain temporary equipment, services, and personnel, with traffic control and protective devices, as required to expedite vehicular traffic flow

- on haul routes, at site entrances, at on-site access roads, and parking areas during construction.
- 5. Remove temporary equipment and facilities when no longer required, restore grounds to original, or specified conditions.
- E. Police Details: Provide qualified police detail when construction operations require, or as required by the Owner.
- F. Construction Parking Control: Control vehicular parking to preclude interference with public traffic or parking, access by emergency vehicles, Owner's operations, or construction operations. Monitor parking of construction personnel's private vehicles:
 - 1. Maintain free vehicular access to and through parking areas.
 - 2. Prohibit parking on or adjacent to access roads, or in nondesignated areas.
 - 3. Coordinate with APCOA, the Portland's Jetport Parking Management consultant during the work.
- G. Haul Routes: Consult with governing authorities, establish public thoroughfares which will be used as haul routes and site access. Confine construction traffic to designated haul routes.
 - 1. Provide traffic control at critical areas of haul routes to expedite traffic flow and to minimize interference with normal public traffic.
 - 2. The Contractor shall not close or obstruct any portion of any street, public or private, without obtaining permits therefore from the proper authorities. If any street or private way shall be rendered unsafe by the Contractor's operations, the Contractor shall make such repairs or provide such temporary ways or guards as shall be acceptable to the governing authority.
 - 3. The Contractor shall conduct the work at all times so that the abutters shall have access to their property. When public or private property is isolated by the temporary closure of a road, the Contractor shall be responsible for providing such safe means of access to a public way.
- H. Safety Controls and Safety Signing:
 - 1. Detour signs shall have breakaway post assemblies conforming to the applicable provisions of MDOT Specifications.
- I. Temporary Site Control Fence: Prior to start of work at the Project site, install control fence with suitably locked entrance gates. Locate fence to enclose substantially entire Project site, or that portion the Contractor establishes as required to encompass entire Project construction operation. Locate vehicular entrance gates in suitable relation to construction facilities; and to avoid interference with traffic on public thoroughfares.
 - 1. Construct fence in accordance with industry standards, and as shown on Drawings.
 - 2. Unless otherwise indicated, fence height shall be 6 ft. minimum.

- J. Security Procedures: Secure project against unauthorized entry at all times. Provide secure, locked, temporary entrances to prevent vandalism, theft, and similar violations of security.
 - 1. Storage: Provide secure, locked facilities for areas where materials and equipment are stored.
 - 2. Comply with Owner's security program.
 - 3. Secure entry during construction hours. All construction personnel shall wear a photo ID badge while on site. General Contractor shall be responsible for preparing, issuing, and controlling badges. The General Contractor shall provide a security guard at site entrance to check for badges on entry.
 - 4. All construction personnel shall sign in with the security guard on entry and exit from the site. The first and last entries for each day shall be written certification by the General Contractor's superintendent and posted security guard that premises were fully secured at both start and close of the work day. Entry log shall employ tamperproof metal locking sheaths imprinted with project ID and consecutive numbering
 - a. General Contractor shall maintain this log and submit a copy of the log and used locking bands weekly to the Architect and Program Manager.

PART 3 EXECUTION

3.01 MAINTENANCE, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. Limit waste and abuse.
- B. Maintenance: Maintain temporary facilities in operating condition; repair damages immediately upon discovery. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour per day basis.
- C. Termination and Removal: Unless otherwise requested by Architect, remove each temporary facilities when no longer useful, or when replaced by permanent facility. Clean and renovate permanent facilities that have been used during construction period, including:
 - 1. Replace air filters and clean inside of ductwork and housings.
 - 2. Replace worn parts.
 - 3. Replace lamps.

END OF SECTION

SECTION 01600

MATERIAL AND EQUIPMENT

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Contract Conditions, and other Technical Specifications Sections apply to work of this Section insofar as applicable.

1.02 WORK INCLUDED

- A. This Section specifies administrative and procedural requirements for materials and equipment used for the Project.

1.03 RELATED REQUIREMENTS

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:

1. AGREEMENT.
2. Section 01010, SUMMARY OF WORK.
3. Section 01300, SUBMITTALS.
4. Section 01630, SUBSTITUTION REQUEST FORM.
5. Section 01700, CONTRACT CLOSEOUT.

1.04 MATERIAL AND EQUIPMENT INCORPORATED INTO THE WORK.

- A. Conform to applicable specifications and standards.
- B. Comply with size, make, type and quality specified, or as specifically approved in writing by the Architect.
- C. Manufactured and Fabricated Products:
 1. Design, fabricate and assemble in accord with the best engineering and shop practices.
 2. Manufacture like parts of duplicate units to standard size and gages, to be interchangeable.
 3. Two or more items of the same kind shall be identical, by the same manufacturer.
 4. Products shall be suitable for service conditions.
 5. Equipment capacities, sizes, and dimensions shown or specified shall be adhered to unless variations are specifically approved in writing.

- D. Do not use material or equipment for any purpose other than that for which it is designed or is specified.

1.05 WORKMANSHIP

- A. Comply with industry standards except when more restrictive tolerances or specified requirements indicate more rigid standards or more precise workmanship.
- B. Perform work by persons qualified to produce workmanship of specified quality.
- C. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, and racking.

1.06 MANUFACTURERS' INSTRUCTIONS

- A. When work is specified to comply with manufacturers' instructions, submit copies of said instructions, as specified in Section 01300, SUBMITTALS, distribute copies to persons involved, and maintain one set in field office.
- B. Perform work in accordance with details of instructions and specified requirements. Should a conflict exist between Specifications and manufacturer's instructions, consult with Architect.

1.07 TRANSPORTATION AND HANDLING

- A. Arrange deliveries of products in accord with construction schedules, coordinate to avoid conflict with work and conditions at the site.
- B. Transport Products by methods to avoid Product damage; deliver in undamaged condition in manufacturer's unopened containers or packaging, dry.
- C. Provide equipment and personnel to handle Products by methods to prevent soiling or damage.
- D. Promptly inspect shipments to assure that Products comply with requirements, quantities are correct, and products are undamaged.
- E. Product Handling
 - 1. Immediately upon delivery, inspect shipment to assure:
 - a. Product complies with requirements of Contract Documents and reviewed submittals.
 - b. Quantities are correct.
 - c. Containers and packages are intact, labels are legible.

- d. Products are properly protected and undamaged.
2. Expedite replacement of damaged products.
3. Provide equipment and personnel necessary to handle products, including those provided by OWNER, by methods to prevent soiling or damage to products or packaging.
4. Provide additional protection during handling as necessary to prevent scraping, marring or otherwise damaging products or surrounding surfaces.
5. Handle products by methods to prevent bending or overstressing.
6. Lift heavy components only at designated lifting points.

1.08 STORAGE AND PROTECTION

- A. Store Products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive Products in weathertight enclosures; maintain within temperature and humidity ranges required by manufacturer's instructions.
- B. For exterior storage of fabricated Products, place on sloped supports above ground. Cover Products subject to deterioration with impervious sheet covering; provide ventilation to avoid condensation.
- C. Store loose granular materials on solid surfaces in a well-drained area; prevent mixing with foreign matter.
- D. Arrange storage to provide access for inspection. Periodically inspect to assure Products are undamaged and are maintained under required conditions.
- E. After installation, provide coverings to protect Products from damage from traffic and construction operations, remove when no longer needed.
- F. Maintenance of Storage
 1. Maintain periodic system of inspection of stored products on scheduled basis to assure that:
 - a. State of storage facilities is adequate to provide required conditions.
 - b. Required environmental conditions are maintained on continuing basis.
 - c. Surfaces of products exposed to elements are not adversely affected. Any weathering of products, coatings and finishes is unacceptable under requirements of Contract Documents.

2. Mechanical and electrical equipment which requires servicing during long term storage shall have complete manufacturer's instructions for servicing accompanying each item, with notice of enclosed instructions shown on exterior of package. Comply with manufacturer's instructions on scheduled basis.
3. Any product damaged because of improper storage or protection shall be unacceptable for installation and shall be removed from the site.

1.09 PRODUCT OPTIONS

- A. Within 30 days after date of Contract, submit complete list of major Products proposed, with name of manufacturer, trade name, and model.
- B. Options:
 1. Products specified only by reference standard: Any Product meeting that standard.
 2. Products specified by naming several manufacturers: Products of any named manufacturer meeting Specifications.
 3. Products specified by naming one or more manufacturers and "or equal": Submit a request for substitution for any manufacturer not specifically named.
 4. Products specified by naming only one manufacturer: No option.

1.10 MATERIAL SUBSTITUTIONS

- A. Where products or materials are specified by manufacturer's name, trade name or catalog reference, the words "or approved equal" shall be understood to follow unless there is a statement specifically indicating that no substitution will be allowed. An item shall be considered equal to the item so named or described if in the opinion of the Architect:
 1. It is at least equal in quality, durability, appearance, strength and design; including compliance with applicable specifications and compatibility with physical space allocations provided for the item;
 2. It performs at least equally the function imposed by the general design for the work;
 3. It conforms substantially, even with deviations to the detailed requirements for the item as indicated by the specifications.
- B. Where two or more products or materials are specified, the choice of these shall be optional with the Contractor.
- C. Should the Contractor, after the award of the Contract, wish to use any products or materials other than those specified, he shall request written permission of the Architect. His request shall name and adequately describe (including shop drawings) the proposed substitutions, furnish any information requested by the Architect, and state what difference, if any, will be made in the Contract price, including the cost of changes in the Work, for such substitutions should they be accepted. Upon receipt of

complete information from the Contractor, the Architect will consider all aspects of the proposed substitution and advise the Contractor in writing approving or disapproving the substitution. The principal reasons for approval or disapproval of the substitution will be enumerated by the Architect. Disapproval of the substitution shall not be cause for an increase in contract price or a delay in schedule.

- D. Request constitutes a representation that Contractor:
 - 1. Has investigated proposed Product and determined that it meets or exceeds, in all respects, specified Product.
 - 2. Will provide the same warranty for substitution as for specified Product.
 - 3. Will coordinate installation and make other changes which may be required for Work to be complete in all respects.
 - 4. Waives claims for additional costs which may subsequently become apparent.

- E. Substitutions will not be considered when they are indicated or implied on Shop Drawing or Product Data submittals without separate written request on the form included at the end of this Section, or when acceptance will require substantial revision of Contract Documents.

- F. The Architect will determine acceptability of proposed substitution, and will notify Contractor of acceptance or rejection in writing within a reasonable time.

- G. Any additional cost, or any loss or damage arising from the substitution of any materials, equipment or execution of work for those originally specified shall be borne by the Contractor, notwithstanding approval or acceptance of such substitution by the Architect, unless such substitution was made at the written request or direction of the Architect.

- H. Redesign
 - 1. Redesign of any portion of the work affected by the substitution and coordination of installation of the substitution shall be the responsibility of the CONTRACTOR. There shall be no increase in Contract Price for redesign due to substitution of products.

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

END OF SECTION

SECTION 01630

SUBSTITUTION REQUEST FORM

No substitutions will be considered
without this completed substitution request form and supporting documentation.

Substitutions made without completion of this form
will be considered defective work

Date: _____ Number: _____

Project: Terminal Passenger Circulation Improvements
Parking Garage and Sitework
Portland International Jetport

To: Domenech Hicks & Krockmalnic

Re: Request for Substitution

The Contractor proposes the following substitution in accordance with the requirements of the Contract Documents:

Scope of Substitution _____

Specification Reference _____

Drawing Reference _____

Reason for Proposed Substitution _____

Impact on Project Cost _____

Impact on
Project Schedule

Impact on
Guarantees and
Warranties

Coordination Required
with Adjacent Materials
and System

List Deviations
From Specified
Requirements

Attachments: Attach supporting documentation sufficient for Architect to evaluate substitution. Substitution Request Forms submitted without adequate documentation will be returned without review.

Attachments

Response Date: List date by which response by Architect is requested to maintain project schedule and allow sufficient time for inclusion of proposed substitution.

Response Date

Submitted By

Firm and Address

Signature below signifies acceptance of responsibility for accuracy and completeness of information included in this Substitution Request Form.

Authorized
Signature

ARCHITECT'S RESPONSE

Notations listed below shall have same meaning as on Architect's approval stamp. Clarifications to or changes in project schedule or time shall be processed using standard project forms.

- Architect's Response
- Approved
 - Approved as Corrected
 - Revise and Resubmit
 - Rejected
 - Returned Without Review

Remarks

Date Signed

END OF FORM

SECTION 01700

CONTRACT CLOSEOUT

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Contract Conditions, and other Technical Specifications Sections apply to work of this Section insofar as applicable.

1.02 WORK INCLUDED

- A. This Section specifies administrative and procedural requirements during contract closeout, including, but not limited to:

1. Substantial Completion.
2. Final Acceptance.
3. Record document submittal.
4. Operating and maintenance data.
5. Warranties.
6. Final cleaning.

B. Requirements for Closeout

1. Neither the final payment nor the remaining retained percentage shall become due until the CONTRACTOR has satisfied the requirements of THE CONTRACT and the following:
 - a. An affidavit that all payrolls, bills for materials and equipment, and other indebtedness connected with the work for which the OWNER might in any way be responsible, have been paid or otherwise satisfied (see attached form at end of this section).
 - b. Data establishing payment or satisfaction of all such obligations, such as receipts, releases and waivers of liens arising out of the Contract, to the extent, and in such form as may be designated by the OWNER. If any subcontractor refuses to furnish a release or waiver required by the OWNER, the CONTRACTOR may furnish a bond satisfactory to the OWNER to indemnify the OWNER against any resulting lien. If any such lien remains unsatisfied after all payments are made, the CONTRACTOR shall refund to the OWNER all monies that the latter may be compelled to pay in discharging such lien, including all costs and attorney's fees.
2. Additional requirements for Project closeout shall include submittal, (if not previously submitted) of the following:

- a. Evidence of compliance with requirements of governing authorities.
 1. Certificate of occupancy.
 2. Certificates of inspection required for mechanical and electrical systems.
- b. Project Record Documents: In accordance with Section 01720 - Project Record Documents.
- c. Operation and Maintenance Data: In accordance with Section 01730 - Operation and Maintenance Manuals.
- d. Warranties and Bonds: In accordance with Section 01740 - Warranties and Bonds.
- e. Evidence of payment and release of liens in accordance with conditions of the Contract (see attached form at end of this section).
- f. Consent of Surety to final payment (see attached form at end of this section).

1.03 RELATED REQUIREMENTS

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
 1. AGREEMENT; Fiscal provisions, legal submittals, and additional administrative requirements.
 2. Section 01010, SUMMARY OF WORK; Owner occupancy.
 3. Section 01720 RECORD DOCUMENTS.
 4. Section 01730 OPERATIONS AND MAINTENANCE MANUALS.
 5. Respective Sections of Specifications: Closeout Submittals for work of the Section.

1.04 SUBSTANTIAL COMPLETION

- A. Prior to requesting inspection for certification of Substantial Completion, complete the following:
 1. On Application for Payment, show 100% completion for portions of work claimed as substantially complete. Submit list of incomplete items, value of incomplete work, and resubmission of occupancy permits.
 2. Submission of warranties.
 3. Submission of test/adjust/balance records.
 4. Submission of maintenance instructions.
 5. Submission of meter readings.

-
6. Final cleaning.
 7. Application for reduction of retainage.
 8. Consent of surety.
 9. Notification of shifting insurance coverages.
 10. Final progress photographs.
- B. Within reasonable time, the Architect will inspect to determine status of completion.
- C. Should Architect determine Work is not substantially complete, he will promptly notify Contractor in writing, giving reasons therefor.
- D. Contractor shall remedy deficiencies, and send a second written notice of Substantial Completion. The Architect will re-inspect the Work.
- E. When Contractor determines Work is Substantially Complete, he will prepare Certificate of Substantial Completion in accordance with the AGREEMENT for approval of Architect.
- 1.05 FINAL ACCEPTANCE
- A. Prior to requesting final inspection for certification of Final Acceptance and final payment, complete the following:
1. Submission of final payment request with releases and supporting documentation.
 2. Completion of incomplete Work.
 3. Assurances that unsettled claims will be settled.
 4. Submission of updated final statement, including accounting for final additional changes to the Contract Sum. Show additional Contract Sum, additions and deductions, previous Change Orders, Total Adjusted Contract Sum, previous payments, and Contract Sum due.
 5. Submission of consent of surety.
 6. Submission of evidence of final, continuing insurance coverage complying with insurance requirements.
 7. Transmit final Project Record Documents to Owner.
 8. Transmit certified property survey.
 9. Prove that taxes, fees, and similar obligations have been paid.
 10. Remove temporary facilities and services.
 11. Remove surplus materials, rubbish and similar elements.
 12. Change lock cylinders or cores, and submit keys and keying schedules.
 13. Certify Work has been inspected for compliance with Contract Documents.
 14. Certify Work has been completed in accordance with Contract Documents, and deficiencies listed with Certificate of Substantial Completion have been corrected.
 15. Certify equipment and systems have been tested in presence of Architect, and are operational.
 16. Certify Work is complete and ready for final inspection.
- B. Architect will inspect to verify status of completion with reasonable promptness.

-
- C. Should Architect consider Work is incomplete or defective, he will promptly notify Contractor in writing, listing incomplete or defective work.
 - 1. Contractor shall take immediate steps to remedy deficiencies and send a second written certification that Work is complete, and Architect will re-inspect the work.
 - 2. When Architect finds Work is acceptable, he will consider closeout submittals.
 - 3. Re-inspection Fees: Should of Architect perform re-inspections due to failure of Work to comply with claims made by the Contractor, the Owner will deduct the amount of such compensation from final payment to the Contractor.
 - D. Application for Final Payment: Submit Application for Final Payment in accordance with procedures and requirements in Conditions of the Contract.

1.06 INSTRUCTION OF OWNER'S PERSONNEL

- A. Prior to final inspection or acceptance, fully instruct Owner's designated operating and maintenance personnel in the operation, adjustment and maintenance of products, equipment and systems.
- B. Operating and maintenance manual shall constitute the basis of instruction.
 - 1. Review contents of manual with personnel in full detail to explain all aspects of operation and maintenance.

1.07 FINAL CLEANING

- A. General: General cleaning during construction operations is specified as Work of Section 01500, CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS.
- B. Employ experienced workers or professional cleaners for Final Cleaning. Clean each surface to the condition expected in a normal building cleaning and maintenance program. Comply with manufacturer's instructions and recommendations.

PART 2 PRODUCTS

2.01 CLEANING MATERIALS

- A. General: Provide cleaning materials that will not create hazards to health nor property, and will not damage surfaces or finishes.
- B. Use cleaning materials and methods recommended by manufacturer of surface to be cleaned.
- C. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 EXECUTION

3.01 FINAL CLEANING

- A. Employ skilled workers for final cleaning.
- B. Clean and restore adjoining surfaces and other work soiled or damaged during installation; replace work damaged beyond successful restoration. Where performance of subsequent work could result in damage to complete unit or element, provide protective covering and other provisions to minimize potential for damage.
- C. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels, and other foreign materials from sight-exposed surfaces.
- D. Complete the following cleaning operations prior to requesting inspection for Certification of Substantial Completion:
 - 1. Remove labels that are not permanent.
 - 2. Clean glass and mirrors.
 - 3. Polish glossy surfaces to clear shine.
 - 4. Clean interior and exterior finishes to a clean, dust-free condition. Remove stains, films, and similar foreign substances.
 - 5. Leave concrete floors broom clean.
 - 6. Clean site areas of rubbish, litter, and other foreign substances. Sweep paved areas broom clean; rake ground surfaces clean.
- E. Replace lamps in permanent light fixtures used during construction with lamps specified in Division 16 - ELECTRICAL.
- F. Before final completion and Owner-occupancy, inspect sight-exposed exterior surfaces and work areas to verify that Work is clean.

END OF SECTION

SECTION 01720

PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Maintaining and submitting record documents and samples.

1.02 MAINTENANCE OF DOCUMENTS AND SAMPLES

- A. Maintain at the site for OWNER one record copy of:
 - 1. Contract Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other modifications to the Contract.
 - 5. Accepted shop drawings, product data, and samples.
 - 6. Field test records.
 - 7. Inspection certificates.
 - 8. Manufacturer's certificates.
 - 9. Manufacturer's operating and maintenance manuals.
- B. Store record documents and samples in field office apart from documents used for construction. Provide files, racks, and secure storage for record documents and samples.
- C. Label and file record documents and samples in accordance with section number listings in Table of Contents of this Specification. Label each document "PROJECT RECORD" in neat, large, printed letters.
- D. Maintain record documents in a clean, dry and legible condition. Do not use record documents for construction purposes.
- E. Keep record documents and samples available for inspection by ARCHITECT.

1.03 RECORDING

- A. Record information on a set of blue line drawings.
- B. Use felt tip marking pens, maintaining separate colors for each major system, for recording information.
- C. Record information concurrently with construction progress. Do not conceal any work until required information is recorded.
- D. Contract Drawings and Shop Drawings: Legibly mark each item to record actual construction, including:
 - 1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.

2. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of construction.
 3. Field changes of dimensions and details.
 4. Changes made by modifications.
 5. Details not on original Contract Drawings.
 6. References to related shop drawings and modifications.
 7. Swing ties to all underground utilities.
- E. Specifications: Legibly mark each item to record actual construction, including:
1. Manufacturer, trade name and catalog number of each product actually installed, particularly optional items and substitute items.
 2. Changes made by addenda or modifications.
- F. Other Documents: Maintain manufacturer's certifications, inspection certifications, and field test records, required by individual Specification sections.

1.04 SUBMITTALS

- A. At Contract closeout, deliver record documents and samples as specified in Section 01700 - Contract Closeout, to ARCHITECT for use in the preparation of Project Record Drawings.
- B. Transmit with cover letter in duplicate, listing:
1. Date.
 2. Project title and number.
 3. CONTRACTOR'S name, address, and telephone number.
 4. Number and title of each Record Document.
 5. Signature of CONTRACTOR or authorized representative.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01730

OPERATION AND MAINTENANCE MANUALS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Compiling of product data and related information required for maintenance of products.
- B. Preparing of operation and maintenance data and instructions for systems and equipment.
- C. Schedule of required submittals.

1.02 QUALITY ASSURANCE

- A. Prepare instructions and data using personnel experienced in maintenance and operation of described products.

1.03 FORMAT

- A. Prepare data in the form of an instructional manual.
- B. Binders: Commercial quality, 8-1/2 x 11 inch three-ring binders with hardback, cleanable, plastic covers; two inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.
- C. Cover: Identify each binder with typed or printed title "OPERATION AND MAINTENANCE INSTRUCTIONS"; list title of Project and identify equipment covered by manual.
- D. Arrange content by section numbers and provide Table of Contents.
- E. Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
- F. Text: Manufacturer's printed data, or typewritten data on twenty (20) pound paper.
- G. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

1.04 CONTENTS, EACH VOLUME

- A. Table of Contents: Provide title of Project; schedule of products and systems, indexed to content of the volume.
- B. For Each Product or System: List names, addresses and telephone numbers of subcontractors, manufacturers and suppliers, including local source of supplies and replacement parts.

- C. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation; delete inapplicable information.
- D. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.
- E. Typed Text: Prepare as required to supplement product data. Provide logical sequence of instructions for each procedure. Incorporate manufacturer's instructions for delivery, storage, assembly, installation, start-up, adjusting, finishing, operation and maintenance.
- F. Warranties and Bonds: Bind in one (1) copy of each.

1.05 MANUAL FOR MATERIALS AND FINISHES

- A. Building Products, Applied Materials, and Finishes: Include product data with catalog number, size, composition, and color and texture designations. Provide information for re-ordering custom manufactured products.
- B. Instructions for Care and Maintenance: Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.
- C. Moisture-protection and Weather-exposed Products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.
- D. Additional Requirements: As Specified in individual Specification sections.

1.06 MANUFACTURER'S MANUALS FOR EQUIPMENT AND SYSTEMS

- A. Each Item of Equipment and Each System: Include a description of unit or system, and component parts. Give function, normal operating characteristics, and limiting conditions. Include performance curves, with engineering data, tests, and certifications where appropriate and complete nomenclature and commercial number of replaceable parts, where applicable.
- B. Panel Board Circuit Directories: Provide electrical service characteristics and name of load on each branch circuit breaker.
- C. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
- D. Maintenance Requirements: Include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions. Provide servicing and lubrication schedule, and list of lubricants required.
- E. Controls: Provide the following:
 - 1. Sequence of operation.

2. Original parts list, illustrations, assembly drawings, and diagrams required for maintenance.
 3. As-installed control diagrams.
 4. CONTRACTOR'S coordination drawings, with as-installed color coded piping diagrams.
 5. Charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
 6. As-installed color coded wiring diagrams.
- F. Additional Requirements: As specified in individual Specification sections.

1.07 SUBMITTALS

- A. Submit six (6) copies of a draft Operation and Maintenance Manual for equipment and component parts within thirty (30) days after shop drawing approval. Draft manuals need only include the substantive material and need not comply with the presentation and format requirements of this section. Four (4) copies will be returned, One (1) copy will have ARCHITECT'S comments.
- B. Submit six (6) copies of revised manual in final form complying with all paragraphs of this section and all ARCHITECT'S comments within thirty (30) days from the return of the reviewed manual under paragraph 1.07 A. Four (4) copies will be returned, One (1) copy of which will have the ARCHITECT'S comments. Revise content of documents as required prior to final submittal.
- C. Submit four (4) copies of revised manual in final form within thirty (30) days from the return of manuals under paragraph 1.07 B.
- D. The ARCHITECT will review each manual submitted in a reasonable amount of time, not limited to fifteen (15) days.

1.08 SCHEDULE OF SUBMITTALS

- A. Operation and Maintenance Manuals conforming to this specification and individual specifications, shall be submitted for the following equipment.

Equipment Description
Site Lighting

The above schedule is not all inclusive of individual sections requiring operation and maintenance manuals. The CONTRACTOR remains responsible for operation and maintenance manuals for equipment both on the schedule and not on the schedule but called for in the individual specifications.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01731

SERVICES OF MANUFACTURER'S REPRESENTATIVES

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Observing installation of equipment.
- B. Checking, inspecting and adjusting equipment and certification of equipment, alarms, instrumentation and controls.
- C. Performance testing and start-up of equipment, alarms, instrumentation and controls.
- D. Operator training.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.01 OBSERVING INSTALLATION, CHECKING, INSPECTION AND ADJUSTING EQUIPMENT AND CERTIFICATION OF EQUIPMENT, INSTRUMENTATION AND CONTROLS

- A. Furnish the services of a manufacturer's qualified representative to observe the actual installation of equipment indicated on the schedule in paragraph 3.04.
- B. Furnish the services of a manufacturer's qualified trained service representative or designee acceptable to the ARCHITECT, to check, inspect, and adjust all equipment and accessories in accordance with the schedule in paragraph 3.04 and in accordance with individual specification sections. The services shall begin when the equipment is requested to be placed into operation by the CONTRACTOR and as approved by the ARCHITECT.
- C. The minimum period of time that the service representatives shall perform the services described herein shall be in accordance with the schedule in paragraph 3.04 and in accordance with individual specification sections. Any additional time to correct and make equipment ready to start-up will be "as required" and at no additional cost to the OWNER. The individual specification sections noted on the schedule are not all inclusive of sections requiring service representation.
- D. The service representative shall: inspect the equipment for proper installation, lubrication and adjustment, damage and missing parts; inspect and check control systems and accessory equipment whether or not supplied by other manufacturers; and, make all necessary corrections to make equipment ready to start-up and properly operate after start-up.
- E. Prior to equipment start-up, the service representative shall furnish a letter to the ARCHITECT confirming that equipment installation is in conformance with the manufacturer's recommendations; that all alignments, adjustments and corrections have been made; and, that the equipment is ready for operation.

- 3.02 PERFORMANCE TESTING AND START-UP OF EQUIPMENT, INSTRUMENTATION AND CONTROLS
- A. Performance testing shall not be performed until after the service representative's letter of installation certification has been furnished to ARCHITECT.
 - B. Performance testing of all electrical, mechanical and hydraulic equipment and associated controls and instrumentation shall be performed to demonstrate that the equipment and associated systems meet the specified performance conditions.
 - C. The CONTRACTOR shall provide the services of a manufacturer's qualified service representative or designee acceptable to the ARCHITECT, as required for equipment provided on the Project, to directly supervise the performance testing of equipment installed on the Project. These services shall be provided in addition to the installation observation and/or installation certification requirements and operator training requirements as described in this section.
 - D. All mechanical, electrical and hydraulic equipment and associated control systems and instrumentation are to be tested. Performance criteria and/or procedures are contained in various sections of the individual equipment specifications. Where a specific procedure is not described in the individual specifications, testing procedures common to the industry shall be employed to verify performance.
 - E. All scheduling of performance testing shall be approved by the ARCHITECT and a minimum of seven (7) days notice shall be provided to the ARCHITECT by the CONTRACTOR prior to scheduling of testing. In addition, when more than one system is to be tested within a given week, the CONTRACTOR shall provide a proposed equipment testing schedule to the ARCHITECT for review prior to initiating equipment tests.
 - F. Performance testing of all equipment shall be performed prior to plant start-up and/or acceptance of the Work. Requests for exception of this requirement must be submitted to the ARCHITECT in writing for approval.
 - G. Prior to initiating the performance tests, the general procedure to be used shall be submitted to the ARCHITECT for his review and approval.
 - H. All equipment, instrumentation, materials and labor shall be provided by the CONTRACTOR and/or the service representative.
 - I. During the performance tests, the designated service representative shall record data necessary to verify that the equipment being tested meets the specified performance criteria.
 - J. Following completion of the performance tests, the CONTRACTOR shall submit a performance test report which summarizes the results of the performance tests and certifies that the equipment meets the specified performance requirements.
 - K. If the equipment fails to meet the specified performance requirements, the equipment shall be modified or replaced and retested with the end result being that the equipment meets the specified performance criteria. Modification, replacement and retesting shall be provided at no extra cost to the OWNER.
 - L. Requests for acceptance of a piece of equipment or system will be considered only after completion of successful performance testing and submittal of the performance test report by

the CONTRACTOR.

3.03 OPERATOR TRAINING

- A. Operator training shall not be performed until after the service representative's letter of installation certification has been approved.
- B. After certifying to the installation of the equipment and at the direction of the ARCHITECT, the manufacturer's representative shall train the OWNER'S operational staff in the start-up, operation and routine maintenance of the equipment as described in Section 3.04 in the presence of the ARCHITECT.
- C. An overall scheduling proposal shall be submitted to the ARCHITECT for approval. In addition, prior to performing operator training services, a schedule for training services proposed shall be submitted to the ARCHITECT for approval at least three (3) days in advance of the proposed operator training. When more than one system is proposed for operator training in a given week, a proposed schedule for that week shall be submitted to the ARCHITECT for approval.
- D. Following the training, the manufacturer shall provide written certification to the ARCHITECT that the required training was provided.
- E. All inspection and training shall be coordinated with the ARCHITECT.

3.04 SCHEDULE OF MANUFACTURER'S SERVICE REPRESENTATIVE

- A. Services of the manufacturer's representatives for observing installation, inspecting, adjusting, testing and start-up shall be provided.

END OF SECTION

SECTION 01740

WARRANTIES AND BONDS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Preparing and submitting of warranties and bonds.

1.02 FORM OF SUBMITTALS

- A. Bind in commercial quality 8-1/2 x 11 inch, three-ring side binders, with hardback, cleanable, plastic covers.
- B. Label cover of each binder with typed or printed title "WARRANTIES AND BONDS", with title of Project; name, address and telephone number of CONTRACTOR; and name of responsible principal.
- C. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Contract Documents, with each item identified with the number and title of the specification section in which specified, and the name of product or work item.
- D. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

1.03 PREPARATION OF SUBMITTALS

- A. Obtain warranties and bonds, executed in duplicate by responsible subcontractors, suppliers, and manufacturers within ten (10) days after completion of the applicable item of work. Except for items put into use with OWNER'S permission leave date of beginning of time of warranty open until the date of substantial completion is determined. All warranty coverage shall be extended directly to the benefit of the OWNER.
- B. Verify that documents are in proper form, contain full information, and are notarized.
- C. Co-execute submittals when required.
- D. Retain warranties and bonds until time specified for submittal.

1.04 TIME OF SUBMITTALS

- A. For equipment or component parts of equipment put into service during construction with OWNER'S permission, submit documents within ten (10) days after acceptance.
- B. Make other submittals within ten (10) days after date of substantial completion, prior to final application for payment.

- C. For items of Work when acceptance is delayed beyond date of substantial completion, submit within ten (10) days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01921

PERMITS AND WORK ALLOWANCES

PART 1 – GENERAL

1.01 REQUIREMENTS INCLUDED

- A. The Contractor shall pay for and obtain all required building/electrical/plumbing/code enforcement permits prior to the commencement of work. Any and all required coordination between the Contractor and the appropriate utility/agency shall be performed as often as required or at the request of the utility/agency. The Contractor shall make all efforts to accommodate such utilities/agencies to ensure a safe and complete system is realized. The Architect shall be copied on and made aware of all correspondence between the contractor and the utility/agency(s).

1.02 SCHEDULE OF ALLOWANCES

- A. All associated fees shall be paid for by the Contractor in order to obtain the appropriate permits and the contractor shall pay all costs incurred as a result of coordination with utilities/agencies. The Contractor shall include in his bid the lump sum allowance amounts listed below to cover costs charged to the contractor by utilities/agencies for connections or work required to be accomplished by the utility/agency. Actual final payment for the allowance work will be based on actual bills from the utility/agency(s). In the event the actual cost from the utility/agency is greater than the estimated amount, the Work allowance will be increased accordingly, and the Contractor shall pay the utility/agency the difference. Conversely, if actual cost for the allowance is less than the estimated amount, the difference will be credited to the owner. The Contractor shall not pay any additional costs for each respective Work Allowance until such additional cost has been approved and accepted by the Architect. There will be no contractor markup on Work Allowances.

1.03 BASIS OF PAYMENT

- A. The Contractor shall be reimbursed for each Work Allowance on the first periodic cost estimate prepared after written verification to the Architect of receipt of the respective Work Allowance by the utility/agency. When additional costs are incurred by the utility/agency and approved by the Architect, the Contractor shall be reimbursed for each additional payment on the first periodic cost estimate prepared after verification of receipt of the payment by the utility/agency.

END OF SECTION

SECTION 01925

CONSTRUCTION AIDS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Furnishing, installing and maintaining required construction aids. Removal of materials and equipment on completion of the Work.
- B. Refer also to Section 01500 Temporary Facilities and Controls for additional requirements.

1.02 REFERENCE STANDARDS

- A. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Materials may be new or used, suitable for the intended purpose, and shall comply with requirements of applicable codes and standards.

2.02 CONSTRUCTION AIDS

- A. Provide and maintain construction aids and equipment to facilitate execution of the Work including scaffolds, staging, bracing, ladders, stairs, ramps, runways, platforms, railings, hoists, cranes, chutes and other such facilities and equipment.

2.03 TEMPORARY ENCLOSURES

- A. Provide temporary weather-tight enclosure of exterior walls for successive areas of building as work progresses, as necessary to provide acceptable working conditions, provide weather protection for materials, allow for effective temporary heating, and to prevent entry of unauthorized persons.
 - 1. Provide temporary exterior doors with self-closing hardware and padlocks.
 - 2. Provide other removable enclosures as necessary for work and for handling of materials.
- B. Provide temporary enclosures to separate work areas from areas of existing building occupied by OWNER; to prevent penetration of dust or moisture into occupied areas; to prevent damage to existing equipment; and to protect OWNER'S employees and operations from construction work.
- C. Provide temporary partition and ceiling enclosures.
 - 1. Framing and sheet materials shall comply with structural and fire rating requirements of applicable codes and standards.
 - 2. Close joints between sheet materials, and seal edges and intersections with existing

surfaces to prevent penetration of dust or moisture.

3. In locations where fire protection is required, paint ceilings and both sides of partitions with fire-retardant paint to provide maximum flame spread of 25 when tested under ASTM E84, or as required by local fire regulations.

PART 3 EXECUTION

3.01 PREPARATION

- A. Consult with ARCHITECT, review site conditions and factors which affect construction procedures and construction aids, including adjacent properties and public facilities which may be affected by execution of the Work.

3.02 GENERAL

- A. Comply with applicable requirements of Contract Documents especially Specification Section 01500, Temporary Facilities and Controls.
- B. Relocate construction aids as required by progress of construction, by storage or work requirements, and to accommodate requirements of OWNER and other contractors employed at the site.

3.03 REMOVAL

- A. Completely remove temporary materials, equipment and services when construction needs can be met by use of permanent construction.
- B. Clean and repair damage caused by installation or by use of temporary facilities.
 1. Remove foundations and underground installations used for construction aids.
 2. Grade areas of site affected by temporary installations to required elevations and slopes, and clean the area.
- C. Restore permanent facilities used for temporary purposes to specified condition.

END OF SECTION

SECTION 01930

BARRIERS

PART I GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Furnishing, installing and maintaining suitable barriers and related signage as required for project phasing, to separate pedestrian walkways from the construction area, to separate construction work areas from vehicular traffic, to prevent public entry; to provide public safety; and to protect the Work, existing facilities, trees and plants from construction operations. Removal of barriers when no longer needed, or at completion of the Work.
- B. Refer also to Section 01500 Temporary Facilities and Controls; for additional requirements.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Materials may be new or used, suitable for the intended purpose and shall comply with applicable codes and standards. Barriers shall be lighted throughout hours of darkness and during periods of inclement weather seven days per week.
- B. Barriers shall be of the various types and materials as shown on the plans.

PART 3 EXECUTION

3.01 GENERAL

- A. Install facilities in a neat and reasonable uniform appearance, structurally adequate for required purposes.
- B. Place barriers to prevent public entry and to protect the work, existing facilities and all construction operations.
- C. Maintain barriers during entire construction period or until no longer needed.
- D. Relocate barriers as required by progress of construction and phasing, and as outlined in the Contract Documents. All barriers shall be on site and in place prior to the commencement of work. Barriers shall be removed only upon approval by the ARCHITECT.
- E. Comply with applicable requirements of Contract Documents especially Specification Section 01500, Temporary Facilities and Controls.

3.02 TREE, SHRUB AND PLANT PROTECTION

- A. Preserve and protect existing trees, shrubs and plants designated to remain at site, and those adjacent to site.

- B. Consult with ARCHITECT, and remove agreed-on roots and branches which interfere with construction.
- C. Provide temporary barriers to a height of four feet, around each, or around each group, of trees, shrubs and plants.
- D. Protect root zones of trees, shrubs and plants within drip zone of canopy:
 - 1. Do not allow vehicular traffic or parking.
 - 2. Do not store materials or products.
 - 3. Prevent dumping of refuse or chemically injurious materials or liquids.
 - 4. Prevent puddling or continuous running water.
- E. Carefully supervise excavating, grading and filling, and subsequent construction operations, to prevent damage.
- F. Replace, or suitably repair, trees, shrubs and plants -designated to remain which are damaged or destroyed due to construction operations.

3.03 REMOVAL

- A. Completely remove barriers, including foundations, when construction has progressed to the point that they are no longer needed, and when approved by ARCHITECT.
- B. Clean and repair damage caused by installation, fill and grade areas of the site to required elevations and slopes, and clean the area at no additional cost to the OWNER.

END OF SECTION

SECTION 01940

SECURITY

PART I GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Providing a project security program, to:
 - 1. Protect the Work, stored products and construction equipment from theft and vandalism.
 - 2. Protect Airport property from entry by unauthorized persons.

1.02 MAINTENANCE OF SECURITY

- A. Initiate security program promptly after job mobilization.
- B. Maintain security program throughout construction period, until OWNER occupancy or OWNER acceptance precludes the need for CONTRACTOR security.

1.03 EXCLUSION OF PERSONS

- A. Persons not properly authorized or identified shall be excluded from Airport/City property.

1.04 ENTRANCE CONTROL

- A. Provide control of all persons and vehicles entering and leaving Project site. Require display of proper identification by each person.
- B. OWNER will control deliveries and vehicles related to his own operations.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 RESPONSIBILITIES

- A. The CONTRACTOR shall be fully responsible for injury to persons and damage to any and all of the OWNER'S property resulting from construction activities and/or failure to provide adequate security and safety measures.

END OF SECTION

SECTION 02221

SELECTIVE DEMOLITION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Contract Conditions, and other Technical Specifications Sections apply to work of this Section insofar as applicable.

1.02 WORK INCLUDED

- A. The work of this section includes, but is not limited to, selective demolition at interior spaces as required for new construction and the following:
 - 1. Protection of portions of the building adjacent to or affected by selective demolition, including erection of dust barriers.
 - 2. Removal and legal disposal of demolished materials off site.
- B. Contractor shall assume that demolition activities which require entry into other tenant spaces or which produce excessive noise must be performed on weekends or after normal business hours.

1.03 RELATED WORK

- A. 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 or by the Architect in the field shall remain in-place for future service and shall be protected.

1.04 SUBMITTALS

- A. Submit detailed operational plan and time line for demolition operations.

1.05 INTENT

- A. A major intent of the work of this section is to demolish, remove from site and legally dispose of items to be completely or selectively demolished as required.
- B. Upon completion of selective demolition work, spaces and surfaces shall be broom clean and all nails, wires, hangers, system components, and other items shall be removed down to bare substrates unless indicated otherwise.
- C. Contractor shall comply with requirements of all applicable Federal, State, and local safety and health regulations regarding the demolition of structures including ANSI/NFPA 241 - Building Construction and Demolition Operations.

1.06 PROJECT CONDITIONS

- A. Occupancy: Areas to be demolished will be unoccupied prior to start of work.
- B. Condition of Structures: Owner assumes no responsibility nor makes any claim as to the actual condition or structural adequacy of any existing construction to be demolished. The Contractor shall investigate and assure himself of the condition of the work to be demolished and shall take all precautions to ensure safety of persons and property.
- C. Salvage: Items indicated to be reused shall be removed by workmen skilled in the type of work involved, and stored in a manner to prevent damage. Removal shall include anchors where applicable.
 - 1. Items of value designated to be demolished which are not indicated to be returned to the Owner or to be reused, shall become the property of the Contractor. Storage or sale of items on the project site is prohibited.
- D. 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.
- E. Weather Protection: Provide temporary weather protection, during interval between demolition and removal of existing construction, on exterior surfaces and new construction to ensure that no water leakage or damage occurs to structure or interior areas.
- F. Utilities: Maintain all utilities except those requiring removal or relocation. Keep utilities in service and protect from damage. Do not interrupt utilities serving used areas without first obtaining permission from the utility company, building owner, and the Owner. Provide temporary services as required.

PART 2 - PRODUCTS Not used.

PART 3 - EXECUTION

3.01 DEMOLITION

- A. Engineer, provide and maintain throughout the course of construction all bracing and shoring required or necessary to support the existing building elements. Ensure complete compliance with all relevant notes and details on the architectural and structural drawings prior to commencement of demolition.
- B. Prior to demolition of any building elements that are to be essentially duplicated by restoration of existing materials or replacement with new materials, such building elements are to be sufficiently measured, photographed, drawn, shape molded, or otherwise documented to allow accurate restoration, replacement or reinstallation as applicable.
- C. Demolish items to be demolished completely and legally remove from site. Use demolition methods within limitations of governing regulations.
- D. Proceed with demolition systematically. Demolish in small sections and avoid overloading structure. Notify Architect immediately upon discovery of unsuitable existing structure and

remove structural members only after obtaining Structural Engineer's written permission.

- E. Remove all debris from site and dispose of legally. Burning on site is not permitted.

END OF SECTION

SECTION 03300

CAST -IN-PLACE CONCRETE

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Contract Conditions and other Technical Specification Sections apply to the work of this section.
- B. Examine all other sections of the Specifications for requirements which affect work of this Section whether or not such work is specifically mentioned in this Section.
- C. Coordinate work with that of all trades affecting or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.02 DESCRIPTION OF WORK:

- A. Work included: Provide labor, materials, and equipment necessary to complete the work of this Section and, without limiting the generality thereof, furnish and include the following:
 - 1. The extent of cast-in-place concrete work is shown on drawings and includes (but not by way of limitation) formwork, reinforcing, cast-in-place concrete, accessories, finishing, and casting in of items specified under other Sections of the Specifications or furnished by Owner that are required to be built-in with the concrete.
 - 2. Cast-in-place Concrete foundations, concrete walls, concrete ramp slabs and elevated concrete slabs on metal deck and other concrete shown on structural and architectural drawings.

1.03 RELATED WORK:

- A. Metal Fabrications: Section 05500
 - 1. Embedded Items - Section 05500
- B. Concrete Anchors - Section 05400
- C. Anchor Bolts: Section 05500
- D. Joint Sealants: Division 7
- E. Underslab Vapor Retarders/Wall Waterproofing: Division 7

1.04 QUALITY ASSURANCE:

- A. Codes and Standards: Comply with provisions of the latest edition of the following except where more stringent requirements are shown or specified:
 - 1. ACI "Manual of Concrete Practice".

2. ACI 117 "Standard Specifications for Tolerances for Concrete Construction and Materials".
 3. ACI 211.1 "Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete."
 4. ACI 212.3R "Chemical Admixtures for Concrete."
 5. ACI 301 "Specifications for Structural Concrete for Buildings."
 6. ACI 302.1R "Guide for Concrete Floor and Slab Construction."
 7. ACI 304R "Guide for Measuring, Mixing, Transporting and Placing Concrete."
 8. ACI 304.2R "Placing Concrete by Pumping Methods."
 9. ACI 306 R "Cold Weather Concreting."
 10. ACI 308 "Standard Practice for Curing Concrete."
 11. ACI 309R "Guide for Consolidation of Concrete."
 12. ACI 315 "ACI Detailing Manual."
 13. ACI 318 "Building Code Requirements for Reinforced Concrete."
 14. ACI 347R "Guide to Formwork for Concrete."
 15. Concrete Reinforcing Steel Institute, "Placing Reinforcing Bars."
 16. AISC "Code of Standard Practice for Steel Buildings and Bridges."
 17. "Code of Federal Regulations, Part 1926" per the Occupational Safety and Health Administration (OSHA), Department of Labor (Latest Revision).
- B. Materials and installed work may require testing and retesting, as directed by the Architect or Structural Engineer, at any time during progress of work. Allow free access to material stockpiles and facilities. Tests not specifically indicated to be done at Owner's expense, including retesting of rejected materials and installed work, shall be done at Contractor's expense.

1.05 SUBMITTALS:

- A. Unless otherwise specified, submittals required in this section shall be submitted for review. Submittals shall be prepared and submitted in accordance with Division 1.
- B. General Contractor shall submit a Submittal Schedule to the engineer within 30 days after they have received the Owner's Notice to Proceed.
- C. All submittals shall be reviewed and returned to the Architect within 10 working days.

- D. Incomplete submittals will not be reviewed.
- E. Submittals not reviewed by the General Contractor prior to submission to the Engineer will not be reviewed. Include on the submittal statement or stamp of approval by Contractor, representing that the Contractor has seen and examined the submittal and that all requirements listed in this Section and Division 1 have been complied with.
- F. Engineer will review submittals a maximum of two review cycles as part of their normal services. If submittals are incomplete or otherwise unacceptable and re-submitted, General Contractor shall compensate Engineer for additional review cycles.
- G. Product Data: Submit producer's or manufacturer's specifications and installation instructions for the following products. Include laboratory test reports and other data to show compliance with specifications (including specified standards).
1. Reinforcement certified mill reports covering chemical and physical properties and yield strength.
 2. Patching products.
 3. Non-shrink grout.
 4. Curing compounds, where applicable.
 5. Admixtures.
 6. Expansion/Adhesive Anchors.
- H. Shop Drawings:
1. Shop Drawing Preparation: Electronic files of structural drawings will not be provided to the contractor for preparation of shop drawings. Reproduction of any portion of the Construction Documents for use as Shop drawings is prohibited. Shop drawings created from reproduced Construction Documents will be returned without review. Submit shop drawings for fabrication, bending and placement of concrete reinforcement. Comply with ACI 315, showing bar schedules, stirrup and tie spacing, diagrams of bent bars, and arrangement of concrete reinforcement. Include special reinforcement required at openings through concrete elements. Include supplemental reinforcing and bar supports necessary to support reinforcing steel at proper location within forms or slabs.
 - a. Review of the shop drawings will be made for the size and arrangement of reinforcement. Conformance of the Shop Drawings to the Contract Drawings remains the responsibility of the General Contractor. Engineer's review in no way relieves the General Contractor of this responsibility. **Submit three prints. Prints will be reviewed by the Engineer, and then the Architect. One marked print will be returned to Contractor for printing and distribution. Multiple copies will not be marked by the Engineer.**
 - b. Shop drawings will not be reviewed as partial submittals. A complete submittal shall be provided all items listed prior. **Incomplete submittals will not be reviewed.**

- I. Mix designs: Submit all laboratory test reports and materials for each mix design listed within. Prepare mixes by the field experience method and/or trial mixtures per the requirements of chapter 5 of ACI 318. Include the calculation of average strength and standard deviation. Proportioning by water cement ratio method will not be permitted.
- J. Samples: Submit samples of materials as specified and as otherwise requested by Architect, including names, sources and descriptions.
- K. Curing Methods: Submit documentation of curing methods to be used for review. Account for anticipated project temperature ranges and conditions in curing methods.
- L. Contraction/Construction Joints: Submit plan indicating proposed location of contraction and construction joints in walls and slabs.
- M. Test Reports: Test reports shall be submitted to the Owner, Architect and Engineer within 48 hour after completion of each test.

PART 2 PRODUCTS

2.01 FORM MATERIALS:

- A. Forms for Exposed Finish Concrete: Unless otherwise indicated, construct formwork for exposed concrete surfaces with plywood, metal, metal-framed plywood faced or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings. Provide form material with sufficient thickness to withstand pressure of newly-placed concrete without bow or deflection.
 - 1. Use plywood complying with U.S. Product Standard PS-1 "B-B (Concrete Form) Plywood", Class I, Exterior Grade or better, mill-oiled and edge-sealed, with piece bearing legible inspection trademark.
- B. Forms for Unexposed Finish Concrete: Form concrete surfaces which will be unexposed in finished structure with plywood, lumber, metal or other acceptable material. Provide lumber dressed on at least 2 edges and one side for tight fit.
- C. Form Coatings: Provide commercial formulation form-coating compounds that will not bond with, stain nor adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces.

2.02 REINFORCING MATERIALS:

- A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.
- B. Welded Wire Fabric: ASTM A 185, welded steel wire fabric. Provide welded wire fabric in flat sheets.

- C. Supports for Reinforcement: Provide supports for reinforcement including bolsters, chairs, spacers, and other devices for spacing, supporting and fastening reinforcing bars and welded wire fabric in place. Use plastic, wire bar type supports or concrete block supports complying with CRSI recommendations, unless otherwise specified. Wood, clay brick and other unspecified devices are not acceptable.
 - 1. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
 - 2. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs which are plastic protected (CRSI, Class I) or stainless steel protected (CRSI, Class 2).

2.03 CONCRETE MATERIALS:

- A. Portland Cement: ASTM C 150, Type I or Type II, unless otherwise approved Use one brand of cement throughout project, unless otherwise acceptable to Architect.
- B. Normal Weight Aggregates: ASTM C 33. Provide from a single source for exposed concrete. Do not use aggregates containing soluble salts or other substances such as iron sulfides, pyrite, marcasite, or ochre which can cause stains on exposed concrete surfaces.
- C. Light Weight Aggregates: ASTM C 330.
- D. Water: Potable.
- E. Air-Entraining Admixture: ASTM C 260.
- F. High-Range Water-Reducing Admixture (Super Plasticizer): ASTM C 494, Type F or Type G containing not more than 1% chloride ions.
- G. Fiber reinforcement shall be Type III Synthetic Virgin Homopolymer Polypropylene Fibers conforming to ASTM C1116. Fiber reinforcing shall be added and distributed prior to incorporation of Super Plasticizer.
- H. Normal range water reducing admixture: ASTM C 494 Type A containing no calcium chloride.
- I. Accelerating Admixture: ASTM C 494, Type C or E.
- J. Blast Furnace Slag: ASTM C989
- K. Fly Ash: ASTM C618, Class C or F
- L. Calcium Chloride is not permitted.

