# Manchester - Boston Regional Airport City of Manchester, NH, Department of Aviation

# AIRPORT TERMINAL BUILDING IMPROVEMENTS

# AWIP : BHS-TC4/TC2 : A-WING OFFICES

# MHT / CITY BID # FY24-805-45

**Request for Bids** 



# **CONSTRUCTION PROJECT MANUAL**

# MAY 2024

**ISSUED FOR BIDDING** 

PREPARED BY:



AECOM TECHNICAL SERVICES, INC. 1155 ELM STREET, SUITE 401 MANCHESTER, NH 03101