2.04 RELATED MATERIALS:

- A. Underslab Vapor Retarder: Provide vapor retarder over prepared sub base. Refer to architectural drawings, geotechnical report and/or division 7 specifications for additional requirements and vapor retarder location.

- B. Non-Shrink Cement-based Grout: Provide grout consisting of pre-measured, prepackaged materials supplied by the manufacturer requiring only the addition of water. Manufacturer's instructions must be printed on the outside of each bag.
 - 1. Non-shrink: No shrinkage (0.0%) and a maximum 4.0% expansion when tested in accordance with ASTM C-827. No shrinkage (0.0%) and a maximum of 0.2% expansion in the hardened state when tested in accordance with CRD-C-621.
 - 2. Compressive strength: A minimum 28 day compressive strength of 5000 psi when tested in accordance with ASTM C-109.
 - 3. Setting time: A minimum initial set time of 60 minutes when tested in accordance with ASTM C-191.
 - 4. Composition: Shall not contain metallic particles or expansive cement.
- C. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHTO M182, Class 2.
- D. Moisture-Retaining Cover: One of the following, complying with ANSI/ASTM C 171.
 - 1. Waterproof paper.
 - 2. Polyethylene film.
 - 3. Polyethylene-coated burlap.
- E. Liquid Membrane-Forming Curing Compound: Liquid type membrane forming curing compound complying with ASTM C 309, Type I, Class A unless other type acceptable to Architect. Curing compound shall not impair bonding of any material, including floor finishes, to be applied directly to the concrete. Demonstrate the non-impairment prior to use.
- F. Preformed Expansion Joint Formers:
 - 1. Bituminous Fiber Type, ASTM D 1751.
 - 2. Felt Void, Poly-Styrene Cap with removable top as manufactured by SUPERIOR.
- G. Slab Joint Filler: Multi-component polyurethane sealant (self-leveling type).
- H. Waterstops shall be Bentonite/Butyl Rubberbased product. Use in conjunction with manufacturer's approved mastic. Acceptable products include:
- I. "Waterstop Rx," by American Colloid Co.
 - 1. "Adeka Ultra Seal MC-2010," by Asahi Denka Koeyo, Kik MN.

2.05 PROPORTIONING AND DESIGN OF MIXES:

- A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 318. Use material, including all admixtures, proposed for use on the project. If trial batch method used, use an independent testing facility acceptable to Architect for preparing and reporting proposed mix designs. The testing facility shall not be the same as used for field quality control testing unless otherwise acceptable to Architect.
- B. Submit written reports to Architect of each proposed mix for each class of concrete. Do not begin concrete production until mixes have been reviewed by Architect.
- C. Proportion design mixes to provide concrete with the following properties:
 1. Footings and foundation walls
 - a. Strength: 3000 psi at 28 days.
 - b. Aggregate: 3/4"
 - c. W/C Ratio: 0.54 maximum
 - d. Entrained Air: 6% +/- 1.5%
 - e. Slump: 4" maximum
 2. Interior Slabs on grade and elevated slabs:
 - a. Strength: 3000 psi at 28 days
 - b. Aggregate: 3/4" minimum, 1 1/2" maximum.
 - c. W/C Ratio: 0.54 maximum
 - d. Entrapped Air only (no entrainment), 2% maximum
 - e. Slump: 4" maximum
 3. Add air entraining admixture at manufacturers prescribed rate to result in concrete at point of placement having the above noted air contents.
 4. Additional slump may be achieved by the addition of a mid-range or high-range water reducing admixture. Maximum slump after the addition of admixture shall be 6 or 8 inches for mid-range or high range water reducing admixtures, respectively.
- D. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor, when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, at no additional cost to Owner and as accepted by Architect. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Structural Engineer before using in work.
 1. Water may be added at the project only if the maximum specified slump and design mix maximum water/cement ratio is not exceeded.

2. Additional dosages of superplasticizer should be used when delays occur and required slump has not been maintained. A maximum of two additional dosages will be permitted per ACI 212.3R recommendations.

2.06 CONCRETE MIXING:

- A. Job-Site Mixing will not be permitted.
- B. Ready-Mix Concrete: Must comply with the requirements of ASTM C 94, and as herein specified. Provide batch ticket for each batch discharged and used in work, indicating project name, mix type, mix time and quantity.
 1. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C94 may be required by Structural Engineer.
 2. When the air temperature is between 85 degrees F. and 90 degrees F., reduce the mixing and delivery time from 1 1/2 hours to 75 minutes, and when the air temperature is above 90 degrees F., reduce the mixing and delivery time to 60 minutes.

PART 3 EXECUTION

3.01 FORMS:

- A. Design, erect, support, brace and maintain formwork to support vertical and lateral loads that might be applied until such loads can be supported by concrete structure. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation and position.
- B. Design, construct, erect, maintain, and remove forms for cast-in-place concrete work in compliance with ACI 347.
- C. Design formwork to be readily removable without impact, shock or damage to cast-in-place concrete surfaces and adjacent materials.
- D. Construct forms to sizes, shapes, lines and dimensions shown, and to obtain accurate alignment, location, grades, level and plumb work in finished structures. Provide for openings, offsets, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in work. Use selected materials to obtain required finishes. Solidly butt joints and provide backup at joints to prevent leakage of cement paste.
- E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, dovetail slots, reglets, recesses, and the like to prevent swelling and for easy removal.
- F. Provide temporary openings where interior area of formwork is inaccessible for clean out, for inspection before concrete placement and for placement of concrete. Securely brace temporary openings and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings on forms at inconspicuous locations.

- G. Chamfer exposed corners and edges as indicated, using wood, metal, PVC or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.
- H. Form Ties: Factory-fabricated, adjustable-length, removable or snap-off metal form ties, designed to prevent form deflection, and to prevent spalling concrete surfaces upon removal.
 - 1. Unless otherwise indicated, provide ties for concrete surfaces to be exposed to view in the final condition so portion remaining within concrete after removal is 1" (minimum) inside concrete.
 - 2. Form ties shall not leave holes larger than 1" diameter in concrete surface. Repair holes left by form ties after removal of formwork.
- I. Provision for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses, and chases from trades providing such items. Accurately place and securely support items built into forms.
- J. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt or other debris just before concrete is placed. Retighten forms and bracing after concrete placement as required to eliminate mortar leaks and maintain proper alignment.

3.02 PLACING REINFORCEMENT:

- A. Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars", for details and methods of reinforcement placement and supports, and as herein specified.
 - 1. Subgrade tolerance shall conform to a tolerance of $+0/-1\ 1/2"$. Base tolerance (fine grading) for slabs shall conform to a tolerance of $+0"/-3/4"$ in. Confirm compliance of above tolerances with surveyed measurements taken at 20 ft. intervals in each direction.
 - 2. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials which reduce or destroy bond with concrete.
 - 3. Accurately position, support and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers and hangers, as required.
 - 4. Place reinforcement to obtain specified coverage for concrete protection within tolerances of ACI-318. Arrange, space and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.
 - 5. Install welded wire fabric in flat sheets in as long lengths as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset end laps in adjacent widths to prevent continuous laps in either direction.

3.03 JOINTS:

- A. Construction Joints: Locate and install construction joints, which are not shown on drawings, so as not to impair strength and appearance of the structure, as acceptable to Architect. Submit plan indicating proposed location of construction joints for review prior to beginning work.
1. Provide keyways at least 1-1/2" deep in construction joints in walls, and slabs; bulkheads reviewed by the Engineer, designed for this purpose may be used for slabs.
 2. Roughened surfaces shall be used between walls and footings unless shown otherwise on the drawings. The footing surface shall be roughened to at least an amplitude of 1/4" for the width of the wall before placing the wall concrete.
 3. Place construction joints perpendicular to the main reinforcement. Continue reinforcement across construction joints.
 4. Joints in slabs on grade shall be located and detailed as indicated on the drawings. If saw-cut joints are required, the early-entry dry-cut process shall be used. Refer to ACI 302, section 8.3.12.

3.04 INSTALLATION OF EMBEDDED ITEMS:

- A. General: Set and build into work anchorage devices and other embedded items required for other work that is attached to, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions and directions provided by suppliers of items to be attached thereto. Notify other trades to permit installation of their work. Templates to be utilized for setting of anchorage devices shall be constructed in a manner to allow mechanical consolidation of concrete. “Wet Setting” of embedded items into plastic concrete will not be permitted without special permission from the Engineer.
- B. Edge Forms and Screed Strips for Slabs: Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in finished slab surface.
- C. Provide PVC sleeves where pipes and/or conduit pass through exterior concrete or slabs. Sleeves or penetrations shall not be placed through footings, piers, pedestals, drop caps, columns or pilasters unless specifically noted.
- D. Tolerances: Tolerances for Anchor Bolts/Rods, bearing surfaces and other embedded items shall meet the requirement set forth in the latest edition of the American Institute of Steel Construction “Code of Standard Practice for Steel Buildings and Bridges,” and ACI 117. The more stringent criteria from these documents shall apply.

3.05 INSTALLATION OF GROUT

- A. Place grout for base plates in accordance with manufacturer's recommendations.
- B. Grout below setting plates as soon as practicable to facilitate erection of steel and prior to removal of temporary bracing and guys. If leveling bolts or shims are used for erection grout shall be installed prior to addition of any column load.
- C. Pack grout solidly between bearing surfaces and bases or plates to ensure that no voids remain. Finish exposed surfaces, protect installed materials and allow to cure. For proprietary grout materials, comply with manufacturer's instructions.

3.06 PREPARATION OF FORM SURFACES:

- A. Coat contact surfaces of forms with a form-coating compound before reinforcement is placed.
- B. Thin form-coating compounds only with thinning agent of type, and in amount, and under conditions of form-coating material manufacturer's directions. Do not allow excess form coating to accumulate in forms or to come into contact with concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.

3.07 CONCRETE PLACEMENT:

- A. Preplacement Review: Footing bottoms are subject to review by the Geotechnical Engineer. Reinforcement and all concrete preparation work shall be subject to review by the Structural Engineer. Verify that reinforcing, ducts, anchors, seats, plates and other items cast into concrete are placed and securely held. Notify Engineer/**Project Special Inspector** 48 hours prior to scheduled placement and obtain approval or waiver of review prior to placement. Be sure that all debris and foreign matter is removed from forms.
- B. Concrete shall be placed in the presence of an approved testing agency.
- C. General: Comply with ACI 304, and as herein specified.
 - 1. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete as nearly as practicable to its final location to avoid segregation due to rehandling or flowing.
 - 2. Concrete shall be handled from the mixer to the place of final deposit as rapidly as practicable by methods which will prevent segregation or loss of ingredients and in a manner which will assure that the required quality of the concrete is maintained.
 - 3. Conveying equipment shall be approved and shall be of a size and design such that detectable setting of concrete shall not occur before adjacent concrete is placed. Conveying equipment shall be cleaned at the end of each operation or work day. Conveying equipment and operations shall conform to the following additional requirements:
 - a. Belt conveyors shall be horizontal or at a slope which will not cause excessive segregation or loss of ingredients. Concrete shall be protected against undue drying or rise in temperature. An arrangement shall be used at the discharge end to prevent apparent segregation. Mortar shall not be allowed to adhere to the return length of the belt. Long runs shall be discharged into a hopper or through a baffle.
 - b. Chutes shall be metal or metal-lined and shall have a slope not exceeding 1 vertical to 2 horizontal and not less than 1 vertical to 3 horizontal. Chutes more than 20 feet long, and chutes not meeting the slope requirements may be used provided they discharge into a hopper before distribution.

- c. Pumping or pneumatic conveying equipment shall be of suitable kind with adequate pumping capacity. Pneumatic placement shall be controlled so that segregation is not apparent in the discharged concrete.
 - d. Concrete shall not be conveyed through pipe made of aluminum alloy. Standby equipment shall be provided on the site.
 - e. Tined rakes are prohibited as a means of conveying fiber reinforced concrete.
 4. Do not use reinforcement as bases for runways for concrete conveying equipment or other construction loads.
- D. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers not deeper than 18 inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
 1. Consolidate placed concrete by mechanical vibrating equipment. Hand-spading, rodding or tamping as the sole means for the consolidation of concrete will only be permitted with special permission from the Engineer. Use equipment and procedures for consolidation of concrete in accordance with ACI recommended practices.
 2. Use vibrators designed to operate with vibratory equipment submerged in concrete, maintaining a speed of not less than 8000 impulses per minute and of sufficient amplitude to consolidate the concrete effectively. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine, generally at points 18 inches maximum apart. Place vibrators to rapidly penetrate placed layer and at least 6 inches into the preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion maintain the duration of vibration for the time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix, generally from 5 to 15 seconds. A spare vibrator shall be kept on the job site during all concrete placing operation.
- E. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed.
 1. Consolidate concrete using internal vibrators during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 2. Bring slab surfaces to correct level with straightedge and strike off. Use bull floats or darbies to smooth surface, free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations. Do not sprinkle water on plastic surface.
 3. Maintain reinforcing in proper position during concrete placement operations.
 4. Slab thicknesses indicated on the drawings are minimums. Provide sufficient concrete to account for structure deflection, subgrade fluctuations, and to obtain the specified slab elevation at the flatness and levelness indicated here within.
 5. Finish: See "Monolithic Slab Finishes" in this specification for slab finish requirements.

- F. Cold Weather Placing: Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with ACI 306 and as herein specified.
1. When air temperature has fallen to or is expected to fall below 40 degrees F (4 degrees C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 degrees F (10 degrees C), and not more than 80 degrees F (27degrees C) at point of placement.
 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 3. Do not use calcium chloride, salt and other materials containing antifreeze agents or chemical accelerators.
 4. All temporary heat, form insulation, insulated blankets, coverings, hay or other equipment and materials necessary to protect the concrete work from physical damage caused by frost , freezing action, or low temperature shall be provided prior to start of placing operations.
 5. When the air temperature has fallen to or is expected to fall below 40 degrees F, provide adequate means to maintain the temperature in the area where concrete is being placed between 50 and 70 degrees F.
- G. Hot Weather Placing: When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACI 305 and as herein specified.
1. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 degrees F. Mixing water may be chilled, or chopped ice may be used to control the concrete temperature provided the water equivalent of the ice is calculated to the total amount of mixing water.
 2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that the steel temperature will not exceed the ambient air temperature immediately before embedment in concrete.
 3. Wet forms thoroughly before placing concrete.
 4. Do not use retarding admixtures without the written acceptance by the Architect.

3.08 FINISH OF FORMED SURFACES:

- A. Rough Form Finish: For formed concrete surfaces not exposed-to-view in the finish work or by other construction, unless otherwise indicated. This concrete surface shall have texture imparted by form facing material, with tie holes and defective areas repaired and patched and fins and other projections exceeding 1/4 in. in height rubbed down or chipped off.

- B. Smooth Form Finish: For formed concrete surfaces exposed-to-view, or that are to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, damp-proofing, painting or other similar system. This as-cast concrete surface shall be obtained with selected form facing material, arranged orderly and symmetrically with a minimum of seams. Repair and patch defective areas with fins or other projections completely removed and smoothed.
- C. Grout Cleaned Finish: Provide grout cleaned finish to scheduled concrete surfaces which have received smooth form finish treatment. Combine one part Portland cement to 1-1/2 parts fine sand by volume and mix with water to consistency of thick paint. Proprietary additives may be used at Contractor's option. Blend standard Portland cement and white Portland cement, amounts determined by trial patches, so that final color of dry grout will closely match adjacent surfaces.
 - 1. Thoroughly wet concrete surfaces and apply grout to coat surfaces and fill small holes. Remove excess grout by scraping and rubbing with clean burlap. Keep damp by fog spray for at least 36 hours after rubbing.
- D. Related Unformed Surfaces: At tops of walls and grade beams, horizontal offset surfaces occurring adjacent to formed surfaces, strike-off, smooth and finish with a texture matching adjacent uniformed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.09 FLOOR FLATNESS AND LEVELNESS

- A. Floor flatness/levelness tolerances: Tolerances for various floor uses shall conform to the requirements set forth in ACI 117 and ACI 302 for "flat" floor profile.
 - 1. Minimum Test Area Flatness/Levelness: F_F30/F_L20
 - 2. Minimum Local F Number: F_F15/F_L10
- B. Levelness criteria shall be applied to slabs-on-grade only.
- C. Contractor shall measure floor finish within 72 hours after slab finishing and provide corrective measures for finishes not within tolerance. Corrective procedures shall be reviewed by the Architect prior to implementation.

3.10 MONOLITHIC SLAB FINISHES:

- A. Scratch Finish: Apply scratch finish to monolithic slab surfaces that are to receive concrete floor topping or mortar setting beds, and as otherwise indicated.
 - 1. After placing slabs, plane surface to a tolerance not exceeding 1/2 in. in 10 ft. when tested with a 10-ft. straightedge. Slope surfaces uniformly to drains where required. After leveling, roughen surface before final set with stiff brushes, brooms or rakes.
- B. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as hereinafter specified, and slab surfaces which are to be covered with membrane or elastic waterproofing, and as otherwise indicated.

- C. Trowel Finish: Apply trowel finish to monolithic slab surfaces indicated, including slab surfaces to be covered with carpet, resilient flooring, paint or other thin-film finish coating system.
- D. Non-Slip Broom Finish: Apply non-slip broom finish to exterior concrete platforms, steps and ramps, and elsewhere as indicated.
- E. Slab finishes for floor coverings not indicated or exposed to view in the final condition shall be coordinated with the Architect prior to slab placement.
- F. Slab Joints: Where indicated, sawn slab contraction joints shall be “soft cut”, immediately after concrete surface is firm enough not to be torn or damaged by the blade.

3.11 CONCRETE CURING AND PROTECTION:

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with the requirements of ACI 308 as herein specified.
- B. Curing Methods: Perform curing of concrete by moist curing, by moisture-retaining cover curing, by curing compound, and by combinations thereof, as herein specified unless noted otherwise. Curing shall commence as soon as concrete surfaces are sufficiently hard as to withstand surface damage. Slabs-on-grade shall be cured by moist curing methods.
- C. Curing Formed Surfaces: Cure formed concrete surfaces, including undersides of beams, supported slabs and other similar surfaces by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.
- D. Protection From Mechanical Injury: During the curing period and duration of construction, the concrete shall be protected from damaging mechanical disturbances, such as load stresses, heavy shock, and excessive vibration. All finished concrete surfaces shall be protected from damage by construction equipment, materials, or methods, by application of curing procedures, and by rain or running water. Self-supporting structures shall not be loaded in such a way as to overstress the concrete.

3.12 REMOVAL OF FORMS:

- A. Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50 degrees F for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form removal operations, and provided curing and protection operations are maintained.
- B. Formwork supporting weight of concrete, such as joints, slabs and other structural elements, may not be removed in fewer than 14 days or until concrete has attained design minimum compressive strength at 28 days. Determine potential compressive strength of in-place concrete by testing field-cured specimens representative of concrete location or members.

- C. Form facing material may be removed 4 days after placement only if shores and other vertical supports have been arranged to permit removal of form facing material without loosening or disturbing shores and support.

3.13 REUSE OF FORMS:

- A. Clean and repair surfaces of forms to be reused in work. Split, frayed, delaminated or otherwise damaged form facing material will not be acceptable for exposed surfaces. Apply new form coating compound as specified for new formwork.
- B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and latency, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use "patched" forms for exposed concrete surfaces, except as acceptable to Architect.

3.14 MISCELLANEOUS CONCRETE ITEMS:

- A. Fill in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place, and cure concrete as herein specified, to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete work.

3.15 CONCRETE SURFACE REPAIRS:

- A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removal of forms, when acceptable to the Architect.
 - 1. Cut out honeycomb, rock pockets, voids over 1/4 inch in any dimension, and holes left by tie rods and bolts, down to solid concrete but in no case to a depth of less than 1 inch. Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush coat the area to be patched with specified bonding agent. Place patching mortar after bonding compound has dried.
 - 2. For exposed-to-view surfaces, blend white Portland cement and standard Portland cement so that, when dry, patching mortar will match color surrounding. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.
- B. Repair of Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Architect. Surface defects, as such, include color and texture irregularities, form tie holes, cracks, spalls, air bubbles, honeycomb, rock pockets, fins, and other projections on surface and stains and other discolorations that cannot be removed by cleaning.

3.16 QUALITY CONTROL TESTING DURING CONSTRUCTION:

- A. Testing Agency/**Project Special Inspector** shall verify reinforcement, including foundation reinforcement and slab reinforcement (WWF or reinforcing bar). Agent shall verify WWF or reinforcement has been chair/placed with proper clearances.

- B. The Owner shall employ a Testing Laboratory to inspect, sample and test the materials and the production of concrete and to submit test reports. Concrete testing shall be performed by technicians certified by the Maine Concrete Technician Certification Board and/or ACI Concrete Field Testing Technician Grade I.
- C. Concrete shall be sampled and tested for quality control during placement. Quality control testing shall include the following, unless otherwise directed by the Architect.
- D. See Submittals section for report requirements.
- E. Sampling Fresh Concrete: ASTM C 172.
 - 1. Slump: ASTM C143; **one test for each concrete load at point of discharge and** one test for each set of compressive strength test specimens. Sample shall be taken from middle third of the load per ASTM C172. A slump test must be run prior to the incorporation of the CFP fibers per recommendations of ACI 544. A slump test must be run prior to and following the addition of a water reducer (superplasticizer) per recommendations of ACI 301.
 - 2. Air Content: ASTM C231 "Pressure method for normal weight concrete." **One test for each concrete load, and** one test for each set of compressive strength specimens measured at point of discharge.
 - 3. Concrete Temperature: Per ASTM C-1064; **One test for each load and** one test each time a set of compression test specimens are made.
 - 4. Compression Test Specimen: ASTM C31; one set of 4 standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field-cure test specimens are required.
 - a. An insulated Cure Box for specimen curing shall be supplied by Testing Agency for initial curing as defined in ACI C31.
 - b. Means of heating or cooling the Cure Box shall be provided by the Inspection Agency if required in order to maintain a temperature between 60 and 80 degrees F. Contractor shall provide an electrical source to the Testing Agency when required for temperature control.
 - c. A maximum-minimum thermometer shall be provided in the Cure Box by the Testing Agency to record the temperature range of the Cure Box during specimen curing. The Testing Agency shall record the maximum/minimum temperature of the Cure Box when transferring the specimens to the laboratory.
 - d. Test Specimens shall be moist cured.
 - e. Refer to ACI C31 for additional requirements for Test Specimens.
 - 5. Compressive Strength Tests: ASTM C39; one set for each 50 cu. yds. or fraction thereof, of each concrete class placed in any one day or for each 4,000 sq. ft. of surface area placed; 1 specimen tested at 7 days, 2 specimens tested at 28 days, 1 specimen retained in reserve for later testing if required.

6. Pumped concrete shall be tested at point of discharge per ACI 301.
- F. Additional Tests: The testing service will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by the Architect. Testing service may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42, or by other methods, as directed. Contractor shall pay for such tests conducted, and any other additional testing as may be required, when unacceptable concrete is verified.

END OF SECTION

SECTION 04200

UNIT MASONRY

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Contract Conditions, and other Technical Specifications Sections apply to work of this Section insofar as applicable.

1.02 WORK INCLUDED

- A. Provide unit masonry work, as indicated on Drawings and as specified herein. Include, but do not limit to:
 - 1. Concrete masonry unit (CMU) work.
 - 2. Masonry reinforcing, anchors, and ties.
 - 3. Reinforced unit masonry work.
 - 4. Installation of access doors furnished elsewhere.
 - 5. All other unit masonry work shown on Drawings or reasonably required to make work of this Section complete in all respects.

1.03 RELATED WORK

- A. Examine Contract Documents for requirements that affect Work of this Section. Other Specification Sections that directly relate to Work of this Section include, but are not limited to:
 - 1. Section 01410, TESTING LABORATORY SERVICES; Inspection and testing.
 - 2. Section 03300, CAST-IN-PLACE CONCRETE; Concrete slabs and fills.
 - 3. Section 05500, METAL FABRICATIONS; Miscellaneous metal including furnishing of loose steel lintels to be built into masonry.
 - 4. Section 07900, JOINT SEALERS; Sealing of expansion and control joints.
 - 5. Section 08110, STEEL DOORS AND FRAMES.
 - 6. Section 08305, ACCESS DOORS; Furnishing of metal access panels.

1.04 SUBMITTALS

- A. Samples: Submit representative samples for each material as follows. Delivered materials shall closely match approved samples.
 - 1. Concrete Unit Masonry: Submit one full size unit of each type, size, and color.

2. Expansion and control joint material: Submit duplicate samples of material, minimum 6 in. length.
 3. Mortar: Submit cured mortar samples of each mortar color selected.
 4. Reinforcing Anchors and Ties: Submit samples of each type, size, thickness, and finish specified.
- B. Product Data: Submit product data of materials and systems. Include manufacturer's installation instructions, use limitations, and recommendations for each material used.
- C. Shop Drawings: Submit shop drawings showing bar schedules, stirrup spacing, diagrams of bent bars, and arrangement of masonry reinforcement for fabrication, bending, and placement of reinforcement bars. Comply with ACI 315.
- D. Samples for initial selection of the following:
1. Unit masonry samples in small scale form showing the full range of colors and textures available for each different exposed masonry unit required.
 2. Colored-masonry mortar samples showing the full range of colors available.
- E. Samples for verification of the following:
1. Full-size units for each different exposed masonry unit required showing the full range of exposed colors, textures, and dimensions to be expected in the completed construction.
 2. Colored-masonry mortar samples for each color required showing the full range of colors expected in the finished construction. Make samples using the same sand and mortar ingredients to be used on the Project. Label samples to indicate type and amount of colorant used.
 3. Weep holes/vents in color to match mortar color.
 4. Accessories embedded in the masonry.
- F. Material certificates for the following, signed by manufacturer and Contractor, certifying that each material complies with requirements.
1. Each different cement product required for mortar and grout, including name of manufacturer, brand, type, and weight slips at time of delivery.
 2. Each material and grade indicated for reinforcing bars.
 3. Each type and size of joint reinforcement.
 4. Each type and size of anchors, ties, and metal accessories.
- G. Material test reports from a qualified independent testing agency, employed and paid by Contractor or manufacturer, indicating and interpreting test results relative to compliance of the following proposed masonry materials with requirements indicated:

1.05 QUALITY ASSURANCE

- A. Source: For each type of material required by work of this section, provide primary materials which are products of a single manufacturer. Provide secondary materials which are acceptable to manufacturers of primary materials.
- B. Codes: Comply with State of Maine Building Code and ACI 530.
- C. Preconstruction Testing: Employ and pay a qualified independent testing agency to perform the following preconstruction testing to establish compliance of proposed materials and construction with specified requirements:
 - 1. Concrete Masonry Unit Test: For each different concrete masonry unit indicated, test units for strength, absorption, and moisture content per ASTM C 140.
 - 2. Prism Test: For each type of wall construction indicated, test masonry prisms per ASTM E 447, Method B.
 - 3. Test mortar properties per test methods of ASTM C 270.
- D. Fire-Resistance Ratings: Where indicated, provide materials and construction identical to those of assemblies with fire resistance ratings determined per ASTM E 119 by a testing and inspecting agency, by equivalent concrete masonry thickness, or by another means, as acceptable to authorities having jurisdiction.
- E. Single-Source Responsibility for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from one source and by a single manufacturer for each different product required.
- F. Single-Source Responsibility for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source or producer for each aggregate.

1.06 TESTS

- A. Testing and inspection of mortar and masonry materials will be conducted by testing laboratory selected and paid for as described under Section 01410, TESTING LABORATORY SERVICES.
- B. No materials shall be used on work without prior test and written approval of Testing Laboratory. Materials shall be submitted to Testing Laboratory at least three weeks in advance of proposed first use in structure for subjection to basic acceptance tests and determination of basic mixtures.
- C. At start of field operations, and periodically during course of work, Testing Laboratory will test materials and mortar and conduct on-job inspections of measuring, mixing, laying, and curing of mortar and masonry materials, including prism tests, in

conformance with ASTM C 952 and ASTM E 447 (Method B), to ensure compliance with these specifications and originally approved samples. Number and frequency of tests shall be determined by Testing Laboratory and Architect. Recommendations of Testing Laboratory shall be strictly followed.

- D. Prepare seven-day and 28-day prisms for each 5,000 sq. ft. of CMU wall area installed, and deliver to testing laboratory as directed.
 - 1. Height:thickness ratio for CMU prisms shall be no less than 1.33:1 and no more than 3:1.

1.07 PROJECT CONDITIONS

- A. Protection of Masonry: During erection, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
 - 1. Extend cover a minimum of 24 in. down both sides and hold cover securely in place.
- B. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
 - 1. Protect base of walls from rain splashed mud and mortar splatter by coverings spread on ground and over wall surface.
 - 2. Protect sills, ledges, and projections from mortar droppings.
 - 3. Protect surfaces of window and door frames, curtain wall systems, as well as similar products with painted and integral finishes, from mortar droppings.
 - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt on completed masonry.
- C. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace unit masonry damaged by frost or freezing conditions. Comply with the following requirements:
 - 1. Cold-Weather Construction: When the ambient temperature is within the limits indicated, use the following procedures:
 - a. 40 to 32 deg F: Heat mixing water or sand to produce mortar temperatures between 40 and 120 deg F.
 - b. 32 to 25 deg F: Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F. Heat grout materials to produce grout temperatures between 40 and 120 deg F. Maintain mortar and grout above freezing until used in masonry.

-
- c. 25 to 20 deg F: Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F. Heat grout materials to produce grout temperatures between 40 and 120 deg F. Maintain mortar and grout above freezing until used in masonry. Heat masonry units to 40 deg F if grouting. Use heat on both sides of walls under construction.
 - d. 20 deg F and Below: Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F. Heat grout materials to produce grout temperatures between 40 and 120 deg F. Maintain mortar and grout above freezing until used in masonry. Heat masonry units to 40 deg. Provide enclosures and use heat on both sides of walls under construction to maintain temperatures above 32 deg F within the enclosures.
2. Cold-Weather Protection: When the mean daily temperature is within the limits indicated, provide the following protection:
 - a. 40 to 25 deg F: Cover masonry with a weather-resistant membrane for 48 hours after construction.
 - b. 25 to 20 deg F: Cover masonry with insulating blankets or provide enclosure and heat for 48 hours after construction to prevent freezing. Install wind breaks when wind velocity exceeds 15 mph.
 - c. 20 deg F and Below: Provide enclosure and heat to maintain temperatures above 32 deg F within the enclosure for 48 hours after construction.
 3. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until masonry has dried out, but not less than 7 days after completion of cleaning.
- D. Hot-Weather Requirements: Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required. Do not apply mortar to substrates with temperatures of 100 deg. F, and above.
- E. Loading: Do not apply loads until work has set and cured and is ready to accept loading.
- 1.08 PRODUCT DELIVERY, STORAGE, AND HANDLING
- A. Materials shall be delivered, stored, and handled fully protected from wetting, staining, chipping, and other damage. Store masonry materials on raised timber or platforms, above ground, under weathertight covers or indoors, and kept clean and dry.
 - B. Deliver and store cement, lime, and other perishable materials in their original containers, plainly marked with brand name and manufacturer's name, indoors or in weathertight sheds.
 - C. Protect metal accessories and reinforcement from elements. Immediately before placing, remove loose rust, dirt, and other foreign materials.

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS

- A. CMU: Provide moisture-controlled, normal weight, load bearing units of Portland cement, water, sand, and gravel. Provide hollow and/or solid configurations as indicated, and conforming to ASTM C 90. Provide concrete masonry units with following characteristics:
1. Moisture Content: Not more than 35% of total absorption when tested in accordance with ASTM C 140. Maintain moisture content within this limit throughout storage and construction.
 2. Residual Linear Shrinkage: Not more than 0.01% when dried to equilibrium of 50% relative humidity at 73°F ambient temperature.
 3. Provide block exposed in finished work with uniform light gray color and uniform medium-fine texture. Manufacture units in a single run, uninterrupted except at ends of normal working days, to assure uniformity of color and texture. Moderate "manufacturing range" of variation in color and texture will be permitted, but such variations shall not exceed those shown on approved sample panels.
 4. Face: Standard, smooth face, split face, as selected by the Architect.
 5. Size: Provide units 8 in. by 16 in. nominal face size, and of indicated nominal thicknesses.
 6. Provide special shapes of each type of block, including "soaps", as required to complete work as indicated at no additional cost to Owner. Carefully review Drawings to determine scope and varieties of special block shapes required. Provide lip stretcher block 100% solid.
 7. Concrete Masonry Units for Fire-Resistive Construction: Provide concrete block for construction of fire-rated masonry block construction as listed by Underwriters' Laboratories, Inc. of Minimum Equivalent Thickness(es) defined and required by governing code.
 8. Faces of units exposed in finished work shall be handled and stored with extreme care to prevent chipping or marring. Chipped or otherwise damaged faces will not be permitted in exposed work.
 9. Provide half-blocks, lintel blocks, beam "U" blocks, other special blocks, and required special cutting. Provide jamb blocks, end blocks, control joint blocks, and lintel blocks with exposed ends closed.
 10. Provide block insulation, "KorFil" or approved equal. Insulation values to meet applicable energy codes. Block insulation shall be "U" shaped inserts as manufactured by KorFil.
 11. Split Face Units: Provide standard aggregate, split face units where indicated. Provide colors as selected by Architect from manufacturer's standard choices. More than one color will be used on the Project. Provide units from one of the following manufacturers:
 - a. A. Jandris & Sons, Inc.

- b. Plasticrete.
- c. Southeastern - Foster Brothers.
- d. Architect approved equal.

2.02 MORTAR MATERIALS

- A. Portland Cement: ASTM C 150, Type I, free from water soluble salts and alkalies. Provide cement which exhibits no efflorescence when tested in conformance with these specifications.
- B. Lime: ASTM C 207, hydrated, Type S.
- C. Grout Aggregate: Complying with ASTM C 404.
- D. Mortar Aggregate: Complying with ASTM C 144, well graded.
- E. Water: Clean, potable.

2.03 REINFORCING TIES AND ANCHORS

- A. Horizontal Joint Reinforcing and Masonry to Masonry Ties: Provide truss type, welded wire units fabricated from 3/16 in. ASTM A 82 cold-drawn galvanized steel wire, deformed side rods and smooth cross wires spaced 16 in. o.c. maximum equal to HB Lox All Adjustable Eye-Wire, Truss Type #170 or Ladder Type #270, manufactured by Hohmann & Barnard, Inc., Hauppauge, NY 11788-0270; or approved equal. Provide prefabricated corners and tees. Provide one side rod for each concrete masonry shell face. Provide two-piece adjustable eye and pintel type units for concrete masonry composite wall construction. Provide width as recommended by manufacturer for wall which gives minimum of 5/8 in. cover on exterior walls.
- B. Masonry to Structural Steel Anchors: Provide two-piece, hot-dip galvanized flexible anchors that permit horizontal and vertical movement and that provide secure lateral restraint.
- C. Miscellaneous Ties: Provide hot dip galvanized steel straps, bars, rods, and similar items which are fabricated from minimum 16 gage steel sheet or 3/16 in. diameter steel wire.
- D. Reinforcing Bars: ASTM A 615, Grade 60, deformed rebars.
- E. Galvanizing: Provide hot-dip galvanized, ASTM A 153, Class B, 1.5 oz./ft.² zinc coating on ties, joint reinforcing, anchors, and similar items which extend into exterior wall assemblies.

2.04 MISCELLANEOUS ANCHORS

- A. Unit Type Inserts in Concrete: Cast-iron or malleable-iron inserts of type and size indicated.
- B. Anchor Bolts: Steel bolts complying with ASTM A 307, Grade A with ASTM A 563 hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153, Class C; of diameter and length indicated.

2.05 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Type 2, Class A, Grade 1; compressible up to 35 percent; of width and thickness indicated; formulated from the following material:
 - 1. Neoprene.
- B. Preformed Control-Joint Gaskets: Material as indicated below, designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
 - 1. Styrene-Butadiene Rubber Compound: ASTM D 2000, Designation M2AA-805.
- C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type II (No. 15 asphalt felt).
- D. Weep Holes: Provide the following:
 - 1. Rectangular Plastic Tubing: Clear butyrate, 3/8 diameter, by 1-1/2 by 3-1/2 inches with cotton rope.
- E. Job-Mixed Detergent Solution: Solution of 1/2 cup dry measure tetrasodium polyphosphate and 1/2 cup dry measure laundry detergent dissolved in 1 gallon of water.

2.06 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
 - 1. Do not use calcium chloride in mortar or grout.
- B. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification, for types of mortar indicated below:

1. Limit cementitious materials in mortar for exterior use to Portland cement and lime.
 2. For nonload-bearing partitions, and for other applications where another type is not indicated, use Type S mortar with a minimum 28 day compressive strength (cubes or cylinders) of 1800 psi.
- C. Grout for Unit Masonry: Comply with ASTM C 476, with a minimum 28 day compressive strength of 2500 psi. Use grout of consistency indicated or, if not otherwise indicated, of consistency (fine or coarse) at time of placement that will completely fill spaces intended to receive grout.
1. Use fine grout in grout spaces less than 2 in. in horizontal dimension, unless otherwise indicated.
 2. Use coarse grout in grout spaces 2 in. or more in least horizontal dimension, unless otherwise indicated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of unit masonry. Do not proceed with installation until unsatisfactory conditions have been corrected.
- B. Examine rough-in and built-in construction to verify actual locations of piping connections prior to installation.

3.02 INSTALLATION, GENERAL

- A. Thickness: Build walls to the actual thickness of the masonry units, using units of thickness indicated.
- B. Build chases and recesses to accommodate items specified in this and other Sections of the Specifications.
- C. Leave openings for equipment to be installed before completion of masonry. After installing equipment, complete masonry to match construction immediately adjacent to the opening.
- D. Cut masonry units with motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide continuous pattern and to fit adjoining construction. Use full-size units without cutting, where possible. Allow units cut with water-cooled saws to dry before placing, unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

- E. Mix units for exposed unit masonry from several pallets or cubes as they are placed to produce uniform blend of colors and textures.

3.03 CONSTRUCTION TOLERANCES

- A. Variation from Plumb: For vertical lines and surfaces of columns, walls, and arrises, do not exceed 1/4 inch in 10 feet, nor 3/8 inch in 20 feet, nor 1/2 inch in 40 feet or more. For external corners, expansion joints, control joints, and other conspicuous lines, do not exceed 1/4 inch in 20 feet, nor 1/2 inch in 40 feet or more. For vertical alignment of head joints, do not exceed plus or minus 1/4 inch in 10 feet nor 1/2 inch maximum.
- B. Variation from Level: For bed joints and lines of exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines, do not exceed 1/4 inch in 20 feet, nor 1/2 inch in 40 feet or more. For top surface of bearing walls, do not exceed 1/8 inch in 10 feet, nor 1/16 inch within width of a single unit.
- C. Variation of Linear Building Line: For position shown in plan and related portion of columns, walls, and partitions, do not exceed 1/2 inch in 20 feet, nor 3/4 inch in 40 feet or more.
- D. Variation in Cross-Sectional Dimensions: For columns and thickness of walls, from dimensions shown, do not exceed minus 1/4 inch nor plus 1/2 inch.
- E. Variation in Mortar-Joint Thickness: Do not vary from bed-joint thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch. Do not vary bed-joint thickness from bed-joint thickness of adjacent course by more than 1/8 inch. Do not vary from head-joint thickness indicated by more than plus or minus 1/8 inch. Do not vary head-joint thickness from adjacent head-joint thickness by more than 1/8 inch. Do not vary from collar-joint thickness indicated by more than minus 1/4 inch or plus 3/8 inch.

3.04 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint widths and for accurate locating of openings, movement-type joints, returns, and offsets. Avoid the use of less-than-half-size units at corners, jambs, and where possible at other locations.
- B. Lay walls to comply with specified construction tolerances, with courses accurately spaced and coordinated with other construction.
- C. Bond Pattern for Exposed Masonry: Lay exposed masonry in running bond pattern; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

- D. Stopping and Resuming Work: In each course, rack back 1/2-unit length for one-half running bond or 1/3-unit length for one-third running bond; do not tooth. Clean exposed surfaces of set masonry, wet clay masonry units lightly if required, and remove loose masonry units and mortar prior to laying fresh masonry.
- E. Built-in Work: As construction progresses, build-in items specified under this and other Sections of the Specifications. Fill in solidly with masonry around built-in items.
- F. Fill space between hollow metal frames and masonry solidly with mortar, unless otherwise indicated.
- G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core.
- H. Fill cores in hollow concrete masonry units with grout 24 inches under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.
- J. Build nonload-bearing interior partitions full height of story to underside of solid floor or roof structure above and as follows:
 - 1. Install compressible filler in joint between top of partition and underside of structure above.

3.05 MORTAR BEDDING AND JOINTING

- A. Lay hollow concrete masonry units as follows:
 - 1. With full mortar coverage on horizontal and vertical face shells.
 - 2. Bed webs in mortar in starting course on footings and in all courses of piers, columns, and pilasters, and where adjacent to cells or cavities to be filled with grout.
 - 3. For starting course on footings where cells are not grouted, spread out full mortar bed, including areas under cells.
 - 4. Maintain joint widths indicated, except for minor variations required to maintain bond alignment. If not indicated, lay walls with 3/8-inch joints.
- B. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.
- C. Cut joints flush for masonry walls that are to receive plaster or other direct-applied finishes (other than paint), unless otherwise indicated.

3.06 HORIZONTAL-JOINT REINFORCEMENT

- A. General: Provide continuous horizontal-joint reinforcement as indicated. Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcing a minimum of 6 inches.
 - 1. Space reinforcement not more than 16 inches o.c.
 - 2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
 - 3. Provide reinforcement in mortar joint 1 block course above and below wall openings and extending 12 inches beyond opening.
- B. Cut or interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.
- C. Provide continuity at corners and wall intersections by using prefabricated "L" and "T" sections. Cut and bend reinforcement units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.
- D. Reinforced Unit Masonry: Reinforce work according to the Structural Drawings.

3.07 ANCHORING MASONRY TO STRUCTURAL MEMBERS

- A. Anchor masonry to structural members where masonry abuts or faces structural members to comply with the following:
 - 1. Provide an open space not less than 1 inch in width between masonry and structural member, unless otherwise indicated. Keep open space free of mortar or other rigid materials.
 - 2. Anchor masonry to structural members with flexible anchors embedded in masonry joints and attached to structure.
 - 3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

3.08 CONTROL AND EXPANSION JOINTS

- A. General: Install control and expansion joints in unit masonry where indicated. Build-in related items as the masonry progresses. Do not form a continuous span through movement joints unless provisions are made to prevent in-plane restraint of wall or partition movement.
- B. Form control joints in concrete masonry as follows:
 - 1. Install preformed control-joint gaskets designed to fit standard sash block.

3.09 LINTELS

- A. Install steel lintels where indicated.
- B. Provide masonry lintels where shown and where openings of more than 24 inches for block size units are shown without structural steel or other supporting lintels.
- C. Provide minimum bearing of 8 in. at each jamb, unless otherwise indicated.

3.10 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or if units do not match adjoining units. Install new units to match adjoining units; install in fresh mortar or grout, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point-up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for application of sealants.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears prior to tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 - 2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
 - 3. Protect adjacent nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
 - 4. Wet wall surfaces with water prior to application of cleaners; remove cleaners promptly by rinsing thoroughly with clear water.
 - 5. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2 applicable to type of stain present on exposed surfaces.
- E. Protection: Provide final protection and maintain conditions that ensure unit masonry is without damage and deterioration at time of Substantial Completion.

END OF SECTION

SECTION 05300
METAL DECKING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Contract Conditions and other Technical Specification Sections apply to the work of this section.
- B. Examine all other sections of the Specifications for requirements which affect work of this Section whether or not such work is specifically mentioned in this Section.
- C. Coordinate work with that of all trades affecting or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.02 DESCRIPTION OF WORK

- A. Extent of metal floor and roof deck is shown on the drawings and includes type VL composite floor deck, cell closures, end plates, pour stops with vertical leg return lip, composite finish strips and welding washers.

1.03 RELATED WORK

- 1. Section 05120 - Structural Steel
- 2. Section 05400 –Cold Formed Metal Framing

1.04 QUALITY STANDARDS

- A. Codes and Standards: Comply with provisions of the following codes and standards, except where more stringent requirements are indicated or specified:
 - 1. AISI "Specification for the Design of Cold Formed Steel Structural Members".
 - 2. AWS D1.1 "Structural Welding Code" - Steel
 - 3. AWS D1.3 "Structural Welding Code" - Sheet Steel
 - 4. Steel Deck Institute (SDI) " Design Manual for Floor Decks and Roof Decks".
 - 5. "Code of Federal Regulations, Part 1926" per the Occupational Safety and Health Administration (OSHA), Department of Labor (Latest Revision).
- B. Qualification of field welding: Qualify welding process and welding operators in accordance with AWS D1.1 "Standard Qualification Procedure."

1.05 SUBMITTALS

- A. Unless otherwise specified, submittals required in this section shall be submitted for review. Submittals shall be prepared and submitted in accordance with this section and Division 1.
- B. General Contractor shall submit a Submittal Schedule to the engineer within 30 days after they have received the Owner's Notice to Proceed.
- C. All submittals shall be reviewed and returned to the Architect within 10 working days.
- D. Incomplete submittals will not be reviewed.
- E. Submittals not reviewed by the General Contractor prior to submission to the Engineer will not be reviewed. Include on the submittal statement or stamp of approval by Contractor, representing that the Contractor has seen and examined the submittal and that all requirements listed in Division 1 have been complied with.
- F. Engineer will review submittals a maximum of two review cycles as part of their normal services. If submittals are incomplete or otherwise unacceptable and re-submitted, General Contractor shall compensate Engineer for additional review cycles.
- G. Product Data: Submit manufacturer's specifications and installation instructions for each type of decking and accessories. Include manufacturer's certification as may be required to show compliance with these specifications.
- H. Shop Drawings:
 - 1. Shop Drawing Review: Electronic files of structural drawings **will not** be provided to the contractor for preparation of shop drawings.
 - a. Submit detailed drawings showing layout and types of deck panels, galvanizing, shop paint, anchorage details, and conditions requiring closure panels, supplementary framing, sump pans, cant strips, cut openings, special jointing, and all other accessories. Conformance of the Shop Drawings to the Contract Drawings remains the responsibility of the General Contractor. Engineer's review in no way relieves the General Contractor of this responsibility. Submit one print and one reproducible. Print will be reviewed and a reproducible will be returned to Contractor for printing and distribution. Multiple copies will not be marked by Engineer.
 - b. Shop drawings will not be reviewed as partial submittals. A complete submittal shall be provided and shall include; erection and piece drawings. Incomplete submittals will not be reviewed.

1.06 DELIVERY, STORAGE AND HANDLING:

- A. Deliver materials to site at such intervals to insure uninterrupted progress of work.
- B. Store materials to permit easy access for inspection and identification. Keep deck sheets off ground, using pallets, platforms, or other supports. Protect deck sheets and packaged materials from corrosion and deterioration.

- C. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Materials shall be stored in a manner to avoid ponding of precipitation on members. Repair or replace damaged materials or structures as directed.

PART 2 PRODUCTS

2.01 GENERAL:

- A. Acceptable Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:
 - 1. United Steel Deck
 - 2. Wheeling Corrugating Co.
 - 3. Epic Metals Corporation
 - 4. Vulcraft
- B. Materials:
 - 1. Steel for Metal Deck Units:
 - a. Floor Deck Units: ASTM A611, Grade C, D or ASTM 653-94, Structural Quality, grade 40 or higher
 - 2. Miscellaneous Steel Shapes: ASTM A36 minimum.
 - 3. Sheet metal Accessories: ASTM A526, commercial quality, galvanized.
- C. Galvanizing: Conform to ASTM 924-94 with minimum coating class of G60 (Z180) as defined in ASTM A653-94.
- D. Paint: Manufacturer's baked on, rust inhibitive paint, for application to metal surfaces which have been chemically cleaned and phosphate chemical treated.
- E. Flexible closure Strips: Manufacturer standard vulcanized, closed-cell, synthetic rubber.

2.02 FABRICATION:

- A. General: Form deck units in lengths to span 3 or more supports, unless otherwise noted on the drawings, with flush, telescoped or nested 2" laps at ends and interlocking or nested side laps, unless otherwise indicated.
- B. Metal Cover Plates: Fabricate metal cover plates for end-abutting floor deck units of not less than same thickness as decking. Form to match contour of deck units and approximately 6" wide.

- C. Metal Closure Strips: Fabricate metal closure strips, cell closures, "Z" closures, column closures, pour stops, girder fillers and openings between decking and other construction, of not less than 0.045" min. (18 gage) sheet steel or as indicated on the drawings. Form to provide tight fitting closures at open ends of cells or flutes and sides of decking.
- D. Pour Stops: Minimum material thickness shall be 18 gage or as indicate on drawings.. Fabricate vertical leg to accommodate specified slab thickness. Fabricate horizontal leg to minimize field cuts. Provide welded attachment sufficient to resist forces during concrete placement.
- E. Provide all pour stops and accessories necessary to contain concrete for poured concrete surfaces.

PART 3 EXECUTION

3.01 INSTALLATION:

- A. Install deck units and accessories in accordance with manufacturer's recommendations and final shop drawings, and as specified herein.
- B. Place deck units on supporting steel framework and adjust to final position with ends accurately aligned and bearing on supporting members before permanently fastened. Deck shall be in full contact with members parallel to ribs and attached as indicated. Do not stretch or contact side lap interlocks.
- C. Place deck units in straight alignment for entire length of run of cells and with close alignment between cells at ends of abutting units.
- D. Place deck units flat and square, secured to adjacent framing without warp or excessive deflection.
- E. Coordinate and cooperate with the structural steel erector in locating decking bundles to prevent overloading of structural members.
- F. Do not use decking units for storage or working platforms until permanently installed.

3.02 FASTENING:

- A. Floor Deck: Fasten metal deck to supporting steel members as indicated on the Design Drawings: Each deck is to be fastened with a minimum of 5/8" diameter puddle welds spaced not more than 12" o.c. with a minimum of 2 welds per unit at each support. Secure deck units at 6" oc along brace lines, edge of building or at the edge of openings or deck discontinuity. Secure deck to each supporting member in ribs where sidelaps occur. Use welding washers where recommended by the deck manufacturer. Deck units shall bear over the ends of supports by a minimum of 1.5inches. Sidelaps: #10 Tek screws, 5/8" arc puddle welds or 1" long fillet welds, intervals not exceeding 36 inches. Crimped or button punched sidelaps are not permitted.

- B. Welding: Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work.
- C. Uplift loading: Floor deck units are not required to resist uplift loads.
- D. Cutting and Fitting: Cut and neatly fit deck units and accessories around other work projecting through or adjacent to the decking.
- E. Reinforcement at openings: Provide additional metal reinforcement and closures pieces as required for strength, continuity of decking and support of other work shown.
 - 1. Deck penetrations affecting no more than (1) deck rib need not be reinforced.
 - 2. For deck penetration affecting more than (1) deck rib, but less than 10", reinforce the opening with a 0.057" thick plate spanning between unaffected ribs, unless otherwise shown on the Design Drawings or supporting a piece of mechanical equipment (see item 3).
 - 3. Reinforce deck penetrations larger than 10" with the structural frame described in the Design Drawings.
- F. Joint Covers: Provide metal joint covers at abutting ends and changes in direction of floor deck units.
- G. Closure Strips: Provide metal closure strips at open uncovered ends and edges of roof decking, and in voids between decking and other construction. Weld into position to provide a complete decking installation.
- H. Touch-Up Painting:
 - 1. Painted Deck: After decking installation, wire brush, clean and paint scarred areas, welds and rust spots on top and bottom surfaces of decking units and supporting steel members.
 - a. Touch up painted surfaces with same type paint used on adjacent surfaces.
 - b. In areas where shop-painted surfaces are to be exposed, apply touch-up paint to blend into adjacent surfaces.

3.03 QUALITY CONTROL:

- A. General: Contractor is responsible for maintaining quality control in the field and for providing a structure that is in strict compliance with the Contract Documents.
- B. Required inspection and testing services are intended to assist the Contractor in complying with the Contract Documents. These specified services, however, do not relieve the Contractor of his responsibility for compliance, nor are they intended to limit the Contractor's quality control efforts in the field.

- C. Testing: Owner shall engage an Independent Testing Agency to inspect all puddle welded connections, to perform tests and prepare reports of their findings. All connections must pass these inspections prior to the installation of subsequent work which they support.
- D. Deck Testing Requirements (to be performed by the Independent Testing Agency):
1. Deck and accessory welding and/or attachments subject to inspection and testing. Work found to be defective will be removed and replaced at the Contractor's expense.
 2. Provide certification that welders to be employed in work have satisfactorily passed AWS qualification tests. If re-certification of welders is required, re-testing will be the Contractor's responsibility.

END OF SECTION

SECTION 05400
COLDFORMED METAL FRAMING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Contract Conditions and other Technical Specification Sections apply to the work of this section.
- B. Examine all other sections of the Specifications for requirements which affect work of this Section whether or not such work is specifically mentioned in this Section.
- C. Coordinate work with that of all trades affecting or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.02 DESCRIPTION OF THE WORK

- A. Work specified within this Section includes, but is not necessarily limited to, the following:
 - 1. Provide and install steel stud structural bearing wall framing system at floor infill as noted on the Drawings.
 - 2. Providing and installing miscellaneous fasteners, hat channels, stiffeners, bridging, expansion joints, bracing, headers and accessories necessary to complete the work.
- B. Related work specified elsewhere:
 - 1. Metal Decking - Section 05300

1.04 QUALITY ASSURANCE

- A. Materials and installation shall conform to recommendations of the following publications:
 - 1. American Iron and Steel Institute Cold-Formed Steel Design Manual, Specification for the Design of Cold-Formed Steel Structural Members, 1986 Edition and 1989 Addendum.
 - 2. AWS D1.1 "Structural Welding Code" - Steel.
 - 3. AWS D1.3 "Structural Welding Code" - Sheet Steel.
 - 4. ASTM C 954, Standard specification for steel drill screws for the application of gypsum board or metal plaster bases to steel studs from 0.033 in. to 0.112 in. thickness.

5. ASTM C 955, Standard Specification for Load-Bearing Steel Studs, Runners, and Bracing or Bridging, for Screw Application of Gypsum Board and Metal Plaster Bases.
6. ASTM C 1007 Standard Specification for installation of load bearing steel studs and related accessories.
7. ASTM 653 Standard Specification for Sheet Steel, zinc or zinc alloy-coated by the hot dip process.

1.04 SUBMITTALS

- A. General: Submit the following information for review by the Architect/Engineer prior to beginning work.
- B. Product Data: Submit Manufacturer's specifications and installation instructions for the following products. Include laboratory test reports and other data to show compliance with specifications.
 1. Steel Studs
 2. Anchors and anchor bolts
 3. Self drilling screws
- C. Wall Framing Layout Drawings: Provide 1/4" scale wall framing elevation drawings indicating stud sizes, locations, headers, jamb and sill construction with all connections shown. Drawings shall clearly indicate arrangement of framing to ensure compliance with the design intent.

PART 2 PRODUCTS

2.01 FRAMING MEMBERS & COMPONENTS

- A. Steel Studs:
 1. Framing materials shall be as indicated on the drawings as manufactured by Dietrich. Approved equals will be considered.
 2. Provide channel-shaped load-bearing studs, channel-shaped joists, runners (tracks), blocking, lintels, clip angles, shoes, reinforcements, stiffeners, fasteners, and other accessories recommended by manufacturer for complete framing system.
 3. Steel framing materials shall comply with ASTM A 446, A 570, or A 611, as applicable. Fabricate all components from structural quality sheet steel with the following minimum yield points:
 - a. 16 ga. and heavier 50,000 psi
 - b. 18 ga., 33,000 psi minimum

- c. 20 ga., 33,000 psi minimum
 4. Manufacture of studs, runners (track), and other framing members shall comply with ASTM C 955.
 5. Framing components shall be galvanized per ASTM A 525, minimum G-60 coating.
- B. Screws and other attachment devices:
1. Screws shall be of the type, size and location show in the contract documents or approved shop drawings.
 2. Provide a protective cadmium or zinc plated coating and comply with ASTM A 165 type NS.
 3. Self-drilling screws shall comply with the Industrial Fastener Institute Standard for steel self-drilling and tapping screws (IFI-113).
 4. Penetration through jointed materials shall not be less than three (3) exposed threads.
 5. Contractor shall refer to installation instructions published by the screw manufacturer and ASTM C954 for minimum spacing and edge distance requirements and torque requirements.
- C. Concrete Anchors
1. Screw type concrete fasteners shall be Hilti Kwik Con II or approved equal.
 2. Powder actuated fasteners shall be 0.145" diameter Hilti X-DNI for concrete or X-EDNI for steel.
 3. Concrete anchors shall not be installed until full compressive strength is obtained.
 4. Contractor shall refer to instructions published by the anchor manufacturer for minimum spacing, edge distance and concrete embedment and additional installation requirement.
- D. Standard Steel Shapes:
1. Standard steel shapes, plates, etc. shall conform to material and finish specifications in Division 5 -Miscellaneous Metals.

PART 3 EXECUTION

3.01 INSTALLATION: GENERAL

- A. Product Storage: Store studs, joists, track etc. on a flat plane. Material damaged (i.e. rusted, dented, bent or twisted) shall be discarded. Protect adhesives and sealants from freezing.
- B. Construction Methods: Construction may be either piece-by-piece (stick-built), or by fabrication into panels either on or off site.
- C. Material Fit up: All framing components shall be cut squarely or at an angle to fit squarely against abutting members. Members shall be held firmly in position until properly fastened. Prefabricated panels, if used, shall be square and braced against racking.
- D. Cutting: Cutting of steel framing shall be by saw, shear or plasma cutting equipment. Oxyacetylene torch cutting is not permitted.
- E. Bracing: Temporary bracing shall be provided and remain in place until work is permanently stabilized and permanent bracing is installed.
- F. Splices: Where splicing of track is necessary between stud spacing, a piece of stud shall be placed between adjacent tracks and fastened by welds or screws to each side of the track, each end. Splicing of framing components, other than track, is not permitted.
- G. Spacing: Studs shall be spaced as shown (in the contract documents or approved shop drawings) or as required to meet the design requirements and limitations of the collateral materials.
- H. Attachment: Components shall be joined by self-drilling screws, so that connection meets or exceeds required design loads. Wire tying of framing components will not be permitted. Field welding will be permitted only where shown on the drawings or approved by the engineer.
- I. Anchorage to Structure: Securely anchor studs and track to floor construction and overhead structure as indicated on contract documents. Provide fasteners at a maximum of 16" on center.
- J. Openings: Frame openings larger than 2 ft. square with double studs. Provide suitable reinforcements (double studs, headers, jack studs, cripples, bracing, etc.) at control joint intersections, corners, and other special conditions.

3.02.1 INSTALLATION: LOAD BEARING (AXIAL) WALL STUDS

- A. Studs shall be installed seated squarely against the web (within 1/16th) of the top and bottom track to assure transfer of axial load. Studs shall be plumbed, aligned and secured to the continuous runner tracks at each and each side before the installation of components which induce axial load.
- B. Track shall rest on a continuous bearing surface. If not provided, install full size shims below track at stud locations or set bottom track in high strength non-shrink grout.

- C. Bridging shall be installed before loading. Bridging shall be flat straps with solid blocking at mid-height of stud or cold rolled channels through stud punchouts. Install per manufacturer's recommendations.
- D. Framed wall openings shall include headers and supporting components as shown in the contract documents or approved shop drawings.
- E. Installation of shear wall assemblies, as shown in the contract documents or approved shop drawings shall be completed before the attachment of facing materials and the erection of ascending levels.
- F. Where the floor or roof components do not directly align over a stud, a continuous distribution member shall be provided at the top of the wall. Do not use the top track as a distribution member unless specifically designed for that purpose.

END OF SECTION

SECTION 05500

METAL FABRICATIONS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Contract Conditions, and other Technical Specifications Sections apply to work of this Section insofar as applicable.

1.02 WORK INCLUDED

- A. The work of this Section includes, but is not limited to the following:

1. Stainless steel handrails, railings and guardrails.
2. Loose steel lintels.
3. Miscellaneous framing and supports.
4. Perforated metal.
5. Stainless steel corner guards.
6. Stainless steel column covers.
7. Rough hardware.

1.03 RELATED WORK

- A. Examine Contract Documents for requirements that affect Work of this Section. Other Specification Sections that directly relate to Work of this Section include, but are not limited to:

1. Section 01420, MOCK-UPS; Requirements for constructing mock-up.
2. Section 03300, CAST-IN-PLACE CONCRETE; Placing of inserts and anchors.
3. Section 06100, ROUGH CARPENTRY; Rough hardware for rough carpentry work.
4. Section 09900, PAINTING; Field painting.
5. Division 15, MECHANICAL and Division 16, ELECTRICAL; hangers, brackets, troughs, guards, and other steel items for support or protection of Mechanical and Electrical work.

1.04 SUBMITTALS

- A. Shop Drawings: Submit shop drawings of work showing size and thickness of each member, type of material, method of connection and assembly. Show dimensions, clearances, anchorages, relationships to surrounding work, coatings, and other pertinent details of fabrication and installation.

1. Show profiles, reinforcing, fasteners, and any accessories.
2. Indicate welded connections using standard AWS welding symbols. Indicate net weld lengths.

- B. Product Data: Provide manufacturer's product data, installation instructions, use limitations, and recommendations for each material used. Provide certifications that materials comply with requirements.

- C. Calculations: Where installed metal fabrication work is indicated to comply with certain design loadings, provide professionally prepared calculations, material properties, certification, and other information required for structural analysis of performance of work.
- D. Welders Certification: Provide certifications, signed by Contractor, certifying that welders employed at project comply with requirements specified under AWS D1.1 and AWS D1.2.
- E. Mock-Ups: Prior to commencing the primary work of this Section, provide materials as required for mock-ups at locations acceptable to Architect. Comply with requirements specified under Section 01420, MOCK-UPS. Obtain Architect's acceptance of visual qualities. Protect and maintain accepted mock-ups throughout the remainder of the work of this section to serve as criteria for acceptance of the work.

1.05 QUALITY ASSURANCE

- A. Engineering: Provide services of a professional engineer, registered in State of Maine, to design and certify that work of this Section meets or exceeds performance requirements specified.
- B. Shop fabricate work to greatest extent possible. Label each piece in shop to facilitate field assembly.
- C. Welding: Perform welding in conformance with AWS D1.1 and D1.3. as applicable.
- D. Architectural Exposed Structural Steel: For all items indicated on the Drawings, or specified herein as "Architectural Exposed Structural Steel", comply with all requirements of AISC Specification for Architecturally Exposed Structural Steel.
 - 1. For Architectural Steel, and items exposed to view in the completed work, take special care in choosing materials that are smooth and free of blemishes such as pits, roller marks, trade names, scale and roughness. Fabricate work with uniform, hairline tight joints. Form joints and seams welded continuously and grind flush and smooth so that welds are invisible after painting.
- E. The Architect retains the right to inspect the fabrication plant where metal fabrications are being fabricated. Architect will review materials proposed for use by fabricator, and may, to extent necessary, inspect fabrication operations from time to time.

1.06 PRODUCT HANDLING AND STORAGE

- A. Store work off ground and under cover. Protect from damage. Repair and clean work before erection.

1.07 PROJECT CONDITIONS

- A. Do not permit use of stairs, ladders, handrails, or other work until work is completely and fully installed and ready to assume intended design loads. Do not permit overloading of metal fabrication systems. Do not permit use of concrete filled metal pan stair systems until concrete is placed and cured.

PART 2 PRODUCTS

2.01 MATERIALS

- A. General: Provide products and materials of new stock, free from defects, and of best commercial quality for each intended purpose.
- B. Steel Plates, Shapes, and Bars: ASTM A 36.
- C. Steel Tubing: ASTM A 500 or A 501, hot or cold rolled, as required for design loading.
- D. Steel Pipe: ASTM A 53, schedule 40, Type S (seamless), black except where galvanized is indicated, Grade A for cold-bending.
- E. Steel Pipe for Bollards: ASTM A 53, schedule 80, Type S (seamless), galvanized, Grade A for cold-bending.
- F. Steel Sheet: ASTM A 366, A 570, or A 611, grade required for design loading.
- G. Architectural Exposed Structural Steel: Where Architectural Exposed Structural Steel is indicated on Drawings, provide Architectural Steel that conforms to requirements of the AISC Specification for Architecturally Exposed structural Steel.
- H. Iron Castings: ASTM A 47, or A 48, grade and class are manufacturer's options.
- I. Bolts and fasteners: ASTM A 307 and A 325.
- J. Stainless Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 304.
- K. Stainless Steel Bars and Shapes: ASTM A 276, Type 304.
- L. Stainless Steel Rods: ASTM A276.
- M. Concrete: Concrete fill for steel pan stair systems is specified in Section 03300, CAST-IN-PLACE CONCRETE.
- N. Inserts: Threaded or wedge type, galvanized ferrous castings; either ASTM A 47 malleable iron, or ASTM A 27 cast steel. Provide threaded inserts and wedge inserts manufactured by one of the following or Architect approved equal:
 - 1. Hohmann and Barnard.
 - 2. Gateway Erections, Inc.
 - 3. Richmond Screw Anchor Co.
- O. Provide anchors, bolts, sockets, sleeves, and other parts required for securing each item of work to other construction. Furnish inserts and sleeves to be set into concrete formwork and concrete under Section 03300, CAST-IN-PLACE CONCRETE. Furnish anchors, bolts, and other items required to be built-into masonry under Section 04200, UNIT MASONRY.
 - 1. Anchor bolts, bolts smaller than 5/8 in., and fasteners shall be steel castings conforming to ASTM A 307. Bolts larger than 5/8 in. shall conform to ASTM A 325.

- P. Provide exposed fastenings of same material and finish as metal to which applied, unless otherwise noted.
- Q. Welding Rods: Conform to AWS Standards and recommendations of welding rod manufacturer.
- R. Grout for Interior Applications: Pre-mixed, non-staining, non-corrosive, non-shrink, non-metallic complying with CE CRD-C-621, Type D.

2.02 FABRICATION - GENERAL

- A. Fabricate work of this Section to be straight, plumb, level and square, and to sizes, shapes and profiles indicated on approved shop drawings. Ease exposed edges. Cut, reinforce, drill and tap metal work as required for proper assembly.
 - 1. Fabricate miscellaneous supports, brackets, braces and the like required to fully complete the work.
 - 2. Obtain loading requirements from suppliers of work to be supported. Design and support systems with a safety factor of at least 5 unless otherwise indicated.
 - 3. Allow for thermal movement resulting from 100°F change in ambient temperature.
 - 4. Shear and punch metals accurately. Remove burrs.
 - 5. Ease exposed edges to a radius of approximately 1/32 in., unless indicated otherwise. Form bent corners to smallest radius possible without causing grain separation or impairing work.
 - 6. Remove sharp or rough areas on exposed traffic surfaces.
 - 7. Weld seams continuously. Spot welding is permitted for temporary welding only.
- B. Work Exposed to View: For work exposed to view, select materials with special care. Provide materials which are smooth and free of blemishes such as pits, roller marks, trade names, scale and roughness. Fabricate work with uniform hairline joints. Form welded joints and seams continuously. Grind welds flush to be smooth after painting. For exposed fasteners, use hex head bolts or Phillips head counter-sunk machine screws.
- C. Galvanizing: Hot-dip galvanize items located in exterior wall assemblies, and other items indicated to be galvanized, in compliance with ASTM A 123, ASTM A 153, or ASTM A 386. Provide minimum 1.5 oz./ft.² zinc coating. Galvanize after fabrication.
- D. Loose Steel Lintel Fabrication: Fabricate lintels from angles or shapes for openings, recesses in walls, where shown, and elsewhere where needed. Provide for minimum of 8 in. bearing at each end. Weld individual angles or shapes together to form composite members where indicated or required.
- E. Steel and Stainless Steel Handrails and Guardrails and Pipe Guards: Conform to ASTM E 985 for design and engineering for structural performance based on testing performed in accordance with ASTM E 894 and ASTM E 935, using load and deflection values specified below. Design and fabricate handrails and guardrails to support 50 lb. per linear foot uniform load and 300 lb. concentrated load, located at any point to cause greatest stress horizontally or vertically. Load conditions do not act concurrently. Design maximum deflection of any member under load conditions shall not exceed L/360.
 - 1. Provide members of type, size, style and profile indicated, unless otherwise required to

-
- support loads. Provide standard steel pipe rails to greatest extent possible to meet applicable design load requirements.
2. Provide fully welded construction, using internal slip connectors. Grind joints smooth and flush so that joints are invisible after painting.
 3. Provide coped joints at member intersections, fully welded all around. Provide mitered connections at square turns unless radius turns are indicated.
 4. Provide smooth radii at bends and maintain uniform cross-section throughout with no kinks, cracks, buckling or twisting.
 5. Return ends to walls with concealed anchors, except where detailed not to return to wall.
 6. Close ends with 1/8 in. steel plate, or hemispherical fittings.
 7. Provide toe boards fabricated to dimensions and details indicated.
 8. Provide brackets, flanges, fittings and anchors for connecting railings to railing, railings to floors, landings, stringers, and walls.
 9. For railing posts set in concrete, fabricate sleeves from steel pipe not less than 6 in. long, and with an inside diameter not less than 1/2 in. greater than outside diameter of post with a steel plate closure welded to bottom of sleeve. Provide friction fit, removable covers designed to keep sleeves clean and hold top edge of sleeve 1/2 in. below finished surface of concrete.
 10. Where removable railing posts are indicated, provide slip-fit sockets fabricated from steel pipe with an inside diameter sized for a close fit with posts, so that deflection of post at top is limited to 1/12 of post height.
 11. Architectural Steel Fabrication: Fabricate work to be truly straight, plumb, level and square and to sizes, shapes, and profiles indicated on approved shop drawings. Ease exposed edges. Cut, reinforce, drill and tap metalwork as necessary for proper assembly and use.
 - a. Fabricate all miscellaneous metal supports, brackets, braces and the like required to fully complete the architectural steel handrails and guardrails.
 - b. Welding: Any welds at steel connections shall be performed in the shop to the greatest extent possible.
 - c. Design bolted connections to allow for field adjustment.
 - d. Take special care in choosing materials that are smooth and free of blemishes such as pits, roller marks, trade names, scale and roughness. Fabricate work with uniform, hairline tight joints. Form joints and seams welded continuously and grind flush and smooth to be invisible after painting.
 - e. Use full length pieces. Minimize all splices. Locate splices at locations as approved by Architect.
 - f. Ends of rods shall align at either side of posts.
 - g. Ends of all handrails shall be rounded as indicated.
- F. Miscellaneous Framing and Supports: Fabricate miscellaneous framing and supports to adequately support live and dead loads with a safety factor of 5. Provide necessary anchors, inserts, and fasteners. Fabricate support system to carry entire load of work being supported to structure above. Do not transfer any loads to ceiling systems.
1. Cut, drill, and tap units to receive hardware, hangers and similar items.
 2. Coordinate loading and attachment requirements for miscellaneous framing and supports with manufacturers of items being supported.
- G. Perforated Metal: Perforated Metal: Provide 16 gage steel sheet with 5/8"-diameter holes, staggered pattern, at stair railing and 11 gage steel sheet with 3/4"-diameter holes, staggered pattern, at garage guardrail by Ametco or approved equal.

1. Panels shall be factory-coated with shop applied polyester powder coating. Color will be selected by the Architect.
 2. Panel Heights and Widths: As indicated.
- H. Stainless Steel Corner Guards: Fabricate from ASTM A 666, Type 314 stainless steel with ANSI No. 4 finish, as indicated on the Drawings.
- I. Rough Hardware: Provide standard and custom fabricated bolts, anchors, hangers, dowels and other miscellaneous metal items as needed to properly complete the work of the project.
1. Fasteners and Fittings: Provide exposed fasteners and fittings as indicated on the Drawings and as selected by the Architect. Exposed fasteners and fittings shall be finished as indicated.
- J. Stainless Steel Column Covers: Provide custom column covers of shapes, dimensions, and configurations shown on Drawings.
1. Manufacturers: Product manufactured by one of the following, or Architect approved equal:
 - a. Fry Reglet
 - b. Pittcon
 - c. Baker Metal Products, Inc.
 - d. MM Systems
 2. Column covers shall be equal to Series E by Fry Reglet with butt joint. All secondary posts, anchors, clips and fasteners are to be provided as a complete package of this work. No exposed fasteners for metal closures are allowed.
 3. Stainless steel sheet shall be Type 304, minimum 0.064" (16 Gauge).
 4. Secondary Framing: Provide the following secondary framing members:
 - a. Secondary structural members shall be the manufacturer's standard sections fabricated from 14-gage (0.0747-inch) cold-formed galvanized steel.
 - b. Clips and Anchors shall be manufacturer's standard stainless steel.

2.03 FINISHING

- A. General: Shop prime work to greatest extent possible, except those items indicated to be embedded in concrete, and those items indicated to receive fireproofing. Field touch-up shop applied coatings after installation.
- B. Prepare work for shop priming in compliance with SSPC SP6.
- C. Provide 1 mil dry film thickness of rust inhibitive primer over properly prepared, non-galvanized and/or non-fireproofed surfaces. Provide two coats with 2 mils total dry film thickness for surfaces which are inaccessible after assembly or erection.
- D. Primer for Non-Galvanized Ferrous Surfaces (except interior handrail and railing assemblies and interior steel stairs): Provide high-quality, lead-free, rust-inhibitive primer, equal to one of the following:
1. Series 10 Metal Primer, Tnemec.
 2. Bar-ox Quick Dry Universal Primer; Devoe and Raynolds.

3. Ironclad Retardo; Benjamin Moore.
- E. Interior Handrail and Railing Assemblies and Interior Steel Stairs: Provide one of the following shop primers:
 1. No. 69 Hi-Build Epoxoline; Tnemec.
 2. Approved equal by International Protective Coatings.
 3. Approved equal by Valspar.
- F. Touch-Up for Galvanized Surfaces: Touch-up damaged or abraded galvanized surfaces with products equal to one of the following:
 1. Cold Galvanizing Compound; ZRC.
 2. Speedhide Galvanized Steel Paint; PPG.
 3. Series 90-93 Zinc-Rich Primer; Tnemec.
- G. Shop Primer for Galvanized Fabrications: Exterior galvanized handrails, ladders, exhaust lintels, shelf angles, pipe bollards, and other items as indicated or directed by Architect to be painted, shall be primed with one of the following shop primers within 12 hours of the galvanizing process. Provide one coat of the following at 3.0 to 4.0 mils DFT for galvanized items indicated to be painted:
 1. No. 69 Hi-Build Epoxoline; Tnemec.
 2. International Protective Coatings equal.
 3. Valspar equal.
- H. Bituminous-based paint for electrolytic isolation shall be cold applied black asphaltic mastic conforming to SSPC Paint 12, with no asbestos fibers

PART 3 EXECUTION

3.01 PREPARATION

- A. Coordinate and furnish anchorage devices, setting drawings, diagrams, templates, instructions, and directions for installation of concrete inserts, sleeves, anchor bolts, and miscellaneous items to be embedded or attached to concrete work, masonry work, or structural steel work.

3.02 INSTALLATION, GENERAL

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners necessary for securing work of this Section to in-place construction. Include threaded fasteners for concrete and masonry inserts, toggle bolts, through bolts, lag bolts, wood screws, and other connectors required.
 1. Provide chemical epoxy-type anchors for stair installation.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installation of work of this Section.
- C. Erect work square, plumb and true, accurately fitted, and with tight joints and intersections. All anchors, inserts and other members to be set in concrete or masonry shall be furnished loose

by this trade to be built-into concrete and masonry by those trades. Avoid field cutting or drilling to greatest extent possible.

- D. Brace work rigid and secure to surrounding construction. Provide temporary bracing or anchors where required.
- E. Fit exposed connections accurately together to form hairline joints. Shop weld connections, except when work cannot be shop welded due to shipping size or galvanizing limitations.
- F. Field Welding: Comply with AWS D1.1 and D1.2 for procedures of manual metal-arc welding, appearance and quality of welds, and correction methods for defective welds.
- G. Where members other than expansion bolts or inserts are fastened into concrete, set such members in proprietary-type expanding grout manufactured specifically for such purpose. Use grouts strictly in accordance with manufacturer's directions. Form to receive members with galvanized metal sleeves, or other approved method to provide at least 1/2 in. clearance around entire perimeter. At exposed applications, hold expanding grout back 1/2 in. from finish surface and fill voids with Portland cement grout to match color and texture of surrounding concrete surface.
- H. Electrolytic Isolation: Where dissimilar metals are to come into contact with one another, isolate by application of a heavy coating of bituminous paint on contact surfaces in addition to shop coat specified above. Do not permit the bituminous paint in any way to remain on surfaces to be exposed or to receive sealant.

3.03 INSTALLATION

- A. Loose Steel Lintels: Furnish loose steel lintels required at masonry openings throughout project to Masonry trade for installation. Provide as scheduled on Structural Drawings.
- 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 1-1/2 in. of clearance between walls and handrails, unless otherwise indicated. Provide wall brackets and/or posts as required at spacings indicated, or if not indicated, not more than 6 ft. - 0 in. o.c., or as required to support specified loads.
- C. Miscellaneous Items: Carefully review Drawings for miscellaneous metal items required by various trades but not specifically listed above, such as miscellaneous clip angles, miscellaneous steel bracketing, and other miscellaneous metal items as indicated on Drawings, reasonably implied therefrom, or reasonably necessary for thorough completion of work.

3.04 REPAIRING, CLEANING, AND PROTECTION

- A. Non-Galvanized Surfaces: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed surfaces with same material as used for shop painting. Comply with SSPC PA 1.
- B. Galvanized Surfaces: Clean welds, bolted connections and abraded areas and apply galvanizing repair paint in compliance with ASTM A 780.

END OF SECTION

SECTION 06100

ROUGH CARPENTRY

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Contract Conditions, and other Technical Specifications Sections apply to work of this Section insofar as applicable.

1.02 WORK INCLUDED

- A. Provide all rough carpentry work, as indicated on the Drawings and as specified herein. Rough carpentry shall include but not be limited to:
 1. Rough hardware, inserts, and related metal components.
 2. Rough carpentry sleepers, blockings, curbs, cants, edgings, grounds, nailers, and furring.
 3. Wood preservative treatments and applications.
 4. Plywood backing panels for electrical and telephone equipment.

1.03 RELATED WORK

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
 1. Section 03300, CAST-IN-PLACE CONCRETE; Installation of inserts and anchor bolts.
 2. Section 06402, INTERIOR ARCHITECTURAL WOODWORK.

1.04 QUALITY ASSURANCE

- A. Provide lumber and plywood bearing the grade-trademark of the association under the rules or standards of which it was produced. Grade-trademarks shall conform to the rule or standard under which the material is produced, including requirements for qualifications and authority of the inspection organization, usage of authorized identification, and information included in the identification.
 1. Grades specified are the minimum acceptable. Lumber grades shall be determined in accordance with ASTM D 245.
 2. Lumber shall bear the grade mark of an American Lumber Standards Committee, Board of Review-approved agency. Lumber shall conform to USDC PS 20.
 3. Lumber shall bear a mark of mill identification.

4. Plywood shall comply with APA Ref. 1 grading requirements, USDC PS 1, and ANSI A199.1.
5. Fasteners shall comply with CABO NER-272.

1.05 SUBMITTALS

- A. Shop Drawings: Submit shop drawings of wood blocking installation and other rough carpentry work. Describe proposed methods of installation and anchorage to structure showing sizes, types, thicknesses, connections of wood blocking and related items, including adjoining work by other trades.
- B. Samples: Submit representative samples of all materials for use under this Section.
- C. Product Data: Submit product data consisting of manufacturers product description and specifications.
- D. Certificates: Submit certificates of grading, treatment, and conformance to specified standards. Certifications shall state date of treatment, conformance with Specifications, and agency grading of wood.

1.06 COORDINATION

- A. Coordinate the work of this Section with the work of other Sections to assure the steady progress of all the work of the Contract.

1.07 PRODUCT DELIVERY AND STORAGE

- A. Stack and store materials above ground under protective coverings, or indoors in such a manner to insure proper drainage, ventilation, and protection. Do not place kiln dried materials in the building until concrete and masonry work have been completed, and are sufficiently dry.
- B. Store rough carpentry materials stickered in elevated piles to allow for air circulation below. Wrapped lumber completely, including bottoms, in waterproof tarps. Tie tarps down to protect against wind blow-off. Stored lumber in covered storage trailers during project delays.

PART 2 PRODUCTS

2.01 LUMBER AND PLYWOOD

- A. Lumber: Provide lumber for miscellaneous wood framing, blocking, cant strips, nailers, etc. for all work of the Project, including, but not limiting to, handrails, railings, roofing, flashing, sheet metal work, and the like.

- B. Provide new lumber of consistent size, free of stains and mildew, kiln dried to a moisture content of not more than 19% by weight. Where exposed or semi-exposed, provide wood members selected for best possible appearance from the grade of stock specified.
- C. Provide lumber in longest practical lengths. Use single length pieces wherever possible.
- D. Plywood shall conform to the requirements of APA Design/Construction Guide, Residential and Commercial, and be Structural 1 rated sheathing.

E. General Carpentry Material Schedule shall be as follows:

<u>Item</u>	<u>Grade</u>	<u>Species</u>
Lumber 2 in. nominal thickness or greater	Construction Grade	Douglas-Fir
Lumber less than 2 in. nominal thickness	Construction Grade	Douglas-Fir or Spruce

- E. Pressure Preservative Treated Lumber: Pressure preservative treat lumber above ground and in contact with roofing, flashing, sheet metal, masonry, concrete, dampproofing, and waterproofing in conformance with AWPA C2. Provide pressure preservative treated lumber with a minimum net retention of 0.25 pcf. Dry lumber to maximum moisture content of 19% after treatment. Use only waterborne preservatives which conform to AWPA P5. Creosote preservatives are not acceptable.
 - 1. Pressure preservative treat lumber in contact with ground in compliance with AWPA C2 with a minimum net retention of 0.40 pcf.
- F. Fire Retardant Treated Lumber: Provide lumber located at interior of building fire retardant treated complying with AWPA C20, Type A. Provide fire retardant treatment which, yields a flame spread rating of not more than 25 when tested in accordance with ASTM E 84 kiln dried after treatment to maximum moisture content of 19%.

2.02 CONSTRUCTION PANELS

- A. Scope: Construction panels required to complete the work of this Section include, but is not limited to the following:
 - 1. Electrical and telephone equipment backing panels.

- B. Comply with USDC PS 1 and APA Ref. 1 as applicable. Factory mark each panel with APA trademark showing compliance with requirements.
- C. Plywood Backing Panels for Telephone and Electrical Equipment: Provide APA trademarked, Performance-Rated sheathing, UL fire-retardant treated, C-D Plugged, Exposure 1 panels, not less than 5/8 in. thick. Provide fire-retardant treatment which yields a flame spread rating of not more than 25 when tested in conformance with ASTM E 84, and conforms to AWWA C 27, Interior Type A. Kiln dry after treatment to a maximum moisture content of 15%.

2.03 MISCELLANEOUS MATERIALS

- A. Inserts, Anchors, and Fasteners: Provide inserts, anchors, anchor bolts, lag bolts, screws, washers, nuts, nails, and other rough hardware. Assist other trades as necessary in the placement of inserts and anchor bolts in concrete and masonry. Furnish full instructions regarding locations, sizes, and other requirements to ensure proper preparation. Provide rough hardware which complies with requirements of the governing laws and codes.
- B. Rough Hardware: Provide rough hardware items for use at roof and other exterior uses hot-dip galvanized in accordance with ASTM A 153. Provide other concealed items cadmium plated or zinc chromate plated.
- C. Provide hammer drive anchors and fasteners for securing wood framing, blocking or plywood into masonry of sufficient length to penetrate the receiving member a minimum of 1-1/2 in.
- D. Building Felts: Provide 15 lb. asphalt saturated felts, non-perforated, conforming to ASTM D 226, Type I.

PART 3 EXECUTION

3.01 ROUGH CARPENTRY WORK, GENERAL

- A. Refer to Drawings to determine the major extent of the rough carpentry work required.
- B. The Contractor shall be responsible for structural integrity, connections, and anchorage of rough carpentry work.
- C. Discard units of material which are unsound, warped, bowed, twisted, improperly treated, not adequately seasoned, or too small to fabricate.
- D. Set rough carpentry work to required levels and lines, with members plumb and true to line, cut and fitted.

- E. Provide wood sleepers, blockings, curbs, cants, edgings, grounds, nailers, and furring where required for screeding or attachment to other work. Coordinate locations with other work to be supported.
- F. Attach to substrates as required to support applied loading. Countersink bolts and nuts flush with surfaces.
- G. Provide permanent grounds of dressed, preservative treated, key-bevelled lumber not less than 1-1/2 in. wide, and of thickness required.
- H. Unless indicated otherwise, blockings, nailers, etc., of 2 in. nominal thickness or greater shall be bolted to back-up material with 1/2 in. bolts (galvanized at exterior locations and at roofs) located 4 in. from ends and splices, and spaced not greater than 32 in. on center along lengths of the members. Provide nails of sufficient length to penetrate receiving member a minimum of 1-1/2 in.
- I. Butt joints in wood shall be flush to provide smooth, uniform line with no irregularities. Built-up blocking shall have butt joints staggered 4 in. minimum layer to layer. The minimum length of any individual piece of lumber shall be 12 in. Lengths of lumber shall have a minimum of four fasteners.
- J. Construct all rough carpentry work plumb, level, and true with tight, close fitting joints, securely attached and braced to surrounding construction. Counterbore for bolt heads, nuts, and washers where required to avoid interference with other materials.
- K. Install all wood grounds at gypsum wallboard work, including those required by other trades, to properly attach their work, such as grounds to assure proper lines and levels and for attachment of fixtures, louvers, grilles, registers, diffusers, etc. Do not include fixture support blockings at steel stud framed or furred gypsum finished walls or partitions as work of this Section.
- L. Repair all damage caused by puncturing of conduits, pipes, ducts, etc. When nailing, drilling, or powder-driving into concrete or masonry.

3.02 FASTENING OF WOODWORK

- A. Fasten wood to masonry with hammer driven anchors through predrilled holes spaced 8 in. on center maximum. Predrill the hole, insert fastener sleeve, and secure in place with nail.
- B. Install plywood on masonry surfaces hammer driven anchors through predrilled holes spaced 12 in. on center along the top and bottom edges. Keep fasteners 3 in. minimum from the board edge. Drive fastener heads flush with surface. Secure plywood to wood substrate with nails at same spacing as hammer driven anchors. Secure plywood to metal studs with screws approved by metal stud manufacturer.

3.03 CLEANING

- A. Upon completion of rough carpentry work in any given area, remove all rubbish and debris from the work area and leave in broom clean condition.

END OF SECTION

SECTION 06402

INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Contract Conditions, and other Technical Specifications Sections apply to work of this Section insofar as applicable.

1.02 WORK INCLUDED

- A. The work of this section includes, but is not limited to, architectural woodwork including the following:
 - 1. Standing and running trim and rails

1.03 RELATED WORK

- A. Examine Contract Documents for requirements that affect Work of this Section. Other Specification Sections that directly relate to Work of this Section include, but are not limited to:
 - 1. Section 06100, ROUGH CARPENTRY; Blocking, grounds and nailers.

1.04 INTENT

- A. A major intent of the work of this section is to provide all wood related products that are exposed to view and are not specified as part of another specification section.

1.05 SUBMITTALS

- A. Certifications: Provide certifications stating that materials and fabrication complies with specification requirements.
- B. Shop Drawings: Provide large scale shop drawings for fabrication, installation and erection of all parts of the work. Provide large scale detailed plans, elevations, and details of anchorages, connections and accessory items.
- C. Field Measurements: Take accurate field measurements before preparation of shop drawings and fabrication. Do not delay job progress; allow for field cutting and fitting where taking field measurements before fabrication is not possible.

- D. Verification Samples: Submit at least two fully finished representative samples of each material that is to be exposed in the finished work, showing the full range of color and finish variations expected.

1.06 QUALITY ASSURANCE

- A. Source: For each material type required for work of this Section, provide primary materials which are product of one manufacturer. Provide secondary or accessory materials which are acceptable to manufacturers of primary materials.
- B. Installer: A firm with a minimum of three years experience in type of work required by this Section.
- C. Quality Standard: Provide work complying with applicable requirements of AWI Quality Standards. Where not otherwise indicated, fabricator may choose among options permitted by AWI for grade of work specified.
 - 1. Panel Products: Provide minimum 45 pounds per cubic foot medium density particleboard. Do not use hardboard.
- E. Mock-Ups: Prior to commencing primary work of this Section, provide mock-ups of areas indicated on the Drawings at locations acceptable to Architect. At a minimum, one 4' mock-up of each major type of work is required.
 - 1. Provide materials for color and finish mockups specified in Section 09900 - Painting.
 - 2. Clarify extent of mock-up with Architect prior to fabrication. Obtain Architect's acceptance of visual qualities. Protect and maintain accepted mock-ups throughout remainder of work of this Section to serve as criteria for acceptance of work. Approved mock-ups may be incorporated into finished work.

1.07 PROJECT CONDITIONS

- A. Substrates: Proceed with work only when substrate construction and penetration work is complete.
- B. Wet Work: Proceed with work of this Section after wet work has been complete and fully dry or cured. Wet work is defined as plaster, gypsum drywall, paint, concrete, etc.
- C. Conditioning: Advise Contractor of temperature and humidity requirements for woodwork installation. Do not install work of this Section until required temperature and relative humidity in areas of installation has been stabilized and will be maintained.

PART 2 - PRODUCTS

2.01 LUMBER

- A. Lumber: Provide AWI Lumber Grade 1; solids shall be Baltic. Kiln dry to 6-8 percent moisture content. Components shall be free of defects.

2.02 STANDING AND RUNNING TRIM AND RAILS

- A. Scope: Standing and running trim work includes, but is not limited to, the following:
 - 1. Handrails.
 - 2. Miscellaneous molding and trim.
- B. Quality Standard: Provide AWI Premium Grade materials and workmanship.
- C. Wood Species and Cuts: Provide as follows:
 - 1. Transparent Finished Work: As specified hereinabove
- D. Shop Assembly: Shop assemble casings and frames with accurately mitered joints, pressure glued with lemon shaped splines.

PART 3 - EXECUTION

3.01 WORKMANSHIP - GENERAL

- A. Work of this Section shall conform to design and detail indicated. Where practicable, work shall be finished and assembled at architectural millwork shop.
- B. Work shall be finished smooth and free from machine or tool marks that will telescope through finish.

3.02 INSTALLATION

- A. Preinstallation Meeting: Convene a pre-installation conference to establish procedures to maintain optimum working conditions and coordinate this work with related and adjacent work. Require architectural woodwork manufacturer, Installer, Contractor, and Architect to attend.
- B. The Installer shall examine substrates, supports, and conditions under which this work is to be performed and notify Contractor, in writing, of conditions detrimental to the proper completion of the work. Do not proceed with work until unsatisfactory conditions are corrected. Beginning of installation work means Installer's acceptance of substrates and conditions.
- C. Condition woodwork to average prevailing humidity conditions in installation areas prior to installation.

- D. Proceed with installation only when required ambient conditions have been properly maintained, as determined by all attending pre-installation conference.
 - 1. Provide work to sizes, shapes, and profiles indicated on approved shop drawings.
 - 2. Install work to comply with quality standards and tolerances specified for shop work.
 - 3. Color match wood at joints and seams to minimize expression of joints and seams in transparent finished work.
- E. Install architectural woodwork plumb, level, true and straight. Shim as required using concealed shims. Install work, including tops, to a tolerance of $\pm 1/8$ in. in 8 ft.
- F. Scribe and cut architectural woodwork to fit adjoining work. Refinish cut surfaces.

3.03 REPAIRING AND PROTECTION

- A. Repair minor damage to eliminate all evidence of repair. Remove and replace work which cannot be satisfactorily repaired.

- B. Provide temporary protection to ensure work being without damage or deterioration at time of final acceptance. Remove protections and reclean as necessary immediately before final acceptance.

END OF SECTION

SECTION 07210

BUILDING INSULATION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Contract Conditions, and other Technical Specifications Sections apply to work of this Section insofar as applicable.

1.02 WORK INCLUDED

- A. Provide building insulation work as indicated on Drawings, and as specified, including but not limited to:
 - 1. Rigid insulation.
 - 2. Other building insulation work as may be called for on Drawings and not indicated or specified to be included under other Sections.

1.03 RELATED WORK

- A. Examine Contract Documents for requirements that affect Work of this Section. Other Specification Sections that directly relate to Work of this Section include, but are not limited to:
 - 1. Section 07270, FIRESTOPPING; Firestopping insulation.
 - 2. Section 09250, GYPSUM DRYWALL; Acoustical insulation.
 - 3. Division 15 - MECHANICAL; Pipe and duct insulation.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's printed product data, specifications, standard details, installation instructions, use limitations and recommendations for each material used. Provide certifications that materials and systems comply with specified requirements.
- B. Verification Samples: Submit representative samples of each insulation material. Provide samples having minimum size of 100 sq. in.
- C. Mock-Ups: Prior to commencing the primary work of this Section, provide materials as required for mock-ups at locations acceptable to Architect. Comply with requirements specified under Section 01420, MOCK-UPS. Obtain Architect's acceptance of visual qualities. Protect and maintain accepted mock-ups throughout the remainder of the work of this section to serve as criteria for acceptance of the work.

1.05 QUALITY ASSURANCE

- A. Fire Performance: Provide products which meet or exceed flammability ratings indicated or required by authorities having jurisdiction.
- B. Thickness: Where R values are indicated, provide thicknesses of insulation materials required

to achieve value specified.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Materials shall be delivered to site in original, unopened packages or containers bearing manufacturer's names, brand names, and types and thicknesses of contents.
- B. Store off floor in interior spaces, adequately protected against damage from all sources.

PART 2 PRODUCTS

2.01 BOARD-TYPE INSULATION UNDER SLABS-ON-GRADE

- A. Extruded-Polystyrene Board Insulation: ASTM C 578, Type IV, 1.60 cu.ft. density, with maximum flame-spread and smoke-developed indices of 75 and 450, respectively:
 - 1. Manufacturer: Styrofoam SE by Dow Chemical or equal.
 - 2. Compressive Strength, ASTM D 1621: 25 pounds per square inch, minimum.
 - 3. Minimum Thicknesses: 2 inches under slabs-on-grade.
 - 4. Board Edge: Square.
- B. Adhesive for Bonding Insulation at Vertical Surfaces: Product recommended by insulation manufacturer with demonstrated capability to bond insulation securely to substrates indicated without damaging insulation or substrates.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

- A. Insulating materials and installation shall be in strict accordance with manufacturer's printed instructions and specific recommendations, and health and safety precautions, for each of project conditions and in accordance with governing laws and building code.

3.02 RIGID INSULATION UNDER SLABS

- A. Comply with insulation manufacturer's written instructions applicable to products and application indicated.
- B. Install insulation that is undamaged, dry, unsoiled, and has not been exposed at any time to ice and snow.
- C. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Apply single layer of insulation to produce thickness indicated.

3.03 CLEANING

- A. Upon completion of building insulation work in any area, remove rubbish and debris from work area and leave in broom clean condition.

END OF SECTION

SECTION 07265

SPRAYED-ON FIREPROOFING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Contract Conditions, and other Technical Specifications Sections apply to work of this Section insofar as applicable.

1.02 WORK INCLUDED

- A. The work of this section includes, but is not limited to, patching and repair of concealed sprayed-on fireproofing. Refer to Drawings for schedule of fireproofing requirements.

1.03 RELATED WORK

- A. Examine Contract Documents for requirements that affect Work of this Section. Other Specification Sections that directly relate to Work of this Section include, but are not limited to:
 - 1. Section 05300, METAL DECKING
 - 2. Section 07270, FIRESTOPPING
 - 3. Section 09250, GYPSUM DRYWALL; Drywall fire protection.

1.04 PERFORMANCE

- A. Fireproofing Performance Schedule: Provide in-place fireproofing to achieve the fire protection levels required by code and as indicated on the Drawings. Comply with codes and requirements of authorities having jurisdiction. It is the Contractor's responsibility to verify construction types and to determine proper thicknesses before beginning fireproofing work.

1.05 QUALITY ASSURANCE

- A. Installer: A firm which has at least three years experience in work of the type required by this section and which is acceptable to the manufacturer of the primary fireproofing materials.
- B. Source: Provide fireproofing materials which are the products of one manufacturer. Provide secondary materials which are acceptable to the fireproofing manufacturer.

1.06 TESTS

- A. Fire-Resistance: Provide materials, density, and construction which are identical to assemblies whose fire-resistance rating has been tested in compliance with ASTM E 119 [UL 263, NFPA 251] by independent agencies acceptable to the Architect and authorities having jurisdiction. Provide systems with fire resistance ratings established by UL or another recognized testing agency acceptable to authorities having jurisdiction.
 - 1. UL designation numbers are listed on Drawings.
- B. Burning Characteristics: Provide materials whose surface burning characteristics, when tested in compliance with ASTM E 84 are Class A or Class 1.
- C. Field Tests and Inspections: The Owner may engage an independent testing agency to sample and test completed work for density and thickness in compliance with ASTM E 605.

1.07 SUBMITTALS

- A. Product Data: Submit manufacturer's product data, installation instructions, use limitations and recommendations for each material used. Provide certifications stating that materials comply with requirements.
- B. Test Reports: Submit manufacturer's certified reports on performances including, but not limited to, burning characteristics, fire-performance, densities, compressive strengths, bond strengths, hardness, water absorption, air erosion and corrosion resistance. Submit in-place density and thickness test results, if tests are performed.
- C. Schedules: Submit detailed schedule of fireproofing activities.

1.08 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials and products in unopened factory labeled packages. Store and handle in strict compliance with manufacturer's instructions and recommendations. Protect from damage. Sequence deliveries to avoid delays, but minimize on-site storage.

1.09 PROJECT CONDITIONS

- A. Weather: Perform work only when existing and forecasted weather conditions are within the limits established by manufacturers of the materials and products used. Maintain recommended ambient conditions throughout application and curing.
- B. Substrates: Proceed with work only when substrate construction and penetrating work is complete.

- C. Wind Control: Comply with manufacturer's requirements and recommendations. Avoid too quick drying.

1.10 SEQUENCING AND SCHEDULING

- A. Conference: Attend a pre-installation conference to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work.
- B. Sequence: Perform work of this section in the optimum sequence that minimizes exposure to weather and the elements, minimizes exposure to abrasion and other possible damage due to subsequent construction operations, and which provides fireproofing protection for the structure at the earliest possible time. Coordinate installation to minimize need for other trades to remove installed fireproofing. Immediately patch cut-away fireproofing to comply with requirements for original work.

1.11 WARRANTY

- A. Provide written warranty agreeing to repair or replace work which exhibits defects in materials or workmanship. "Defects" is defined to include, but is not limited to, cracking, flaking, peeling, excessive dusting, abnormal aging or deterioration, and failure to perform as required. Include requirement for removal and replacement of covering and connected adjacent work.

1. Warranty Period: 3 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MATERIALS AND PRODUCTS

- A. Sprayed-On Fireproofing: Provide cementitious fireproofing by W. R. Grace or approved equal for spray application to provide fire protection ratings indicated and required by authorities having jurisdiction. Mineral fiber fireproofing will not be considered equal.
 1. Standard Density Fireproofing (at concealed areas): Provide MK-6/HY type as required to meet UL designs required.
 2. Medium Density Fireproofing (at exposed areas): Provide Z-106/HY type as required to meet UL designs required.
- B. Primers: Provide primers recommended by fireproofing manufacturer which are compatible with steel shop primer, if any.

2.02 PERFORMANCE CRITERIA

- A. Materials, procedures for application, dry densities, and thicknesses necessary to provide the required protection shall be approved by UL for the uses indicated. Submit certification by an independent Testing Laboratory acceptable to the Owner that materials, dry densities, thicknesses, and application procedures satisfy the requirements of the governing laws and building code, and UL requirements, with respect to the minimum protection requirements below when tested in accordance with ASTM E 119.
- B. Fireproofing Performance: Structural steel members throughout the project to receive fireproofing shall be protected under this Section with adequate fireproofing thicknesses and densities in accordance with UL Ref. 1. Provide fire resistance ratings at steel supporting rated enclosures as required per Wisconsin Building Code, ILHR 51.042(8).
- C. Thickness and Density: Thickness of fire protection material for each condition for the specified fire resistance rating shall be according to manufacturer's data and UL requirements. Where required thickness is given as an average thickness the minimum thickness permitted shall be that given as average thickness. Acceptable minimum thickness of applied material shall be that measured at specified dry density.
- D. Fire ratings interpolated or extrapolated from actual test data will not be acceptable. Provide evidence prior to application that proposed materials, and installation methods and materials have been approved by all authorities that have jurisdiction.

PART 3 - EXECUTION

3.01 INSPECTION

- A. The Installer shall examine substrates and conditions under which this work is to be performed and notify Contractor, in writing, of conditions detrimental to the proper completion of the work. Do not proceed with work until unsatisfactory conditions are corrected. Beginning work means Installer accepts substrates and conditions.

3.02 PREPARATION & INSTALLATION

- A. Strictly comply with manufacturer's instructions and recommendations, except where more restrictive requirements are specified in this section.
 - 1. Mask and protect adjacent work which could be damaged by overspray or fallout.
 - 2. Clean substrates of all substances which might be incompatible or inhibit bond.
 - 3. Prime surfaces if recommended by fireproofing manufacturer.
 - 4. Apply adhesive if recommended by fireproofing manufacturer.

5. Provide thickness and density required to obtain fire-resistance ratings required.
6. Provide reinforcement where movement is anticipated and at locations recommended by fireproofing manufacturer.

3.03 CLEANING, REPAIR AND PROTECTION

- A. Clean non-fireproofed exposed surfaces of all overspray and fallout using materials and methods recommended by manufacturer. Remove and replace work that cannot be successfully cleaned.
- B. Provide temporary protection to ensure work being without damage or deterioration at time of final acceptance. Reinspect work frequently until it is permanently enclosed. Immediately patch and repair damaged fireproofing to provide fire resistance ratings required.

END OF SECTION

SECTION 07270

FIRESTOPPING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Contract Conditions, and other Technical Specifications Sections apply to work of this Section insofar as applicable.

1.02 WORK INCLUDED

- A. Provide firestop systems consisting of a material, or combination of materials, installed top retain the integrity of fire-rated construction by maintaining an effective barrier against the spread of flame, smoke, or gases through penetrations in fire-rated barriers, in accordance with the State of Maine State Building Code.
- B. Firestops shall be used in locations including, but not limited to, the following:
 - 1. Penetrations through fire-resistance-rated floor construction including both empty openings and openings containing cables, pipes, ducts, conduits, and other penetrating items.
 - 2. Penetrations through fire-resistance-rated walls and partitions including both empty openings and openings containing cables, pipes, ducts, conduits, and other penetrating items.
 - 3. Penetrations through smoke barriers and construction enclosing compartmentalized areas involving both empty openings and openings containing penetrating items.
 - 4. Sealant joints in fire-resistance-rated construction.

1.03 RELATED WORK

- A. Examine Contract Documents for requirements that affect Work of this Section. Other Specification Sections that relate directly to Work of this Section include, but are not limited to:
 - 1. Section 03300, CAST-IN-PLACE CONCRETE.
 - 2. Section 07900, JOINT SEALERS.
 - 3. Division 15 - MECHANICAL; Pipe and duct insulation.
 - 4. Division 16 - ELECTRICAL; Conduit, cable trays, etc.

1.04 SYSTEM PERFORMANCE REQUIREMENTS

-
- A. General: Provide firestopping systems that are produced and installed to resist the spread of fire, according to requirements indicated, and the passage of smoke and other gases.
 - B. F - Rated Through-Penetration Firestop Systems: Provide through-penetration firestop systems with F ratings indicated, as determined per ASTM E 814, but not less than that equaling or exceeding the fire-resistance rating of the constructions penetrated.
 - C. T - Rated Through-Penetration Firestop Systems: Provide through-penetration firestop systems with T ratings, in addition to F ratings, as determined per ASTM E 814, where indicated and where systems protect penetrating items exposed to contact with adjacent materials in occupiable floor areas. T-rated assemblies are required where the following conditions exist:
 - 1. Where firestop systems protect penetrations located outside of wall cavities.
 - 2. Where firestop systems protect penetrations located outside fire-resistive shaft enclosures.
 - 3. Where firestop systems protect penetrations located in construction containing doors required to have a temperature-rise rating.
 - 4. Where firestop systems protect penetrating items larger than a 4 in. diameter nominal pipe or 16 sq. in. in overall cross-sectional area.
 - D. Fire-Resistive Joint Sealants: Provide joint sealants with fire-resistance ratings indicated, as determined per ASTM E 119, but not less than that equaling or exceeding the fire-resistance rating of the construction in which the joint occurs.
 - E. For firestopping exposed to view, traffic, moisture, and physical damage, provide products that do not deteriorate when exposed to these conditions.
 - 1. For piping penetrations for plumbing provide moisture-resistant through-penetration firestop systems.
 - 2. For floor penetrations with annular spaces exceeding 4 in. or more in width and exposed to possible loading and traffic, provide firestop systems capable of supporting the floor loads involved either by installing floor plates or by other means.
 - 3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.
 - F. For firestopping exposed to view, provide products with flame-spread values of less than 25 and smoke-developed values of less than 450, as determined per ASTM E 84.

1.05 SUBMITTALS

- A. Submit product data for each type of product specified.

-
1. Certification by firestopping manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs) and are nontoxic to building occupants.
 - B. Submit Shop drawings detailing materials, installation methods, and relationships to adjoining construction for each through-penetration firestop system, and each kind of construction condition penetrated and kind of penetrating item. Include firestop design designation of qualified testing and inspecting agency evidencing compliance with requirements for each condition indicated.
 1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop configuration for construction and penetrating items.
 2. Where Project conditions require modification of qualified testing and inspecting agency's illustration to suit a particular through-penetration firestop condition, submit illustration approved by firestopping manufacturer's fire protection engineer with modifications marked.
 - C. Product certificates signed by manufacturers of firestopping products certifying that their products comply with specified requirements.
 - D. Product test reports from, and based on tests performed by, a qualified testing and inspecting agency evidencing compliance of firestopping with requirements based on comprehensive testing of current products.
 - E. Qualification data for firms and persons specified in "Quality Assurance" article to demonstrate their capabilities and experience. Include list of completed projects with project names, addresses, names of engineers and owners, and other information specified.
- 1.06 QUALITY ASSURANCE
- A. Fire-Test-Response Characteristics: Provide firestopping that complies with the following requirements and those specified under the "System Performance Requirements" article:
 1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL, Warnock Hersey, or another agency performing testing and follow-up inspection services for firestop systems that is acceptable to authorities having jurisdiction.
 2. Through-penetration firestop systems are identical to those tested per ASTM E 814 under conditions where positive furnace pressure differential of at least 0.01 inch of water is maintained at a distance of 0.78 inch below the fill materials surrounding the penetrating items in the test assembly. Provide rated systems complying with the following requirements:

- a. Through-penetration firestop systems correspond to those indicated by reference to through-penetration firestop system designations listed by UL in their "Fire Resistance Directory," by Warnock Hersey, or by another qualified testing and inspecting agency.
3. Fire-resistive joint sealant systems are identical to those tested for fire-response characteristics per ASTM E 119 under conditions where the positive furnace pressure differential is at least 0.01 inch of water, as measured 0.78 inch from the face exposed to furnace fire. Provide systems complying with the following requirements:
 - a. Fire-Resistance Ratings of Joint Sealants: As indicated by reference to design designations listed by UL in their "Fire Resistance Directory" or by another qualified testing and inspecting agency.
 - b. Joint sealants, including backing materials, bear classification marking of qualified testing and inspection agency.
- B. Installer Qualifications: Engage an experienced Installer who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having the necessary experience, staff, and training to install manufacturer's products per specified requirements. A manufacturer's willingness to sell its firestopping products to the Contractor or to an Installer engaged by the Contractor does not in itself confer qualification on the buyer.
- C. Single-Source Responsibility: Obtain through-penetration firestop systems for each kind of penetration and construction condition indicated from a single manufacturer.
- D. Field-Constructed Mockup: Prior to installing firestopping, erect mockups for each different through-penetration firestop system indicated to verify selections made and to demonstrate qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for final installations.
 1. Locate mockups on site in locations indicated or, if not indicated, as directed by Architect.
 2. Notify Architect one week in advance of the dates and times when mockups will be erected.
 3. Obtain Architect's acceptance of mockups before start of final unit of Work.
 4. Retain and maintain mockups during construction in an undisturbed condition as a standard for judging completed unit of Work.
 - a. Accepted mockups in an undisturbed condition at time of Substantial Completion may become part of completed unit of Work.

- E. Provide firestopping products containing no detectable asbestos as determined by the method specified in 40 CFR Part 763, Subpart F, Appendix A, Section 1, "Polarized Light Microscopy."

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver firestopping products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer; date of manufacture; lot number; shelf life, if applicable; qualified testing and inspecting agency's classification marking applicable to Project; curing time; and mixing instructions for multicomponent materials.
- B. Store and handle firestopping materials to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.08 PROJECT CONDITIONS

- A. Environmental Conditions: Do not install firestopping when ambient or substrate temperatures are outside limits permitted by firestopping manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Ventilation: Ventilate firestopping per firestopping manufacturers' instructions by natural means or, where this is inadequate, forced air circulation.

1.09 SEQUENCING AND SCHEDULING

- A. Notify Government's inspection agency at least one week in advance of firestopping installations; confirm dates and times on days preceding each series of installations.
- B. Do not cover up those firestopping installations that will become concealed behind other construction until Owner's inspection agency and authorities having jurisdiction, if required, have examined each installation.

PART 2 PRODUCTS

2.01 FIRESTOPPING, GENERAL

- A. Compatibility: Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by firestopping manufacturer based on testing and field experience.

- B. Accessories: Provide components for each firestopping system that are needed to install fill materials and to comply with "System Performance Requirements" article in Part 1. Use only components specified by the firestopping manufacturer and approved by the qualified testing and inspecting agency for the designated fire-resistance-rated systems. Accessories include but are not limited to the following items:
1. Permanent forming/damming/backing materials including the following:
 - a. Semirefractory fiber (mineral wool) insulation.
 - b. Ceramic fiber.
 - c. Sealants used in combination with other forming/damming materials to prevent leakage of fill materials in liquid state.
 - d. Fire-rated formboard.
 - e. Joint fillers for joint sealants.
 2. Temporary forming materials.
 3. Substrate primers.
 4. Collars.
 5. Steel sleeves.
- C. Applications: Provide firestopping systems composed of materials specified in this Section that comply with system performance and other requirements.

2.02 FIRE-SAFING BOARD INSULATION

- A. Provide material tested, listed and labeled by UL and listed by UL in designs similar to applications indicated. Provide semi-rigid, non-asbestos mineral fiber board, rated noncombustible when tested according to ASTM E 136:
1. k-Value: 0.25 at 75°F.
 2. Thickness: 4 in., unless otherwise indicated, and not less than thickness necessary to obtain required fire-rating.
 3. Density: Nominal 4 pcf.
 4. Product: U.S. Gypsum Co., Thermafiber Safing Insulation; Partek Insulation, Inc., Paroc Safing Insulation; Fibrex, Inc., FBX Fire Safing Insulation; or approved equal.

2.03 MINERAL WOOL

- A. Provide loose mineral wool, rated noncombustible when tested in accordance with ASTM E 136, free of asbestos and glass fiber, and suitable for in-place density of 6 pcf to 12 pcf.

2.04 CAULK AND PUTTY

- A. Provide one of the following products, or Architect approved equal, that meet or exceed specified requirements:
1. Bio Therm; Bio Fireshield.
 2. Fire-Barrier Series; 3M Fire Protection Products.
 3. Flamesafe; International Protective Coatings Corp.
 4. Flame Stop V Putty and Caulking; Flame Stop, Inc.
 5. Fyre Putty; Standard Oil Engineered Materials Company.
 6. Silicone Firestop Foam 2001, and Sealant 2000; Dow Corning Corp.
 7. CLK Adhesive Firestop; Nelson Firestop.
 8. STI SpecSeal S100.
- B. Schedule: Provide fire-resistive sealants as follows:
1. Wall Precast Panel Joints (3/4"): System "Dynatrol II - Ultrablock" by Pecora Corp. and Backer Rod Mfg., Inc. or approved equal.
 2. Floor Precast Joints (3/4"): System "Dynatrol II - Ultrablock" by Pecora Corp. and Backer Rod Mfg., Inc. or approved equal.
 3. Floor expansion joint assembly (4"): System "AC-20FTR - Ultrablock" by Pecora Corp. and Backer Rod Mfg., Inc. or approved equal.

2.05 FIRESTOP MORTAR

- A. Prepackaged dry mix composed of a blend of inorganic binders, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogenous mortar.
- B. Provide one of the following products, or Architect approved equal, that meet or exceed specified requirements:
1. Novasit K-10; Bio Fireshield
 2. KBS Mortar Seal; International Protective Coatings Corp.
 3. CMP Firestop Compound; Nelson Firestop.
 4. STI SpecSeal Mortar.

2.06 FIRESTOP COLLARS

- A. Provide premanufactured fire protective pipe sleeves equal to one of the following products, or Architect approved equal, that meet or exceed specified requirements:
1. Bio-Fireshield Firestop Collars.
 2. STI SpecSeal Firestop Collars.
 3. Hilti CP 642 Firestop Collar.

2.07 FIRESTOP BAGS/PILLOWS

- A. Pillows/Bags: Re-usable, heat-expanding pillows/bags composed of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents and fire-retardant additives.
- B. Provide one of the following products, or Architect approved equal, that meet or exceed specified requirements:
 - 1. Firestop Pillows; Bio Fireshield.
 - 2. KBS Sealbags; International Protective Coatings Corp.
 - 3. PLW Firestop Pillow; Nelson Firestop.
 - 4. STI SpecSeal Pillows.

2.08 WRAP STRIPS

- A. Single-component, elastomeric sheet with aluminum foil on one side. Provide one of the following products, or Architect approved equal, that meet or exceed specified requirements:
 - 1. SpecSeal Wrap Strip; STI.
 - 2. Fire Barrier FS195 Wrap Strip; 3M.
 - 3. CS2420 Intumescent Wrap, Hilti Construction Chemicals, Inc.

2.09 COMPOSITE BOARDS

- A. Provide one of the following products, or Architect approved equal, that meet or exceed specified requirements:
 - 1. Barrier Sheet Material; 3M.

2.10 DAMMING/FORMING MATERIALS, FASTENERS, AND ANCHORAGE ACCESSORIES

- A. Provide damming/forming materials in accordance with manufacturer's recommendations.
- B. Provide fasteners and anchorage accessories complying with UL designs and other components and accessories as needed and as recommended by the firestopping material manufacturer.

2.11 MIXING

- A. For those products requiring mixing prior to application, comply with firestopping manufacturer's directions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time,

and other procedures needed to produce firestopping products of uniform quality with optimum performance characteristics for application indicated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of firestopping. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Surface Cleaning: Clean out openings and joints immediately prior to installing firestopping to comply with recommendations of firestopping manufacturer and the following requirements:
 - 1. Remove all foreign materials from surfaces of opening and joint substrates and from penetrating items that could interfere with adhesion of firestopping.
 - 2. Clean opening and joint substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with firestopping. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form release agents from concrete.
- B. Priming: Prime substrates where recommended by firestopping manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Use masking tape to prevent firestopping from contacting adjoining surfaces that will remain exposed upon completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestopping materials. Remove tape as soon as it is possible to do so without disturbing firestopping's seal with substrates.

3.03 INSTALLING THROUGH-PENETRATION FIRESTOPS

- A. General: Comply with the "System Performance Requirements" article in Part 1 and the through-penetration firestop manufacturer's installation instructions and drawings pertaining to products and applications indicated.
- B. Install forming/damming materials and other accessories of types required to support fill materials during their application and in the position needed to produce the cross-

sectional shapes and depths required to achieve fire ratings of designated through-penetration firestop systems. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.

- C. Install fill materials for through-penetration firestop systems by proven techniques to produce the following results:
 - 1. Completely fill voids and cavities formed by openings, forming materials, accessories, and penetrating items.
 - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
 - 3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.04 INSTALLING FIRE-RESISTIVE JOINT SEALANTS

- A. General: Comply with the "System Performance Requirements" article in Part 1, with ASTM C 1193, and with the sealant manufacturer's installation instructions and drawings pertaining to products and applications indicated.
- B. Install joint fillers to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability and develop fire-resistance rating required.
- C. Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint width that optimum sealant movement capability. Install sealants at the same time joint fillers are installed.
- D. Tool non-sag sealants immediately after sealant application and prior to the time skinning or curing begins. Form smooth, uniform beads of configuration indicated or required to produce fire-resistance rating, as well as to eliminate air pockets, and to ensure contact and adhesion of sealants with sides of joint. Remove excess sealant from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

3.05 FIELD QUALITY CONTROL

- A. Inspecting agency employed and paid for by the Government will examine completed firestopping to determine, in general, if it is being installed in compliance with requirements.

- B. Inspecting agency will report observations promptly and in writing to Contractor and Architect.
- C. Do not proceed to enclose firestopping with other construction until reports of examinations are issued.
- D. Where deficiencies are found, repair or replace firestopping so that it complies with requirements.

3.06 CLEANING

- A. Clean off excess fill materials and sealants adjacent to openings and joints as work progresses by methods and with cleaning materials approved by manufacturers of firestopping products and of products in which opening and joints occur.
- B. Protect firestopping during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated firestopping immediately and install new materials to produce firestopping complying with specified requirements.

END OF SECTION

SECTION 07900

JOINT SEALERS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Contract Conditions, and other Technical Specifications Sections apply to work of this Section insofar as applicable.

1.02 WORK INCLUDED

- A. Caulk and seal joints as indicated on the Drawings and as specified. Include, but do not limit to:
 - 1. Sealing of joints between perimeter of exterior door frames, window frames, metal panels, vents, louvers, and other items occurring in openings in exterior masonry walls, and the surrounding construction, including bed sealing of thresholds.
 - 2. Sealing of interior perimeter joints at door frames, window frames, vents, louvers, and other wall openings.
 - 3. All other interior sealing called for, or reasonably inferred from the Drawings, and as required to provide weathertight conditions in exterior assemblies.

1.03 RELATED WORK

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
 - 1. Section 07270, FIRESTOPPING; Fire resistive sealants and caulks.
 - 2. Section 08800, GLASS AND GLAZING; Glazing sealants and gaskets.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's printed product data, specifications, standard details, installation instructions, use limitations and recommendations for each sealant material used. Provide certifications that sealant materials comply with specified requirements.
- B. Initial Selection Samples: Submit samples manufacturer's color charts showing complete range of colors, textures, and finishes available for each material used.

- C. Verification Samples: Submit actual representative samples of each sealant material that is to be exposed in the completed work. Show full color ranges and finish variations expected. Provide sealant samples having minimum size of 4 in. long.
- D. Test Reports: Provide certified reports for all specified tests.

1.05 COMPATIBILITY

- A. Provide sealant and sealant joint backing materials suitable for the use intended and compatible with the materials with which they will be in contact. Compatibility of sealant and accessories shall be verified by the sealant manufacturer.

1.06 QUALITY ASSURANCE

- A. Source: For each sealant material type required for the work of this section, provide primary materials which are the product of one manufacturer. Provide secondary or accessory materials which are acceptable to the manufacturers of the primary materials.
- B. Installer: A firm with a minimum of five years experience in type of work required by this Section and which is acceptable to the manufacturers of the primary materials.
- C. Mock-Ups: Prior to commencing the primary work of this Section, provide mock-ups at locations acceptable to Architect. Obtain Architect's acceptance of visual qualities. Protect and maintain accepted mock-ups throughout the remainder of the work of this section to serve as criteria for acceptance of the work.

1.07 PROJECT CONDITIONS

- A. Weather: Perform work of this Section only when existing or forecasted weather conditions are within the limits established by manufacturers of the materials and products used.
- B. Substrates: Proceed with work only when substrate construction and penetration work is complete.

1.08 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Materials under this Section shall be delivered to, and stored at, the job site in unbroken factory sealed containers with labels intact.

1.09 WARRANTY

- A. Furnish joint sealant manufacturer's written single-source performance warranty that joint sealant work will be free of defects related to workmanship or material deficiency for five years from date of Substantial Completion of the Project.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Before installation check each sealant for compatibility with adjacent materials and surfaces and with indicated exposures. Select sealers which are recommended by manufacturer for each application indicated. Where exposed to pedestrian or vehicular traffic, provide sealants which are non-tracking and are strong enough to withstand the traffic without damage.
- B. Provide colors as selected by Architect from manufacturer's standard and special (Tremco Fastpak) colors. Where specifically requested, provide custom color matches.

2.02 SELF-LEVELING POLYURETHANE SEALANT

- A. Provide two or more part, self-leveling, polyurethane based elastomeric sealant, complying with ASTM C 920, Fed. Spec. TT-S-00227E Type 1 Class A, having Shore A hardness of not less than 30 when tested according to ASTM C 920, cured modulus of elasticity at 100% elongation of not more than 150 psi when tested according to ASTM D 412, and tear resistance of not less than 50 lbs./inch when tested according to ASTM D 624.
- B. Where joint surfaces contain bituminous materials, provide modified sealants which are compatible with bituminous materials encountered.
- C. Provide one of the following products that meet or exceed specified requirements:
 - 1. Tremco THC 900.
 - 2. Pecora Urexpan NR-200.
 - 3. Tremco Vulkem 245 or 255.
 - 4. Sika 2C, SL.
 - 5. Sonneborn Sonolastic PvJtSt.
- D. Extent: Provide self-leveling polyurethane sealant for floor joints not indicated to be sealed with another type of sealant.

2.03 SILICONE RUBBER SEALANT

- A. Provide one part, silicone rubber based elastomeric sealant, complying with ASTM C 920 Type S, Class 25, Grade NS, and Fed. Spec. TT-S-001543A Class A.
- B. Provide mold and mildew resistant, sanitary interior type sealant.
- C. Provide one of the following products that meet or exceed specified requirements:

1. Dow 786.
2. General Electric 1702 Sanitary.
3. Pecora 863.
4. Rhodorsil 6b White.
5. Sonneborn OmniPlus.
6. Tremco Proglaze.

- D. Extent: Provide silicone rubber sealant for interior joints around plumbing fixtures and tile to tile joints in ceramic tile work.
- E. Provide colors to match grout as approved by the Architect.

2.04 ACRYLIC LATEX SEALANT

- A. Provide permanently flexible, latex rubber modified acrylic emulsion sealant, complying with ASTM C 834.
- B. Provide one of following products that meet or exceed specified requirements:
1. Pecora AC-20.
 2. Tremco Acrylic Latex 834.
 3. Sonneborn Sonolac.
- C. Extent: Provide acrylic latex sealant for use at mirrors, for exposed acoustical sealant, and for interior joints except where silicone rubber sealant is indicated.
- D. At interior joints greater than 1/2 in. in width or subjected to periodic building movement, substitute exterior type sealant specified above.
- E. Where surrounding wall surfaces are to be left unpainted, substitute exterior type sealant as specified above.

2.05 MISCELLANEOUS MATERIALS

- A. Primer: Provide primer recommended by sealant manufacturer for surfaces to be adhered to.
- B. Bond Breaker Tape: Provide polyethylene or other plastic tape recommended by sealant manufacturer to prevent three-sided adhesion.
- C. Backer Rod: Provide compressible rod of durable nonabsorptive material recommended by sealant manufacturer for compatibility with sealant. Provide products of one of the following manufacturers:
1. Backer Rod Manufacturing and Supply Co.
 2. Dow Chemical Co.

3. Williams Products, Inc.
 4. Woodmont Products, Inc.
- D. Joint backing for general use at joints in horizontal surfaces shall consist of two rows of butyl rubber or neoprene foam rod in contact with one another, and each compressed to approximately 2/3 original width when in place.
- E. Provide miscellaneous materials of type that will not bleed through sealant, discolor surface, or produce other deleterious effects. Select size to provide compression to approximately 2/3 original width when in place. Provide backing material profile concave to the rear of the sealant, and equipped with a bond-breaking film.

PART 3 EXECUTION

3.01 INSPECTION

- A. The Installer shall examine substrates and conditions under which this work is to be performed and notify Contractor, in writing, of conditions detrimental to proper completion of work. Do not proceed with work until unsatisfactory conditions are corrected. Beginning of sealant work means Installer's acceptance of joint surfaces and conditions.

3.02 PREPARATION

- A. Strictly comply with manufacturers' instructions and recommendations, except where more restrictive requirements are specified in this Section.
- B. Clean joint surfaces immediately before installation of sealants, primers, tapes and fillers. Remove substances which could interfere with bond. Etch or roughen joint surfaces to improve bond. Surfaces which have been given protective coatings and those that contain oil or grease shall be thoroughly cleaned with xylol or MEK solvent, with due precautions taken to minimize hazards.
- C. Unless otherwise indicated, use of sealants shall conform to the following: ASTM C 790 for latex sealants and ASTM C 962 for other sealants.
- D. Tape or mask adjoining surfaces to prevent spillage and migration problems.
- E. Prime surfaces as recommended by sealant manufacturer.

3.03 INSTALLATION

- A. Schedule work as long as possible after completion of concrete work and finished brick masonry and granite work.

- B. Provide backer rods for sealants except where specifically recommended against by sealant manufacturers.
- C. Prevent three sided adhesion by use of bond breaker tapes or backer rods.
- D. Force sealant into joints to provide uniform, dense, continuous ribbons free from gaps and air pockets. Completely wet both joint surfaces equally on opposite sides.
- E. Except in hot weather, make sealant surface slightly concave. Install sealants so that compressed sealants do not protrude from joints. Dry tool sealants to form a smooth dense surface. At horizontal joints form a slight cove to prevent trapping water.
- F. Provide sealants to depths indicated, or if not indicated, follow manufacturer's recommendations. For joints up to 3/8 in. width, depth of joint shall not exceed 1/2 in.; for joints larger than 1/2 in. width, depth of joint shall not exceed 5/8 in.

3.04 EXTENT OF SEALANT WORK

- A. General Extent: Seal joints indicated, and all interior and exterior joints, seams, and intersections between dissimilar materials. Provide elastomeric sealant installation with backer rod in all interior and exterior control joints.
- B. Exterior Sealing: Without limitation, the work of this Section includes sealing the following:
 - 1. Masonry to masonry joints.
 - 2. Masonry to other exterior wall materials, including concrete, metal, and wood.
 - 3. Precast to precast joints.
 - 4. Precast to other exterior wall materials, including concrete, metal, and wood.
 - 5. Joints and cracks in paving and walks.
 - 6. Joint fillers for all joints.
- C. Interior Sealing: Without limitation, the work of this Section includes sealing the following:
 - 1. Perimeters of door frames, window frames, and metal and wood frames.
 - 2. Top of wall base along irregular walls.
 - 3. Between acoustical ceiling edge angle and irregular walls.
 - 4. Completely around plumbing fixtures, fittings, and trim to walls and floors.
- D. Thresholds of exterior doors shall be set in full beds of exterior sealant, not less than 3/8 in. thick. At Contractor's option, a polybutene or polyisobutylene sealant by same manufacturer may be used at thresholds.

3.05 CURING

- A. Cure sealants in strict compliance with manufacturers' instructions and recommendations to obtain highest quality surface and maximum adhesion. Make every effort to minimize accelerated aging effects and increase in modulus of elasticity.

3.06 CLEANING AND PROTECTION

- A. Remove smears from adjacent surfaces immediately, as the work progresses. Exercise particular care to prevent smearing or staining of surrounding surfaces which will be exposed in the finished work, and repair any damage done to same as result of this work without additional cost to Owner.
- B. Remove and replace work that is damaged or deteriorated.
- C. Clean adjacent surfaces using materials and methods recommended by sealant manufacturer. Remove and replace work that cannot be successfully cleaned.
- D. Provide temporary protection to ensure work being without damage or deterioration at time of final acceptance. Remove protection immediately before final acceptance.

END OF SECTION

SECTION 08305

ACCESS DOORS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Contract Conditions, and other Technical Specifications Sections apply to work of this Section insofar as applicable.

1.02 WORK INCLUDED

- A. Furnish access doors for installation under work of other Sections as indicated on Drawings and as specified.

1.03 RELATED WORK

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
 - 1. Section 04200, UNIT MASONRY; Installation of access doors.
 - 2. Section 09250, GYPSUM DRYWALL; Installation of access doors.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's printed product data, specifications, standard details, installation instructions, use limitations and recommendations for each material used. Provide certifications that materials and systems comply with specified requirements.
- B. Shop Drawings: Provide large scale shop drawings for fabrication, installation and erection of all parts of the work. Provide plans, elevations, and details of anchorage, connections and accessory items. Provide installation templates for work installed by others. Show all interfaces and relationships to work of other trades.

1.05 QUALITY ASSURANCE

- A. Source: For each material type required for the work of this section, furnish primary materials which are the product of one manufacturer. Furnish secondary or accessory materials which are acceptable to the manufacturers of the primary materials.

1.06 TESTS

- A. Fire Resistance Ratings: Where fire resistant ratings are indicated or required by authorities having jurisdiction, provide materials and construction which are identical to assemblies whose fire resistance ratings have been tested in compliance by independent agencies acceptable to the Contracting Officer and authorities having jurisdiction. Provide U. L. labeled assemblies.

PART 2 PRODUCTS

2.01 METAL ACCESS DOORS AND PANELS

- A. Furnish metal access doors and panels for access to valves, damper controls, pipes, conduits, switches, regulators, etc., to the proper trades for building into the work, except that any access panels specifically specified under the Mechanical or Electrical Sections of the Specifications to be furnished by those trades are excluded from the work of this Section.
- B. Furnish flush-type access doors, 18 gage minimum thickness specially designed for each type of wall and ceiling finish and construction with which used, with factory-applied prime finish, as manufactured by Cierra Products, J. L. Industries, Karp Associates, Inc., Birmingham Ornamental Iron Co., Miami-Carey, Babcock-Davis, or equal approved by Contracting Officer. Refer to Architectural, Mechanical, and Electrical Drawings for locations, sizes, and materials with which used.
 - 1. Where installed at fire-rated walls or ceilings access panels shall be of fire-resistive construction and shall bear the U. L. 2 hour label.
 - 2. Where installed in toilet rooms, access panels shall be AISI Type 304 stainless steel with No. 4 finish.
- C. Access Doors and Panels - Types: Unless otherwise indicated, provide the following access panel types:
 - 1. Access Door Type 2 (For use in Masonry Partitions): Recessed access panel, 16 gage steel frame, 14 gage steel door, concealed piano hinge, and screw driver operated cam type latch, equal to J. L. Industries Model TM.
 - 2. Access Door Type 4 (Fire Rated Panels for Service Access to Utilities in Fire-Rated Walls or Ceiling of Stairwells, Shafts, and Corridors): Recessed access panel, 16 gage steel frame, 18 gage steel door, concealed piano hinge, self-closing door, and universal latch mechanism, equal to J. L. Industries Model FDWB.

PART 3 EXECUTION

3.01 INSTALLATION

- A. All items furnished under this Section shall be delivered to site and turned over to the Contractor for installation by other appropriate trades.

END OF SECTION

SECTION 08410

ALUMINUM ENTRANCES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract Documents, including General and Supplementary Conditions and Division 1 General Requirements, apply to the work of this section.

1.02 DESCRIPTION OF WORK

- A. The work of this section includes, but is not limited to, the following:
 1. Removal and relocation of existing aluminum entrance door assemblies.
 2. Aluminum closure plates at South wall glazing assemblies.

1.03 RELATED WORK

- A. Carefully examine all of the Contract Documents for requirements which affect the work of this section.
- B. Other specifications sections which directly relate to the work of this Section include, but are not limited to, the following:
 1. Section 07900, JOINT SEALANTS; Metal seam sealant.
 2. Section 08700, FINISH HARDWARE; Hardware; cylinders; coordination with security system.
 3. Section 08800, GLASS AND GLAZING; Glass types, quality and requirements.
 4. Division 15, MECHANICAL and Division 16, ELECTRICAL; Coordination with security, fire alarm systems.

1.04 INTENT

- A. A major intent of the work of this section is to provide heavy-use public entrances that meet or exceed specified performance requirements. A major intent of the work of this section is to provide doors which match the window system for entrance doors.

1.05 QUALITY ASSURANCE

- A. Installer: A firm which has at least five years experience in work of the type required by this section and which is acceptable to the manufacturers of the primary products.

- B. Source: For each type of material required for the work of this section, provide primary materials which are the products of one manufacturer. Provide secondary materials which are acceptable to the manufacturers of the primary materials.

1.06 SUBMITTALS

- A. Field Measurements: Take accurate field measurements before preparation of shop drawings and fabrication. Do not delay job progress.

PART 2 - PRODUCTS

2.01 MATERIALS AND PRODUCTS

- A. Existing Entrances: Refurbish as required. Provide new hinges and hardware as required.
- B. Existing South Wall Glazing Assemblies: Provide closure plate as indicated on the Drawings. Finish to match existing.
- C. Aluminum Sheet: ASTM B 209, alloy 3003 with temper as recommended by manufacturer for use condition.
 - 1. Thickness: Minimum 14 gage for exposed flashings; minimum 26 gage for concealed flashings; minimum 12 gage for formed members.

PART 3 - EXECUTION

3.01 INSPECTION

- A. The Installer/Erector shall examine substrates, supports, and conditions under which this work is to be performed and notify Contractor, in writing, of conditions detrimental to the proper completion of the work. Do not proceed with work until unsatisfactory conditions are corrected. Beginning work means Installer accepts substrates and conditions.

3.02 INSTALLATION/ERECTION

- A. Strictly comply with manufacturer's instructions and recommendations, except where more restrictive requirements are specified in this section.
- B. Set work true to line, accurately plumb, level and square and free from rack and warp. Anchor securely in place, isolating dissimilar metals to prevent corrosion.

- C. Fasten with concealed fasteners wherever possible. Set sills and thresholds in full bed of sealant and seal metal to metal joints with sealants specified in Section 07900 - Joint Sealers and Fillers.

3.03 TOLERANCES

- A. The following allowable installed tolerances are allowable variations from locations and dimensions indicated by the Contract Document and shall not be added to allowable tolerances indicated for other work.

1. Allowable Variation from True Plumb, Level, & Line: $\pm 1/8$ " in 20'-0".
2. Allowable Variation from True Plane of Adjacent Surfaces: $\pm 1/16$ ".

3.04 ADJUSTING, CLEANING, TOUCH-UP, & PROTECTION

- A. Adjust operating parts and hardware to work easily, smoothly, and correctly.
- B. Touch-up damaged coatings and finishes and repair minor damage to eliminate all evidence of repair. Remove and replace work which cannot be satisfactorily repaired.
- C. Clean exposed surfaces using materials and methods recommended by manufacturer of material or product being cleaned. Remove and replace work that cannot be successfully cleaned.
- D. Provide temporary protection to ensure work being without damage or deterioration at time of final acceptance. Remove protections and reclean as necessary immediately before final acceptance.

END OF SECTION

SECTION 08800

GLASS AND GLAZING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Contract Conditions, and other Technical Specifications Sections apply to work of this Section insofar as applicable.

1.02 WORK INCLUDED

- A. Furnish and install glass and glazing, as indicated on Drawings and as specified herein. Include, but do not limit to glass and glazing for the following:
 - 1. Ramp guardrails.
 - 2. Doors.

1.03 RELATED WORK

- A. Examine Contract Documents for requirements that affect Work of this Section. Other Specification Sections that directly relate to Work of this Section include, but are not limited to:
 - 1. Section 05500, METAL FABRICATIONS; Guardrails to be glazed.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's printed product data, specifications, standard details, installation instructions, use limitations and recommendations for each material used. Provide certifications that materials and systems comply with specified requirements.
- B. Initial Selection Samples: Submit samples of each glass and glazing material showing complete range of colors, textures, and finishes available for each material used.
- C. Verification Samples: Submit representative samples of each glass and glazing material that is to be exposed in completed work. Show full color ranges and finish variations expected. Provide glass samples having minimum size of 144 sq. in. and 6 in. long samples of sealants and glazing materials.

- D. Calculations: Provide glass manufacturer's wind load charts, calculations and certification of performance of this work. Indicate how design requirements for loading and other performance criteria have been satisfied.
- E. Test Reports: Provide certified reports for specified tests.

1.05 QUALITY ASSURANCE

- A. Source: For each glass and glazing type required for work of this Section, provide primary materials which are products of one manufacturer. Provide secondary or accessory materials which are acceptable to manufacturers of primary materials.
- B. Installer: A firm with a minimum of three years experience in type of work required by this Section and which is acceptable to manufacturers of primary materials.
- C. Mock-Ups: Prior to commencing primary work of this Section, provide mock-ups at locations acceptable to Contracting Officer. Obtain Contracting Officer's acceptance of visual qualities. Protect and maintain accepted mock-ups throughout remainder of work of this Section to serve as criteria for acceptance of work. Approved mock-ups may be incorporated into finished work.
- D. Glass Thickness: Determine and provide size and thickness of glass products that are certified to meet or exceed performance requirements specified in this Section. Provide units with proper thickness, edge clearance and tolerance to comply with recommendations of glass manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials and products in unopened, factory labeled packages. Store and handle in strict compliance with manufacturer's instructions and recommendations and FGMA Manual.
 - 1. Protect materials from moisture, sunlight, excess heat, sparks and flame.
 - 2. Sequence deliveries to avoid delays, but minimize on-site storage.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS/FABRICATORS

- A. Provide glass products of one of the following manufacturers/fabricators that meet or exceed the requirements of these specifications:
 - 1. Advanced Coating Technology.
 - 2. AFG Industries.
 - 3. Ford Glass Division.
 - 4. Guardian Industries.

5. Interpane Coatings, Inc.
6. Pilkington Libbey Owens Ford.
7. PPG Industries.
8. Solar Seal Company.
9. Spectrum Glass Products.
10. Viracon, Inc.

2.02 GLASS MATERIALS AND PRODUCTS

- A. Clear Float Glass: ASTM C 1036 ,Type I - Transparent, Flat, Class 1-Clear, Quality q3.
- B. Clear Heat Strengthened Glass: ASTM C 1048, Condition A-Uncoated, Type I - Transparent, Flat, Class 1-Clear, Quality q3, Kind HS.
- D. Clear Tempered Glass: ASTM C 1048, Condition A-Uncoated, Type I - Transparent, Flat, Class 1-Clear, Quality q3, Kind FT.
 1. Provide 3/8 in. thick glass at guardrails.
- E. Butt Glazing: Provide glass with polished, radiused edges.
- F. Glazing Film: Provide glazing film by 3M or Madico, as selected by the Architect.

2.03 GLAZING MATERIALS AND PRODUCTS

- A. General: Provide sealants and gaskets with performance characteristics suitable for applications indicated. Ensure compatibility of glazing sealants with insulated glass sealants, with laminated glass interlayers, and with any other surfaces in contact.
- B. General Glazing and Cap Bead Sealant: Provide sealant with maximum Shore A hardness of 50. Provide one of the following:
 1. Dow Corning 795.
 2. General Electric Silglaze N 2500 or Contractors SCS-1000.
 3. Rhodorsil 3B, 5C, or 6B.
 4. Tremco Proglaze.
- C. Setting Blocks: Provide neoprene or silicone blocks with Shore A hardness of 80-90. Provide products certified by manufacturer to be compatible with silicone sealants.
 1. Shims: For shims used with setting blocks, provide same materials, hardness, length and width as setting blocks.
- D. Edge Blocks: Provide neoprene or silicone as required for compatibility with glazing sealants. Provide blocks with Shore A hardness of 55±5.

- E. Miscellaneous Glazing Materials: Provide sealant backer rods, primers, cleaners, and sealers of type recommended by glass and sealant manufacturers.

PART 3 EXECUTION

3.01 INSPECTION

- A. The Installer/Glazier shall examine substrates, supports, and conditions under which this work is to be performed. Notify Contractor in writing, outlining conditions detrimental to proper completion of work. Do not proceed with work until unsatisfactory conditions are corrected. Beginning of installation will be construed as glazier accepting substrates and conditions.

3.02 INSTALLATION

- A. General Installation Requirements: Strictly comply with manufacturer's instructions and recommendations, except where more restrictive requirements are specified in this Section. Comply with FGMA Manual. Do not glaze when ambient temperature is below 40°F.
 1. Prior to installing glass, clean glazing channels and framing members.
 2. Remove coatings not completely bonded to substrates.
 3. Remove lacquer from metal surfaces where in contact with sealants.
 4. Protect glass from edge damage at all times. Use roller blocks and suction cups.
 5. Replace glass with edge damage or other imperfections which could weaken glass.
 6. Install setting and side blocks in locations recommended by referenced standards, and as required to prevent glass displacement.
 7. Center glass in openings. Provide 1/2 in. minimum glass bite and 1/8 in. edge clearances.
 8. Install glass and glazing in such a manner as to allow for easy replacement of glass and glazing without dismantling of frames.
 9. Prevent metal to glass contact at all times. Protect edges of insulated units from moisture and solvents.
 10. Clean, prime, and install stops.

- B. Mirrors: Adhere mirrors to walls plumb and level. Support mirror bottoms with stainless steel clips spaced at quarter-points.

3.03 CLEANING AND PROTECTION

- A. Clean exposed surfaces using manufacturer recommended materials and methods. Remove and replace work which cannot be successfully cleaned. Clean glass and framing members frequently to protect from build-up of harmful construction contaminants.

- B. Touch-up damaged coatings and finishes. Eliminate visible evidence of repair.
- C. Re-clean glass within one week of final acceptance.
- D. Provide temporary protection at all times during course of work, and immediately after completion to ensure work of this Section is not damaged or deteriorated in any way at time of final acceptance. Remove temporary protections and reclean as necessary immediately prior to final acceptance.
- E. Remove and replace broken, chipped, cracked, or otherwise damaged glass.

END OF SECTION

SECTION 09215

GYPSUM VENEER PLASTER

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract Documents, including General and Supplementary Conditions and Division 1 Specification Sections, apply to the work of this Section.

1.02 WORK INCLUDED

- A. Provide gypsum veneer plaster required to complete the work of the Contract, as indicated on the Drawings and as specified herein. Include, but do not limit to:
 - 1. One-component gypsum veneer plaster finishes for interior walls, partitions, and ceilings, as indicated.

1.03 RELATED WORK

- A. Examine Contract Documents for requirements that affect the work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
 - 1. Section 06100, ROUGH CARPENTRY; Wood blocking, furring, grounds, etc., except fixture support blocking.
 - 2. Section 09250, GYPSUM DRYWALL; Cementitious board base for veneer plaster; gypsum wallboard construction.
 - 3. Section 09900, PAINTING; Painting.

1.04 QUALITY ASSURANCE

- A. Reference Standards: Conform to governing laws, building code, and manufacturer's printed standards.
- B. Obtain veneer plaster products from a single manufacturer, or from manufacturers recommended by the prime manufacturer of veneer plaster and gypsum base.

1.05 SUBMITTALS

- A. Shop Drawings: Furnish complete shop drawings of all work of this Section to Architect for approval, showing all pertinent details of construction and installation,

and sizes, gauges, configurations, and connections of all components; including control joints. Confirm on shop drawings that deflection will not exceed $L/270$.

- B. Samples: Furnish to Architect for approval samples of materials to be furnished under this Section which are specifically requested by Architect.
- C. Product Data: Submit manufacturer's product specifications and installation instructions for each component of veneer plaster systems, including test data and other pertinent data as may be required to show compliance with these specifications.

1.06 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver all manufactured materials to site in original packages, containers, or bundles bearing the manufacturer's name and brand names, type of material, and contents.
- B. Store materials in interior spaces, above floors, under cover, away from sweating walls and other damp surfaces, and with good ventilation.

1.07 PROJECT CONDITIONS

- A. Environmental Requirements, General: Comply with requirements of ASTM C 843 and recommendations of veneer plaster manufacturer, for environmental conditions before, during and after application of veneer plaster.
- B. Cold Weather Protection: When ambient outdoor temperature is below 55 degrees F. maintain continuous, uniform, comfortable building working temperatures of not less than 55 degrees F. for a minimum period of one week prior to and during veneer plastering, and for a minimum period of one week after veneer plaster has set; unless otherwise indicated.
- C. Ventilation: Ventilate building spaces as required to remove water in excess of that required for hydration of veneer plaster, immediately after its application and set.

PART 2 PRODUCTS

2.01 VENEER PLASTER

- A. One Coat Veneer Plaster: Provide one component veneer plaster for application directly to cement board base conforming to ASTM C 587 and equal to one of the following:
 1. Georgia Pacific Corp.; Dens-Cote.
 2. National Gypsum Co.; Uni-Kal Plaster.
 3. United States Gypsum Co.; Diamond Interior Finish.

2.02 ACCESSORIES

- A. General: Provide accessories conforming to ASTM C 840.
- B. Corner Beads: 1 in. by 1 in. perforated flange, standard type, 26 gauge, galvanized steel, for plaster veneer finish.
- C. Metal Trim: 24 gauge, galvanized steel, with perforated flanges, for plaster veneer finish.
- D. Control Joint: 26 gauge, galvanized steel, "Vee" type, with perforated flanges, for plaster veneer finish.

PART 3 EXECUTION

3.01 INSPECTION AND COORDINATION

- A. Inspect job conditions and related work and report to Contracting Officer in writing, all conditions interfering with the proper installation of work of this Section. Commencement of work in any given area shall constitute acceptance of conditions in that area as acceptable to receive work of this Section.
- B. Make all changes and adjustments in work of this Section as needed to accommodate the work of other trades, providing all cutting and patching until it has been inspected.

3.02 GENERAL REQUIREMENTS

- A. Work shall conform to the printed specifications and installation instructions of each of the manufacturers, the approved shop drawings, above-referenced quality assurance standards, the governing laws and building codes. Refer to Drawings to determine location of fire-resistive, fire-protective, and acoustically-rated work, and construct this work to conform to the specifications and installation instructions of UL or other testing agency(ies). Provide thickness as recommended by manufacturer, also refer to the Drawings to determine the thickness of plaster, etc., for each of the installations.
- B. Do veneer plaster work only after all windows and door openings are enclosed and a temperature of not less than 55 degrees F. is maintained during and up to completion of the plaster work.

3.03 INSTALLATION OF TRIM AND ACCESSORIES

- A. Install trim and accessories at gypsum base installations, as follows, in strict accordance with manufacturer's instructions. All trim shall be "mudded in" type.
 - 1. Install joint reinforcement tape at all joints, and at all internal corners where abutting surfaces are both gypsum construction.
 - 2. Install corner beads at all external gypsum base corners.

3. Install casing bead wherever finish gypsum plaster abuts dissimilar materials and other places where specifically called for on the Drawings.
4. Install control joints generally over all door frames, over control joints in back-up materials, and at maximum distance of 30 ft. in walls; 60 ft. or to limit areas to not more than 2400 sq. ft., at ceilings (except where lesser distance is indicated); and other places specifically called for on the Drawings. Interrupt furring and/or framing behind the control joints. In all cases, specific locations of control joints shall be as indicated or as directed by the Contracting Officer, and this information must be in hand before control joint installation is begun.

3.04 GYPSUM VENEER PLASTER APPLICATION

- A. Gypsum veneer plaster application shall conform to ASTM C 843 and the recommendations of the gypsum veneer plaster manufacturer.

3.05 CLEANING

- A. Protect the work of other trades and work of this Section already installed against soiling and damage by the exercise of reasonable care and precautions. Repair or replace any work so damaged or soiled.

END OF SECTION

SECTION 09250

GYPSUM DRYWALL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Contract Conditions, and other Technical Specifications Sections apply to work of this Section insofar as applicable.

1.02 WORK INCLUDED

- A. The work of this section includes, but is not limited to, the following:
 1. Metal framing and trimming systems for drywall systems.
 2. Gypsum boards and cementitious boards for wall, ceiling and soffit applications.
 3. Sound attenuation insulation.
 4. Concealed acoustical sealants.
 5. Miscellaneous metal framing and blocking.
 6. Installation of access panels.

1.03 RELATED WORK

- A. Examine Contract Documents for requirements that affect Work of this Section. Other Specification Sections that directly relate to Work of this Section include, but are not limited to:
 1. Section 01420, MOCK-UPS; Requirements for mock-ups.
 2. Section 06100, ROUGH CARPENTRY; Blocking and wood studs.
 3. Section 07270, FIRESTOPPING; Firesafing insulation and sealant.
 4. Section 07900, JOINT SEALERS; Exposed acoustical sealant.
 5. Section 09215, GYPSUM VENEER PLASTER.
 6. Section 09900, PAINTING; Finishing of work of this section.
 7. Division 15, MECHANICAL and Division 16, ELECTRICAL; Coordination of mechanical, electrical and plumbing requirements.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's product data, installation instructions, use limitations and recommendations for each material used. Provide certifications stating that materials comply with requirements.

- B. Calculations: Provide professionally prepared calculations and certification of the performance of this work. Show how design load requirements and other performance requirements have been satisfied.

1.05 QUALITY ASSURANCE

- A. Source: For each type of material required for the work of this section, provide primary materials which are the products of one manufacturer. Provide secondary materials which are acceptable to the manufacturers of the primary materials.
- B. Structural Performance: Provide the services of a Professional Engineer, registered in the State of Maine, to design and certify that the work of this section meets or exceeds the performance requirements specified in this section.
 - 1. Limit deflection to L/240 for non-rigid finishes, L/360 for rigid finishes applied over drywall. Lateral load is 5 psf.

1.06 TESTS

- A. Fire-Resistance: Where fire-resistance ratings are indicated or required by authorities having jurisdiction, provide materials and construction which are identical to assemblies whose fire-resistance rating has been tested in compliance with ASTM E119 by independent agencies acceptable to the Architect and authorities having jurisdiction.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials and products in unopened factory labeled packages. Store and handle in strict compliance with manufacturers' instructions and recommendations. Protect from damage. Adequately support stored gypsum panels to avoid sagging. Sequence deliveries to avoid delays, but minimize on-site storage.

1.08 PROJECT CONDITIONS

- A. Weather: Perform work only when existing and forecasted weather conditions are within the limits established by manufacturers of the materials and products used. Comply with requirements of Gypsum Association publication 220.
- B. Framing Tolerances: Proceed with work only when framing work is complete and within installation tolerances specified in ASTM C 754 and this specification section.
- C. Ventilation: Comply with manufacturer's requirements and recommendations and Gypsum Association publication 216. Avoid too rapid drying in hot weather.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Gypsum Board and Related Products: Provide products by USG, Goldbond or equal meeting requirements specified.
- B. Metal Framing and Support: Provide products of one of the following manufacturers if they meet or exceed the requirements of these specifications:
 - 1. Allied Industries
 - 2. Bostwick Steel Framing
 - 3. National Gypsum Co.
 - 4. Milcor/Inryco
 - 5. Marino Ware Industries
 - 6. U. S. Gypsum Co.

2.02 METAL FRAMING SYSTEMS FOR SUSPENDED AND FURRED CEILINGS

- A. General: Provide components that conform to ASTM C 754 for materials and sizes, unless indicated otherwise. Provide all metal runners, hangers, studs, and channels hot-dip galvanized conforming to ASTM A 525, G60, unless noted otherwise.
- B. Concrete Inserts: Provide inserts designed for attachment to concrete forms, and for embedment in concrete, fabricated from corrosion resistant material, with holes and loops for attachment of hanger wires, and capable of sustaining a load equal to 3 times that imposed by ceiling construction, as tested per ASTM E 488.
- C. Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft temper, 12 gauge minimum.
- D. Hanger Rods: Where required for loading or by local authorities, provide mild-steel rods, sized as required, hot-dip galvanized.
- E. Flat Hangers: Where required for loading or by local authorities, provide mild-steel flat hangers, sized as required, hot-dip galvanized.
- F. Angle-Type Hangers: Provide steel angles with legs not less than 7/8 in. wide, formed from 0.0635 in thick galvanized steel sheet conforming to ASTM A 446, G 90, with bolted connections.
- G. Channels: Provide cold-rolled steel channels, minimum 16 gauge with 7/16 in. wide flanges, protected with corrosion-resistant coating, and as follows:
 - 1. Carrying Channels: 1-1/2 in. deep, 475 lb. per 1,000 lin. ft., hot-dip galvanized.

2. Furring Channels: 25 ga. hot-dip galvanized, screwable, pressed steel furring channels, 7/8 in. thick, hat section.
3. Steel Studs for Furring Channels: ASTM C 645, minimum 25 gage, hot-dip galvanized, with flange edges bent back 90 degrees and doubled over to form minimum 3/16 in. lip, depth as indicated.
4. Clips for attachment of steel furring channels to steel carrying channels shall be proprietary clips as recommended by manufacturer.
5. Resilient Furring Channels: Manufacturer's standard product designed to reduce sound transmission, fabricated from steel sheet complying with ASTM A 653 or ASTM A 568 to form 1/2 in. deep channel.

- H. Ceiling Suspension System: Provide a complete, mechanical suspension system conforming to ASTM C 645, consisting of cold-rolled steel channel main runners, screwable steel furring channels hangers and anchors and all required clips and other components, required for complete installation.

2.03 METAL FRAMING AND SUPPORTS

- A. Studs: ASTM A 446, A 527, and C 645, 20 gage, unless otherwise recommended by manufacturer for conditions, span and deflection constraints indicated. Provide galvanized steel studs with not less than ASTM A 525 G60 coating.
1. Depth: 3-5/8" , unless otherwise indicated on drawings or by span and deflection constraints.
- B. Runners: Match studs. Provide type as recommended by stud manufacturer.
- C. Deflection Track: Manufacturer's top runner complying with the requirements of ASTM C 645 and with 2 inch deep flanges.
- D. Deflection and Firestop Track: Top runner designed to allow partition heads to expand and contract with movement of structure above while maintaining continuity of the assembly. Comply with requirements of ASTM C 645 except configuration, of thickness indicated for studs and width to accommodate depth of studs indicated with flanges offset at midpoint to accommodate gypsum board thickness.
1. Offset Configuration: As indicated.
 2. Product: Subject to compliance with requirements, provide "Fire Trak" manufactured by Fire Trak Corp.
- E. Furring: ASTM C645, 25 gage, except 20 gage where span exceeds 4'; hat shaped or Z-shaped as indicated or appropriate. Provide galvanized steel furring with not less than ASTM A525 G60 coating. Where indicated as "resilient", provide special sound transmission reducing type similar to U. S. Gypsum RC-1.

- F. Cold Rolled Channels: 16 gage steel with factory applied black asphaltum paint coating.
- G. Hanger Wire: ASTM A 641, soft, class 1 galvanized, 9 gage minimum.

2.04 GYPSUM BOARD

- A. Wallboard: ASTM C36.
 - 1. Types: Fire-resistant type X. Refer to the Drawings for locations.
 - 2. Edges: Tapered.
 - 3. Thicknesses: 3/8", and as indicated.
 - 4. Vinyl Faced Gypsum: Provide Textone vinyl faced gypsum board by USG, as approved by the Architect.
- B. Cementitious Board: ANSI A 118.9, cement-coated Portland cement, USG Durock or Modulars Wonderboard or approved equal, nominal 5/8 inch thick.
- C. Gypsum Soffits: USG Exterior Soffit Board. ASTM C 931, thickness as indicated on the Drawings. Provide manufacturer's recommended water-resistant joint compound.
- D. Water Resistant Gypsum Backer Board: Provide water resistant type gypsum backing board conforming to ASTM C 630 at areas as scheduled.

2.05 METAL TRIMS AND ACCESSORIES

- A. Provide the following United States Gypsum trim and accessory types or Architect approved equals from a specified manufacturer:
 - 1. Corner Bead: USG No. 800.
 - 2. Control Joint: USG No. 093.
 - 3. Edge Trim: USG No. 200-A and 200-B for drywall. Series 400 trim is not acceptable.
- B. Interior Work: Galvanized steel trim units of types specified.
- C. Reveals: Factory-primed extruded aluminum reveal by Pittcon or approved equal, sizes as indicated on the Drawings.
- D. Control Joints: Provide control joints complying with ASTM C 1047 and requirements indicated below:
 - 1. Material: Steel sheet coated with aluminum or rolled zinc.
 - 2. Type: One-piece control joint formed with V-shaped slot and removable strip covering slot opening.

- E. Accessory for Curved Edges: Cornerbead formed of metal, plastic, or metal combined with plastic, with either notched or flexible flanges that are bendable to curvature radius.

2.06 JOINT MATERIALS

- A. General: Comply with ASTM C 475.
- B. Tape: Provide perforated, cross-fiber paper or fiberglass reinforcing.
- C. Joint Compound: Provide ready mixed vinyl compound.

2.07 MISCELLANEOUS MATERIALS

- A. Concealed Acoustical Sealant: Non-drying, non-hardening, non-bleeding, non-staining sealant complying with ASTM C 919. Provide one of the following:
 - 1. Pecora BA-98.
 - 2. Tremco Acoustical Sealant
 - 3. USG Acoustical Sealant
- B. Sound Attenuation Insulation: At acoustical partitions, provide U.S.Gypsum Thermafiber sound attenuating fire blanket or approved equal with 2.5 lbs/cu.ft density meeting fire characteristics of Thermafiber. Provide clips or wires to hold insulation in place as applicable.
- C. Laminating Adhesive: Use joint compound or adhesive that is recommended by gypsum board manufacturer for laminating gypsum boards.
- D. Screws: Comply with ASTM C 646 and C 514. Type S, bugle head, for attaching gypsum panels to steel framing. Provide other types as recommended by gypsum board manufacture. Provide cadmium plated fasteners for all fasteners in wet or humid areas.
- E. Anchors: Provide screws, bolts, powder actuated fasteners, inserts and other fasteners that are customarily used in standard construction practices and which are proven capable of supporting at least 3 times design load.
- F. Blocking: Provide steel sheet metal blocking, minimum 20 gauge thick at shaft walls and other areas as indicated.

PART 3 - EXECUTION

3.01 INSPECTION

- A. The Installer/Erector shall examine substrates, supports, and conditions under which this work is to be performed and notify Contractor, in writing, of conditions detrimental

to the proper completion of the work. Do not proceed with work until unsatisfactory conditions are corrected. Beginning work means Installer accepts substrates and conditions.

3.02 INSTALLATION

- A. General Requirements: Strictly comply with manufacturer's instructions and recommendations, except where more restrictive requirements are specified in this section.
1. Furniture Layout: Coordinate and guarantee dimensions required for custom millwork items fitting into wall construction.
- B. Framing: Install/erect framing to comply with ASTM C 754. Provide framing to comply with published details and recommendations of gypsum board manufacturer, or if not available, comply with U. S. Gypsum, Gypsum Construction Handbook.
1. Do not bridge building joints; frame separately on both sides and allow for movement.
 2. Isolate framing system from structural loading both horizontally and vertically.
 3. Provide slip or cushioned joints at top of walls. Maintain lateral stability and acoustical performance.
 4. Terminate partitions [framing and wallboard] at structural deck above, except as noted otherwise.
 5. Where gypsum wallboard is noted to terminate above ceilings, continue framing to deck above.
 6. Space framing members at 16"o.c., unless indicated otherwise. Meet deflection requirements.
 7. Provide metal blocking at areas to receive rails, cabinets, window treatment, furnishings, shelving, and similar items requiring support unless indicated to receive wood blocking.
 8. Ensure maintenance of fire rating and acoustical rating at areas with built-in or recessed items such as fire extinguisher cabinets, furnishings and similar items.
- C. Gypsum Board Installation: Install gypsum board in strict compliance with ASTM C 840 and Gypsum Association publication 216, Recommended Specifications for the Application and Finishing of Gypsum Board. Refer to partition schedule and details on the drawings. Unless indicated otherwise, between offices one layer of gypsum board shall extend to structure above on each side of metal stud. Unless indicated otherwise, between offices and corridors, one layer of gypsum board shall extend to structure above.
1. Locate joints between boards as far from center of walls and ceilings as possible.
 2. Stagger vertical joints on opposite sides of walls and in multiple layer work.
 3. Do not align joints with door, window, or other opening corners.
 3. Install gypsum boards with face side out and with joints over framing members.

4. Do not butt dissimilar board edges.
 5. Provide one-piece boards around door and window frames.
 6. Cover both faces of stud partitions.
 7. Attach boards to metal framing with self-tapping, bugle head screws.
 8. Space fasteners as recommended by gypsum board manufacturer.
 9. Install drywall ceilings prior to gypsum board walls, to the greatest extent possible.
 10. Do not use water-resistant gypsum board on ceilings.
 11. In multiple layer walls, provide backing board or multiple layers of face board.
 12. Form control joints by preparing space between edges to receive metal control joint trim.
 13. Provide materials to maintain acoustical and fire rating of walls at built-in items such as fire-extinguisher cabinets.
- D. Metal Trim: Strictly comply with manufacturer's instructions and recommendations for installation of metal trims and accessories. Meet installation tolerance requirements.
1. Provide corner bead trim at all external corners. Provide joint reinforcing tape at all internal corners.
 2. Provide control joints where shown and at less than 30' o.c. at locations approved by Architect.
 3. Provide edge trim wherever edge of gypsum board is exposed, revealed, or sealant filled, or as noted on Drawings.
- E. Acoustical Insulation Work: Provide sound attenuation insulation where indicated and where required to obtain STC ratings indicated. Use clips or wires to hold insulation in place. Stuff flutes in metal deck with acoustical insulation, except stuff flutes with firesafing insulation for fire-rated partitions.
- F. Acoustical Sealing Work: Provide continuous bead of concealed acoustical sealant at both faces of top and bottom runner tracks, wall perimeters, openings, expansion and control joints. Close off all sound flanking paths and openings, including those above ceilings.
- G. Joint Finishing: Provide 3 coats joint compound treatment at all joints, flanges of trim accessories, penetrations, fastener heads and surface defects. Sand before and after second and third coats. Provide joint reinforcing tape at joints between boards, except where trim accessories are indicated.
1. Extend joint finishing to floor behind wall base to provide a smooth flat surface for installation of wall base.
 2. For water-resistant board applications, use special water-resistant joint compound to seal joints, cover fastener heads, fill surface defects and seal cut edges.
 3. For vinyl-faced gypsum, finish as recommended by manufacturer.

3.03 STEEL CEILING FRAMING AND FURRING

- A. Suspended Ceilings: Install complete suspended steel ceiling framing system in accordance with ASTM C 754, and the following:
1. Install hangers at ends of, and 48 in. on center along lengths of main runners, securing to ceiling structure above with appropriate anchors. Provide all additional secondary framing as required to provide support by primary framing members or structural ceiling deck above. Do not anchor hangers to pipes, ducts, or other overhead non-structural elements.
 2. Install steel runner channels 48 in. on center maximum and within 6 in. of walls.
 3. Install screwable steel furring channels perpendicular to main runners and spaced 24 in. on center along length of, and within 6 in. of walls without wall angles, and within 8 in. of ends of panels and clipped to, the main runners.
 4. Entire installation shall be level and true, with maximum variation from level 1/8 in. when measured with a 10 ft. straightedge, and with accumulation of variation of level not to exceed 1/2 in. per room or area.

3.04 TOLERANCES

- A. The following allowable installed tolerances are allowable variations from locations and dimensions indicated by the Contract Documents and shall not be added to allowable tolerances indicated for other work.
1. Allowable Variation from True Plumb, Level, & Line: $\pm 1/8$ " in 20'-0".
- B. After finishing joints and screw heads shall be flush and not visible. Surfaces shall appear truly flush, smooth, seamless and uniform. Planes shall be truly flat. Corners shall be crisp and at true angles. Where gypsum drywall work butts dissimilar materials, joints shall be tight and shall be accurately scribed to adjacent construction without gaps.

3.05 REPAIR

- A. Repair minor damage to eliminate all evidence of repair. Remove and replace work which cannot be satisfactorily repaired. Clean up all joint compound splatters.

END OF SECTION

SECTION 09300

TILE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Contract Conditions, and other Technical Specifications Sections apply to work of this Section insofar as applicable.

1.02 WORK INCLUDED

- A. The work of this section includes, but is not limited to, the following:
 - 1. Wall tile.
 - 2. Floor tile.
 - 3. Stone thresholds.
 - 4. Preparation of floors surfaces for tile work.

1.03 RELATED WORK

- A. Examine Contract Documents for requirements that affect Work of this Section. Other Specification Sections that directly relate to Work of this Section include, but are not limited to:
 - 1. Section 07900 - JOINT SEALERS
 - 2. Section 09250 - GYPSUM DRYWALL; gypsum drywall.

1.04 QUALITY ASSURANCE

- A. Source: For each type of tile required for the work of this section, provide products of one manufacturer. Provide secondary materials which are acceptable to the manufacturers of the primary materials.
- B. Mock-up: Before beginning primary work of this section, provide 6' x 6' mock-ups of each type of tile work at location acceptable to Architect and obtain Architect's acceptance of visual qualities. Protect and maintain acceptable mock-up throughout the work of this section to serve as criteria for acceptance of this work. Approved mock-ups shall be incorporated into the finished work.

1.05 SUBMITTALS

- A. Product Data: Submit manufacturer's product data, installation instructions, use limitations and recommendations for each material used. Provide certifications stating that materials comply with requirements.
- B. Verification Samples: Submit representative samples of each material that is to be exposed in the finished work, showing the full range of color and finish variations expected. Provide samples having minimum area of 144 square inches mounted on hardboard and grouted. Provide full size trim samples and 6" lengths of stone thresholds.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials and products in unopened factory labeled packages. Store and handle in strict compliance with manufacturers' instructions and recommendations. Protect from damage. Sequence deliveries to avoid delays, but minimize on-site storage.

1.07 PROJECT CONDITIONS

- A. Environment: Perform work only when conditions are within the limits established by manufacturers of the materials and products used. Maintain manufacturer's recommended curing/setting temperatures for at least 7 days after installation.
- B. Substrates: Proceed with work only when substrate construction and penetrating work is complete.
- C. Ventilation: Comply with manufacturer's requirements and recommendations.

PART 2 - PRODUCTS

2.01 MATERIALS AND PRODUCTS

- A. Floor Tile: Matte glazed 12 x 12 x 5/16 in. porcelain tile, with thinset latex-portland cement setting bed and grout. Color as selected by Architect from manufacturer's premium colors.
- B. Wall Tile and Base: Glazed 6 x 6 x 5/8 in. porcelain tile, with latex-portland cement setting bed and grout. Color as selected by Architect from manufacturer's premium colors.
- C. Marble Thresholds: Provide ASTM C503 Marble Institute of America Class A beveled thresholds cut to fit door frame profile. Color as approved by Architect.
- D. Trowelable Underlayments and Patching Compounds: Latex-modified, portland-cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

2.02 SETTING MATERIALS

A. Anti-Fracture Membrane: Cold applied two-part liquid system consisting of liquid rubber and reinforcing fabric, rated extra heavy duty per ASTM C 627 and complying with the following:

1. Hydrostatic Pressure: Per FHA 4900.1, 615-5, C - Pass (40 hrs).
2. Hydrostatic Resistance: Per ASTM D 751 - 120 lbs/sq. in.
3. Elongation: Per ASTM D 751, 17.1 - 70%.
4. Breaking Strength: Per ASTM D 751, 16.1 - 1400 psi.
5. Shear Bond Strength: Per ANSI A118.4 - ≥ 350 psi.
6. Nominal Thickness: Per LIL 1013 - 0.020 in.
7. Service Temperature: Per LIL 1016 - minus 280°F.
8. Crack Suppression: Per 2BD 02 - 1988 - Pass (>0.4 mm).
9. Thickness: 20 mils.

B. Mortar: Latex-Portland cement mortar comply with ANSI A118.4 and the following:

1. Prepackaged dry mortar mix composed of portland cement, graded aggregate, rated extra heavy duty per ASTM C 627.
2. Latex additive, water emulsion shall be manufacturer's standard complying with the following:
 - a. Water Absorption: Per ANNSI A118.4, F-7 - 4.0% maximum.
 - b. Compressive Strength: Per ASTM C 109 - 5000 psi.
 - c. Bond Strength: Per ANSI A118.4, F-6.2.5 - 500 psi.
 - d. Hardness: Per ASTM D 2240 - 57.

PART 3 - EXECUTION

3.01 INSPECTION

A. The Installer shall examine substrates and conditions under which this work is to be performed and notify Contractor, in writing, of conditions detrimental to the proper completion of the work. Do not proceed with work until unsatisfactory conditions are corrected. Beginning work means Installer accepts substrates and conditions.

3.02 INSTALLATION

A. Strictly comply with manufacturer's instructions and recommendations, except where more restrictive requirements are specified in this section. Provide leveling of substrate prior to tile installation on floor at areas requiring leveling; provide pitching of floors to floor drains in toilet and shower rooms prior to installation.

B. Comply with requirements of Tile Council of America Handbook for Ceramic Tile Installation and ANSI 108 series Standard Specifications for the Installation of Ceramic

Tile. Provide complete installations including expansion joints as recommended by these standards even if not shown or otherwise indicated.

- C. Extend tilework into recesses and under and behind fixtures. Terminate work neatly at obstructions, edges and corners without disrupting pattern or joint alignment.
- D. Cut and drill tile without damaging decorative surfaces. Fit tile closely to fixtures, piping and other work.
- E. Lay tile in grid pattern with floor, base and wall joints accurately aligned. Center tile in both directions to avoid use of less than 1/2 tile units.
- F. For tile placed in sheets, make joints between sheets exactly the same width as joints within sheets.
- G. Layout wall tile to wainscot height indicated.
- H. Provide marble thresholds under the door at every change of material. Position the threshold so that the floor on the other side of the room cannot be seen from the other room.
- I. Mix and install grout in strict compliance with manufacturer's instructions and recommendations.
- J. Expansion and Control Joints: Provide sealant filled crack control joints matching width of standard grout joints at all inside corners in compliance with Section 07900 - Joint Sealers and Fillers. Provide minimum 1/4" wide sealant filled expansion joints over all cracks and joints in concrete subfloors, over all changes in backing materials, where tile abuts a restraining surface such as perimeter walls, columns, ceilings, and dissimilar floors. Refer to Drawings for location of joints.
- K. Install tile to comply with the ANSI standards for assemblies specified.
- L. Layout recessed towel dispensers and similar items to fit into uncut tile pattern as indicated on drawings.

3.03 CLEANING AND PROTECTION

- A. Repair minor damage to eliminate all evidence of repair. Remove and replace work which cannot be satisfactorily repaired. Leave work free of broken, chipped and loose tile.
- B. Clean exposed surfaces using materials and methods recommended by manufacturer of tile being cleaned. Remove and replace work that cannot be successfully cleaned. Do not use acid cleaners unless specifically permitted by tile manufacturer and only after

completely curing tile and grout. Protect adjacent surfaces from contact with acid cleaners and thoroughly flush with clean water.

- C. Protect work from foot traffic for at least 7 days after grouting.
- D. Provide temporary protection to ensure work being without damage or deterioration at time of final acceptance. Remove protections and reclean as necessary immediately before final acceptance.

END OF SECTION

SECTION 09510

ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Contract Conditions, and other Technical Specifications Sections apply to work of this Section insofar as applicable.

1.02 WORK INCLUDED

- A. Provide suspended acoustical ceilings as indicated on Drawings and as specified. Work of this Section includes, but is not limited to:
 - 1. Acoustical panel lay-in ceiling with exposed suspension system.

1.03 RELATED WORK

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that relate directly to work of this Section include, but are not limited to:
 - 1. Division 15 - MECHANICAL and Division 16 - ELECTRICAL; Mechanical and electrical fixtures and appurtenances at acoustical ceilings, including independent suspension.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's product data, installation instructions, use limitations and recommendations for each material used. Provide certifications that materials comply with requirements.
- B. Initial Selection Samples: Submit samples showing complete range of colors, textures, and finishes available for each material used.
- C. Verification Samples: Submit representative samples of each material to be exposed in the finish work, showing full range of color and finish work, showing full range of color and finish variations expected. Provide minimum 12 in. x 12 in. samples of panels. Provide minimum 12 in. long samples of exposed suspension systems.
- D. Test Reports: Submit certified reports for tests required.

1.05 QUALITY ASSURANCE

- A. Comply with governing laws and building codes as well as to CISCA Handbook and the requirements of ASTM C 636.
- B. Installer: A firm with minimum three years experience in work of type required by this Section, and which is authorized, certified or licensed by the manufacturers of the primary materials.
- C. Source: For each type of material required for the work of this Section, provide primary materials which are the products of a single manufacturer. Provide secondary materials which are acceptable to the manufacturers of primary materials.

1.06 TESTS

- A. Fire Resistance: Where fire-resistance ratings are indicated or required by authorities having jurisdiction, provide materials and construction which are identical to assemblies whose fire-resistance ratings have been tested in compliance with ASTM E 119 by independent agencies acceptable to the Architect/Engineer and authorities having jurisdiction.
- B. Fire-Test-Response Characteristics: Provide acoustical panel ceilings that comply with the following requirements:
 - 1. Fire-response tests are performed by a qualified testing and inspecting agency. Qualified testing and inspecting agencies include Underwriters Laboratories (UL), Warnock Hersey, or another agency that is acceptable to authorities having jurisdiction and that performs testing and follow-up services.
 - 2. Surface-burning characteristics of acoustical panels comply with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84.
 - 3. Acoustical panel ceilings indicated are identical in materials and construction to those tested for fire resistance per ASTM E 119.
 - 4. Fire-resistance-rated, acoustical panel ceilings are indicated by design designations listed in the UL "Fire Resistance Directory," in the Warnock Hersey "Certification Listings," or in the listing of another qualified testing and inspecting agency.
 - 5. Products are identified with appropriate markings of applicable testing and inspecting agency.
- C. Noise Reduction Coefficient (NRC): Where NRC ratings are indicated or required by authorities having jurisdiction, provide materials and construction which are identical to assemblies whose NRC ratings have been tested in compliance with ASTM C 423 by independent agencies acceptable to the Architect/Engineer and authorities having jurisdiction.

- D. Ceiling Sound Transmission Class (CSTC): Where CSTC ratings are indicated or required by authorities having jurisdiction, provide materials and construction which are identical to assemblies whose CSTC ratings have been tested in accordance with CISCA Test Method AMA-1-II and CSTC rating determined in accordance with ASTM E 413 by independent agencies acceptable to the Architect/Engineer and authorities having jurisdiction.
- E. Light Reflectance (LR): Where LR rating is indicated or required by authorities having jurisdiction, provide materials and construction which are identical to assemblies whose LR rating has been tested in compliance with ASTM C 523 by independent agencies acceptable to the Architect and authorities having jurisdiction.

1.07 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages, containers, or bundles bearing manufacturer's name, brand names, type of material, and contents.
- B. Store materials in interior spaces, above floors, under cover, away from sweating walls and other damp surfaces. Provide ventilation.

1.08 PROJECT CONDITIONS, SEQUENCING, AND SCHEDULING

- A. Environment: Perform work only when temperature and humidity conditions are within the limits established by manufacturers of the materials and products used.
- B. Conference: Convene a pre-installation conference to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work.
 - 1. Proceed with installation of ceiling only when construction above ceilings and penetrating work is complete. Delay installation of ceiling panels until near time of Substantial Completion.
 - 2. Perform work of this Section coordinated with the layout of light fixtures, HVAC equipment and fixtures, fire suppression system components and all other related work. In general, every penetration shall occur at the center of a ceiling panel.

1.09 EXTRA MATERIAL

- A. Provide packaged, wrapped and labeled maintenance stock equal to 2% of the actual quantity installed for the following items of work:
 - 1. Each type of ceiling panel.
 - 2. Each type of suspension system component.

PART 2 PRODUCTS

2.01 SUSPENSION SYSTEM

- A. Provide products of one of the following manufacturers that meet or exceed requirements specified:
1. Armstrong World Industries, Inc.
 2. Chicago Metallic Corporation.
 3. USG Interiors.
- B. Exposed Suspension System, Non-Rated: Provide manufacturer's standard 15/16 in. and narrow 9/16 in. exposed "Tee", commercial quality cold-rolled, electro-galvanized steel grid system, complying with ASTM C 635; as scheduled at end of Section.
1. Provide "Intermediate-Duty System" conforming to ASTM C 635.
 2. Provide grid modules to match ceiling panel sizes.
 3. Provide manufacturer's standard white baked enamel finish on steel exposed surfaces.
 4. Exposed fasteners, including pop rivets, will not be permitted for suspension system installation.
- C. Attachment Devices: Provide attachment devices sized for five times design load indicated by ASTM C 635, Table 1, for Direct Hung.
- D. Hanger Wire: ASTM A 641, galvanized, soft temper, prestretched, Class 1 Coating, minimum 12 gage. Size wire so that stress at three times hanger design load given in ASTM C 635, Table 1, Direct Hung, will be less than the yield stress of the wire but provide not less than 0.106 in. diameter wire.
- E. Bracing: Provide manufacturer's standard stiffening braces.
- F. Hold-Down Clips: Provide spring steel impact clips design to absorb impact forces.
- G. Moldings and Trim: Except as otherwise indicated, provide manufacturer's standard profiles to suit edge conditions, panel profile and penetrations. Provide custom fabricated work as required to provide exact fit.
1. Provide steel angle edge support back bent to reinforce edge where ceiling panels meet walls.
 2. Provide clean, aesthetically pleasing joints at corners.
 3. Pop rivet fastening at connections and intersections of moldings and trim pieces will not be permitted.
 4. All moldings and trim components of suspension system shall have hemmed edges.

5. Provide custom colors, shapes, bends and configurations as required. Provide continuous true round moldings at columns. Segmented molding will not be accepted.
6. Provide moulding equal to "Shadowline" by USG Interiors, Inc.; as approved by the Architect.

2.02 ACOUSTICAL PANELS

- A. Provide ceiling panel products of one of the following manufacturers that meet or exceed requirements specified:
 1. Armstrong World Industries, Inc.
 2. Celotex Corporation.
 3. United States Gypsum Co.
- B. Acoustical Panel: Provide panels equal to "S800 with Overtone Finish" manufactured by Celotex and complying with ASTM E 1264 classifications. Panels shall have the following characteristics:
 1. Light Reflectance: LR 0.75; according to ASTM E 1264.
 2. Surface Burning Characteristics: ASTM E 1264, Class A; Fed. Spec. SS-S-118B Flame Spread 25 or under; UL labeled.
 3. Noise Reduction Coefficient: Minimum 0.70; according to ASTM C 423.
 4. High impact resistance and humidity resistance.
 5. Panels Size: 24 in. by 24 in.

PART 3 EXECUTION

3.01 INSPECTION

- A. The Installer shall examine substrates, supports, and conditions under which this work will be performed and notify Contractor in writing, of conditions detrimental to proper completion of the work. Do not proceed with work until unsatisfactory conditions are corrected. Beginning work means Installer accepts substrates and conditions.

3.02 PREPARATION AND INSTALLATION - GENERAL

- A. General: Strictly comply with manufacturer's recommendations and instructions.
- B. Conditioning: Condition acoustical ceiling materials to temperature and humidity conditions which approximate those that will be present when spaces are occupied by unpackaging and separating material at least 24 hours prior to installation.
- C. Exterior doors and windows shall be in place and glazed prior to ceiling installation. Cleaning, concrete, masonry, plaster, and other "wet-work" shall be complete and dry.

A minimum temperature of 65°F. shall be maintained before, during, and after the installation of acoustical work.

- D. Coordination: Coordinate installation with other work to ensure proper locations of related work such as light fixtures, mechanical fixtures, fire protection systems and the like.
- E. Layout: Measure each area and layout ceilings to balance panel widths on opposite edges of each ceiling in both directions. Avoid use of less than 1/2 width ceiling units wherever possible.
- F. Suspension Installation: Erect suspension system in accordance with ASTM C 636, supported only from building structure. Level main suspension members to within tolerance of 1/8 in. in 10 ft. Splay hangers where necessary and countersplay to balance resulting horizontal forces. Cross brace suspension to prevent lateral sway and displacement during full seismic loads prescribed by code.
- G. Install acoustical units flush and level with joints in perfect alignment. Maintain direction of pattern and "mill-run" of acoustical units in one direction.
- H. Finish acoustical ceilings shall be level to within 1/8 in. in 10 ft. with total accumulated error not to exceed 1/2 in. or L/960 of overall ceiling dimension, whichever is smaller, in any room or area.
- I. Use white, clean gloves when handling ceiling materials.

3.03 INSTALLATION OF SUSPENDED EXPOSED "TEE" LAY-IN PANEL SYSTEM

- A. Install exposed "Tee" suspension system where indicated, in accordance with the requirements of ASTM C 636.
- B. Secure hanger anchors symmetrically to structure above areas to receive "Tee" suspension grid, locating the hangers in rows directly above exposed main "Tees". Install main "Tees" at proper elevation with manufacturer's recommended ties. Install cross "Tees" 2 ft. on center, developing a 2 ft. by 4 ft. grid as indicated. Install wall moldings at perimeter walls and columns where main or cross "tees" do not occur, or as otherwise called for on the Drawings. Miter corners where wall molding intersect or install corner caps.
- C. After installation of the exposed "Tee" suspension system, install acoustical panels flush and level, with panel grain in single direction.

3.04 CLEANING

- A. Protect the work of other trades and work of this Section already installed against soiling and damage by the exercise of reasonable care and precautions. Repair or replace any work so damaged or soiled.

END OF SECTION

SECTION 09650

RESILIENT FLOORING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Contract Conditions, and other Technical Specifications Sections apply to work of this Section insofar as applicable.

1.02 WORK INCLUDED

- A. Provide resilient flooring and related items, as indicated on the Drawings and as specified herein. Work of this Section includes, but is not limited to:
 - 1. Resilient wall base.

1.03 RELATED WORK

- A. Examine Contract Documents for requirements that affect Work of this Section. Other Specification Sections that relate directly to Work of this Section include, but are not limited to:
 - 1. Section 09680, CARPETING.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's printed product data, specifications, standard details, installation instructions, use limitations and recommendations for each material used. Provide certifications that materials and systems comply with specified requirements.
- B. Initial Selection Samples: Submit samples showing complete range of colors, textures, and finishes available for each material used.
- C. Verification Samples: Submit representative samples of each material that is to be exposed in the completed work. Show full color ranges and finish variations expected. Provide samples having minimum size of 144 sq. in.

1.05 COORDINATION

- A. Coordinate work of this Section with work of other Sections affecting, or affected by, this work, as necessary to ensure completion of work of the Contract on schedule.

PART 2 PRODUCTS

2.01 GENERAL MATERIAL REQUIREMENTS

- A. Resilient materials shall be uniform in thickness and size.
- B. Resilient material shall be cut accurately with square, true edges.
- C. Plain colors shall be uniform throughout.
- D. Variegated colors and patterns shall be reasonably uniform so as not to mar appearance of floor.
- E. Except as otherwise indicated or specified, all colors shall be as selected by the Architect from the full range of manufacturer's standard colors.
- F. Resilient materials shall be free of objectionable odors, blisters, cracks, objectionable foreign material, or other physical defects affecting appearance or serviceability.

2.02 RESILIENT FLOORING

- A. Vinyl Wall Base: Provide vinyl wall base by Johnsonite or approved equal conforming to ASTM F 1861, Group 1, Type TV, and as follows:
 - 1. Height: 4 in. typical.
 - 2. Thickness: 1/8 in. gage.
 - 3. Style: Top-set cove at resilient flooring Style B (Cove), straight at carpet Style A (Straight). Provide formed corners.
 - 4. Finish: Matte.
 - 5. Roll Lengths: 100 ft. rolls, continuous runs with no pieces less than 10 ft. in any run over 100 ft.
 - 6. Adhesive: Parabond adhesive and cement.
 - 7. Colors: As selected by Architect.

PART 3 EXECUTION

3.01 PREPARATION OF SURFACES

- A. Initial Preparation Under Other Sections:
 - 1. Surfaces to receive resilient materials shall be level, plumb, true and clean, free of projections, ridges, and waves, and free of loose dirt and dust, grease, oil, and other deleterious materials such as resin type curing compounds, paint, glue, and similar materials, ready to receive work of this Section. Filling of cracks with crack filler, as required, however, will be included as part of work of this Section.

2. When variation in finished surface exceeds allowable amount specified therein, it shall be brought within the allowable tolerance with latex type underlayment applied in strict accordance with manufacturer's instructions.

B. Inspection of Surfaces and Final Preparation Under this Section:

1. Thoroughly examine all surfaces to receive work of this Section, and notify the Architect in writing of all conditions which would adversely affect this work. Do not commence work in any area where such notice of adverse conditions has been sent until corrective work has been completed or waived. Start of work in any area without issuances of such notice shall constitute acceptance of conditions in the area as suitable to properly receive the work of this Section.
2. Fill all cracks, control joints, etc., in sub-surfaces, using approved Crack Filler in accordance with manufacturer's published instructions. Do final cleaning of surfaces just prior to installation, removing all dust, dirt, and other loose particles which may have accumulated since initial cleaning.

3.02 INSTALLATION, GENERAL

- A. Do not begin installation until work of other sections including painting, is substantially complete. Use only experienced workmen. Strictly adhere to printed instructions of manufacturer's of various materials; if found to be in conflict refer to Architect for decision.
- B. Maintain room temperatures in installation areas at not less than 65°F for a period of at least 48 hours prior to commencement of tile work, and to at least 48 hours after completion, and not less than 60°F from that time on.
- C. Lay resilient materials in manner to insure good, uniform contact with subsurface materials, and to produce finished surfaces which are smooth, even, and in true planes, free of buckles, waves, and other imperfections. Store and use adhesive in accordance with manufacturer's published instructions.
- D. Clean off surplus adhesive from resilient materials and adjacent surfaces.

3.03 RESILIENT BASE

- A. Base: Adhere base to walls, columns, casework, and all other permanent surfaces and fixtures. Install base in rolls to minimize seams. Tightly bond base to walls without any gaps between wall and base and with 100% coverage of adhesive. Hand roll base to ensure full contact and adhesion. Field form sharp external corners and keep seams and joints as far from external corners as possible. Cut and cope base at internal corners; do not round internal corner with base.
 1. Fill top edge of base with sealant where base runs along an irregular wall surface such as masonry. Sealant color shall closely match base color.

3.04 ADDITIONAL MATERIALS

- A. Furnish additional, factory-sealed, standard cartons containing a total of at least 3% of the amount of each different material, type, and color of floor tile used on the Project.
- B. Deliver the additional materials to site and place in storage area(s) within the building designated by the Architect.

END OF SECTION

SECTION 09682

CARPET TILE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Contract Conditions, and other Technical Specifications Sections apply to work of this Section insofar as applicable.

1.02 WORK INCLUDED

- A. The work of this section includes, but is not limited to, the following:
 - 1. Carpet tile for glued-down installation.
 - 2. Floor preparation.
 - 3. Resilient edge strips.

1.03 RELATED WORK

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that relate directly to work of this Section include, but are not limited to:
 - 1. Section 09650, RESILIENT FLOORING AND BASE; Materials and installation.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's product data, installation and maintenance instructions, use limitations and recommendations for each carpet and pad product used. Provide certifications stating that materials comply with requirements.
- B. Shop Drawings: Provide large scale shop drawings for layout of all parts of the work. Provide plans indicating carpet directions and details of seaming and accessory items. Show locations of change of dye lot, if any.
- C. Verification Samples: Submit representative samples of each material that is to be exposed in the finished work, showing the full range of color and finish variations expected. Provide labeled carpet samples having minimum size of 18" x 27" and 6" long samples of edge strips.
 - 1. Submit 12" long piece of each type of transition strip and edge guard.
- D. Test Reports: Submit certified reports for tests required.

1.05 QUALITY ASSURANCE

- A. Installer: A firm which has at least five years experience in work of the type required by this section and which is acceptable to the carpet manufacturers.

- B. Source: For each type of carpet required for the work of this section, provide products of one manufacturer. Provide secondary materials which are acceptable to the carpet manufacturers.
- C. Reference Standard: Comply with general recommendations and information contained in Carpet Specifier's Handbook published by the Carpet and Rug Institute.
- D. Manufacturer shall be currently involved in renewing and repatterning used carpet tile in order to eliminate waste sent to landfills.
- E. Carpet tile shall conform to the following environmental considerations:
 - 1. CRI Green Label Plus Certified.
 - 2. No detectable levels of Formaldehyde.
 - 3. All products must be decreasing emitters of Volatile Organic Chemicals (VOC's).
 - 4. Plastic protective wrap shall not be used, in order to minimize waste to landfills.
- F. Must be an Environmentally Preferred Product, SCS Sustainable Choice Gold (NSF 140 standard), Third party certified.

1.06 TESTS

- A. Burning Characteristics: Provide materials whose surface burning characteristics, when tested in compliance with ASTM E84, Class A.
- B. Pill Test: Carpet must pass test for flammability, ASTM D2859.
- C. Floor Radiant Panel Test: Provide carpet with minimum average radiant flux ratings not less than 0.45 watts/ cm² (class 1) when tested according to ASTM E648.
- D. Smoke Density Test: Carpet must pass ASTM E662 test with and without flame.
- E. Lightfastness: Provide fade resistant carpet with rating of not less than 3 international grey scale shade changes after 80 xenon arc standard fading hours; AATCC 16E.
- F. CRI Green Label Plus Indoor Air Quality Testing Program:
 - 1. VOC's not to exceed 0.6 milligrams per square meter per hour.
 - 2. Styrene not to exceed 0.4 milligrams per square meter per hour.
 - 3. 4-PC (Phenyl Cyclo Hexene) not to exceed 0.1 milligrams per square meter per hour.
 - 4. Formaldehyde not to exceed 0.05 milligrams per square meter per hour.
 - 5. CRI Certification Number is required.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials and products in unopened mill labeled packages with mill register numbers and tags attached. Store and handle in strict compliance with manufacturer's instructions and recommendations. Protect from damage.
- B. Sequence deliveries to avoid delays, but minimize on-site storage.

1.08 SEQUENCING AND SCHEDULING

- A. Conference: Convene a pre-installation conference to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work.
- B. Sequence: Perform work of this section only when other work which could damage carpet is completed. Heating, ventilating and air conditioning systems shall be completely operational and properly functioning before, during and after the carpet work.

1.09 WARRANTY

- A. Installation Warranty: Installer shall warrant this work for a period of two years. Warranty shall include requirement to make necessary replacements and/or repairs due to defective material and/or unsatisfactory workmanship which becomes apparent within 24 months after initial installation.
- B. Manufacturer's Warranty: Provide the following warranties:
 - 1. Lifetime Antimicrobial Warranty
 - 2. Lifetime Antistatic Warranty
 - 3. Lifetime Atmospheric Fading Warranty
 - 4. Lifetime Colorfastness Warranty
 - 5. Lifetime Delamination of Backing Warranty
 - 6. Lifetime Edge Ravel Warranty
 - 7. Lifetime Floor Compatibility Warranty
 - 8. Lifetime Floor Release Warranty
 - 9. Lifetime Latent Defects Warranty
 - 10. Lifetime Moisture Barrier Warranty
 - 11. Lifetime Pattern Loss Warranty
 - 12. Lifetime Resiliency Warranty
 - 13. Lifetime Wear Warranty
 - 14. Ten Year Image Assurance Warranty
 - 15. 100% Pattern Match Warranty - Modular
 - 16. 100% Bow/Bias Warranty – Modular

1.10 EXTRA MATERIAL

- A. Provide packaged, wrapped and labeled maintenance stock equal to 3% of the actual quantity of each type of carpet installed. Provide wrapped and labeled usable pieces of scraps. Discard smaller pieces as waste.

PART 2 - PRODUCTS

2.01 CARPET

- A. Carpet Tiles: Provide the following by Milliken Contract as approved by the Architect.
 - 1. Custom Midnight Sparkle p/6452 c/012 Modified Dalesman design (used in walkways DR#ES143032-06 Mod. Dalesman
 - 2. Custom Midnight Sparkle p/6383 c/088 Woodland Walk design (large scale used in the passenger waiting areas

2.02 INSTALLATION ACCESSORIES

- A. Concrete-Slab Primer: Nonstaining type as recommended by carpet tile manufacturer.
- B. Trowelable Underlayments and Patching Compounds: As recommended by carpet tile manufacturer.
 - 1. Sub-Floor Filler: W.W Henry 345, Webpatch 60 or other Portland cement based floor patching compound.
- C. Adhesive: Provide pressure sensitive adhesive that meets CRI Indoor Air Quality Green Label certification. Provide certification number.
- D. Edge Strips: As selected by the Architect.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine subfloors and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting performance of carpet tile. Do not proceed with installation until unsatisfactory conditions have been corrected.
- B. Verify that subfloors and conditions are satisfactory for carpet tile installation and comply with requirements specified in this Section and those of carpet tile manufacturer.

3.02 PREPARATION

- A. General: Comply with carpet tile manufacturer's installation recommendations to prepare substrates indicated to receive carpet tile installation.
- B. Level subfloor within 1/4 inch in 10 feet (6 mm in 3 m), noncumulative, in all directions. Sand or grind protrusions, bumps, and ridges. Patch and repair cracks and rough areas. Fill depressions.
 - 1. Use leveling and patching compounds to fill cracks, holes, and depressions in subfloor as recommended by carpet tile manufacturer.
- C. Remove subfloor coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone.
- D. Broom or vacuum clean subfloors to be covered with carpet tile. Following cleaning, examine subfloors for moisture, alkaline salts, carbonation, or dust.
- E. Concrete-Subfloor Preparation: Apply concrete-slab primer, according to manufacturer's directions, where recommended by carpet tile manufacturer.

3.03 INSTALLATION - TILE

- A. General: Comply with CRI 104, Section 13: "Carpet Modules (Tiles)".
 - 1. Carpet tiles shall be laid with nap running in ashlar pattern.
- B. Where demountable partitions or other items are indicated for installation on top of finished carpet tile floor, install carpet tile before installation of these items.
- C. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings.
- D. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

3.04 CLEANING

- A. Perform the following operations immediately after completing installation:
 - 1. Remove visible adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet tile manufacturer.
 - 2. Remove protruding yarns from carpet tile surface.
 - 3. Vacuum carpet tile using commercial machine with face-beater element.

3.05 PROTECTION

- A. General: Comply with CRI 104, Section 15: "Protection of Indoor Installation".
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure carpet tile is without damage or deterioration at the time of Substantial Completion.

END OF SECTION

SECTION 09900

PAINTING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Contract Conditions, and other Technical Specifications Sections apply to work of this Section insofar as applicable.

1.02 WORK INCLUDED

- A. Provide painting and finishing work throughout exterior and interior of Project as indicated on the Drawings and as specified.
- B. Examine Contract Documents to determine full extent of painting and finishing work required. Materials provided under other Sections that need painting or finishing and are left unfinished under requirements of other Specification Sections, shall be painted and finished to completion under work of this Section, unless specifically scheduled herein to be left unfinished.
- C. Preparatory work of materials and surfaces to receive paint beyond that specified to be done as work of other Sections, shall be included as work of this Section.

1.03 RELATED WORK

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that relate directly to work of this Section include, but are not limited to:
 - 1. Section 05310, STEEL DECK.
 - 2. Section 05500, METAL FABRICATIONS; Prime coat on miscellaneous metal .
 - 3. Section 06100, ROUGH CARPENTRY; Wood preservative treatments.
 - 4. Section 09250, GYPSUM DRYWALL.
 - 5. Division 15 - MECHANICAL and Division 16 - ELECTRICAL; Factory finish and prime coats on mechanical and electrical fixtures and equipment.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's printed product data, specifications, use limitations and recommendations for each material used. Provide certifications that materials and systems comply with specified requirements.

- B. Initial Color Selection Samples: Submit manufacturer's standard color charts or chips showing complete range of colors, textures, and finishes available for each paint system used.
- C. Verification Samples: After initial selection of colors, submit representative samples of each paint system color that is to be exposed in the completed work. Show full color ranges and finish variations expected. Provide texture to simulate actual conditions. Define each separate coat, including block fillers and primers. Resubmit samples until required sheen, color, and texture have been approved. Provide samples as follows:
 - 1. Paint Samples for Smooth Surfaces: Provide samples of painted finishes on gypsum drywall, Masonite board, and CMU surfaces to be painted, having minimum size of 144 sq. in.

1.05 QUALITY ASSURANCE

- A. Source: Provide primers and undercoat paint produced by same manufacturer of finish coats for each substrate.
- B. Coordination: Review other Specification Sections where primers are provided to ensure compatibility with finish coatings provided under this Section.
- C. Mock-Ups: Prior to commencing work of this Section, provide 50 sq. ft. mock-ups of each color, paint system, and substrate at locations acceptable to the Architect. Obtain Architect's acceptance of visual qualities. Refinish mock-ups until Architect's acceptance is obtained. Maintain acceptable mock-ups throughout the remainder of the work to serve as criteria for acceptance of the work. Acceptable mock-ups may be incorporated into the finish work.

1.06 TESTS

- A. The Owner may employ an independent testing agency to perform tests, evaluations, and certifications of products used. Cooperate and permit samples of materials to be taken as they are used.

1.07 PROJECT CONDITIONS

- A. Weather, Temperature, and Humidity: Perform work only when existing and forecasted weather conditions fall within limits established by manufacturers of materials used.
 - 1. Indoor Temperature: Maintain indoor temperature at 65°F. during application and drying of paints.
 - 2. Outdoor Temperature and Conditions: Air and surface temperature shall be between 50°F and 90°F. Surfaces shall be dry within limits of finish system manufacturer.

3. Do not paint or stain exterior surfaces while surfaces are exposed to the hot sun.
 - B. Substrates: Proceed with work only when substrate construction and penetration work is complete.
 - C. Lighting: Since lighting conditions can alter appearances of finish painting work, perform work of this Section under lighting conditions simulating permanent lighting system to the greatest extent possible.
- 1.08 PRODUCT DELIVERY, STORAGE, AND HANDLING
- A. Deliver materials in unopened original containers bearing manufacturer's labels.
 - B. Store materials in fully sealed containers, outside the building, preferably in exterior storage shed, well ventilated, and with a minimum ambient temperature of 45°F. Oily rags and waste must be removed from the building every night, and under no circumstances will be allowed to accumulate. Each space containing stored paint materials shall be provided with UL labeled fire extinguisher of suitable type, class, and capacity.

PART 2 PRODUCTS

- 2.01 ACCEPTABLE MANUFACTURERS
- A. Latex and Alkyd Based Paints: Provide products of one of the following manufacturers that meet or exceed specified requirements:
 1. Benjamin Moore and Co. (Moore).
 2. Pratt and Lambert (P & L).
 3. The Sherwin Williams Company (S-W).
 - B. High Performance Paint Coatings: Provide products of one of the following manufacturers that meet or exceed specified requirements:
 1. Tnemec Company, Inc. (Tnemec).
 2. DuPont.
 3. Hempel.
 - C. Materials used shall be best grade products of their respective kinds. The Painting Schedule is based on products the above named manufacturers. These are specified to establish a standard of quality and kind of material desired. Provide these products, or equals as approved by Architect.
 - D. Note: If substitutes are proposed, submit complete schedule showing materials specified and equivalent materials proposed as substitutes. Provide complete

manufacturer's product data on proposed materials. Substitutes must be approved by Architect before commitment for materials is made.

- E. Assume full responsibility for proper performance of materials, for method of application, and for compatibility of materials applied over shop coats or other coats previously applied, including but limited to primers, sealers, preservative treatments, etc. Notwithstanding specific schedules in this Section, select primers which have been verified to be appropriate for each of the substrates and finishes encountered.
- F. Provide miscellaneous painting materials such as linseed oil, shellac, turpentine, and thinner of the highest quality.

2.02 COLORS

- A. Provide colors in accordance with schedule provided by Architect. Tint and match colors to the satisfaction of Architect. Provide facilities for comparison and adjustment of colors. No limit is placed on number of colors that may be required; however the following maximum number of colors may be used in any one room, area, or surface:
 - 1. Three colors.

2.03 FILLERS, SOLVENTS, AND MISCELLANEOUS MATERIALS

- A. Turpentine: Pure gum spirits of turpentine conforming to Fed Spec. TT-T-801.
- B. Drier: Conform to Fed. Spec. TT-D-65.
- C. Tinting Materials: Best quality, ground in pure boiled linseed oil, limeproof, and non-fading.

PART 3 EXECUTION

3.01 INSPECTION AND GENERAL PREPARATION

- A. Inspect surfaces to receive finishes to ensure they are in proper condition to receive work under this Section.
- B. If surfaces are not thoroughly dry, or if surfaces cannot be put in proper condition to receive paint or other finish by customary cleaning methods, sanding, or spackling, notify Architect in writing.
- C. Commencing work on any surface will be construed as acceptance of the surface as being satisfactory to properly receive the work of this Section.

- D. Furnish and lay drop cloths in all rooms and areas where painting and finishing is being done, to adequately protect flooring and other work from all damage during the painting work.
- E. Remove hardware, accessories, device plates, lighting fixtures, factory finished work, and similar items; or provide ample in-place protection. Use skilled mechanics for removal, resetting, and protection.
- F. Cleaning: Do not paint over dirt, dust, rust, grease, moisture, or other contaminants detrimental to the formation of a durable paint finish. Clean surfaces thoroughly prior to painting in any given area.
- G. Touch up bare or abraded spots on surfaces with shop or existing finishes scheduled to be painted under this Section. Use same material used for shop coat. Substrate shall be smooth, free from raised grain; putty sags, cracks, rust, grease, dirt, or other foreign matter or defect.
- H. Incompatible Shop Primers: Remove incompatible shop primers and reprime surfaces, or provide barrier coats in compliance with finish paint manufacturer's instructions.

3.02 SURFACE PREPARATION

- A. Prepare surfaces to receive work of this Section in strict accordance with manufacturer's instructions applicable to each material, condition, and finish.
- B. Gypsum Wallboard: Fill holes, dents, and similar flaws in gypsum wallboard with plaster of Paris or spackling compound. Cut out and fill cracks. Sand surface of patch smooth and flush with adjacent surfaces. Do not abrade adjacent surfaces. Patched areas shall not be detectable in finished work.
- C. Concrete and Masonry: Prepare concrete and masonry surfaces prior to painting. Allow a minimum of 60 to 90 days curing time prior to painting poured or precast concrete. Allow a minimum of 30 to 60 days curing time prior to painting concrete masonry. Determine substrate alkalinity and moisture content and take appropriate remedial actions as recommended by paint material manufacturer. Do not paint surfaces which are sufficiently alkaline to cause blistering or peeling until remedial action is taken. Do not paint surfaces where moisture content exceeds that permitted in manufacturer's printed instructions.
 - 1. Thoroughly clean of dirt, grit, loose materials, mortar drippings, and other deleterious substances.
 - 2. The first coat for masonry is a fill coat. Thoroughly brush fill coat into the surface in accordance with manufacturer's directions. Preliminary coats on masonry are to be absorbed into the surface. Provide additional undercoats as necessary to achieve perfect uniformity of finish coats.

- D. Ferrous Metal: After installation, field-welding, and grinding, and immediately before painting, remove rust, loose mill scale, dirt, weld flux, weld spatter, weld smoke stains, burnt primer, and other foreign material with wire brushes and/or steel scrapers. Power tool clean in accordance with SSPC SP 3. Remove grease and oil by use of solvent recommended by paint manufacturer. Sand exposed surfaces, and between coats, as required to produce smooth, even finishes.
 - 1. Sand smooth and spot prime welded areas, and areas where prime coat has been damaged or abraded, using rust inhibitive primer scheduled in this Section.
 - 2. Spot prime all areas where shop coat has been damaged or abraded, using same type paint as used for shop coat.
- E. Other Non-Ferrous Metal: Prepare shop primed non-ferrous metals similarly to ferrous metals, specified above.
 - 1. Prepare unprimed non-ferrous metals by thoroughly cleaning of oil, grease, and temporary protective coatings using solvent recommended by primer manufacturer. Provide additional pretreatment recommended by primer manufacturer to assure permanent adhesion of paint coats.
- F. Other Materials: Prepare other materials in strict accordance with recommendations of manufacturers of materials to be finished, and primers and finishes to be applied.
- G. Materials Preparation: Mix and prepare paint materials in accordance with manufacturer's printed instructions. Use only thinners approved by paint manufacturer, and only within recommended limits.

3.03 APPLICATION

- A. Painting Schedule in this Section lists minimum number of coats required. If specified minimum number of coats does not completely cover or hide base materials, provide additional coats required for coverage and uniform finish appearance, without additional cost to Owner.
- B. Apply paint in strict accordance with manufacturer's instructions. Use applicators and techniques best suited for substrates and types of materials being applied. No material shall be thinned in any way except as directed by manufacturer.
- C. Apply paints, stains, and coatings at coverage rates and dry film thicknesses scheduled at the end of this Section. Each coat applied must be inspected and approved by Architect prior to application of succeeding coat, otherwise no credit for the coat applied will be given and work in question shall be recoated without additional expense to the Owner. Notify Architect when each coat is ready for inspection.
- D. Additional Coats: Provide additional coats necessary to eliminate show through and bleed through conditions.

- E. Drying Time: Allow manufacturer's recommended drying time between successive coats. However, allow each coat to thoroughly dry prior to application of subsequent coat.
- F. Sanding: Lightly sand finishes between coats using #00 sandpaper.
- G. Tinting: Tint prime coat on gypsum wallboard and plaster to approximate color of final shade.
- H. Closets: Finish closets inside the same as adjoining rooms, unless otherwise specified or scheduled.
- I. Doors and Panels: Paint all doors, panels, access panels, etc., in the "open" position. Paint all edges, tops, bottoms, and both faces. Paint back face of access panels and removable or hinged covers to match adjacent exposed surfaces.
- J. Movable Equipment and Furnishings: Paint surfaces behind movable equipment and furnishings same as adjacent exposed surfaces.
- K. Permanently Fixed Equipment: Paint surfaces behind permanently fixed equipment with prime coat only.
- L. Duct Interiors: Paint interior surfaces of ducts where visible through registers, grilles, or louvers with flat black, non-specular paint.
- M. Finished work shall be free from runs, sags, hairs, defective brushing, and clogging of lines and angles. Flaws visible in the completed work shall be removed and the area satisfactorily repaired.
- N. Mechanical and Electrical Work: Painting of mechanical and electrical items is limited to to items exposed to view in the mechanical rooms and in occupied areas.
 - 1. Mechanical items to be painted include, but are not limited to:
 - Ductwork.
 - Heat exchangers.
 - Insulation
 - Motors and mechanical equipment.
 - Piping, hangers, and supports.
 - Tanks and equipment.
 - 2. Electrical items to be painted include but are not limited to:
 - Conduit and fittings.
 - Switchgear.

- O. Completed Work: Provide finishes that match approved samples and mock-ups for color, texture, and coverage. Remove, refinish, or repaint work not in compliance with specified requirements.

3.04 COMPLETION

- A. Cleaning: At completion of work of this Section, remove paint and varnish spots, and oil, grease, and other stains caused by this work from exposed surfaces. Leave finishes in a satisfactory condition.
- B. At completion of work of this Section, remove masking materials and other debris. Reinstall or replace fixtures, plates, etc., removed to facilitate application of paint.
- C. Retouching: Touch-up and repair applied finishes which, for any reason have been damaged during construction work. All finished work applied under this Section shall have finished surfaces as approved by finish material manufacturer.
- D. Final Inspection: Protect painted surfaces against damage until date of Substantial Completion. Architect will conduct final inspection of painting work. Areas that do not comply with requirements of these Specifications shall be repainted or retouched to satisfaction of Architect at no additional cost to the Owner.

3.05 SURFACES NOT TO BE FINISHED

- A. Finishes for the following items are either included under other appropriate Sections or require no painting, except as otherwise specifically scheduled with subsequent Exterior and Interior Schedules.
 - 1. Chrome or nickel plating, stainless steel, bronze, brass, and aluminum other than mill finished, unless otherwise specified.
 - 2. Factory finished mechanical and electrical equipment, pumps, and machinery, which occur in mechanical or equipment rooms or areas.
 - 3. Galvanized ducts, pipes, conduits, etc., occurring within mechanical areas or spaces. Also all such items fully concealed from view in the finished work.
 - 4. Factory finished materials, specialties, and accessories unless otherwise specified.
 - 5. Ceramic and clay products, glass, plastic, and other surfaces with "integral" finishes, except as otherwise scheduled hereinbelow.
 - 6. Exterior concrete.

3.06 PAINT SCHEDULE

- A. Number of coats scheduled is minimum. Refer to Paragraph 3.03A., hereinbefore.
- B. Painting of Interior Surfaces: Important Note: Notwithstanding anything in the following schedule to the contrary, interior painting and finishing shall conform to the

applicable laws and building code regarding fire hazard classifications of finish materials.

1. Interior Gypsum Wallboard for Alkyd Flat Finish:

- | | |
|-----------|--|
| One Coat | 1. Moore Latex Quick Dry Prime Seal (201) |
| | 2. Devoe 1102 Wonder-Tones Latex Primer |
| | 3. Duron 56-900 Pro Kote Vinyl Primer Sealer |
| | 4. Con-Lux "Grip-Plex 490" |
| | 5. S-W ProMar 200 Latex Wall Primer |
| Two Coats | 1. Moore Alkyd Sani-Flat (204) |
| | 2. Devoe 21XX Velour Flat |
| | 3. Duron 42-003 Wall Kote Alkyd Flat |
| | 4. Con-Lux "Flat-Lite 600 Series" |
| | 5. S-W ProMar 200 Alkyd Flat Wall Paint |

2. Interior Gypsum Wallboard for Alkyd Eggshell Finish:

- | | |
|-----------|--|
| One Coat | 1. Moore Latex Quick Dry Prime Seal (201) |
| | 2. Devoe 1102 Wonder-Tones Latex Primer |
| | 3. Duron 56-900 Pro Kote Vinyl Primer Sealer |
| | 4. Con-Lux "Grip-Plex 490" |
| | 5. S-W ProMar 200 Latex Wall Primer |
| Two Coats | 1. Moore Satin Impervo (235) |
| | 2. Devoe 23XX Velour Eggshell |
| | 3. Duron 45 Wall Kote Alkyd Eggshell Enamel |
| | 4. Con-Lux "Luster-Lite 2900 Series" |
| | 5. S-W ProMar 200 Alkyd Eg-Shel Enamel |

3. Interior Gypsum Wallboard for Alkyd Semi-Gloss Finish:

- | | |
|-----------|--|
| One Coat | 1. Moore Moorcraft Vinyl Latex Primer (273) |
| | 2. Devoe 1102 Wonder-Tones Latex Primer |
| | 3. Duron 56-900 Pro Kote Vinyl Primer Sealer |
| | 4. Con-Lux "Grip-Plex 490" |
| | 5. S-W ProMar 200 Latex Wall Primer |
| Two Coats | 1. Moore Moorcraft Alkyd Semi-Gloss (271) |
| | 2. Devoe 26XX Velour Semi-Gloss |
| | 3. Duron 55 Pro Kote Alkyd Semi Gloss Enamel |
| | 4. Con-Lux "Satin-Lite 900 Series" |
| | 5. S-W ProMar Salon Alkyd Semi-Gloss Enamel |

4. CMU Walls in Dry Areas:

Primer Tnemec Series 130 Envirofill Acrylic Block Filler Spray-
(100 sq. ft. per gallon) Applied and Rolled Out

Two Coats Tnemec 161 Fascure Epoxy
(dry-film at 4.0 mils,
per coat)

5. CMU Walls at Wet Areas:

Primer Tnemec Series 130 Envirofill Acrylic Block Filler, Spray-
(100 sq. ft. per gallon) Applied and Rolled Out.

Two Coats Tnemec Series 83 Ceramlon II or 161 Fascure Epoxy
(dry-film 5.0 to 7.0 mils
per coat)

6. Exposed Steel Deck:

Shop Primer Tnemec Series 161 Tneme-Fascure
Shop-applied primer as specified in the applicable steel
section. Refer to Section 05310, STEEL DECK.

Intermediate Coat Tnemec Series 161 Tneme-Fascure

Finish Coat Tnemec Series 73 Endura-Shield

7. Interior Ferrous Metal, Non-Ferrous Metal, and Galvanized Steel:

Surface Preparation: SSPC SP1 Solvent Wipe and SSPC SP3 Power Tool

One Coat Epoxy Primer in shop, under other Section.

After Installation:

Touch-Up Coat Tnemec "No. 66 Hi-Build Epoxoline" Epoxy
(dry film 3.0 mils)

One Coat Tnemec "No. 73 Endura-Shield III" Acrylic
(dry film 3.0 mils) Polyurethane

8. Interior Metals not Specified to Receive other Coating Systems:

One Coat Approved primer, in shop under other Sections

(where specified)

One Coat Field Primer (only where shop primer is not specified):

1. Moore Ironclad Retardo Primer
2. Devoe 13101 Rust Penetrating Primer
3. S-W Kem Kromik Metal Primer

OR, at non-ferrous metals only,

1. Moore Ironclad Zinc Chromate Primer
2. Devoe Zinc Chromate Primer
3. Glidden Zinc Chromate Primer

Note: One prime coat only is required at interior metal work, except touch-up of areas which have become rusted or damaged prior to finish painting.

Two Coats 1. Moore Satin Impervo Enamel
 2. Devoe Velour Semi-Gloss Enamel
 3. Glidden Spred-Lustre Semi-Gloss Enamel
 4. S-W ProMar Salon Alkyd Semi Gloss Enamel

9. Mechanical and Electrical Work (Paint all exposed items throughout the project except factory finished items with factory-applied baked enamel finishes which occur in mechanical rooms or areas, and excepting chrome or nickel plating, stainless steel, and aluminum other than mill finished. Paint all exposed ductwork and inner portion of all ductwork visible through grilles and registers):

Same as specified for other interior metals, hereinabove.

END OF SECTION

SECTION 10400

SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY OF WORK

- A. The work as herein identified, requires the manufacture and/or purchase of; and delivery, installation and/or application of: Signage and Environmental Graphics as part of the Portland International Jetport Phase II Expansion to the Parking Garage.

1.2 SUBMITTALS

A. SHOP DRAWINGS / MATERIAL/FINISH SAMPLES

- 1. Prior to the commencement of fabrication work, or delivery to the site of any manufactured elements, the Contractor shall furnish to the Designer for approval, three (3) copies of Shop Drawings on the contractor's title block, indicating at a minimum, the following:
 - a. Methods and materials of fabrication;
 - b. All connection details, including adhesives and mechanical fasteners;
 - c. Inserts, waterproofing and anchorages;
 - d. Illumination and electrical, including location and clearance of "luminous" tubing (or other illumination source) and location of transformers;
 - e. Insulation of dissimilar metals;
 - f. Methods and materials relating to finishes;
 - g. One-quarter full-size butcher paper "pen plot" patterns for each sign face, indicating graphic layouts, typography and/or graphic devices (from same output/computer program/device that will direct final graphic plotting/routing/cutting). Retain all original annotated patterns reviewed during pattern submittal process. Retain final approved/stamped patterns for use and review at installation;
 - h. Message listing with all forms, symbols and text to be used. Message listing to correspond to numbering system shown on Sign Location Plans, Sign Design Drawings and the Sign Message Schedule provided by the Designer.
 - i. Submit samples as follows for review and approval. Identify each sample with the sign type number to which the sample applies, as follows:
 - 1.) Three (3) paint samples, 6" x 6", on specified materials to match color, texture and finish.

- 2.) Three (3) each type of exposed metal used for major elements of work with respective finish.
 - 3.) Three (3) each type plastic (acrylic, polycarbonate, PVC) used for major elements of work with respective finish..
 - 4.) Three (3) each type fabric used for major elements of work.
 - 5.) Three (3) each type adhesive plastic film, 6" x 6", including die-cut designs.
 - 6.) Three (3) decorative hardware, including bolt-heads, nail-heads, screw-heads, rivets and similar exposed items.
 - 7.) Three (3) of all other items as may be required by Owner or as indicated on Design Drawings.
2. Shop Drawings in the form of manufacturer's descriptive literature, catalog cuts and brochures which are approved with no corrections will be stamped "Approved"; and those requiring only minor corrections will be stamped "Approved with Corrections Noted". Please Note: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the product, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

1.3 QUALITY ASSURANCE

- A. Reference is made to all individual tests and performance specifications indicated herein, as well as the highest standards of the Architectural Contract Signage industry.
- B. The work shall comply with all laws, ordinances, rules, regulations and orders of any public authority having jurisdiction over the work.
- C. It is the intent of these specifications to establish quality and performance standards of materials and equipment installed, hence, specific items are identified by manufacturer, trade name and catalog designation where possible. Should the Contractor propose to furnish materials and equipment other than those specified as permitted by the "or approved equal" clauses, he shall submit this request in writing to the Designer prior to the supplying of said item.
- D. The electrical installation shall be in compliance with the requirements of the latest edition of the National Electrical Code, O.S.H.A., and the rules and regulations of the power company supplying power to the building.
- E. All electrical equipment shall be equal to or exceed the minimum requirements of N.E.M.A., I.E.E.E., and Underwriters' Laboratories.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. The Contractor shall be entirely responsible for receiving, handling, storage, delivery and placement of signage or other materials, including warehousing as may be necessary until the start of the installation, and shall make his own arrangements with all parties concerned in this regard.
- B. The Contractor shall:
 - 1. Protects signs after installation from damage due to subsequent construction activities until acceptance by the Owner including, but not limited to the following:
 - a. Plaster of painting overspray or droppings on both shop-finished or field finished signs and graphics.
 - b. Physical impact damage from construction activities, including workmen and equipment.
 - 2. Warning signs and other methods of protection must be sufficiently substantial to withstand normal, anticipated construction activities and are subject to Owner's approval.

1.5 MAINTENANCE

- A. The Contractor shall supply the Owner with three (3) copies of instructions on the proper maintenance of all items covered in this Contract.

1.6 DESIGNER'S REVIEW OF IN-SHOP WORK-IN-PROGRESS

- A. In addition to the Base Bid amount for the fabrication and installation of all work as identified herein, the bidder shall include costs associated with a maximum of two (2) in-shop reviews of work-in-progress by the designer and the Owner's representative. These costs, to be directly reimbursed to the designer, shall include travel between Knoxville, Tennessee, and the location of the fabrication plant (air transportation - coach), ground transportation while in the city of the fabrication plant (car rental - economy class, and gasoline) or \$.39 per-mile for surface transportation, lodging (one night), and meals (per-diem of \$25). These dollars are to be exclusive of fee; part of the existing services provided to and paid for by the Owner.
- B. In the event the in-shop work-in-progress review is not taken by the Designer or Owner's representative, the amount carried for these expenses shall be taken as a credit to the Contract Base Bid.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with requirements herein, manufacturers offering Architectural Contract Signage systems and/or product/material/finishes that may be incorporated in the Work include, but are not limited to the following:

Typography (electronic)	FontHaus, Incorporated 1375 Kings Highway East Fairfield, Connecticut 06430 203.367.1993
Typography (electronic)	Adobe Systems, Incorporated 345 Park Avenue San Jose, California 95110-2704 800.445.8787
Laser-cut Foam/Acrylic Letterforms:	Precision Letter Corporation 649 East Industrial Park Drive Manchester, New Hampshire 03109 603.625.9625
Vinyl Die-cut Letterforms:	Graphitek of Vermont Route 7A, P.O. Box 69 Bennington, Vermont 05201 802.442.3183
Vinyl Die-cut Letterforms:	Simple Space-Rite P.O. Box 11978, 3315 West Vernon Phoenix, Arizona 85061 800.528.8429
Fabricated Metal Letterforms:	Steel Art 75 Brainerd Road Boston, Massachusetts 02134-9108 617.566.4079
Fabricated Metal Letterforms:	US Sign One Trefoil Drive Wilton, Connecticut 06611 203.601.1000
Applied Paint Finishes:	Matthews Paint Company 8201 100th Street Kenosha, Wisconsin 53142-7739 414.947.0700
Applied Paint Finishes:	Wyandotte Sign Finishes (AKZO Nobel)

6369 Old Peachtree Road
Norcross, Georgia 30071
800.233.3301

Metal Sign Extrusions: Sign Comp
5009 West River Drive
Comstock Park, Michigan 49321
616.784.0405

Metal Sign Extrusions: Excellart Sign Products, L.L.C.
1654 South Lone Elm Road
Olathe, Kansas 66061
913.764.2364

Laser-cut/Water-jet Cutting: Millennium Sign & Display Group, Inc.
90 West Graham Avenue
Hempstead, New York 11550
516.292.8000

2.2 MATERIALS

A. METALS

1. Aluminum used for exposed structural elements shall be T-5 mill aluminum, thickness as shown on the Construction Drawings.
2. Aluminum used for concealed framing of signage shall be 6063 T-5 Alloy with mill finish.
 - a. Sheet aluminum: ASTM B209. Provide alloy and temper consistent with specific fabrication and finishing processes.
 - b. Extruded aluminum: Provide alloy and temper consistent with specific fabrication and finishing processes.
 - 1.) Bars, rod, wire and shapes: ASTM B221
 - 2.) Pipe and tubing: Seamless, minimum Schedule 40 or equivalent wall thickness.
 - a.) Structural: ASTM B429
 - b.) Non-structural: ASTM B210 and ASTM B241.

B. PLASTICS

1. All plastics necessary for particular applications noted in specifications or shown on Construction Drawings shall be of new stock, free from defects and of the best quality available.

2. Acrylic Plastic: Provide acrylic plastics equivalent to "Plexiglas" manufactured by Rohm and Haas Company, in sizes, thickness, clarity, opacity, texture and color as shown.
 - a. Provide colors as shown, or as selected by D:C.
 - b. Provide ultra-violet resistant type, where exposed to sunlight.

C. NEOPRENE AND TAPE GASKETS

1. Neoprene gaskets, where shown or required, shall be of hardness shore durometer 80 with a minimum tensile strength of 2000 psi and 175% elongation. After heating the neoprene compounds in air for 22 hours at 158 degrees F., the compression set shall not exceed 35%. All rubber compound shall withstand bending 180 degrees flat without showing visual surface cracks, checks or breaks. All neoprene shall be reasonable smooth and free from talc and wax. The color of the materials shall be black.
2. Tape gaskets, where required, shall be polyurethane foam tape with adhesive on one side, as manufactured by Minnesota Mining and Manufacturing Company or approved equal.

D. ADHESIVES

1. All adhesives required for metals and plastics - for assembly of elements, or attaching those elements to the work - shall be of a type recommended for the particular usage by the manufacturer and guaranteed to meet the general and structural support criteria shown on the drawings. Exact identification of all adhesives shall be noted on the shop drawings, together with data describing the method of application.

E. MISCELLANEOUS MATERIALS

1. Silicone: sign-component silicone rubber, General Electric or Dow Corning as approved by the Owner.
2. Epoxy: Two-part, catalyzed; provide fast-setting, high-strength, flexible, high-viscosity or other specific types as necessary and approved by the Owner
3. Tape: Double-coated, high strength acrylic adhesive foam tape, 3M VHB+ tape.
4. Thread-locking: Anaerobic, single-component adhesive, as manufactured by Herson, Loctite, Permabond or equivalent.
5. Solder metal: ASTM B32, lead-free (less than 0.2% lead content), silver, tin, antimony or alloys thereof best suited for conditions.
6. Locks: Tubular key or Allen wrench activated cam lock, brass and/or stainless steel construction.
7. Magnets: Commercial quality. Type and size required for the work.

8. Hook and loop tape (Velcro): High shear strength, dual-grip hook and loop with pressure-sensitive adhesive backing.
9. Misc. hardware: Provide continuous (piano) hinges, hooks and hook-eyes, hinges and bolts with acorn nuts, chain, invisible (Soss) hinges, and other non-corrosive, commercial type hardware items including fasteners as necessary, where not specifically indicated on the Design Drawings. Ferrous metal hardware is not acceptable.

2.3 MANUFACTURED UNITS - SIGNS

- A. Signs are fully detailed as to size, location, color, copy graphic content and layout, and fabrication or connection details on the construction drawings.

2.4 FABRICATION

A. METAL

1. Shop fabrication and tolerances shall conform to the standards of the industry.
2. Field dimension shall be verified by the Contractor before releasing work for fabrication.
3. All welding procedures shall conform to applicable AWS specifications. All welds shall develop capacity of members being joined unless specific length or extent is noted on the Construction Drawings.
4. All exposed screw fastening shall be kept to a minimum and shall be made with counter-sunk TORX flat-head self-tapping machine screws of the same material as the parts that are joined, except as noted on the Construction Drawings, so far as possible.
5. All supplemental parts necessary to complete each item shall be furnished by the Contractor, even though such parts are not definitely shown on the Construction Drawings or specified herein. All anchors and other fasteners for securing work to the construction shall be included.
6. Design components to allow for expansion and contraction for a minimum material temperature range of 100 degrees F., without causing buckling, excessive opening of joints or over-stressing of welds and fasteners.
7. Form work to the required shapes and sizes, with true curves, lines and angles. Provide necessary rebates, lugs and brackets for assembly of units. Use concealed fasteners wherever possible.
8. Items shall be shop fabricated so far as practical. Joints shall be fastened flush to conceal reinforcement, or welded where thickness of section permits.
9. Contact surfaces of connected members shall be ground true. Parts shall be so assembled that joints will be tight and practically unnoticeable, without use of filling compound.

10. Holes for bolts and screws shall be drilled. Fastenings shall be concealed where possible. Exposed ends and edges shall be milled smooth, with corners slightly rounded. Joints exposed to weather shall be formed to exclude water.

B. PLASTICS

1. Panel and/or plaque edges are to be straight and true, and contain no chatter marks, scratches, scars or ripples. Following assembly, and prior to any surface applied final color coat, all exposed panel/plaque edges shall be "buff" polished to a satin finish.
2. Holes drilled per Construction Drawings, shall be normal to the panel/plaque plane, unless noted otherwise, and be clean and free of gouges, scratches, scars or drilling debris.
3. No visible adhesive "ooze", sags, sheeting edges or tape will be accepted.

2.5 GRAPHICS/IMAGERY

A. Letterforms and Lettersize

1. Letterforms shall be as shown or indicated on the Construction Drawing(s), and shall be the only typography used.
2. Lettersize for their appropriate sign types shall be as shown on the Construction Drawing(s), graphic layouts. Case shall be as indicated.
3. Alternate letterforms and lettersize will not be accepted.

B. Letterspacing and Word Spacing

1. Letterspacing shall be standard optical spacing. Spacing between words shall be equal to the horizontal dimension of a lower-case "r" for the size of the copy and typestyle being used. The Contractor shall furnish to D:C for approval, full-size spacing patterns for each message and legend specified.
2. No work shall be executed from spacing patterns not approved by D:C.

C. Directional Arrowforms

1. The directional arrowforms, sizes and locations as shown on the Construction Drawing(s), shall be used in the orientations indicated on the graphic layouts and Sign Message Schedule, hereinafter.
2. Alternate arrowforms and/or usage will not be accepted.

D. Pictograms

1. Pictograms, sizes and locations as shown on the Construction Drawing(s) shall be the ONLY pictograms used.
2. Alternate pictograms will not be accepted.

2.6 FINISHES

A. PAINTED/IMPRINTED SURFACES

1. Before painting, all loose mill scale, dirt, weld flux, weld spatter and other foreign material shall be removed. All grease and oil shall be removed by solvent. Surfaces shall be dry when paint is applied.
2. All exposed surfaces shall receive one (1) thorough prime coat of a suitable primer before leaving the shop. Thickness of this coat shall be 1.0 to 1.5 mil. In addition to the prime coat, all exposed metal shall receive two (2) color coats totaling 1.5 to 2.0 mils in thickness. Final colors shall match those colors identified on the Color Schedule, hereinafter. Color samples shall be submitted to and approved by D:C.
3. Paint shall be thoroughly and evenly applied and shall be well worked into corners and joints and shall have no edge or joint build-up.
4. Though not a specific requirement, a Down-Draft spray booth is preferred for all shop finished work. This preference is based on a general reduction of over-spray, compared to a cross-flow spray booth.
5. Contractor shall insure that all spray booth filters are clean, and fans and/or air circulation devices (fresh air source outside the host building) are operating properly. All doors to the booth shall remain closed during the application of paint finish; the booth at "positive pressure" prior to the application of paint.
6. All inks, paints and lacquers required for silk-screened or imprinted surfaces or other specified surfaces shall be a type made for the surface material on which it is to be applied and recommended by the manufacturer of the ink or paint. Exact identification of all ink and paint shall be noted on the shop drawings, together with data describing the method of application and, if other than "air" dried, drying.
7. All silk-screen inks shall be made by a manufacturer with experience in production and consistency of such inks for the purposes and surfaces involved.
8. No paint, ink or lacquer that will fade, discolor or de-laminate as a result of proximity to UV light source or heat therefrom shall be used.
9. All inks, paints and lacquers shall be evenly applied and without pinholes, scratches, orange peeling, application marks, etc. Rear-illuminated panels containing the above or other defects that cause light leaks in surface areas specified to be covered will not be accepted. Workmanship in connection with finishes and formations of letters and/or graphics shall conform to the standards of the trade and shall be acceptable to D:C.
10. Prime coats or other surface pre-treatments, where recommended by the manufacturer for inks, paints or lacquers, shall be included in the work (and

noted on the shop drawings) as part of the finished surface work at no extra cost to the Owner.

11. Contractor shall provide to the Owner, the contact name, address and telephone for a local (immediate project area) source of supply for each component of finish medium used throughout this work.

B. REPRODUCTION PROCESSES

1. Vinyl Die-cut Letterforms and Graphics

- a. Film for die-cut letterforms and/or graphics shall be "Scotch-Cal" ("Scotch-Lite") brand film, engineer grade, with pressure sensitive adhesive, as manufactured by Minnesota Mining and Manufacturing Company, or approved equal; colors as indicated on the Color Schedule, hereinafter. Installation shall be as recommended by the manufacturer.
- b. All letters and/or graphics shall be permanently affixed to surfaces in such a manner that all letter surface and edge areas are tightly and evenly adhered to the subject surface. Letters with creases or air pockets, or with folded, curled or loose edges or corners will not be accepted.
- c. Excess adhesive, if any, shall be removed from applied and letter surfaces in such a manner and with such a solvent that neither the applied nor vinyl surfaces are scratched, dis-colored, glossed or de-glossed.
- d. Typography and/or graphics shall be pre-spaced on carrier tapes prior to application. Composition of copy at site is not acceptable.
- e. Vinyl die-cut legends and/or graphics scheduled to be placed upon painted surfaces, as shown on the construction drawings or graphic layouts, shall not be installed earlier than twenty-four (24) hours following the application of the final color coat. Surface bubbles as a result of paint curing ("off-gassing") beneath vinyl legends and/or graphics shall be cause for rejection of the work; requiring removal and reinstallation of the affected legends and/or graphics.

2. Masked and/or Frisket Letterforms and Graphics

- a. Masks and/or frisket for letterforms and/or graphics to appear on new construction sign faces (or rehabilitated sign faces) shall be formed from "low tack" vinyl (Control-tac AGB-224-D, Matte White, manufactured by Minnesota Mining and Manufacturing) die-cut letterforms and/or graphics.
- b. After positioning the letterforms and/or graphics on the sign face (acrylic-plastic, painted metal, etc.) specified hereinafter, two (2) coats of an opaque primer (black) shall be evenly sprayed over the entire sign face. When these primer coats are hard and dry, two (2) additional coats of primer (bright "cold" white) shall be evenly sprayed over the entire sign face.

- c. When all primer is hard and dry, the finish color coats, specified hereinafter, shall be evenly sprayed over the entire sign face. Lightly applied, the final color shall receive sufficient coats until the color specified is achieved over the entire sign face.
 - d. The vinyl mask shall be removed with sufficient care to insure that no knife marks or other surface damage is visible, and that sharp and true edges of the letterform and/or graphic result.
 - e. Sign faces made up of multiple panels shall be sprayed simultaneously so that color and finish is consistent.
3. Routed/Laser-cut Letterforms and Graphics
- a. All "Routed" letters, logotypes and/or graphic devices specified as part of this work shall be executed from either photo-mechanical artwork or approved computer generated images of the copy specified. Contractor shall submit full size showings of foundry, mechanicals or butcher-paper "pen-plots" to be used to D:C for approval. All above work is to be included in this Contract.
 - b. Actual "routing" of material shall consist of one of the following:
 - 1) Metal pattern/pantograph routing,
 - 2) Light laser cutting, or
 - 3) High pressure "water-jet" cutting.
 - c. No freehand-cut routing will be accepted.
 - d. All "routing" shall be executed in such a manner that edges and corners of finished letterforms and graphic devices are normal to the surface and are true and clean. Letterforms and/or graphic devices with minute rounded corners inherent in the routing process, will be accepted.
 - e. Cut edges shall be finished so that all burrs, chatter and/or burn marks, etc., are removed without visually degrading the specified letterforms and/or graphic devices.
 - f. Letterform and/or graphic device "voids" (the hole in an "o" or "d", etc...) shall be reinstalled upon the surface of the back-up plexiglas sheet using mechanical means (studs, washers and nuts..). Adhesives and/or tapes alone will NOT be accepted for this application.
4. Photo Polymer Sign Faces - Tactile Letterforms, Graphics and Braille
- a. Panel material shall consist of solid Photo Polymer material with a .125 inch nominal thickness, prior to bonding to any base material and/or plate, as shown or indicated on Construction Drawings.

- b. Etched graphics, including letterforms, pictograms, arrows and Braille, shall be tactile via photomechanical resist and chemical etching. Etched images shall be at least 1/32 inch deep and shall not exceed 3/64 inch depth in order to keep tactile and Braille lettering legible. Letterforms, Braille and any other graphic devices shall be photographically reproduced from approved type-styles and "cuts", and shall follow dimensions, kerning, spacing and leading qualities shown on Construction Drawings.
- c. Panel background finish shall consist of primer and finish color coat per polymer and paint manufacturer's specifications utilizing Matthew's Acrylic Polyurethane VOC or approved equal; the final color as indicated in the Color Schedule, herein. All final color finishes shall be "eggshell", with a measurable 20% gloss.
- d. Braille text shall consist of photo-chemically reproduced Grade 2 Braille letters as a result of etching background to a depth of 1/32 inch minimum and no deeper than 3/64 inch overall. Braille images shall be smooth and rounded upon the face of the dots and shall be acceptable for tactile reading. Sharp edged dots are specifically not acceptable.
- e. Photopolymer sign faces shall be installed upon the front surface of the indicated base plate/material with sheets of 3M VHB (Very High Bond) Tape equal to the overall dimension of the pieces being bonded.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Contractors, subcontractors, and materials suppliers shall inform themselves as to all conditions, existing and proposed relative to this work. Neglect of this requirement will not be accepted as cause for additional compensation.

3.2 PROTECTION OF PRESENT BUILDING AND PROPERTY

- A. Damage due to negligence of the Contractor to surfaces or building to remain, shall be repaired and restored to its original condition by this Contractor at no extra cost to the Owner nor tenant of the Owner.
- B. Contractor shall notify the Designer of conflicting conditions before the start of work. Failure to do so constitutes acceptance of these conditions and places responsibility of corrective measures with the Contractor.

3.3 INSTALLATION

A. METAL

- 1. All surfaces shall be covered with protective cover non-deleterious to finish for protection until final installation or erection.

2. Complete all connections in proper alignment and tighten bolts securely. Leveling is to be done only by instruments: Measuring equal distances from existing building surfaces will not be acceptable as a basis of level and/or plumb.

B. ELECTRICAL SIGNS

1. DESCRIPTION

- a. The work covered by this section shall include all labor, equipment, supplies and materials necessary for the installation of the complete electrical system as shown or indicated on the accompanying plans and specified herein.
- b. It is the intent of these documents that the entire electrical installation shall be complete in every respect and any minor items omitted but obviously necessary to accomplish this intent shall be furnished and installed.
- c. All local fees and permits and services of inspection authorities shall be obtained and paid for by the Contractor. The Contractor shall cooperate fully with the local utility company with respect to their services.
- d. It shall be understood during the bidding process that the power source for all electrified signs shall be 277 volts, and that this power shall be "stepped down" to 110 volts for the illumination source within each electrified sign cabinet.

2. CODES, REGULATIONS AND STANDARDS

- a. The electrical installation and the Contractor shall comply fully with all city, county, and state laws, ordinances and regulations applicable to electrical installations as identified by this Contract.

3. INSPECTIONS, TESTS AND GUARANTEES

- a. The work shall be subject to inspection by the Owner and D:C or their representatives at all times and in the event of questionable work, their decision will be final.
- b. After the electrical installation is completed and at such times as the Owner or D:C may direct, the Contractor shall conduct an operating test for approval. The installation shall be demonstrated to be in accordance with the requirements of this specification. Any defects revealed shall be corrected promptly and the test re-conducted, at no additional cost to the Owner.

4. PROGRESS OF WORK

- a. The Contractor shall order the progress of his work so as to conform to the progress of the work of other trades and shall complete the entire installation as soon as the condition of the building will permit. Any cost resulting from the defective or delay of work performed under this section shall be borne by the Contractor.

5. CUTTING, PATCHING, ETC.

- a. The work shall be carefully laid out in advance. Where cutting, channeling, chasing or drilling of floors, walls, partitions, ceilings or other surfaces is necessary for the proper installation, support, or anchorage of raceway, outlets or other electrical equipment required by this work, it shall be carefully done. Any damage to the building, piping, equipment or any defaced finish plaster, metal or metalwork shall be repaired by skilled mechanics of the trades involved at no additional cost to the Owner.
- b. The Contractor shall do no cutting, channeling, chasing or drilling of unfinished concrete, masonry, tile, etc., unless he first obtains permission from D:C. If permission is granted, the Contractor shall perform this work in a manner approved by D:C.

6. IDENTIFICATION OF EQUIPMENT

- a. Legible and complete wiring and circuitry diagrams, lamp sizes and wattage and any special operating or replacement instructions are to be provided on waterproof paper labels and firmly affixed to the interior of signage access panels.
- b. Identify all applicable circuits in branch circuit panel-boards with a type-written directory mounted behind clear plastic and fastened to inside of panel door.

7. LIGHTING

- a. Furnish and install all lighting equipment described in these specifications and shown on the Construction Drawings. Lighting equipment shall be installed complete, including suspensions of proper lengths, sockets, holders, reflectors, ballasts, lamps, etc., all wired, assembled and ready for operation.
- b. All lighting fixtures shall bear the U.L. label for its application, be free of light leaks, warps and dents. When utilizing ballasts, they shall be designed and constructed so that the ballast case temperature will not exceed the U.L. 90 degree Centigrade limit in a 25 degree Centigrade ambient.
- c. Install all fixtures straight and true with reference to sign cabinet and supporting structural members. Before final acceptance, adjust and direct all fixtures as directed by D:C.

8. GROUNDING

- a. All electrical neutral conductors, raceways and non-current carrying parts of electrical equipment and associated enclosures shall be grounded in accordance with the National Electrical Code (N.E.C.). This shall include neutral conductors, conduits, supports, cabinets, boxes, ground buses, etc.

The neutral conductor shall be grounded at one (1) point only; its transformer ground source.

9. RACEWAYS AND WIRING

- a. All wiring located outside the electrified sign cabinets that are supplied and installed as required by this work, shall be installed in conduit. Use corrosion resistant rigid steel with PVC coating or heavy wall PVC. Provide rigid steel ells coated with PVC where PVC raceways are used.
- b. In locations where mechanical damage may be incurred, corrosion resistant rigid steel or intermediate metal conduit shall be used except heavy wall aluminum may be used in dry locations where exposed. Electric metallic tubing or intermediate metal conduit may be used in all other applications.
- c. Use approved type couplings and connectors in all conduit runs, and make all joints tight. Provide insulated bushings for all terminations. Set-screw type couplings will be permitted for exposed EMT conduits only. Provide expansion fittings and bonding conductors for all runs that cross building expansion joints. Fittings shall be as manufactured by O.Z., Tomic, Raco, Appleton, Steel City or I and B.
- d. Exposed conduit shall not be installed in finished areas. Exposed conduit may be installed at surface mounted equipment and at other locations approved by the Designer. All exposed conduit shall be run parallel to or at right angles to building lines.
- e. Conduit shall be of the size required by, and installed according to the N.E.C. Bends shall be made with approved hickey or conduit bending machine. Provide supports in accordance with N.E.C. requirements
- f. No wire shall be installed until work that might cause damage to the conductors has been completed. Prior to pulling of the conductors, conduits shall be swabbed clean of all foreign matter, or replaced where such accumulation cannot be removed by approved methods.

3.4 SCHEDULES

A. SIGN COLOR SCHEDULE

1. All finish color for signage elements shall be as hereinafter indicated. Color specification as shown on the color schedule, refers to the Pantone Matching system (P.M.S. number), Acrylic Plastic (plexiglas) material as manufactured by the Rohm & Haas Company (R.H. number), Paint as manufactured by the Matthews Paint Company (MAP number), Pressure sensitive vinyl as manufactured by the Minnesota Mining and Manufacturing Company (3-M number), or metallic finish as identified. The intent with respect to applied finish

or referenced manufactured product, is to provide a MATCH to those colors noted, using the finish appropriate to the surface.

2. Alternate colors or hues of these colors will not be accepted.
3. When the colors of factory-finished equipment are specified to be selected by D:C, the colors selected may or may not be the manufacturer's standard colors. Should special colors be specified, samples shall be provided as required.
3. Finish color shall be as follows:

.....

Sign Type A

Panel background – MAP 70A-1A Mosaic Blue (satin)
Angles/connector piece – MAP 18A-1A Really Orange (gloss)
Legends/arrowforms – 3M 280-10 White (reflective)
Panel background (A.4) – MAP 5A-1A Spectrum Red (satin)
Legend (A.4) – 3M 280-10 White (reflective)
Pictogram (A.4) – 3M 280-10 White (reflect.)/280-72 Red (reflect.)

.....

Sign Type B

Legend panel face/edges – MAP 70A-1A Mosaic Blue (satin)
“Level” & numeral – 3M 220-11 Pearl Grey (non-reflective)
“Row” & alpha – 3M 220-11 Pearl Grey (non-reflective)
Graphic rule – 3M 220-77 Peacock Blue (non-reflective)
“Make note...keys!” – 3M 220-11 Pearl Grey (non reflective)
“Elevators...building” – 3M 220-11 Pearl Grey (non-reflective)
“Pay on...” “Airport Parking” – MAP 70A-1A Mosaic Blue (match)
 “P” – MAP 69A-3P Forget-me-not (match)
 “Pay on Foot” – 28A-1A Cadmium Yellow (match)
A.4 panel face/edges – MAP 39A-2P Winter Sky (gloss)
Arrowform – 3M 220-10 White (non-reflective)
Cabinet, level 1 – MAP 64B-1P Blue Goddess (satin)
Cabinet, level 2 – MAP 71B-1P Thistle (satin)
Cabinet, level 3 – MAP 14C-1P Salmon Mousse (satin)
Cabinet, level 4 – MAP 19B2T Orange Gem (satin)
Cabinet, level 5 – MAP 27A-2P Banana Split (satin)

.....

Sign Type C

Cabinet face/edges/rear – MAP 70A-1A Mosaic Blue (satin)
Routed faces – RH 2146 Ivory
Connection to ceiling – MAP 70A-1A Mosaic Blue (satin)

.....

Sign Type D

Level 1

Dimensional letterforms – MAP 64B-1P Blue Goddess (satin)

PSV legends – 3M 220-77 Peacock Blue / 3M 220-347 Powder Blue

Level 2

Dimensional letterforms – MAP 71B-1P Thistle (satin)

PSV legends – 3M 220-88 Violet / EM 220-138 Pale Lavender

Level 3

Dimensional letterforms – MAP 14C-1P Salmon Mousse (satin)

PSV legends – 3M 220-94 Coral / 3M 220-104 Dark Coral

Level 4

Dimensional letterforms – MAP 19B-2T Orange Gem (satin)

PSV legends – 3M 220-64 Apricot / 3M 220-54 Orange

Level 5

Dimensional letterforms – MAP 27A-2P Banana Split (satin)

PSV legends – 3M 220-25 Sunflower / 3M 220-85 Vista Yellow

.....
Sign Type E

Disk face/edges/wall connection – MAP 67A-1A Continental Blue (satin)

“I” image/edges – MAP 39A-2P Winter Sky (satin)

Structure/connectors/connection/map frame – MAP 39A-2P Winter Sky (satin)

Chrome “raceway” tubing – No. 8 mirror polish

“TERM...ION”, face/edge/rear – MAP 56A-1A Jamaican Holiday (satin)

“PWM”, face/edge/rear – MAP 67A-1A Continental Blue (satin)

“Portland...Jetport”, face/edge/rear – MAP 39A-2P Winter Sky (satin)

.....
Sign Type F.1

Plaque background – MAP 39A-2P Winter Sky (satin)

Upper graphic background – MAP 56A-1A Jamaican Holiday (satin)

Upper legend – 3M 220-10 White (non-reflective)

Lower legends – 3M 220-151 Traffic Grey (non-reflective)

Sign Type F.2

Plaque background – MAP 39A-2P Winter Sky (satin)

Graphic border – 3M 220-151 Traffic Grey (non-reflective)

Flame – 220-253 Warm Red (non reflective)

Figure/stairs/arrow – 220-12 Black (non-reflective)

Legends – 3M 220-151 Traffic Grey (non-reflective)

Sign Type F.3

Base-plate face/edges – MAP 39A-2P Winter Sky (satin)

Graphic plate face/edges – MAP 70A-1A Mosaic Blue (satin)

Pictogram – 3M 220-11 Pearl Grey (non-reflective)

Tactile face/edges – MAP 70A-1A Mosaic Blue (satin)

Tactile legend – MPA 39A-2P Winter Sky (satin)

Sign Type F.4

Plaque background – MAP 39A-2P Winter Sky (satin)

Headline – 3M 220-151 Traffic Grey (non-reflective)

“Level...level” – 3M 220-12 Black (non-reflective)

Level colors in corresponding boxes...

level 1 – MAP 64B-1P Blue goddess (satin)

level 2 – MAP 71B-1P Thistle (satin)

level 3 – MAP 14C-1P Salmon Mousse (satin)

level 4 – MAP 19B2T Orange Gem (satin)

level 5 – MAP 27A-2P Banana Split (satin)

.....
Sign Type G

“Airport Parking” – MAP 70A-1A Mosaic Blue (gloss)

“P” – MAP 39A-2P Winter Sky (gloss)

“Pay on Foot” – 28A-1A Cadmium Yellow (gloss)

“Portland ... moving” - MAP 70A-1A Mosaic Blue (gloss)

.....
Sign Type H

Vertical post – SW4079 Laser Blue (gloss) (match)

Capital/connection pieces – MAP 56A-1A Jamaican Holiday (gloss)

Flag panels/edges – MAP 39A-2P Winter Sky (satin)

Graphic panels/edges – MAP 70A-1A Mosaic Blue (satin)

Legends – 3M 220-10 White (non-reflective)

Picto panels – 3M 220-10 White (non-reflective)

Picto images – 3M 220-12 Black (non-reflective)

Vertical connection/cross bar – MAP 18A-1A Really Orange (gloss)

Dist face (both) MAP 67A-1A Continental Blue (satin)

“I” images/edges – MAP 39A-2P Winter Sky (satin)

.....
Sign Type J

Vertical post – MAP 56A-1A Jamaican Holiday (satin)

Panel face – Map 67A-1A Continental Blue (satin)

Pictogram / legend – 3M 280-10 White (reflective)

Panel rear – MAP 56A-1A Jamaican Holiday (satin)

.....
Sign Type K

Cabinet face/edges/rear – MAP 39A-2A Winter Sky (satin)

Legend RH 2051 Blue

Stripe – 3M 220-25 Sunflower (non-reflective)

Connection tubing – MAP 39A-2P Winter Sky (satin)

B. SIGN MESSAGE SCHEDULE

1. Capitalization (case) shall be as indicated on the Sign Message Schedule, which follows this Section.
2. Alternate sign messages will not be accepted.
4. Sign messages/legends shall be as follows:

END OF SECTION

SECTION 15000

COMMON WORK RESULTS FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The General Conditions, Supplemental General Conditions and Instructions to Bidders shall apply to this work. Read these to be familiar with conditions related to the installation of the work.
- B. ALTERNATES.

1.2 WORK SHOWN ON DRAWINGS

- A. The drawings accompanying this specification, as a part thereof, are working drawings indicating the location and arrangement of the increments of the systems of this section of work. Material deviation from this arrangement, process or means of application, shall bear the Engineer's review stamp before the change is made on the job or materials are ordered. Changes made without such review shall be ordered removed and items installed as specified shall be provided at no additional expense to the Owner.
- B. The drawings are not intended to show in minute detail minor items of installation or materials such as specific fittings or findings.

1.3 MATERIALS AND LABOR

- A. Furnish materials and labor necessary to deliver to the Owner a complete and operable system installed in accordance with the contract documents.
- B. Materials shall be of the best quality. Workmanship shall be of highest grade and construction shall be done according to best practices of the trade.
- C. Provide, when required, labeled samples of material or equipment specified herein or proposed to be used in this work.
- D. Where words "furnish", "provide", or "install" are mentioned, either singly or in combination, these words are hereby interpreted to mean "furnish and install" or "provide and install", including materials complete with connections, supplemental devices, accessories and appurtenances, unless specifically otherwise noted. These words are likewise hereby interpreted as being prefixed to materials, equipment, and apparatus hereinafter mentioned, either in abbreviated or scheduled information or in the technical sections of the specifications.

1.4 EQUIPMENT INSTALLATION IN HEATING SEASON

- A. The system shall be installed provided that the construction area will have sufficient heat to maintain temperature above 40°F throughout the construction period.

1.5 COOPERATION BETWEEN TRADES

- A. Provide information sufficiently in advance of this work, so that work by the other trades may be coordinated and installed without delays. Furnish and locate sleeves, supports, anchors and necessary access panels.

- B. Where work is concealed, assure it does not project beyond finished lines of floors, ceilings, or walls.
- C. Equipment or piping requiring access found to be located above sheetrock ceilings shall be brought immediately to the attention of the Architect for resolution.

1.6 VISITING THE PREMISES

- A. Visit the site and verify the existing conditions prior to submitting a bid. The Contractor shall be responsible for any existing condition considerations that are readily apparent during a site visit.

1.7 ORDINANCES, AUTHORITIES, PERMITS, AND FEES

- A. Obtain necessary permits and licenses, give notices and comply with laws, ordinances, rules, regulations or orders affecting the work, and pay fees and charges in connection therewith.
- B. The "authority having jurisdiction" is the organization, office, or individual responsible for "approving" equipment, an installation, or a procedure.

1.8 PROTECTION OF WORK AND MATERIALS

- A. Protect and care for materials delivered and work performed until the completion of the work. Defective equipment or equipment damaged in the course of storage, installation or test shall be replaced or repaired to the satisfaction of the Engineer at no additional cost to the Owner.

1.9 INSURANCE

- A. Purchase and maintain Public Liability and Property Insurance during the progress of the work and until completion and acceptance of the entire project by the Owner in the amounts as specified in the General Conditions.

1.10 APPLICABLE CODES

- A. Work and materials shall conform to the latest rules and regulations listed below and these rules and regulations hereby are made part of this specification. They include, but are not necessarily limited to the following:

- American Society for Testing and Materials (ASTM)
- Underwriters' Laboratories, Inc. (UL)
- Air Moving and Conditioning Assoc. (AMCA)
- American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE)
- American Society of Mechanical Engineers (ASME)
- National Electrical Manufacturers Association (NEMA)
- Institute of Electrical and Electronics Engineers (IEEE)
- American National Standards Institute (ANSI)
- National Fire Protection Association (NFPA)
- American Water Works Association (AWWA)
- Local Fire Code
- Local Plumbing Codes
- American Welding Society

1.11 SHOP DRAWINGS

- A. Submit shop drawings, manufacturers' data and certificates for equipment, materials and finish, and pertinent details for each system where specified in each individual section, eight (8) copies, to be submitted to the Architect. Shop drawings will be returned "No Exceptions Taken", "Make Corrections Noted", "Amend and Resubmit", "Submit Specified Item", or "Rejected" less two (2) copies. Work shall progress in accordance with "Reviewed" shop drawings (ONLY).
- B. Groups of similar shop drawings shall be submitted as individual bound documents with covers and indexes. Typical similar items would be "Diffusers and Registers", "Valves and Controls". Rejection of individual items shall not be cause for rejection of the entire document.
- C. Clearly indicate item(s) to be reviewed on each submission by highlighting or underlining intended item(s). Submissions not clearly marked shall be returned "Amend and Resubmit".
- D. Shop drawings must bear the Engineer's review stamp. In the event that the Engineer returns shop drawings "Amend and Resubmit" or "Rejected", the shop drawing must be revised and resubmitted for review.
- E. Furnishing of the specified item must still produce the results and performance, dependability and quality reasonably to be expected within the spirit of the specifications, drawings, and the standard of good mechanical performance normal to the trade.

1.12 SUBSTITUTIONS

- A. Refer to Division 01. Where the specifications allow the substitution of a product, still this product is subject to review by the Engineer in accordance with the paragraph entitled "Shop Drawings". Review of a substitute item is an indication only that the substitute item is compatible with the specified item as a claim of the manufacturer. Insure dimensional propriety, performance, and quality of the substitute item.
- B. Reference in the specifications or on the drawings to any product, material, fixture, form or type of construction, by proprietary name, manufacturer, make or catalog number, establishes a standard of quality or design and is not meant to limit competition. Use any equivalent substitute provided favorable written review by the Engineer is first obtained. The (ONLY) notation in the specification is an exception to this and leaves no option.
- C. For materials or equipment which are supplied with integral or factory applied finish, the colors will be considered in evaluating substitutions.
- D. For the purpose of avoiding conflicts with other trades, contracts, and adjoining work where more than one (1) article, device, material, fixture, form or proprietary name, manufacturer, make or catalog number, the first named shall be used as the basis of design and details. The cost of any changes because of substituted item shall be borne by the Contractor requesting such change.

PART 3 - EXECUTION

3.1 GRADES AND ELEVATIONS

- A. Establish and maintain grades and elevations in connection with this work.

3.2 EQUIPMENT SUPPORTS

- A. Furnish and install equipment supports for mechanical equipment as required. Supports shall be subject to review by the Engineer.

3.3 SLEEVES AND PREPARED OPENINGS

- A. Coordinate core-drilling, cutting, patching and setting of sleeves, frames, framing and lintels for openings with other trades. Sleeves shall be furnished by the Contractor. Pipe sleeves shall be provided at all floor and wall penetrations. Sleeves shall be Schedule 40 steel pipe for iron pipe, Type "L" copper for copper pipe and Schedule 40 PVC for plastic pipe. Sleeves shall be firestopped, as specified.
- B. Failure to give timely notice of and to locate openings and furnish sleeves shall cause no additional expense to the Owner.

3.4 CONNECTION TO EQUIPMENT

- A. Provide piping connections, supports, brackets, compensators or flexible connections to prevent application of excessive stresses to equipment.
- B. Equipment shall be installed with flanges or unions in such a manner as to permit disconnecting for removal of tubes, coils, elements and other equipment for inspection, service and repairs.

3.5 ACCESS TO EQUIPMENT

- A. The installation of work performed shall provide reasonable accessibility for operation, inspection, and maintenance of equipment and accessories. The Engineer shall determine the adequacy of such accessibility.

3.6 ACCESS PANELS

- A. Access panels shall be provided where indicated on the drawings and as required for access to valves and other serviceable components. Access doors shall be Milcor, Zurn or approved equal hinged with primed finish and with allen wrench operated latch.
- B. Access panels installed in fire-rated assemblies shall have the same fire rating as the assembly.

3.7 PAINTING OF EQUIPMENT

- A. Exposed ironwork, including steel supports and hangers in unfinished spaces, e.g. boiler rooms, mechanical rooms, pits, and trenches shall be properly cleaned, prepared and painted with two (2) coats of black asphaltum varnish.

3.8 GUARDS

- A. Exposed moving and rotating elements of mechanical equipment items shall be protected with suitable guards for personnel protection. Guards shall be of rigid construction, firmly positioned. Holes shall be provided in guards at shaft centers to facilitate tachometer readings.

3.9 LUBRICATION

- A. Furnish and install grease fittings for points requiring lubrication. Furnish extension type fittings as required to provide easy access for maintenance lubrication.
- B. Furnish initial charges of lubricants for equipment. Lubricants shall be in conformance with the manufacturer's requirements and recommendations.

3.10 ELECTRIC MOTORS AND MOTOR CONTROLS

- A. Unless otherwise noted, motors, motor starters and other electrical accessories which are specified under Mechanical specifications shall be selected with characteristics as follows:

1/2 Horsepower and less - 120 volt, 1 phase, 60 Hz.
 3/4 Horsepower and larger - 208 volt, 3 phase, 60 Hz.

- B. Motors shall be built in accordance with the latest applicable NEMA, IEEE and ANSI Standards. Motors shall be manufactured by Baldor, Magnetek or Toshiba, of the latest type and quality specified under individual items of equipment. Motor efficiencies shall be premium high efficiency type per the Consortium for Energy Efficiency Standard and/or be "Energy Star" compliant.
- C. Magnetic motor starters for mechanical items of equipment shall be furnished under Division 16 unless the starter is an integral part of a factory packaged item of equipment. Each starter furnished as an integral item of equipment shall be provided with overload heater elements. Starters shall have single phase protection or shall have relays installed to provide this feature. Starters shall be equipped with suitable step-down transformers to provide required control voltage.
- D. Motors shall have a minimum continuous duty service factor of 1.15. Minimum motor efficiency shall be:

MOTOR HORSEPOWER	PERCENTAGE EFFICIENCY		
	(1200RPM)	(1800 RPM)	(3600 RPM)
1-3	----	86.5	85.5
5	89.5	89.5	86.5
7.5	90.2	91.0	88.5
10	91.7	91.7	89.5
15	91.7	93.0	90.2

3.11 CLEANING OF SYSTEMS

- A. Piping and duct systems shall be thoroughly cleaned and flushed prior to initial operation.
- B. Thoroughly clean exposed portions of the mechanical installation, removing labels and foreign substance.
- C. Furnish detergents, solvents, cleaning compounds, and tools required for cleaning operations.
- D. Keep the premises free from accumulation of waste material or rubbish and at the completion of the work, remove from the job site tools, scaffolding, surplus materials, and rubbish, leaving the work areas "broom" clean.

3.12 STARTING OF EQUIPMENT

- A. Testing or starting of equipment shall be done in collaboration with trades concerned to insure safe and proper operation of the equipment.
- B. Prior to starting equipment, provide lubrication at required points. Before starting any electrical or electric motor driven equipment, a check must be made to insure that proper heater coils are installed in the starters and that the equipment is rotating in the proper direction.

3.13 OPERATIONAL TESTING

- A. Operate systems until successful operation is demonstrated to the Engineer. This initial operation shall be in addition to the testing of the system and shall be done after the system is cleaned and finished.

3.14 RECORD DRAWINGS

- A. During construction, keep an accurate record of deviations to the installation of the work as indicated on the drawings. Upon completion of the work, furnish a copy of this record to the Engineer. **Submit record drawings before requesting final payment.**

3.15 MANUFACTURER'S REPRESENTATIVE

- A. As indicated in the Technical Sections of this specification or as directed by the Engineer, provide the services of a factory trained Engineer or Technician to inspect, adjust, and place in proper operating condition the equipment or item involved. No additional compensation will be allowed for such service.

3.16 MANUFACTURER'S INSTRUCTIONS, OPERATION AND MAINTENANCE DATA

- A. Provide for each item of equipment or apparatus furnished, a complete set of printed instructions obtained from the manufacturer covering proper operation, maintenance, lubrication, cleaning, servicing, adjustment, and safety instructions.
- B. Manufacturer's data shall include performance data (curves are preferred where applicable) complete parts lists, recommended spare parts lists, piping, and wiring diagrams.
- C. Arrange data in complete sets, properly indexed and marked.
- D. Data shall include a complete set of shop drawings.
- E. Material shall first be submitted in preliminary form for review by the Engineer. After review, submit two (2) copies in bound volumes to the Engineer for distribution.

3.17 GUARANTEES

- A. An item becomes "defective" when it ceases to conform to the Contract Documents. Guarantees begin on the date of issuance of a certificate authorizing final payment or certificate of substantial completion with the Owner taking occupancy or beneficial use thereafter.
- B. Upon completion of the work and before applying for final payment, furnish a written guarantee, stating that the work complies with the provisions of codes listed herein and the local enforcing authorities, and that it will be free from defects of material and workmanship for not less than one (1) year. Guarantee shall further state that the Contractor will, at his

own expense, repair or replace any of his material and work which may become defective during the time of guarantee, together with other work damaged as a consequence of such defects.

- C. Where special guarantees, covering installation, operation or performance of any systems, or equipment furnished under are indicated, the full responsibility for the fulfillment of such guarantees must be assumed by the Contractor who shall obtain written guarantees in triplicate, two (2) copies of which shall be filed with the Engineer before final acceptance.
- D. Repeated malfunctioning or failure in service of any item or work of the system is sufficient cause for the Engineer to order the removal of the item, and its replacement with new item at the expense of the Contractor.

3.18 EXISTING UTILITIES AND EQUIPMENT

- A. Field-verify existing utilities and equipment, as required.

3.19 FIRESTOPPING

- A. Firestopping shall be performed in accordance with Specification Section 07270 "Firestopping". All penetrations of fire-rated assemblies including walls and floors by mechanical system components (piping, ductwork, conduits, etc.) shall be firestopped as specified. Coordinate size, location and type of pipe and duct sleeves as required by firestopping systems.

3.20 HAZARDOUS MATERIALS

- A. Recognized hazardous materials such as lead, mercury or asbestos shall be prohibited from the project. Submit MSDS sheets to the Owner for review.

* END OF SECTION *

SECTION 15250

HVAC INSULATION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. The drawings and the specifications including the project manual are hereby made a part of the work of this section.

1.2 DESCRIPTION

- A. The work covered by this Section of the specifications includes the furnishing of labor, materials, equipment, transportation, permits, inspections and incidentals and the performing of operations required to insulate the heating, ventilating, air conditioning, and plumbing systems.

1.3 SUBMITTALS

- A. Substitutions: Your attention is directed to Section 15000-"Substitutions", relative to competition and the (ONLY) notation. Familiarity with this section shall be achieved before reading the PRODUCTS section of this specification.
- B. The items for which the submittals paragraph in Section 15000, Common Work Results for HVAC, apply are as follows:
 - 1. Piping insulation.
 - 2. Duct insulation.
 - 3. Equipment insulation.
 - 4. Insulation application schedule.

1.4 DEFINITIONS

- A. Finished Spaces: Spaces other than furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawl spaces, and tunnels, unless specifically listed below as an unfinished space.
- B. Unfinished Spaces: Mechanical rooms.
- C. Unconditioned Spaces: Spaces exposed to near outside ambient temperatures, such as unheated attic spaces or non-air conditioned areas.
- D. Outside: Areas beyond the exterior side of walls or above the roof, unexcavated spaces, and crawl spaces.
- E. Concealed: Not visible in finished or unfinished spaces. For example, above ceilings, below floors, between double walls, furred-in areas, pipe and duct shafts, and similar spaces.
- F. Exposed: Visible from a finished or unfinished space.

1.5 MANUFACTURER'S STAMP OR LABEL

- A. Packages or standard containers of insulation, jackets, cements, adhesives, and coatings delivered to the project site for use must have the manufacturer's stamp or label attached

giving name of manufacturer, brand, and description of material. Insulation shall be asbestos-free.

1.6 FLAME SPREAD AND SMOKE DEVELOPED RATINGS

- A. Materials shall have a flame-spread rating of not more than 25 and a smoke developed rating of not more than 50 when tested in accordance with NFPA 255, ASTM E84, or UL 723.
- B. Provide materials with flame resistant treatments not subject to deterioration due to aging, moisture, high humidity, oxygen, ozone, or heat.
- C. Materials Exempt From Fire-Resistant Rating: Nylon anchors for securing insulation to ducts or equipment.

PART 2 PRODUCTS

2.1 PIPING INSULATION

- A. Fiberglass: Heavy density preformed fiberglass with thermal conductivity of 0.29 Btu-in/hr-ft²-°F at 150°F mean temperature. Insulation shall conform to ASTM C547 Class I and shall be suitable for 450°F service. Fitting insulation shall be of same material used for pipe.
 - 1. Insulation Jacket: All service (ASJ) type conforming to Fed. Spec. HH-B-100B Type I. Jacket permeability shall not exceed 0.02 perms (ASTM E96). Pipe fitting jacket shall be factory premolded, one-piece, PVC covers with pressure sensitive taped joints. Jackets in exposed locations shall have a white surface suitable for field painting. Provide vapor barrier as required by service.
 - 2. Aluminum Jackets: ASTM B 209M (ASTM B 209), Temper H14, minimum thickness of 27 gage (0.016 inch), with factory-applied polyethylene and kraft paper moisture barrier on inside surface. Provide smooth surface jackets for jacket outside diameters less than 8 inches. Provide corrugated surface jackets for jacket outside diameters 8 inches and larger. Provide 1/2" wide stainless steel bands. Provide factory prefabricated aluminum covers for insulation on fittings, valves, and flanges.
 - 3. PVC Jacket: Glossy white finish, ASTM 1784, minimum thickness 0.030", over insulation and vapor barrier. Jacket shall be overlapped 2" minimum on down side. ***Provide jacketing over insulation in finished areas and other spaces where exposed to view.***
- B. Flexible Unicellular: Flexible unicellular with thermal conductivity of 0.27 Btu-in/hr-ft²-°F at 75°F mean temperature. Insulation shall conform to ASTM C534, Type I, Tubular and shall be suitable for 200°F service. Fitting insulation shall be of same material used for pipe. Permeability shall not exceed 0.10 perms (ASTM E96). Insulation adhesive shall conform to Mil. Spec. MIL-A-24179A, Type II, Class 1.
- C. Fittings, Flanges, and Valves: Provide insulation for fittings, flanges, and valves premolded, precut, or job fabricated of the same thickness and conductivity as used on adjacent piping.

2.2 DUCT INSULATION

- A. Fiberglass (Ductwrap): Fiberglass duct wrap with foil-scrim-kraft facing/vapor barrier, 1.0 lb/cu.ft. density (0.75 lb/cu.ft. for 3" thickness only), 0.29 Btu-in/hr-ft²-°F conductivity at 75°F

mean temperature, 0.05 permeance rating. Insulation shall meet the requirements of NFPA 90A & B and shall be UL rated. Provide foil-scrim-kraft (FSK) tape.

- B. Fiberglass (Ductboard): Fiberglass insulation board with foil-scrim-kraft facing/vapor barrier, 3.0 lb./CF density, 0.25 Btu-in/hr-ft²-°F conductivity at 75°F mean temperature, 0.05 permeance rating. Insulation shall meet the requirements of NFPA 90A and B and shall be UL rated. Provide foil-scrim-kraft (FSK) tape.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

- A. Inspection:
 - 1. Prior to work of this Section, carefully inspect the installed work of other trades and verify that such work is complete to the point where this installation may properly commence.
 - 2. Verify that the insulation systems may be installed in accordance with pertinent codes and regulations and the reviewed Submittals.

3.2 GENERAL

- A. Insulate after system tests have been completed and surfaces to be insulated have been cleaned of dirt, rust, and scale and are dry.
- B. Install insulation with jackets drawn tight and cement down longitudinal and end laps. Do not use scrap pieces where a full length section will fit. Insulation shall be continuous through sleeves, wall and ceiling openings, except at fire dampers in duct systems and pipe penetrations through fire rated assemblies. Extend surface finishes to protect ends, and raw edges of insulation. Apply coatings and adhesives at the manufacturer's recommended coverage per gallon. Individually insulate piping and ductwork. Keep insulation dry during the application of the finish. Bevel and seal the edges of exposed insulation.
- C. Unless otherwise indicated, do not insulate the following:
 - 1. Factory preinsulated flexible ductwork.
 - 2. Factory pre-insulated ductwork, plenums, casings, mixing boxes, and filter boxes.
 - 3. Chrome plated pipes and fire protection pipes.
 - 4. Vibration isolating connections
 - 5. Adjacent insulation
 - 6. ASME stamps, nameplates, access plates
 - 7. Ductwork exposed to view in a normally occupied space.
 - 8. Hydronic specialties: relief valves, relief valve discharge piping, pressure reducing valves, and expansion tanks.
 - 9. Unions and flanges at equipment required for frequent service.

3.3 PIPING INSULATION

- A. Pipe Insulation (Fiberglass): Place sections of insulation around the pipe and joints, tightly butt into place. Draw jacket laps tight and smooth. Secure jacket with fire resistant adhesive, or factory applied self sealing lap. Cover circumferential joints with butt strips, not less than 3-inches wide, of material identical to the jacket material. Overlap longitudinal laps of jacket material not less than 1-1/2 inches. Adhesive used to secure the butt strip shall be the same as used to secure the jacket laps.

- B. Flanges, Unions, Valves and Fittings Insulation (Fiberglass): Factory fabricated removable and reusable insulation covers. Place factory premolded, precut or field-fabricated segmented insulation of the same thickness and conductivity as the adjoining pipe insulation around the flange, union, valve, and fitting abutting the adjoining pipe insulation. Install factory premolded one-piece PVC fitting covers over the insulation and secure by stapling or with metal or plastic tacks made for securing PVC fitting covers and secure with PVC vapor barrier tape.
- C. Pipe Insulation (Flexible Unicellular): Bond cuts, butt joints, ends, and longitudinal joints with adhesive. Miter 90-degree turns and elbows, tees, and valve insulation. Insulate flanges, unions, valves, and fittings.
- D. Where penetrating roofs and exterior walls, insulate piping to a point flush with the underside of the deck or wall and seal with a vapor barrier coating.
- E. Hangers and Anchors: Pipe insulation shall be continuous through pipe hangers. Where pipe is supported by the insulation, provide MSS SP-58, Type 40 galvanized steel shields (16 gage maximum). For fiberglass insulation systems on pipe sizes 2 inches through 3", provide insulation inserts at points of hangers and supports. Insulation inserts shall be of molded glass fiber (minimum 12 pcf). Insulation inserts shall cover the bottom half of the pipe circumference, 180 degrees, and be not less than 4" long. Vapor-barrier facing of the insert shall be of the same material as the facing on the adjacent insulation. Seal inserts into the insulation. Insulation inserts for pipe sizes 4" and larger shall be welded pipe saddles. Install insulation in void area of saddle of same material used on adjacent insulation. For pipe sizes 2" and smaller, insulation inserts for flexible unicellular insulation systems shall be wooden doweling set on end of length equal to insulation thickness. Seal dowel to insulation with adhesive.
- F. PVC or Metal Jackets: Provide over insulation. Machine cut jacket to smooth edge of circumferential joints. Overlap metal jacket not less than 2 inches at longitudinal and circumferential joints and secure with metal bands at not more than 9 inch centers. Overlap longitudinal joints down to shed water. Seal circumferential joints with a coating recommended by insulation manufacturer for weatherproofing. Solvent weld PVC jacket system to provide continuous watertight seal.

Provide jacketing over insulation in finished areas where exposed to view.

3.4 DUCT INSULATION

- A. Rigid Insulation: Secure rigid insulation by impaling over pins or anchors located not more than 3 inches from joint edges of boards, spaced not more than 12 inches on centers and secure with washers and clips. Spot weld anchor pins or attach with a waterproof adhesive especially designed for use on metal surfaces. Each pin or anchor shall be capable of supporting a 20-pound load. Cut off protruding ends of pins. After installing washers, provide foil-scrim-kraft (FSK) tape to seal break in vapor barrier, tape shall extend 1" minimum around pin. Apply insulation with joints tightly butted. Bevel insulation around name plates and access plates and doors. Seal joints with FSK tape. Provide additional adhesive or staples to assist tape adhesion in difficult applications.
- B. Flexible Blanket Insulation: Apply insulation with joints tightly butted. Staple laps of jacket with outward clinching staples and seal with foil scrim kraft (FSK) tape. Sagging of flexible duct insulation shall not be permitted. For ductwork over 24-inches wide on horizontal duct runs, provide pins, washers and clips. Install speed washers with pins and pin trimmed to washer. Cut off protruding ends of pins after clips are secured. Seal with FSK tape, extend tape 1" minimum around pin. Use pins on sides of vertical ductwork being insulated. Space

pins and clips on 18 inch centers and not more than 18 inches from duct corners. Carry insulation over standing seams and trapeze-type hangers.

3.5 EQUIPMENT INSULATION

- A. General Procedures: Apply equipment insulation suitable for temperature and service to fit as closely as possible to equipment. Join sections of insulation with adhesive. Bevel insulation around nameplates, ASME Stamp, and access plates. For insulation on equipment that must be opened periodically for inspection, cleaning, or repair, construct insulation to be removable and replaceable without damage. Provide vapor barrier seal at joints and seams for "cold" equipment.
- B. Heating Equipment: Provide semi-rigid mineral fiberboard insulation. Seal longitudinal and lateral seams with FSK tape. Bond cuts, ends, and mitered sections with adhesive. Provide a vinyl-acrylic mastic coating on exposed fiberglass ends.

3.7 INSULATION APPLICATION SCHEDULE

<u>SERVICE</u>	<u>THICKNESS</u>	<u>MATERIAL/JACKET</u>
----------------	------------------	------------------------

PIPING:

Hot Water Heating Supply and Return Piping 2-1/2" and smaller	1-1/2"	Fiberglass w/ ASJ
Hot Water Heating Supply and Return Branch Piping Less than 10 ft in Stud Walls	1"	Fiberglass w/ ASJ

<u>SERVICE</u>	<u>THICKNESS</u>	<u>MATERIAL/JACKET</u>
----------------	------------------	------------------------

LTHWS/R	1"	Fiberglass w/ ASJ
---------	----	-------------------

DUCTWORK:

Return Ductwork	N.A.	N.A.
-----------------	------	------

EQUIPMENT

Heating System Air Separators	1"	Fiberglass, ASJ
Suction Diffusers, Air Separators, Flexible Connectors, Valves	1/2"	Flexible Unicellular

3.8 FIELD INSPECTION

- A. Visually inspect to ensure that materials used conform to specifications. Inspect installations progressively for compliance with requirements.

* END OF SECTION *

SECTION 15700

HEATING, VENTILATING AND AIR CONDITIONING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. The work covered by this Section of the specifications includes the furnishing of labor, materials, equipment, transportation, permits, inspections and incidentals and the performing of operations required to install the heating, ventilating and air conditioning systems indicated.

1.2 RELATED DOCUMENTS

- A. The drawings and the specifications including SECTION 15000 "Common Work Results for HVAC" are hereby made a part of the work of this section.
- B. ALTERNATES.

1.3 SUBMITTALS

- A. Substitutions: Your attention is directed to Section 15000-"Substitutions", relative to competition and the (ONLY) notation. Familiarity with this section should be achieved before reading the PRODUCTS section of this specification.
- B. The items for which the submittals paragraph in Section 15000 "Common Work Results for HVAC", apply are as follows:
 - 1. Piping materials.
 - 2. Fittings for steel pipe.
 - 3. Hangers.
 - 4. Piping, valve and equipment identification.
 - 5. Valves.
 - 6. Hydronic specialties.
 - 7. Hot water circulating pumps.
 - 8. Fans.
 - 9. Fintube radiation.
 - 10. Firestopping materials and methods.

PART 2 PRODUCTS

2.1 PIPING MATERIALS AND ACCESSORIES

- A. Hot Water Heating Piping (HWS/R and LTHWS/R): Schedule 40 carbon steel pipe with threaded joints and malleable iron fittings (2-1/2" pipe size and under) or Type "L" copper with soldered joints. All 90 degree elbows shall be long radius type.

2.2 FITTINGS FOR STEEL PIPE

- A. Fittings in sizes 1/2" through 2": Steel or malleable iron with requirements as follows:
 - 1. Steel fittings socket welding or screwed type conforming to ANSI B16.11.
 - 2. Malleable iron fittings screwed type conforming to ANSI B16.3.

2.3 HANGERS

- A. Adjustable Swivel Hanger: Pipe Sizes 2" and Less: Carpenter and Paterson Fig. 800 conforming to MSS-SP-58, oversize for insulated piping systems. Pipe Sizes Larger Than 2": Carpenter and Paterson Fig. 100, oversize for insulated piping systems.
- B. Riser Clamp: Carpenter and Paterson Fig. 126 and Fig. 126 CT conforming to MSS-SP-58, provide copper plated clamps on copper pipes.

2.4 VALVES

- A. Ball Valves: Apollo 70-100 Series, bronze body, Fed. Spec. WW-V-35, Type II, Class A (bronze), Style 3, blow-out proof stem, 600 pound W.O.G., screwed connection for steel pipe, sweat connection for copper tube. Provide stem extension to allow operation without interfering with pipe insulation. Provide Tee handles for valves thru 2" pipe size.
- B. Gate Valves: Nibco Model S-113 or T-113, bronze body Fed. Spec. WW-V-54, wedge disc, rising stem, screwed connection for steel pipe, sweat connection for copper tube, 150-pound class.
- C. Outside Screw and Yoke (OS&Y) Gate Valves: Nibco Model F-617-0, iron body, Fed. Spec. WW-V-58 with bronze trim, 125 pound class.
- D. Check Valves: Nibco Model S-413 or T-413, bronze body Fed. Spec. WW-V-51, regrinding swing check type, 200 pound class.

2.5 PIPING, VALVE AND EQUIPMENT IDENTIFICATION

- A. Pipe Identification: Provide plastic "wrap around" identification markers by Seton or Setmark indicating flow direction and fluid flowing for the following:

Hot Water Supply Piping
Hot Water Return Piping

1. Markers shall be placed 30-50 ft. apart for piping in accessible areas.
2. Markers shall be placed outside the pipe insulation and in the most obvious location for viewing. Markers shall not be installed in exposed areas except in the mechanical rooms.
3. Piping identification shall be color-coded and in accordance with ANSI.

- B. Equipment Identification:

1. Provide laminated plastic nameplates for pumps. Laminated plastic shall be 0.125-inch thick melamine plastic conforming to Fed. Spec. L-P-387, black with white center core. Surface shall be a matte finish, corners shall be square. Accurately align lettering and engrave into the white core. Minimum size of nameplates shall be 1.0 inch by 2.5 inches. Lettering shall be minimum of 0.25-inch high normal block lettering.

- C. Valve Tags:

1. Attach to each valve a 1-1/2" round or octagonal brass tag with 1/2" indented numerals filled with a durable black compound. In addition to the valve numbers,

each tag shall identify the system it controls. Service stop valves exposed in finished areas need not be tagged.

2. Tags shall be securely attached to stems of valves with copper or brass "S" hooks, or chains.
3. Valve charts shall be provided for each piping system and shall consist of schematic drawings of piping layouts, showing and identifying each valve and describing its function. Upon completion of the work, one (1) copy of each chart, sealed to rigid backboard with clear lacquer placed under glass and framed, shall be hung where directed. Two (2) additional unmounted copies shall be delivered to the Architect.
4. Tags and charts shall be coordinated with Section 15400 Plumbing and when completed this work shall have been done sequentially.

2.6 HYDRONIC SPECIALTIES

- A. Thermometers: Trerice Model 80030, Tel-Tru, Weiss Instruments or Ashcroft, 3-1/2", vapor-actuated, adjustable angle, acrylic or glass window, cast aluminum or Type 304 stainless steel case, 30⁰F.-240⁰F. range. The thermometer display shall be in ⁰F. Accuracy shall be +/- 1% of the displayed value or 1⁰, whichever is greater. Furnish with brass thermowells and provide with heat transfer fluid to fill the sealed interstitial space between bulb and well. Evidence of the transfer fluid leaking shall be cause for refilling and sealing the well.
- B. Pressure Gauges: Tel-Tru, or Ashcroft Type 1005, Grade B, ANSI B40.1, dial-type, 3-1/2" diameter face installed with shut off petcock and restrictor. Pressure range: 0-60 psig with 5 psi graduations.
- C. Strainers: Watts Model 77S, MIL-S-16293, 125 psig minimum rating wye strainers, cast iron or bronze body, screen shall be stainless steel, monel or bronze with 20 mesh perforations. Provide with blowdown ball valve and 3/4" hose connection.
- D. Automatic Air Vents: Armstrong No. 1-AV, float type to vent air in hydronic systems. Vent constructed with cast iron body and stainless steel internals and with NPT male inlet and outlet for 1/4 inch overflow for safe water connection. 150 psi working pressure, 250⁰F maximum temperature.
- E. Air Separator (AS-*): Taco model 4900A-D, or Spirovent, as scheduled, steel construction, designed for not less than 125 psig and constructed and tested in accordance with Section VIII of the ASME Boiler and Pressure Vessel Code. Tank shall have fabricated connections, screwed for sizes 2" and smaller, flanged for sizes 2-1/2 inches and larger. Separators shall be factory prime-painted. Each air separator shall have an internal design suitable for creating the required conditions for optimal air separation and microbubble removal. Provide fittings for connection of automatic air vent and for connection of manual blow-down valve.
- F. Manual Air Vents: Brass body, fiber discs, 125 psi working pressure, 240⁰F maximum temperature, adjustable for quick venting at system start-up.
- G. Circulator (inline) (CP): Taco model indicated, Bell and Gossett, or approved equal, pumps shall be inline cartridge-type or close coupled pump of capacity and performance indicated with cast-iron body and bronze-fitted, 175 psig rated working pressure, 220⁰F maximum water temperature, carbon Ni-resist mechanical seal, flexible coupling, resilient-mounted drip-proof sleeve bearing motor. The pumps shall be factory tested, cleaned, and painted with machinery enamel. A set of installation instructions shall be included with the pump. Provide premium high efficiency motors. Following the completion of testing and balancing, provide pump impeller trim to match impeller size to the operating conditions.

Motors shall be premium high efficiency type, open drip-proof or TEFC by Baldor, Magnetek or Toshiba. Motor efficiencies shall comply with the Consortium for Energy Efficiency Standard.

- H. Circuit Balance Valves: Taco "Accu-Flo" circuit setter or Bell and Gossett (as located in main branches only).
 - 1. Bronze or brass body and internals, teflon seats, 175 psi working pressure, 250°F working temperature. Balancing devices shall be adjustable and shall have provisions for connecting a portable differential pressure gauge for flow measurement. Each balancing device shall be sized to provide a differential pressure reading between 2 and 5 feet with the valve full open at design flow rates.
 - 2. Install per manufacturer's recommendations for adjacent length of straight pipe.
 - 3. Shop drawings shall indicate gpm, size, wide open differential pressure meter reading, and actual water pressure drop. Circuit balance valves shall be suitable for tight shut-off with memory stop feature.
- I. Automatic Flow Control Valves: Flow Design, Inc., Autoflow Model AC (up to 2") and Model WS (larger than 2"), Griswold, or approved equal. The valves shall be factory set to maintain the specified flow rates within +/- 5% over an operating range of 2-32 psid. Each valve shall have a five (5) year warranty and free first year cartridge exchange. The internal wear surfaces of the valve cartridge shall be electroless nickel or stainless steel. The valve body shall be forged brass and permanently marked with the flow rate and spring range. Minimum pressure and temperature ratings shall be 400 psig at 250° F. Valve accessories shall include a union and pressure and temperature test ports. Installation shall be in accordance with the manufacturer's recommendations. The ball valve shall have a teflon packing, brass packing nut and blowout-proof stem, large diameter plated ball and a full size steel handle with vinyl grip. Provide an automatic flow control valve for each terminal heating unit as indicated on the drawings.

2.7 FINTUBE RADIATION

- A. FTR1: Fintube radiation shall be Sterling "Versaline" Model VB-PM, or Vulcan, pedestal-mounted, performance as scheduled, with an output rating of 950 BTUH/ft. with 180°F average water temperature, 65°F entering air temperature and a 2.0 GPM minimum water flow rate. The finned element shall be 3/4" copper tube with aluminum fins at 50 fins per foot. The enclosure shall be 16 gauge cold rolled steel, 6" deep x 6-3/4" high with factory enamel finish and color selection by the Architect. Installation including mounting height shall be per the manufacturer's recommendations, or as scheduled.
- B. FTR2: Fintube radiation shall be Sterling "Versaline" Model JVK-S11, or Vulcan, wall-mounted, sloped-top, performance as scheduled, with an output rating of 950 BTUH/ft. with 180°F average water temperature, 65°F entering air temperature and a 2.0 GPM minimum water flow rate. The finned element shall be 3/4" copper tube with aluminum fins at 50 fins per foot. The enclosure shall be 16 gauge cold rolled steel, 11" high x 3-1/2" deep with factory enamel finish and color selection by the Architect. Furnish with a full backing plate. Installation including mounting height shall be per the Architect and the manufacturer's recommendations, or as scheduled.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

- A. Inspection:

1. Prior to work of this Section, carefully inspect the installed work of other trades and verify that such work is complete to the point where this installation may properly commence.
2. Verify that the heating system may be installed in accordance with pertinent codes and regulations and the reviewed Submittals.

3.2 INSTALLATION OF PIPING

- A. In general, piping shall be run concealed above ceilings in occupied areas. Piping in other areas may be run exposed. Piping shall not be exposed in occupied spaces unless written authorization is given by the Architect.
- B. Provide and erect in accordance with the best practice of the trade piping shown on the Drawings and as required to complete the intended installation. Make offsets as shown or required to place piping in proper position to avoid other work and to allow the application of insulation and finish painting to the satisfaction of the Architect.
- C. The size and general arrangements, as well as the methods of connecting piping, valves, and equipment, shall be as indicated, or so as to meet the requirements of the Architect.
- D. Piping shall be erected so as to provide for the easy and noiseless passage of heating fluid under working conditions. Inverted eccentric reducing fittings shall be used whenever water pipes reduce in size.
- E. Water mains shall be run level or pitch slightly upward so that no air pockets are formed in the piping. The mains shall be set at elevations such that the runouts feeding equipment shall have no pockets where air can collect except where vents are provided. Provide drains at low points in the piping systems.
- F. High points in water piping shall be provided with manual vents.
- G. In the erection of water piping, make proper allowances for expansion and contraction. Piping shall be anchored as necessary to control expansion. Hot water runouts to units shall be the size as indicated on the Drawings and shall come off the main downward or off the side with a minimum of two 90° elbows provided on runout from main.
- H. Install stop valves and unions to facilitate isolation and removal of equipment. Provide final connections for hydronic specialties furnished under other sections of the Specifications.
- I. Steel piping shall have screwed or welded connections. Threads on piping shall be full length and clean-cut with inside edges reamed smooth to the full inside bore. Close nipples shall not be used. Pipe threads: standard pipe threads, machine cut and full length. Pipe: reamed to remove burrs and up-ended and rapped to dislodge dirt and scale. Joint compound shall be applied to male thread only. If it is necessary to back off a screwed joint after it is made, the thread shall be cleaned and new compound applied. Caulked threads will not be permitted.
 1. Victaulic Joints:
 - a. Not permitted.
- K. Connections between copper and steel piping shall be made with brass fittings.

- L. Install thermometer wells for temperature gauges and sensors, projecting a minimum of 2" into the pipe with extension to face of insulation. Piping 1-1/2" and smaller shall be enlarged to 2" where wells are installed. Wells shall be installed in active sections of piping. Fill wells with heat transfer fluid.
- M. Solder joints shall be made with non-lead solder. Clean surfaces to be soldered and use a paste flux. Wash joints with sodium bicarbonate and water to remove corrosive effects of heated solder paste. Hot wipe solder at each fitting.
- N. Pipe penetrations through walls, floors and ceilings shall have pipe sleeves of the same material as the pipe and in accordance with Section 15000 "Common Work Results for HVAC" and the IBC. Pipe sleeves shall be suitable for firestopping in accordance with the firestopping manufacturers recommendations. Traverse points of piping shall be escutcheoned with split chrome floor and ceiling plates and spring anchors, where visible to occupancy.
- O. Automatic Air Vents: Shall be installed with a manual isolation valve. The vent discharge shall be piped to a local floor drain.

3.3 PIPE HANGERS

- A. Impact driven studs are not acceptable.
- B. Pipes (copper or steel) shall be supported at intervals and rod sizes as follows, double nuts on hangers and on beam clips.

Pipe Size	Hanger Intervals	Rod Sizes
1/2"	5'	3/8"
3/4"	6'	3/8"
1"	7'	3/8"
1-1/4"	8'	3/8"
1-1/2"	9'	3/8"
2"	10'	3/8"

- C. Verticals: Supported at the base and at intervals as follows by use of clamp hangers:

Steel Pipe: Not more than 16 ft.

Copper Pipe and Tubing:

1-1/2" and larger - Not more than 12 ft.

1-1/4" and smaller - Not more than 6 ft.

- D. Provide welded steel saddles at each hanger on steel piping systems 4" and larger.

3.4 CLOSING IN WORK

- A. Cover up or enclose work after it has been properly and completely tested and reviewed.
- B. No additional cost to the Owner will be allowed for uncovering or recovering any work that is covered or enclosed prior to required test and review.

3.5 TEST AND ADJUST

-
- A. Piping Systems: Test with water to a pressure of 75 psi and hold for a period of two hours. Repair any leaks and retest the piping system; repeat process until systems are leak-free. Test piping before it is insulated.
 - B. Before operating any system, flush the piping to remove oil and foreign materials.
 - C. After the installation is complete and ready for operation, test the system under normal operating conditions in the presence of the Architect and demonstrate that the system functions as designed.
 - D. Demonstrate that the HVAC systems have free and noiseless circulation of water, that all air has been purged and that systems are watertight.
 - E. Correct defects which develop in operational testing, conduct additional testing until defect free operation is achieved.

3.6 CLEANUP AND CORROSION PREVENTION

- A. Piping and equipment shall be thoroughly cleaned. Dirt, dust, and debris shall be removed and the premises left in a clean and neat condition.
- B. Before covering is applied to piping systems, clips, rods, clevises and other hanger attachments, and before uncovered piping is permitted to be concealed, corrosion and rust shall be wire brushed and cleaned and in the case of iron products, a coat of approved protective paint applied to these surfaces. When corrosion is from the effects of hot solder paste, the areas shall be cleaned and polished and a wash of bicarbonate of soda and water used to neutralize the acid condition.

3.8 INSTRUCTIONS

- A. On completion of the project, instruct the Owner's representative in the care and operation of the system. The total period of instruction shall not be less than four (4) hours. The time of instruction shall be arranged with the Owner. In addition to the prime Mechanical Contractor, the control system Contractor, Balancing Contractor, and Owner's representative shall be present and participate in the Owner's instruction.

3.9 FIRESTOPPING

- A. Firestopping shall be performed in accordance with Specification Section 07270 "Firestopping". All penetrations of fire-rated assemblies including walls and floors by mechanical system components (piping, ductwork, conduits, etc.) shall be firestopped as specified.

* END OF SECTION *

SECTION 15710

RADIANT HEATING UNITS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. The work covered by this Section of the specifications includes the design, calculations, documentation, and the furnishing of labor, materials, equipment, transportation, permits, inspections and incidentals and the performing of operations required to provide the radiant floor heating systems indicated.

1.2 RELATED DOCUMENTS

- A. The drawings and the specifications referenced or included in the project manual are hereby made a part of the work of this section.

1.3 SUBMITTALS

- A. Substitutions: Your attention is directed to Section 15000-"Substitutions" relative to competition and the (ONLY) notation. Familiarity with this section should be achieved before reading the PRODUCTS section of this specification.
- B. The items for which the submittals paragraph in Section 15000 "Common Work Results for HVAC", apply are as follows:
1. Temperature control system schematic including variables, flow diagrams, ladder diagrams, and point to point wiring diagrams, indicating set points, reset ranges, throttling ranges, differentials, operating ranges, normal positions, controller action, dial ranges, voltages, currents, mounting locations, indicators, and terminal strip points.
 2. Sequence of operation for each system and function.
 3. Generic, functional description of each control component indicated.
 4. Design calculations, tube layout drawings, electrical requirements.

1.4 SYSTEM DESIGN

- A. Design Calculations: Provide and submit calculations for heat loss, loop flow, pump head requirements, and balancing criteria for each heating system loop. The radiant floor heating system shall provide the heat output indicated as a minimum. The design shall provide a radiant floor slab of uniform surface temperature (maximum 85°F). Radiant floor calculations shall be adjusted to account for floor construction, depth of cover, type of floor material, and type of floor finish. The building heating system will provide reset water to each radiant floor zone based on the connected load indicated, a 40°F differential temperature on the heating system (boiler) side, and a linear reset water schedule of; 120°F water temperature at 60°F outside temperature, and 180°F water temperature at 0°F outside temperature. Maximum tube spacing shall be 12" O.C.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

- A. Polyethylene Radiant Floor Tubing: Crosslinked polyethylene (PEX), SDR 9, 5/8" O.D., 180°F at 100 psig, conforming to ASTM F-876. Degree of crosslinking shall be 65-89%. Tubing shall be provided with additional oxygen diffusion barrier which limits oxygen diffusion to 0.1% of normal PEX tube without a barrier.
- B. PEX Kitec Composite Tubing: Cross-linked polyethylene as manufactured by IPEX. Tubing shall have crosslinked polyethylene inner and outer layers with a sonically welded and overlapped aluminum core. The aluminum core creates an oxygen barrier capable of limiting oxygen diffusion below 0.1 g/m³ per day at 104°F. Tubing shall be rated to handle 210°F water temperature at 115 psi. The tubing shall carry a thirty year warranty as standard.
- C. Bend Supports: 18 gage galvanized steel formed support for reduced radius tube bends. Support shall prevent tube collapse and flattening.

2.2 HYDRONIC SPECIALTIES

- A. Automatic Air Vents: Float type to vent air in hydronic systems. Vent shall be constructed of non-corrosive materials and shall have NPT male inlet and compression connector for 1/4 inch overflow to a drain receptor.
- B. Micro-bubble Air Separator: Spirovent inline type, brass body and internals, designed for elimination of air and micro bubbles in heating systems, to less than 3% entrained air at 100°F and 30 psig.
- C. Circulator (inline) for Radiant Floor Service: Pump(s) shall be cartridge-type with cast-iron body and bronze-fitted, 175 psig rated working pressure, selflubricated bearings, replaceable cartridge, UL listed motor.
- D. Valves:
 - 1. Injection Zone Valve: Bronze body, 125 psi max. working pressure, 240°F maximum operating temperature, 24V AC actuator, 5 year warranty on valve body, 3 year warranty on actuator.
 - 2. Four-Way Mixing Valve: Cast-iron body, bronze fitted, 125 psi, 250°F maximum temperature, with mounting assembly for valve actuator. Valve actuator shall be electronic, spring return, low voltage (24VAC), and properly selected for the valve body, temperature, and service.
- E. Piping Manifolds: Bronze construction, multi-port, extendable, specifically made to connect up to PEX tubing with compression type fittings or nitrile tubing with barbed fittings and clamps. Manifolds shall be provided with manual combination shut-off and balance valves for each tube circuit, vents, and drains. Manifolds shall be provided with thermostatic valves as indicated.

2.3 CONTROL

- A. Scope of Work: Furnish and install equipment, accessories and wiring required for a complete and functioning system. Materials and equipment shall be standard components, regularly manufactured for this and/or other systems and not custom designed especially for this project. Components shall have been thoroughly tested and proven in actual use.

- B. Wiring: The radiant floor control system shall be installed by licensed electricians and mechanics, who are trained for this work. Wiring shall be installed in accordance with the requirements of Division 16.
- C. Reset Controller: Mixing Reset Control shall reset supply temperature based on outside air temperature by modulating a 4-way valve. Controller shall be capable of shifting heating curve based on indoor temperature feedback from zone controller. Controller shall receive occupied/unoccupied signal from automatic temperature control system and setback occupied temperature 10°F during unoccupied period. Controller shall shutdown loop circulator when outside air temperature exceeds 60°F.
- D. Zone Controller: Six Zone Control shall regulate the heat delivered to up to 6 zones by cycling zone valves at the radiant manifold. Shall regulate heat delivery based on feedback from room temperature units (RTU's). Shall produce a proportional output signal from the coldest room to reset controller.
- E. Temperature Sensors: Room and slab sensors shall be provided and installed under Section 15900 for each zone. Coordinate wiring and other components, as required.
- F. Outside Air Sensing Elements: Provide element with sun shade to minimize solar effects. Mount sun shade at least 3 inches from building outside wall. Sun shade shall not inhibit the flow of ambient air across the sensing element. Shade shall also protect sensing element from snow, ice and rain.
- G. Supply Water Sensor: Brass thermowell and sensor wired into controller.
- H. Telestat: 24VAC motorized actuator to open loop control valves.

2.4 SEQUENCE OF CONTROLS

- A. The occupied/unoccupied signal shall be provided from the BAS. The BAS shall provide an "on-off" signal to the radiant floor reset controllers.
- B. The radiant floor system controller shall be a direct digital controller with a proportional-integral-differential (P.I.D.) control scheme to proportion the 4-way valve. The radiant loop supply water temperature shall be reset in response to room temperature and outside air temperature. Room temperature setpoint shall be 70°F for normally occupied areas. The spaces shall be setback 10°F during the unoccupied periods.
- C. The radiant floor zone reset controller shall start-stop the zone circulating pumps.
- D. Room or deck sensors shall open/close associated zone telestats to control room temperature at setpoint.

2.5 EQUIPMENT IDENTIFICATION

- A. Provide laminated plastic nameplates for control valves, pumps, and controls. Laminated plastic shall be 0.125-inch thick melamine plastic conforming to Fed. Spec. L-P-387, black with white center core. Surface shall be a matte finish, corners shall be square. Accurately align lettering and engrave into the white core. Minimum size of nameplates shall be 1.0 inch by 2.5 inches. Lettering shall be minimum of 0.25-inch high normal block lettering.
- B. Radiant Floor Circuit Tags:

1. Attach to each end of each heating circuit at each manifold, a 1-1/2" round or octagonal brass tag with 1/2" indented numerals filled with a durable black compound. In addition to the circuit numbers, manifold tags shall identify the rooms served.
2. Tags shall be securely attached to the piping with copper or brass "S" hooks, or chains.
3. Circuit charts shall be provided for each system and shall consist of schematic drawings or piping layouts, showing and identifying each circuit, manifold, and location. Upon completion of the work, one(1) copy of each chart shall be bound into the O&M manual. Two (2) additional unbound copies shall be delivered to the Architect.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Inspection:

1. Prior to work of this Section, carefully inspect the installed work of other trades and verify that such work is complete to the point where this installation may properly commence.
2. Verify that the heating system may be installed in accordance with pertinent codes and regulations and the reviewed Submittals.

3.2 INSTALLATION OF PIPING

- A. Install the radiant floor heating system per manufacturer's installation drawings and instructions. Provide services of tubing manufacturer's technical representative to supervise and test the installation.
- B. Tubing shall be laid as indicated, shall be supported and tied to the floor slab reinforcing to maintain alignment, spacing, and elevation. Minimum tube bend radius shall be 10 times the tube diameter. Minimum tube bend radius may be reduced to 7 times the tube diameter when mechanical bend supports are used. Concealed tube runs shall be continuous, no joints shall be concealed in the slab.
- C. Hydronic specialties provided under this section shall be installed per Section 15700.
- D. Provide 2" PVC sleeves at each underfloor feeder penetration of a footing or foundation wall. Provide polyolefin unicellular insulation sleeves at building expansion joints in slab.
- E. Provide tube bend supports at locations where tube bends must be made with a shorter radius bend than that recommended by the manufacturer for un-guided bends.
- F. Provide polyolefin unicellular insulation on tubing which runs below slab, and where tubing density would cause excessive floor surface temperatures (above 88°F).
- G. Maximum tube spacing shall be 12" O.C.

3.3 CLOSING IN WORK

- A. Cover up or enclose work after it has been properly and completely tested and reviewed.

- B. No additional cost to the Owner will be allowed for uncovering and recovering any work that is covered or enclosed prior to required test and review.

3.4 TEST AND ADJUST

- A. Test radiant slab tubing with water to a pressure of 100 psi and hold for a period of two hours. Repair leaks and retest the piping system; repeat process until systems are leak-free. Maintain water pressure during pouring of concrete floors.
- B. Before connecting underfloor tubing to its supply and return manifold, flush the piping to remove foreign materials. Prior to connecting any above slab manifold interconnecting piping to the supply and return manifolds, remove pumps, control valves, and other accessories which might collect dirt. Flush the piping to remove oil and foreign materials. After flushing procedures are complete, reinstall pumps and control valves, make final connections to supply and return manifolds. Protect cleaned tube runs by capping ends until tubes are connected to the manifolds.
- C. After the installation is complete and ready for operation, test the system under normal operating conditions in the presence of the Architect and demonstrate that the system functions as designed.
- D. Demonstrate that the radiant slab heating systems have free and noiseless circulation of water and that parts are watertight.
- E. Correct defects which develop in operational testing, conduct additional tests until defect free operation is achieved.
- F. System Turn-Over and Service: Upon completion of the installation, start up the system and perform necessary testing and run diagnostics to ensure proper operation. An acceptance test in the presence of the Owner's Representative and the Architect shall be performed. When the system performance is deemed satisfactory by these observers, the system parts will be accepted for beneficial use and placed under warranty.

3.5 CLEANUP AND CORROSION PREVENTION

- A. Thoroughly clean piping and equipment. Remove dirt, dust, and debris and leave the premises in a clean and neat condition.

3.6 INSTRUCTIONS

- A. On completion of the project, instruct the Owner's representative in the care and operation of the system. The total period of instruction shall not be less than four (4) hours. The time of instruction shall be arranged with the Owner. In addition to the prime Mechanical Contractor, the control system Contractor, Balancing Contractor, and Owner's representative shall be present and participate in the Owner's instruction.

3.7 GUARANTEE

- A. Provide guarantee per Section 15000, and the General Conditions.
- B. Provide 30 year limited warranty against manufacturing defects on radiant floor tubing.

END OF SECTION

SECTION 15800

HVAC FOR DISTRIBUTION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. The drawings and the specifications including SECTION 15000 "Common Work Results for HVAC" are hereby made a part of the work of this section.

1.2 DESCRIPTION OF WORK

- A. The work covered by this Section of the specifications includes the furnishing of labor, materials, equipment, transportation, permits, inspections and incidentals and the performing of operations required to install the ductwork systems indicated.

1.3 SUBMITTALS

- A. Substitutions: Your attention is directed to Section 15000-"Substitutions", relative to competition and the (ONLY) notation. Familiarity with this section should be achieved before reading the PRODUCTS section of this specification.
- B. The items for which the submittals paragraph in Section 15000 "Common Work Results for HVAC", apply are as follows:
1. Ductwork.
 2. Ductwork accessories.
 3. Air devices.
 4. Firestopping materials and methods.
 5. Ductwork sealing products.

PART 2 PRODUCTS

2.1 DUCTWORK

- A. Classification of Ductwork: Low pressure ductwork: up to 2" W.G. static pressure.
- B. Materials: Unless otherwise indicated low pressure ductwork shall be galvanized steel. Galvanized sheet metal shall be new galvanized steel sheets of lock forming quality with zinc coating that will not flake or peel under forming operation.
- C. Construction for Low Pressure Round and Rectangular Ductwork:
1. Material: Galvanized steel conforming to ASTM A527, weight of galvanized coating shall be not less than 1-1/4 ounces total for both sides of one sq.ft. of a sheet. Construction, metal gage, and reinforcements shall conform with SMACNA "Duct Construction Standards" and NFPA 90A for 2" W.G. pressure class.
 2. Fittings: Shall be constructed in accordance with SMACNA Standards and shall be of the types indicated (ONLY).
 3. Longitudinal seams shall be Pittsburgh lockseam (ONLY). Button punch snap locks are not acceptable.

4. Joints and seams shall be sealed to SMACNA seal class B (Leakage Class 12 for rectangular ducts and Leakage Class 6 for round and flat oval ducts).

2.2 DUCTWORK ACCESSORIES

A. Access Doors:

1. Low Pressure Duct Systems: Ruskin Model ADC2, 12"x12" size, 24 gauge galvanized steel, steel on both sides of door, foam gasket seals, 1" insulation, 2 cam locks, no hinge.

B. Counter Balanced Dampers (CBD): Aluminum frame and blades, extruded vinyl edge seals, 2-1/4" deep, set 0.06" WG.

C. Backdraft Dampers (BDD): Ruskin Model CBD2 or American Warming and Ventilating aluminum frame and blades, extruded vinyl edge seals, field set at 0.10" W.G. pressure differential for full open operation.

D. Fire Dampers: Greenheck FD-series, Ruskin Model IBD2, or Cesco, curtain type, 100% free area (ONLY), Style C for round duct installations, and Style B for rectangular duct applications. Fire dampers located immediately behind transfer grilles may be Style A dampers. The dampers shall be UL rated for 1-1/2 hours and have a 165°F fusible link. Fire dampers shall comply with UL "Standard for Safety" 555.

E. Volume Dampers:

1. Factory fabricated as specified, or shop fabricated in accordance with SMACNA "HVAC Duct Construction Standards".
2. Rectangular: Ruskin Model MD-35, or American Warming and Ventilating, 12 gauge galvanized steel, locking quadrant, opposed blade over 11", single blade 11" and under.
3. Round: Ruskin Model MDRS25, or American Warming and Ventilating, 20 gauge galvanized steel with locking quadrant(ONLY). Dampers may be provided integral with spin-in fittings.

F. Joint Sealer:

1. Hardcast DT tape and FTA-20 activator.
2. Provide waterproof sealer where watertight seal is specified.

2.3 AIR DEVICES (Krueger, Halton, Price, Anemostat, Metal Aire, Titus) ONLY

A. Material and Finishes: Construct diffusers, registers, and grilles of aluminum. Exterior and exposed edges shall be rolled, or otherwise stiffened and rounded. Steel parts shall be factory zinc-phosphate treated prior to priming and painting or have a baked-on enamel finish. Aluminum parts shall be finish painted. Provide frame style compatible with ceiling or wall type. Colors shall be selected by Architect. Devices to be installed on exposed duct installations shall be furnished in primer suitable for field application of color coat.

B. Sound Pressure Level: Manufacturer certified sound pressure level rating of inlets and outlets in accordance with ADC 1062 R4. Conform with the permissible room sound pressure level for each device as scheduled.

- C. Throw: Defined as distance from the diffuser, register, or grille to the point which the resultant room air velocity is 50 to 35 feet per minute.
- D. Ceiling Diffusers: Equip with core styles required to provide air distribution pattern indicated. Internal parts shall be removable through the diffuser-neck for access to the duct and without the use of special tools. Construct each diffuser of four or more concentric elements designed to deliver air in a generally horizontal direction. The interior elements of square and rectangular ceiling diffusers may be square or rectangular as manufacturer's standard. Screws or bolts in exposed face of frames or core elements are not acceptable. Diffusers shall have an opposed blade volume damper in the diffuser neck. Diffusers shall have a 24"x24" lay-in panel for areas with acoustical ceilings and surface-mount frame for GWB ceilings. Ceiling diffusers shall be Metalaire Series 5000 with induction vane (IV) option.
- E. Grilles and Registers: Construction and finish as indicated, 1/2" louver spacing, 45° curved blade. Registers shall have opposed-blade volume dampers with screwdriver adjuster. Unless otherwise indicated, registers shall be provided.
- F. Heavy Duty Grilles: Shall be Metalaire, Price or Krueger, heavy duty construction and reinforced for high traffic applications. Construction shall be aluminum, painted with a white finish.
- G. General: The interior of all sheetmetal connections to grilles, registers and diffusers shall be painted with a non-specular flat black paint so that no sheetmetal surfaces are visible from the finished space.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Inspection:
 - 1. Prior to work of this Section, carefully inspect the installed work of other trades and verify that such work is complete to the point where this installation may properly commence.
 - 2. Verify that the duct systems may be installed in accordance with pertinent codes and regulations and the reviewed Submittals.

3.2 INSTALLATION OF DUCTWORK AND AIR DEVICES

- A. Provide and erect in accordance with the best practice of the trade ductwork shown on the drawings and as required to complete the intended installation. Make offsets as shown or required to place ductwork in proper position to avoid conflicts with other work and to allow the application of insulation and finish painting to the satisfaction of the Architect. Sizes given are "inside - clear" dimensions and not necessarily that of sheet metal. Ducts shall be arranged to adjust to "field conditions". The Sheet Metal trades shall coordinate his work with other trades. Work shall conform to ASHRAE duct construction recommendations, SMACNA "Duct Construction Standards", NFPA, and the requirements of the IBC code.
- B. Joint Sealing: See PRODUCTS section.
- C. Longitudinal joints: See PRODUCTS section.
- D. Turns shall be made with long radius elbows or, if physically impossible to use long radius elbows, shall be square turns with specified turning vanes. CAUTION: Turns not

conforming to this requirement shall be ordered removed and replaced with properly built turns.

- E. Access Doors: Provide access doors for concealed apparatus requiring service and inspection in the duct system including but not limited to dampers, sensors and motors, and upstream and downstream from duct coils.
- F. Duct Sleeves and Prepared Openings: Install duct sleeves and prepared openings for duct mains, duct branches, and ducts passing through walls, roofs, and ceilings. Insure the proper size and location of sleeves and prepared openings. Allow one-inch clearance between duct and sleeve or one-inch clearance between insulation and sleeve for insulated ducts, except at grilles, registers, and diffusers.
- G. Duct Supports: Unless otherwise indicated, provide one-inch wide by 16 gage galvanized steel sheet metal strips on each side of ducts. Anchor risers in the center of the vertical run to allow ends or riser free vertical movements. Attach supports only to structural framing members. Do not anchor supports to metal decking unless a means is provided (architectural review required) for preventing the anchors from puncturing the metal decking. Where supports are required between structural framing members, provide suitable intermediate metal framing. Where C clamps are used, use retainer clips.
- H. Any deviation in the duct system must be submitted as a shop drawing and stamped. CAUTION: Any deviation not submitted and favorably reviewed will be ordered removed from the system and replaced with that which is shown on the Drawings.
- I. Discrepancies between actual field conditions and the Contract Documents shall be brought to the attention of the Architect prior to fabrication.
- J. Field Changes to Ductwork: Field changes of ducts such as those required to suit the sizes of factory-fabricated equipment actually furnished shall be designed to minimize expansion and contraction. Use 4:1 transitions in field changes as well as modifications to connecting ducts.
- K. Transitions with a slope greater than 4 to 1 shall be ordered removed from the system and replaced with a transition which meets this criteria.
- L. Joints and seams at intake and exhaust plenums and joints on intake and exhaust ductwork for a distance of 3 feet from the plenum shall be sealed watertight on the bottom and side joints and seams.
- M. The inside of sheetmetal connections to grilles, registers and diffusers shall be painted flat black so that no sheetmetal is visible from the finished space.
- N. All sharp edges and corners on ductwork, hangers or equipment located within 7'-0" of the finished floor shall be protected with a suitable padding material and identified with fluorescent orange paint.

3.3 CLOSING IN WORK

- A. Cover up or enclose work after it has been properly and completely tested and reviewed.
- B. No additional cost to the Owner will be allowed for uncovering or recovering any work that is covered or enclosed prior to required test and review.

3.4 TEST AND ADJUST

- A. Before operating any system, the system shall be cleaned out to remove dust and foreign materials.
- B. After the installation is complete and ready for operation, test the system under normal operating conditions in the presence of the Architect and demonstrate that the system functions as designed.
- C. Correct defects which develop during the test period, conduct additional testing until defect free operation is achieved.

3.5 CLEANUP AND CORROSION PREVENTION

- A. Ductwork and equipment shall be thoroughly cleaned. Dirt, dust, and debris shall be removed and the premises left in a clean and neat condition.
- B. Before covering is applied to duct systems, clips, rods, clevises and other hanger attachments, and before uncovered piping is permitted to be concealed, corrosion and rust shall be wire brushed and cleaned and in the case of iron products, a coat of approved protective paint applied to these surfaces.
- C. Protect ductwork from moisture, construction debris and dust, and other foreign materials. Comply with SMACNA's "Duct Cleanliness for New Construction Guidelines".

3.6 INSTRUCTIONS

- A. On completion of the project, instruct the Owner's representative in the care and operation of the system. The total period of instruction shall not be less than (4) hours. The time of instruction shall be arranged with the Owner. In addition to the prime Mechanical Contractor, the control system Contractor, Balancing Contractor, and Owner's representative shall be present and participate in the Owner's instruction.

3.7 FIRESTOPPING

- A. Firestopping shall be performed in accordance with Specification Section 07270 "Firestopping". All penetrations of fire-rated assemblies including walls and floors by mechanical system components (piping, ductwork, conduits, etc.) shall be firestopped as specified.

* END OF SECTION *

SECTION 15900

INSTRUMENTATION AND CONTROLS FOR HVAC

PART 1 - GENERAL

1.1 DESCRIPTION

- A. The work covered by this Section of the specifications includes the furnishing of labor, materials, equipment, transportation, permits, inspections and incidentals and the performing of operations required to install the automatic temperature control system indicated. The system shall be a direct digital control (DDC) system with dynamic color graphics software to provide the sequences as described in these specifications as an expansion of the existing DDC control system. The ATC system shall be complete with required components including, low voltage and line voltage wiring and conduit. Wiring shall be in accordance with Division 16, "Electrical" of the specifications and NFPA 70, National Electrical Code. See "System Point Lists" for additional requirements and information. The Building Management System shall be fully integrated to provide the end users with full control, monitoring and management functions, based on a common computer operating system and operating procedures. Industry standard Open Communication Protocols shall be provided, as specified.
- B. Recognized hazardous materials such as lead, mercury or asbestos shall be prohibited from the project. Submit MSDS sheets to the Owner for review.
- C. The following features and components shall be included:
1. Microprocessor-based primary plant controllers and intelligent room controllers interfacing directly with sensors, actuators and environmental delivery systems (i.e. HVAC equipment, room climate controls, electrical systems, etc.
 2. Electric / electronic sensors and final control elements including valves and actuators.
 3. A two wire peer communication network to allow data exchange between primary controllers and centrals.
 4. A personal computer (PC)-based central, with graphical interface (existing) and associated operator station(s), and software functioning as the primary operator interface to the BMS.
 5. All system components shall be fault tolerant.
 - a. Provide satisfactory operation without damage at 110% and 85% of rated voltage and at +3 Hz. variation of line frequency.
 - b. Provide static, transient and short circuit protection on all inputs and outputs. Communication lines shall be protected against incorrect wiring, static transients and induced magnetic interference. Bus-connected devices shall be transformer coupled or equivalent so that any single device failure shall not disrupt or halt bus communication.
 6. All real time clocks and data file RAM shall be capacitor or battery-backed up. Battery back-up shall last a minimum of 30 days.
- D. LonWorks® compliance:

1. The fully integrated Building Management System (BMS) shall be operable on the LonWorks® bus. General Purpose Controllers, Unitary Controllers, and PC-based centrals shall be able to operate and communicate on the 2-wire LonWorks® bus without the need to use gateways or drivers.
2. The Systems Integrator shall after all hardware (devices / nodes and wiring) has been installed provide all necessary device installation, device installation, device configuration, device diagnostics, network variable binding and systems diagnostics.

E. LONMARK® Association-compliance

1. General Purpose Controllers and Unitary Controllers shall comply with the standard profiles as defined by the LonMark® Interoperability Association.
 - a. If products are not certified by the LonMark® organization, product submittals must include the application source code, external interface file, resource files and complete documentation regarding all network variables and configuration properties supported by the device.
 - b. Products shall be provided with complete documentation. This shall include diagrams of all LonMark® objects supported by the product as well as relevant technical specifications. Undocumented products shall be reviewed by the Engineer prior to installation.
2. Quality Assurance
 - a. Comply with LonMark® Interoperability Association, Interoperability Guidelines for all products. Utilize published functional profiles for all product network message and configuration parameters. Where published profiles do not exist, utilize draft profile standards or submit a proposed draft as part of the submittals required. All drafts shall also be submitted simultaneously to LonMark®.
 - b. All products shall conform to the Interoperability requirements outlined in the LonMark® Interoperability Association Guidelines or be submitted clearly marked as non-compliant.

1.2 ACCEPTABLE MANUFACTURERS

- A. TAC/IA (Maine Controls).

1.3 RELATED DOCUMENTS

- A. The drawings and the specifications including SECTION 15000 "Common Work Results for HVAC" are hereby made a part of the work of this section.
- B. Section 15700 – HVAC.

1.4 SUBMITTALS

- A. Substitutions: Your attention is directed to Section 15000 relative to competition and the (ONLY) notation. Familiarity with this section shall be achieved before reading the PRODUCTS section of this specification.
- B. The items for which the shop drawings paragraph in Section 15000 "Common Work Results for HVAC", apply are as follows:
 - 1. Temperature control system schematic including variables, flow diagrams, ladder diagrams, and point to point wiring diagrams, indicating set points, reset ranges, throttling ranges, controller gains, differentials, operating ranges, normal positions, controller action, dial ranges, voltages, currents, mounting locations, indicators, and terminal strip points.
 - 2. Sequence of operation for each system and function.
 - 3. Generic, functional description of each control component indicated.
 - 4. Equipment interlocks required by sequence of operation.
 - 5. Automatic valve schedule showing flow, Cv, and pressure drop.
 - 6. Manufacturer's Data:
 - a. Dampers, valves and operators.
 - b. Controllers, including wiring and connection diagrams.
 - c. Thermostats, temperature sensors, including wiring and connection diagrams.
 - d. Temperature and pressure indicators.
 - e. Pressure sensors, including wiring and connection diagrams.
 - f. Switches, relays, transmitters, transformers, including wiring and connection diagrams.
 - 7. Dynamic color graphics software data.

PART 2 – PRODUCTS AND FEATURES

2.1 CONTROL PANELS

- A. In general, relays, transformers, or other control devices (not including room thermostats or duct-mounted instruments) shall be grouped and mounted in a factory-built cabinet enclosure.

2.2 AUTOMATIC CONTROL DAMPERS

- A. Automatic dampers not furnished with equipment shall be furnished under this paragraph. Automatic dampers shall be constructed and installed in accordance with the following specifications:
 - 1. Damper Blades: All automatic dampers, including dampers for static pressure control, shall be of the balanced type, factory-fabricated, with fully gasketed galvanized steel airfoil blades, mounted in welded frames. Damper blades shall be not more than 8 inches wide, shall have interlocking edges, edge and jamb seals and be capable of operation against 4" static pressure differential. Dampers shall be Arrow "Arrow-Foil" Model PBDAF-206, OBDAF-207, Ruskin Model CD-60 or Tamco Series 1000.

-
2. Modulating Dampers: All modulating dampers shall be of the opposed blade type.
 3. Damper Size and Bearings: Damper blades shall have steel trunnions mounted in oil-impregnated bearings. Dampers shall be not more than 48 inches in length between bearings.
 4. Frames: Damper frames shall be of welded channel or angle-iron, with heavy steel corner gussets and braces or stiffened with steel tie-rods where necessary. Frames shall be painted with aluminum paint to prevent rusting.
 5. Dampers shall be guaranteed to close tightly, and shall provide substantially the full area of the opening when open. All outdoor air intakes and all exhaust ducts to outside and all fresh air, return air and exhaust air dampers in systems shall have damper blades with inflatable seals or other devices to guarantee low leakage, not to exceed 6 CFM/SF at 1 in. WG pressure differential.
 6. Damper Linkages: Damper-operating links shall be cadmium plated steel or brass rods, adjustable in length with ball and socket joints and of such proportions that they will withstand, without appreciable deflection, a load equal to not less than twice the maximum operating force of the damper motor. Linkages shall be concealed in the frame.
- B. Damper Actuators: For each automatically controlled damper, a suitable damper actuator or actuators shall be provided in accordance with the following specifications:
1. Actuator: Damper actuators shall be electronic, direct-coupled, spring-return type and have a rating of not less than twice the torque needed for actual operation of the damper.
 2. Adjustments: Provide adjustable stops for the open and closed positions.
 3. Mounting: Damper actuators shall be direct-coupled over the shaft. The damper actuators and mounting base shall not be mounted directly on cold or insulated ducts and casings, but shall be mounted outside the insulated covering in such a manner as to prevent sweating and interference with the insulation.
 4. Where indicated, damper actuators shall be provided with an auxiliary switch rated at 120 V AC, and accept a 0 to 20 ma input.
- 2.3 AUTOMATIC CONTROL VALVES (HOT WATER, 250°F MAX.)
- A. Valves shall have removable composition discs with monel stem. Bodies two inches or smaller shall be bronze with screwed ends. Bodies 2-1/2 inches and larger shall be cast-iron with flanged ends. Valve bodies, trim and stuffing boxes shall be designed for not less than 125 psi working pressure. Valve packing shall be non-lubricated teflon packing suitable for hot water service, as required.
 - B. Modulating valves shall be sized for maximum pressure drop of 1.5 to 4.0 psi.
 - C. Automatic control valve differential shut-off pressure shall be a minimum of 35 psig.
 - D. Heating valves shall fail to the "normally-open" position.
 - E. Valves shall have a clearly marked position indicator as part of the operating linkage.

- F. Actuator: Shall be electronic, direct-coupled, pulse width modulation (PWM) or spring return type and have a rating of not less than twice the torque needed for actual operation of the valve.

2.4 TEMPERATURE SENSORS

- A. Temperature Sensors: RTD Elements, accuracy of $\pm 0.1\%$ at 70°F, sensors shall be securely attached to a single gang electrical box or other suitable base, securely mounted on the wall or other building surface. Each sensor shall be located where shown or, if not shown, where it will respond to the average temperature in the room. Sensors, generally, shall be mounted 48 inches above the floor, and shall not be mounted on outside walls if other locations are possible. If located on an outside wall, it shall have an insulated base. Sensors shall have locked or concealed adjustment devices, by means of which the operating points can be adjusted through a range of not less than 10 degrees above and below the operating points specified.
- B. Room temperature sensors shall be a Digital Wall Module, with setpoint adjustment, digital LCD display for temperature and setpoint status. Room sensor setpoints shall have software adjustable limits to keep setpoint within the specified range. Provide heavy-duty tamperproof cast aluminum guards, where indicated. Temperature sensors / thermostats with guards shall have a blank cover (tamperproof).

2.8 SYSTEM DESCRIPTION

- A. The HVAC BMS provided under this section of the specifications shall consist of a distributed Client-Server, Local Area Network (LAN) based system, incorporating PC based Operator Workstations (OW) with dynamic multicolored graphic displays, a PC based Server, an extension of the building local area network furnished by the Owner, routers, switchers, network nodes, the direct digital control system specified and Client software to provide interoperability with the Server software furnished in Sections listed above.
- B. The HVAC BMS shall be modular in design and scaleable in implementation from an initial installation of a single Server with a minimum of two concurrent OWS to a system with up to 40 concurrent OWS, unlimited Web Browser Access (using Internet Explorer 6.0) to system information for monitoring and control functions, and Field Controller Network Interfaces to permit expansion to 60,000 physical hardware points, as required by the Owners requirements.
- C. The HVAC BMS shall be capable of supporting the following Industry Standard, Open System Communication Methods at a minimum:
 - 1. BACnet Client & Server.
 - 2. LonWorks®.
 - 3. OLE for Process Controls (OPC).
 - 4. Advanced DDE.
 - 5. MODBUS.
 - 6. Database Sharing through ODBC and Microsoft Excel Data Exchange.

2.10 SEQUENCE OF CONTROL

- A. Provide and install electronic/electric DDC components to enable the mechanical system to operate in the following sequences:

1. Radiant Floor Circulator (CP-1): At outside air temperatures above 60°F, CP-1 shall be de-energized. The pump shall operate again under the following conditions: The outside air temperature drops to 50°F. and / or any associated space sensor temperature drops below 68°F. Once the pump starts it shall operate continuously.
2. Fintube Radiation:
 - a. A room sensor shall cycle the 2-way zone valve(s) as required to maintain the setpoint.
3. Radiant Floor Systems:
 - a. The BAS shall control the radiant floor system. Furnish room and slab temperature sensors for each zone and coordinate with Section 15710, "Radiant Heating Units".

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Inspection:
 1. Prior to work of this Section, carefully inspect the installed work of other trades and verify that such work is complete to the point where this installation may properly commence.
 2. Verify that the automatic temperature control system may be installed in strict accordance with pertinent codes and regulations and the reviewed Shop Drawings.

3.2 INSTALLATION

- A. Provide wiring, and conduit to connect the ATC components for an operational ATC system. Wiring and installation shall conform to NFPA 70.
- B. Identification: Label or code each field wire at each end. Permanently label or code each point of field terminal strips to show the instrument or item served. Color-coded cable with annotated cable diagrams may be used to accomplish cable identification.
- C. Temperature Sensors: Stabilize sensors to permit on-the-job installation that will require minimum field adjustment or calibration. Temperature sensor assemblies shall be readily accessible and adaptable to each type of application to allow quick, easy replacement and servicing without special tools or skills. Strap-on sensor mountings, using helical screw stainless steel clamps, shall be permitted on new piping for unit heater or other on-off operation only, after pipe is cleaned to bright metal. Strap-on bulb and pipe shall be insulated after installation. Strap-on sensor mountings are also permitted for hot water piping sizes up to 2 inches. Other liquid temperature sensors shall be provided with wells.

- E. Pipe Sensors: Provide wells for sensors measuring temperatures in pressure vessels or in pipes. Wells shall be noncorrosive to the medium being measured and shall have sufficient physical strength to withstand the working and test pressures and velocities. Locate wells to sense continuous flow conditions. Do not install wells using extension couplings. Where piping diameters are smaller than the length of the wells, provide wells in the piping at elbows to effect proper flow across the entire area of the well. Wells may either look upstream or downstream. Provide thermal transmission material within the well to speed the response of temperature measurement. Provide wells with sealing nuts to contain the thermal transmission material and allow for easy removal. Wells shall not restrict flow area to less than 70 percent of line-size-pipe normal flow area. Increase piping size as required to avoid restriction.

3.3 ADJUSTMENTS

- A. Adjust controls and equipment to maintain the conditions indicated, to perform the functions indicated, and to operate in the sequence specified.

3.4 INSTRUCTING OPERATING PERSONNEL

- A. Upon completion of the work and when designated by the Architect, furnish the services of a competent technician regularly employed by the temperature control manufacturer for the instruction of Owner in the operation and maintenance of each automatic space temperature control system. The period of instruction shall be for not less than five (5) 8-hour non-concurrent working days and shall include video tape demonstration of controllers.

3.5 FIELD INSPECTION AND TESTS

- A. Tests shall be performed or supervised by employees of the ATC system or manufacturer of the ATC system, or by an authorized representative of the ATC manufacturer. Give Architect 14 calendar days advance written notice prior to the date of the field acceptance testing. If the Architect witnesses tests, such tests shall be subject to approval. If the Architect does not witness tests, provide performance certification.
- B. Plan for Inspections and Tests: Furnish a written inspections and tests plan at least 60 days prior to the field acceptance test date. This plan shall be developed by the manufacturer of the ATC system. The plan shall delineate the inspections and testing procedures required for the ATC system to demonstrate compliance with the requirements specified. Additionally, the test plan shall indicate how ATC system is to be tested, what variables will be monitored during test, names of individuals performing tests, and what criteria for acceptance should be used. Indicate how operation of H&V system and ATC system in each seasonal condition will be simulated.
- C. Field Acceptance Testing: Upon completion of 72 hours of continuous H&V and ATC systems operation and before final acceptance of work, test the automatic temperature control systems in service with the heating, ventilating and air conditioning systems to demonstrate compliance with contract requirements. Test controls through each cycle of operation, including simulation of each season insofar as possible. Test safety controls to demonstrate performance of required function. Adjust or repair defective or malfunctioning automatic space temperature control equipment or replace with new equipment. Repeat tests to demonstrate compliance with contract requirements.

END OF SECTION

SECTION 15990

TESTING, ADJUSTING AND BALANCING FOR HVAC

PART 1 - GENERAL

- 1.1 DESCRIPTION: The work covered by this section of the specifications includes the furnishing of labor, materials, equipment, transportation, permits, inspections and incidentals and the performing of operations required for testing and balancing the air and water systems.
- 1.2 GENERAL REQUIREMENTS: The provisions of Section 15000 "Common Work Results for HVAC", apply to this section.
- 1.3 DEFINITIONS
- A. Adjust: To regulate the specified fluid flow rate and air patterns at the terminal equipment, (e.g., reduce fan speed, throttling).
 - B. Balance: To proportion flows within the distribution system (submains, branches and terminals) in accordance with specified design quantities.
 - C. Procedure: Standardize approach and execution of sequence of work operations to yield reproducible results.
 - D. Report Forms: Test data sheets arranged for collection of test data in logical order to submission and review. This data should also form the permanent record which shall be used as the basis for any future testing, adjusting, and balancing required.
 - E. Test: To determine quantitative performance of equipment.
- 1.4 SUBMITTALS: Submit the following:
- A. Standards Compliance:

Testing Agency
Testing Agency Personnel
Professional Engineers
Instrument Calibration
- 1.5 TESTING AND BALANCING AGENCY
- A. Air and Water Systems Testing and Balancing: Upon completion of the installation and field testing, performance test and adjust the supply, return, make-up, and exhaust air systems, and heating water systems to provide the air volume and water flow quantities indicated. Accomplish work in accordance with the agenda and procedures specified and AABC 71679 and standards of the NEBB. Correct air and water system performance deficiencies disclosed by the test before balancing the systems.
 - B. Agency Qualifications: Obtain the services of a qualified testing organization to perform the testing and balancing work as herein specified. Prior to commencing work under this section of the specifications, the testing organization shall have been reviewed by the Architect. The criteria for determining qualifications shall be membership in the AABC, or certification by the NEBB, or the testing organization shall have submitted proof to satisfy the Architect that the organization meets or exceeds the technical standards for membership of the AABC as

published in the AABC 71679. The testing organization shall be independent of both the installing contractors and equipment suppliers for this project.

1.6 AGENDA

- A. Preliminary Report: Review drawings and specifications prior to installation of any of the affected system. Submit a written report to the Architect indicating any deficiencies in the system that would preclude the proper adjusting, balancing, and testing of the systems.

1.7 PROCEDURES, GENERAL

- A. Requirements: Adjust systems and components thereof that perform as required by drawings and specifications.
- B. Test Duration: Operating tests of heating and cooling coils, fans and other equipment shall be of not less than 4 hours duration, after stabilized operating conditions have been established. Capacities shall be based on temperatures and air and water quantities measured during such tests.
- C. Instrumentation: Method of application of instrumentation shall be in accordance with the manufacturer's instructions. Furnish personnel, instruments, and equipment for tests specified herein.
- D. Accuracy of Instruments: Instruments used for measurements shall be accurate. Provide calibration histories for each instrument for examination. Calibrate each test instrument by an reviewed laboratory or by the manufacturer. The Architect has the right to request instrument recalibration, or the use of other instruments and test methodology, where accuracy of readings is questionable.
- E. Accuracy of Thermometers: Plus or minus one graduation at the temperatures to be measured. Graduations shall conform with the following schedule:

Medium	Design Temperature Differential (°F)	Maximum Graduation (°F)
Air	10 or less	1/2
Air	over 10	1
Water	10 or less	1/10
Water	10-20	1/2
Water	over 20	1

- F. Flow Rate Tolerance: Values are based on discussion in ASHRAE "HVAC Applications", Chapter 34. Air filter resistance during tests, artificially imposed if necessary, shall be 80 percent of final values.
1. Air Handling Unit CFM: Minus 0 percent to plus 10 percent.
 2. Other Fans: Minus 0 percent to plus 10 percent.
 3. Air Terminal Units (VAV Boxes): Minus 5 percent to plus 10 percent.
 4. Minimum Outside Air (for manually set dampers): Minus 0 percent to plus 10 percent.
 5. Individual Room Air Outlets and Inlets, and Air Flow Rates Not mentioned Above: Minus 10 percent to plus 10 percent.
 6. Heating System Pumps GPM: Minus 0 percent to plus 10 percent.

7. Other Pumps GPM: Minus 10 percent to plus 10 percent.
8. Air Handling Unit Coils GPM: Minus 5 percent to plus 10 percent.
9. Terminal Unit Coils/Elements GPM: Minus 10 percent to plus 10 percent.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.1 AIR SYSTEM PROCEDURES

- A. Adjustments: Adjust air handling systems to provide the required design air quantity to, or through, each component. Conduct adjusting and balancing of systems during periods of the year approximating maximum seasonal operation.
- B. Balance: Use flow adjusting (volume control) devices to balance air quantities only; i.e., proportion flow between various terminals comprising system, and only to the extent that their adjustments do not create objectionable air motion or sound, i.e., in excess of specified limits.
- C. Balancing Between Runs (submains, branch mains, and branches): Use flow regulating devices at, or in, the divided - flow fitting. Minimize restriction imposed by flow regulating devices in or at terminals.
- D. Final Measurements of Air Quantity: Make final measurements of air quantity, after the air terminal has been adjusted to provide the optimum air patterns of diffusion.
- E. Fan Adjustment: Total air system quantities, generally, shall be varied by adjustment of fan speeds, or axial-flow fan wheel blade pitch. For systems with direct-connected fans (without adjustable pitch blades), damper restrictions of a system's total flow or variable speed rheostats shall be adjusted as appropriate.
- F. Air Measurement:
 1. Pitot Tube: Except as specifically indicated herein, make pitot tube traverses of each duct to measure air flow therein. Pitot tubes, associated instruments, traverses, and techniques shall conform with the ASHRAE Handbook Fundamentals.
 2. Pitot Tube Traverse: Pitot-tube traverse may be omitted if the duct serves only a single room or space and its design volume is less than 2000 cfm. In lieu of Pitot-tube traverse, determine air flow in the duct by totaling volume of individual terminals served, measured as described herein.
 3. Measurements of Air Quantity: Where duct's design velocity and air quantity are both less than 1000 (fpm/cfm), air quantity may be determined by measurements at terminals served.
- G. Air Terminal Balancing: Measurement of flow rates by means of velocity meters applied to individual terminals, with or without cones or other adapters, shall be used only for balancing.

3.2 WATER SYSTEM PROCEDURES

- A. Adjustment: Adjust heating, water systems to provide required quantity to, or through each component.
- B. Metering: Measure water quantities and pressures with calibrated meters.
- C. Water Measurements and Balancing: Use venturi tubes, orifices, or other metering fittings and pressure gages. Adjust systems to provide the design flow rates through the heat transfer equipment prior to the capacity testing. Perform measurement of temperature differential with the air system, adjusted as described herein, in operation.
- D. Automatic Controls: Position automatic control valves for full flow through the heat transfer equipment of the system during tests.
- E. Flow: Flow through by-pass circuits at three-way valves shall be adjusted to balance that through the supply circuit.
- F. Distribution: Adjust distribution by means of balancing devices (cocks, valves, and fittings) and automatic flow control valves. Do not use service valves for adjustment. Where automatic flow control valves are utilized in lieu of venturi tubes, record only the pressure drop across the valve if within the pressure drop rating on the valve tag.
- G. Special Procedures: Where available, pump capacity (as designed) is less than total flow requirements of individual heat transfer units of system served, full flow may be simulated by the temporary restriction of flow to portions of the system.

3.3 CERTIFIED REPORTS

- A. Submittal: Submit three copies of the reports described herein, covering air and water system performance, air motion (fpm), to the Architect prior to final tests and inspection.
- B. Instrument Records: Include types, serial numbers, and dates calibration of instruments.
- C. Reports: Reports shall identify conspicuously items not conforming to contract requirements, or obvious maloperation and deficiencies.
- D. Certification: The reports shall be certified by an independent Registered Professional Engineer who is versed in the field of air and water balancing and who is not affiliated with any firm involved in the design or construction phases of the project.

3.4 AIR SYSTEM DATA

- A. Report: The certified report shall include for each air-handling system the data listed below:
 - 1. Equipment (fan or factory fabricated station unit):
 - a. Installation Data:
 - 1) Manufacturer and Model
 - 2) Size
 - 3) Arrangement, Discharge, and Class
 - 4) Motor H.P., Voltage, Phase, Cycles, and Full Load Amps.
 - 5) Location and Local Identification Data
 - b. Design Data: Data listed in schedules on drawings and specifications.

- c. Fan Recorded (Test) Data
 - 1) C.F.M.
 - 2) Static Pressure
 - 3) R.P.M.
 - 4) Motor Operating Amps.
 - 5) Motor Operating B.H.P.

2. Duct Systems:

- a. Duct Air Quantities (Maximum and Minimum) - Main, Submains, Branches, Outdoor (Outside) Air, Total-Air, and Exhaust
 - 1) Duct size(s)
 - 2) Number of Pitot-tube (Pressure) Measurements
 - 3) Sum of Velocity Measurement, excluding pressure measurements
 - 4) Average Velocity
 - 5) Recorded (Test) C.F.M.
 - 6) Design C.F.M.
- b. Individual Air Terminals:
 - 1) Terminal Identification (Supply or Exhaust, Location and Number Designation)
 - 2) Type Size, Manufacturer, and Catalog Identification
 - 3) Design and Recorded Quantities - C.F.M.
 - 4) Deflector Vane or Diffusion Cone Settings
 - 5) Applicable Factor for Application, Velocity, Area
 - 6) Design and Recorded Velocities - F.P.M. (State "core" "inlet," as applicable)

3.5 WATER SYSTEM DATA

A. Report: Include data listed below:

1. Pumps:

- a. Installation Data:
 - 1) Manufacturer and Model
 - 2) Size
 - 3) Type Drive
 - 4) Motor H.P., Voltage, Phase, and Full Load Amps.
- b. Design Data:
 - 1) G.P.M.
 - 2) Head
 - 3) R.P.M.
 - 4) B.H.P. and Amps.
- c. Recorded Data:
 - 1) Discharge Pressures (Full-Flow and No-Flow)
 - 2) Suction Pressures (Full-Flow and No-Flow)
 - 3) Operating Head

- 4) Operating G.P.M. (from pump curves if metering is not provided)
- 5) No-Load Amps. (where possible)
- 6) Full-Flow Amps
- 7) No-Flow Amps

2. Air Heating and Cooling Equipment:

a. Design Data:

- 1) Load in Btu per hr
- 2) G.P.M.
- 3) Entering and Leaving Water Temperature
- 4) Entering and Leaving Air Conditions (D.B. and W.B.)
- 5) C.F.M.
- 6) Water Pressure Drop

b. Recorded Data:

- 1) Type of Equipment and Identification (location or number designation)
- 2) Entering and Leaving Air Conditions (D.B. and W.B.)
- 3) Entering and Leaving Water Temperatures
- 4) G.P.M. (if metered)
- 5) Temperature Rise or Drop

3.6 FINAL TESTS, REVIEW, AND ACCEPTANCE

- A. Capacity and Performance Tests: Make tests to demonstrate that capacities and general performance of air and water systems comply with contract requirements.
- B. Final Inspection: At the time of final review, recheck, in the presence of the Engineer, random selections of data water and air quantities and air motion recorded in the certified report.
- C. Points and Areas for Recheck: As selected by the Architect.
- D. Measurement and Test Procedures: As reviewed for work forming basis of certified report.
- E. Selections for Recheck (specific plus random): In general, selections for recheck will not exceed 25 percent of the total number tabulated in the report.
- F. Retests: If random tests elicit a measured flow deviation of ten percent or more from, or a sound level of 2 Db or more, greater than that recorded in the certified report listings, at ten percent or more of the rechecked selections, the report shall be automatically rejected. In the event the report is rejected, systems shall be readjusted and tested, new data recorded, new certified reports submitted, and new inspection tests made.
- G. Marking of Settings: Following final acceptance of certified reports by the Architect, the settings of valves, dampers, and other adjustment devices shall be permanently marked, so that adjustment can be restored if disturbed at any time. Do not mark devices until after final review.

* END OF SECTION *

SECTION 16000

BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 SCOPE

- A. The work covered by this section includes the furnishing of labor and materials, equipment, and incidentals and the performing of operations in connection with the "electrical work" as indicated on the drawings and/or specified herein and including incidental items to effect a finished, complete and operable system as indicated. The electrical work shall include but not be limited to:

1. Secondary power distribution.
2. Lighting system - interior.
3. Fire alarm system modifications – relocate remote annunciator and Knox Box.
4. Connections and disconnects as shown for mechanical equipment.
5. Exit and emergency lighting.
6. Relocate pay phone telephone lines.

Work shall be subject to the conditions of the contract and shall be in strict accordance with these drawings and specifications.

- B. Assume responsibility to have thoroughly examined the drawings and specifications including all addenda. Questions over conflicting information shown on the drawings and specifications shall be referred to the Architect for clarification.
- C. The term "Contractor used hereinafter shall designate the Electrical Contractor.

1.2 RELATED DOCUMENTS

- A. The General Conditions, Supplemental General Conditions and Instructions to Bidders shall apply to this work. Read these to become familiar with conditions related to the installation of the work.

1.3 CODES AND STANDARDS

- A. Where referred to, published standard specifications of technical societies, trade associations and governmental agencies codes and regulations of Underwriters and protective organizations, Federal, State and Municipal regulations and codes and publications of a similar nature shall be the edition current as of the date of this Specification.

- B. The applicable requirements of the publications of the following organizations shall apply to the work under this section as if fully written herein:

1. American National Standards Institute, Inc. (ANSI)
2. Institute of Electrical and Electronic Engineers (IEEE)
3. National Electrical Manufacturers Associations (NEMA)
4. National Fire Codes
5. Underwriters Laboratories, Inc. (UL)
6. Federal, State and Municipal Building Codes, and all other Authorities having jurisdiction.
7. National Electrical Code (NEC)
8. Insulated Power Cable Engineers Associated Specification (IPCES)

9. American Society for Testing Materials Specifications (ASTM)
10. National Bureau of Standards Handbook (NBS)
11. Occupational Safety and Health Administration (OSHA)
12. National Electrical Safety Code (NESC)
13. Americans with Disabilities Act (ADA)

1.4 MATERIALS AND EQUIPMENT

- A. Materials shall be of the best quality. Workmanship shall be of highest grade and construction shall be done according to best practices of the trade.
- B. Provide, when required, labeled samples of material or equipment specified herein or proposed to be used in this work.
- C. Where words "furnish", "provide", or "install" are mentioned, either singly or in combination, these words are hereby interpreted to mean "furnish and install" or "provide and install", including materials complete with connections, supplemental devices, accessories and appurtenances, unless specifically noted otherwise. These words are likewise hereby interpreted as being prefixed to materials, equipment, and apparatus hereinafter mentioned, either in abbreviated or scheduled information or in the technical sections of the specifications.

1.5 SHOP DRAWINGS

- A. Submit to the Architect for review, not less than eight (8) sets of Shop Drawings of the materials, fixtures and equipment to be incorporated in the work. Information shall contain specific reference to catalog numbers and shall be qualified in writing as required. No considerations will be given to brochure or catalog information not specifically designated or referenced to the specification by an identifying number.
- B. Shop drawings that are facsimiled, (FAX) produced, or a photocopies of FAX documents will not be considered or reviewed. Only originals and or photocopied originals, complying with paragraph A above will be considered.
- C. Before consideration, electrical submittal packages shall include cover pages for each of the electrical equipment groups, i.e. switchgear, lighting, fire alarm, lighting contactors, devices, wire, conduit, security system, master clock system. The cover page of each group shall be typewritten and contain the following information:
 1. Project location.
 2. Electrical Contractor and phone number.
 3. Product manufacturer and phone number.
 4. Distributor or supplier's company and phone number.
 5. Order date and distributor order number.
 6. Approximate on-site delivery date after submittal review and return.
- D. Shop drawings must bear the Architect's review stamp. In the event that the Architect rejects shop drawings, the shop drawing must be revised and resubmitted for review.
- E. Shop drawings shall be submitted to the Architect no later than 14 days after award of General Contract.

1.6 SUBSTITUTIONS

- A. Reference in the specifications or on the drawings to any product, material, fixture, form or type of construction, by proprietary name, manufacturer, make or catalog number, establishes

a standard of quality or design and is not meant to limit competition. Refer to Specification section 01 60 00 paragraph 2.2. Use any equivalent substitute provided favorable written review by the Architect is first obtained. Any substituted system must show a direct comparison to the system specified and all deviations to the specified system clearly identified. In all cases, the suitability of any substituted item or system shall be determined by the Architect/Engineer. If the substituted item or system is rejected, the item or systems specified shall be furnished.

1.7 CODES, PERMITS, INSPECTIONS

- A. The installation shall comply with laws and regulations applying to the electrical installation in effect at the site with regulations of any other governmental body of agency having jurisdiction, and with regulations of the National Electrical Code (NEC).
- B. Obtain and pay for permits required by the ordinances at the site. After completion of the work, furnish the Owner a certificate of final inspection and approval from the Inspection Bureau having jurisdiction.
- C. Inspections and tests shall be made in accordance with the requirements of Division One. Rejected materials shall be removed from the site and new materials furnished, retested and installed to the satisfaction of the Architect without additional cost to the Owner.
- D. Inspect the site and survey the conditions to be encountered in the performance of the Work prior to starting the work. Failure to be familiar with the conditions shall not relieve or reduce responsibility for full completion of the work in accordance with the provisions of the contract.

1.8 ACCEPTANCE

- A. Before acceptance of the work under this section, damaged or imperfect materials shall be refinished or replaced, debris, scaffolding and tools shall be removed and premises shall be "broom clean" to the satisfaction of the Owner.

1.9 GUARANTEE

- A. Guarantee materials and installations under normal use to be free of defects and poor workmanship for a period of one (1) year from the date of acceptance. Any replacement of parts or adjustments, including labor made necessary by inherent defects, shall be provided by the contractor without cost to the Owner within the guarantee period.

1.10 PROTECTION OF EQUIPMENT AND MATERIALS

- A. Protect equipment and material for the electrical work after delivery, before and after installation. This protection must be extended against pilferage, dampness and damages from any cause until the work is accepted by the Owner.

1.11 ELECTRICAL REFERENCE SYMBOLS

- A. Symbols shown on the Drawings show approximate locations of fixtures, outlet boxes, conduit runs and other equipment, unless otherwise detailed. The exact location shall be governed by structural conditions and obstructions. This is not to be construed as to permit redesigning systems. Outlets shall be connected from circuits as shown on the drawings. Locate and install boxes and equipment where they will be readily accessible.

1.12 MATERIALS AND INSTALLATION

- A. Only the best materials of each class specified shall be used and the installation shall be made in a neat and workmanlike manner, complete in every detail, ready for immediate satisfactory operation by the Owner.

1.13 WORK UNDER OTHER SECTIONS

- A. Painting
- B. Cutting and patching

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Unless otherwise indicated, the materials to be furnished under this specification shall be the standard products of manufacturers regularly engaged in the production of such equipment and shall be the manufacturer's latest standard design that complies with the specification requirements.
- B. Materials shall be delivered to the site in the original sealed containers of packages bearing the manufacturer's name and brand designated. Materials shall be stored in a clean, well-ventilated, warm area. Care shall be exercised in handling materials during delivery, storage and installation. Materials damaged, in the opinion of the Architect, shall be replaced at no additional cost to the Owner.

2.2 EQUIPMENT MOUNTING AND SUPPORTS

- A. Provide supports including supplementary steel, channels, rods and guys required for the proper installation, mounting and support of equipment.
- B. Supports shall be firmly attached and connected to building structural elements and constructed in an acceptable manner. Continuously threaded rods less than 3/8" in diameter, tie wire, or metal straps are not acceptable.
- C. Supports in structural systems shall be installed as an integral part of the structural system. Explosive or cartridge driven type anchors, insert or supports are not acceptable.
- D. Except as otherwise required by the Contract Documents the type and size of supports shall be as determined by the Contractor and shall be of sufficient strength and size to allow only a minimum deflection as required by codes or standards and the support manufacturer's requirements for loading.
- E. Inform all parties as to location, size details and method of attachment of supports and the weight which the support is to carry, so that the installation may be coordinated.
- F. Supports shall be installed in a neat and workmanlike manner, perpendicular or parallel to walls, floor, columns, beams or ceilings.
- G. Attachment to structural steel shall be bolted type.

2.3 GROUNDING

- A. Furnish and install grounding system conforming to IEEE Std. 142-1982 and as required by N.E.C.
- B. Feeder, subfeeders, lighting branch circuits and receptacle circuits shall contain a grounding conductor, minimum No. 12 copper with green insulation.
- C. Grounding terminal on receptacles and switches shall be bonded to outlet box with grounding conductor to establish grounding continuity.
- D. Flexible metal conduit and electric metallic tubing feeder raceways shall include grounding conductor.
- E. Grounding conductors shall be stranded copper wire type THW with green color insulation.
- F. Grounding bushings shall be provided for raceways where required. Other raceways shall be provided with insulating bushings.

2.4 PANELBOARDS

- A. Existing to remain.

2.5 RACEWAYS

- A. Install wiring in hot dipped galvanized or sheradized threaded rigid steel conduit (RSC), electric metallic tubing (EMT), or schedule 40 PVC. Schedule 40 PVC may be used outside only, raceways within the building shall be metal.
- B. Raceways and wiring, except as otherwise noted, shall be installed concealed in hung or furred ceilings, concrete slabs, masonry walls and partitions. Raceways may be exposed in unfinished areas such as electric and boiler rooms. Raceways exposed in finished areas shall be surface metal raceways (Wiremold).
- C. Electric metallic tubing shall not be installed in concrete on grade, in concrete in contact with earth or underground.
- D. Connections to portable equipment junction boxes and conduit termination to motors shall be made with liquid-tight flexible metal conduit. Flexible connections shall be maximum of 18" long with grounding conductor.
- E. Magnetic conduit used with power wiring shall be bonded to provide an effective ground. In addition to this, equipment grounding conductors shall also be installed in raceways.
- F. Buried steel conduit shall have two coats of bituminuous protection. EMT is acceptable where permitted by the NEC. Raceway sizes shall be as shown on the drawings.
- G. Run flexible metallic conduit to equipment with motors or equipment requiring alignment or movement and to sound generating equipment. Use liquidtight flexible metallic conduit in areas such as outdoor equipment or where subject to moisture.
- H. Install PVC expansion joints in PVC conduit runs per manufacturer's recommendations.

2.6 CONDUCTORS - WIRE AND CABLE

- A. Secondary power conductors installed in raceway shall be insulated type THWN, 600 volt. Conductors with higher insulation temperature rating shall be provided as required. Cables shall be type "MC" where permitted by the N.E.C.
- B. Conductor and conduit sizes shown on the Drawings are based on copper conductors with THWN insulation, unless otherwise noted.
- C. Joints and splices shall be made in manner equivalent electrically and mechanically to the conductor itself. Connections shall be of the compression type.
- D. Equipment requiring electric service is shown on the Drawings. Where receptacles or convenience outlets are specified to service named equipment, furnish, install and connect approved flexible cable and cap to equipment.
- E. Drawings, in general, indicate required number of conductors in each raceway, however, unless it is specifically noted that raceways are empty by the word "empty" provide required conductors, power, control, supervisory, computer, alarm or branch circuits. Make final connections, flexible or fixed as required to equipment shown requiring final electrical connections.
- F. Conductors shall be color coded as follows:

	120/208 Volts - 3 phase, 4 wire
Phase A	Black
Phase B	Red
Phase C	Blue
Neutral	White
Grounding	Green

- G. Colors, except colors for conductors No. 4 and larger, shall be factory applied the entire length of the conductors by solid color compound, solid color coating or colored striping or bands, 2 sets 180 degree apart. On-site coloring shall not be done, except color coding by means of paint or tapes is acceptable only for conductors No. 4 and larger.
- H. Voltage rating, manufacturers, type and conductor, AWG size indication shall be continuous, factory applied the entire length for each conductor.
- I. Terminals shall be arranged Phase A, Phase B, Phase C from left to right, top to bottom and front to back.
- J. Wires, conductors and cables shall be single conductor, except as otherwise specified or indicated on the Drawings. Wire No. 8 AWG and larger shall be stranded. Wires smaller than No. 8 AWG shall be solid.

2.7 WIRING DEVICES

- A. Switches, receptacles and other utilization devices shall be specification grade. Switches and receptacles shall have a minimum rating of 20 amperes. Color shall be Grey.
- B. Receptacles and switches shall have a grounding pole and grounding terminal, which shall be connected to the outlet box with grounding conductor to establish grounding continuity. Green grounding screw must be used for grounding.

- C. Verify mounting height of devices prior to roughing.
- D. Wiring devices flush mounted in exterior walls shall be furnished with draft stops.

2.8 WIRING DEVICE PLATES

- A. Provide stainless steel device plates for devices, switches, receptacles, and miscellaneous outlets.
- B. All plates shall be stainless steel.

2.9 PULL BOXES AND JUNCTION BOXES

- A. Pull boxes and junction boxes shall be of code gauge galvanized steel with screw covers to match, shall be as required and shall be as shown on the Contract Drawings.
- B. Conductors passing through pull boxes shall be identified to indicate their origin and termination.
- C. Pull and junction boxes and covers shall be for indoor use, except provide other types as required because of location.
- D. Covers shall not be installed until installation has been observed. Provide nameplate on cover: example: Feeder-Panel LP1.

2.10 NAMEPLATES

- A. Provide nameplates for panelboards, pull boxes, junction boxes, and motor disconnect switches designating equipment controlled. Empty raceways shall be labeled.
- B. Nameplates shall be laminated plastic with engraved white letters. Letters shall be 1/4 inches high. Nameplates shall have identifying color background for each system.
- C. Nameplates shall be secured by means of phillips head screws or rivets, adhesive shall not be used. Other types of nameplate identification shall not be acceptable.

2.11 OUTLETS

- A. Outlets shall be centered in panels and spaces provided therefore, if any discrepancy is found to exist between outlets as shown on Electrical Drawings and Architectural Drawings notify Architect to have location verified prior to installation.
- B. Where outlets of any system occur provide suitable boxes and conduit so that they may be built in as the work progresses. Box offsets shall be made at outlets to provide proper adjustment to structural finish.
- C. Verify power wiring with equipment wiring diagrams before wiring equipment. Disconnects for motors shall be lockable if beyond 50 feet of motor or out of sight of the motor. Disconnects and starters shall have nameplates indicating the loads they control. Flush mounted exhaust fan switches in finished areas shall have plates with nameplates and pilot lights.
- D. Install nameplates on disconnects furnished with equipment.
- E. Wire special equipment per manufacturer's wiring instruction and furnish disconnect switch as shown.

2.12 LIGHTING FIXTURES AND LAMPS

- A. Fixtures shall be the manufacturers specified in the Lighting Fixture Schedule.
- B. Energy Saving Ballasts for fluorescent fixtures shall be Class P: electronic - with less than 10% total harmonic distortion; high power factor; shall incorporate UL listed automatic resetting protection: shall be classified for quiet operation, "A" sound rating: shall be designed for a nominal 120 volt system as shown. Interchangeability of lamps and ballasts must be provided. Ballasts shall be designed, manufactured, and tested to meet the latest UL and ANSI standards and this requirement shall be certified by an independent testing organization. In addition to internal integral protection each ballast shall have separate exterior fuse protection. Fixtures shall contain fuse and fuse holder, sized as recommended by manufacturer, mounted in ballasts compartment. Fuse shall provide rapid interruption of short circuits or ground fault current within fixture or ballasts. Fuse protection shall be provided for each type of ballast.
- C. Energy saving lamps of wattage, type and color indicated shall be furnished and installed in necessary quantity to completely lamp every fixture. Incandescent lamps installed in permanent lighting fixtures and used for lighting during construction shall be replaced on or just after the date of substantial completion.
- D. Fixtures shall be complete with all accessories such as close nipples, extension couplings, connecting straps, screws, locknuts, hickies, plaster rings, to provide complete fixture installation for use with any type of standard outlet or switch box. Special fittings required to support fixtures shall be supplied as well as wood, or metal supports or grounds to support surface of pendant mounted fixtures on suspended ceilings.

2.13 FIRE ALARM SYSTEM

- A. The fire alarm system is existing Simplex addressable system consisting of the fire alarm control panel, voice evacuation panel, pull stations, horns and strobes, strobes only per ADA, and smoke detectors. Furnish and install wire, cables, conduit and conduit fittings, wiring and wiring devices, junction boxes and outlet boxes, fire alarm boxes, fire detectors and control equipment and accessories indicated or specified herein for a complete fire detection installation. The system shall be low voltage as manufactured by Simplex Company.

PART 3 - EXECUTION

3.1 LICENSE

- A. Electrical work shall be installed by persons duly licensed by the Electricians Board of the State of Maine.

3.2 COORDINATION

- A. It shall be the responsibility of this contractor to coordinate his work with other trades, the Fire Department to insure that his work is terminated in a satisfactory manner. Also, coordinate with Progressive Computer Inc. to ensure a proper computer/data system installation.

3.3 WORKMANSHIP AND PREPARATION

- A. Work shall be executed in workmanlike manner by experienced electricians in accordance with the most modern engineering practice and shall present a neat appearance when completed. The work shall be carefully laid out in advance and where cutting, channeling,

chasing, or drilling of floors, walls, partitions, and ceiling or other surfaces is necessary for the proper installation, support or anchorage of the conduit, raceways or other electrical work, this work shall be carefully done and any damage to the building, piping or equipment shall be repaired by skilled mechanics of the trades involved and at no additional cost to the Owner.

- B. After installation, electrical equipment shall be protected to prevent damage during the construction period. Openings in conduits and boxes shall be closed to prevent entrance of foreign materials. The interior of boxes and cabinets shall be left clean, exposed surfaces shall be cleaned and plated surfaces polished.

3.4 OBTAINING INFORMATION

- A. Obtain information from the manufacturers of the apparatus which is to be provided for the proper methods of installation. Also obtain information from the General Contractor and other Sub-Contractor which may be necessary to facilitate work and the completion of the whole project.

3.5 GIVING INFORMATION

- A. The Contractor shall keep himself fully informed as to the shape, size and position of openings and foundations required for his apparatus and shall give full information to the General Contractor sufficiently in advance of the work so that such openings and foundation may be built in advance. Also furnish supports herein specified so the General Contractor may build same in place. In the case of a failure on the part of the Contractor to give proper information as noted above, he shall assume the cost of having the work done.

3.6 RACEWAYS

- A. Raceways shall be supported and secured at intervals of not more than 10 ft. with minimum of two supports shall be provided if required. Tie wire or perforated metal straps shall not be used to support or secure raceways or other equipment. Electric metallic tubing shall be supported within 18" of each coupling or connector. In finished areas, furnish and install escutcheons for exposed conduit passing through or entering finished floors or walls.
- B. Expansion coupling shall be provided in each raceway crossing building expansion joint and when length of raceway requires expansion coupling, expansion coupling shall have a total minimum expansion of 4" and shall have a flexible bonding conductor. Setting of expansion coupling shall be a function of the temperature at the time of installation. Flexible couplings shall be provided where required.
- C. Raceways shall have runs installed parallel or perpendicular to walls, structural members or intersections of vertical planes and ceilings. Field-made bends and offsets shall be avoided where possible, but where necessary, shall be made within an approved hickey or conduit bending machine. Crushed or deformed raceways shall not be installed. Trapped raceways shall be avoided. Care shall be taken to prevent the lodging of plaster, dirt or trash in raceway boxes, fittings and equipment during the construction. Clogged raceways shall be entirely free of obstructions or shall be replaced. Wooden plugs inserted in concrete or masonry are not acceptable as a base for raceway fastenings nor shall raceways or pipe straps be welded to steel structures. Raceways shall be secured by pipe straps or shall be supported by wall brackets, strap hangers or ceiling trapeze fastened by wood screws on wood, toggle bolts on hollow units, expansion bolts on concrete or brick and machine screws or welded studs on steel work.

3.7 OUTLETS

- A. Each outlet in the wiring or raceway systems shall be provided with an outlet box to suit the conditions encountered. Each box shall have sufficient volume to accommodate the number of conductors entering the box in accordance with the requirements of the National Electrical Code. Boxes shall not be less than 1-1/2" deep unless shallower boxes are required by structural conditions and are specifically approved.
- B. Ceiling and bracket outlet boxes shall be not less than 4" except that smaller boxes may be used where required by the particular fixture to be installed. Boxes shall be installed in a rigid and satisfactory manner and shall be fastened directly with wood screws on wood, bolts and expansion shield on concrete or brick, toggle bolts on hollow masonry units and machine screws or welded threaded studs on steel work. Threaded studs driven in by a powder charge and provided with lock washers and nuts are acceptable in lieu of wood screw, expansion shields or machine screws if permitted by local authorities.

3.8 FIXTURES

- A. Incandescent and fluorescent fixtures shall be supported by building structural elements independent of furred or suspended ceilings.
- B. Recessed fluorescent fixtures shall be supported by rod or bowchain, minimum of two (2) supports per 4' of fixture.
- C. The minimum number of supports for surface mounted fluorescent or suspended fluorescent fixtures shall equal on for each 4' of length plus one additional support: 4' two (2) supports: 8' three (3) supports: 12' four (4) supports. Additional supports shall be provided if required. Attachment to structural steel shall be bolted type, anchors and inserts shall be installed as an integral part of structural system. Explosive or cartridge driven type insert, anchors or supports are not acceptable.
- D. Subsequent to review of shop drawings and prior to ordering fixtures, verify voltage at each fixture, also consult with others to determine the type of ceiling and ceiling suspension system in each and every room and order fixtures to suit and fit the particular ceiling and ceiling suspension system. Any extra costs because of failure on the part of this Contractor to verify voltage or ceiling requirements shall be paid for by this Contractor.

3.9 WIRING DEVICES

- A. Switches and convenience outlets shall have a rating as indicated on the drawings. Outlets connected to exposed conduits shall be installed in a surface mounted, conduit device box, 4-1/2" long by 2-1/8" wide and with a suitable cover for the device to be installed (box shall be galvanized). Plates on finished walls and on boxes connected to concealed cable and conduits shall be as noted in the specifications.

3.10 INTENT OF DRAWINGS

- A. The drawings do not show in detail every conduit, junction box, or fitting, but material necessary to complete the electrical system in accordance with the best practices of the trade and to the complete satisfaction of the Architect, shall be furnished without additional compensation under this section of the specifications. No deviation from the layout shall be made without written approval from the Architect.

3.11 RECORD DRAWINGS

- A. During the progress of the work, keep a set of drawings marked up to record deviations and changes from the Contract Drawings due to field conditions, change orders, amendments, revisions, addenda and other reasons to represent an accurate record of work as actually installed. Include an accurate layout of in-slab, under-slab, and buried conduits.
- B. Deviations from the Contract Documents shall be favorably reviewed by the Architect before installation.
- C. At the completion of the work, furnish to the Architect a complete set of prints of the original Contract Drawings on polyester film, corrected in a neat manner to reflect the above changes and representing an accurate record of work as actually installed.
- D. The record drawings shall be submitted to the Architect for review and corrected as deemed necessary.
- E. After favorable review, the record drawings shall become the property of the Owner.

3.12 INSTRUCTIONS, OPERATION AND MAINTENANCE DATA

- A. At the completion of the work, deliver one (1) set of operating and maintenance instructions of equipment and systems to the Owner. Submit name and address of nearest available source of repair service and replacement equipment and parts to the Owner and Architect. Explain and demonstrate the operation of the fire alarm system, the security system and the sound system (if Alternate 6C is taken) to the Owner's representative. The manufacturer's field technician shall be present at this demonstration.
- B. Arrange data in complete sets, properly indexed and marked.
- C. Data shall include a complete set of shop drawings.
- D. Material shall first be submitted in preliminary form for review by the Architect. After review, submit two (2) copies in bound volumes to the Architect for distribution.

* END OF SECTION *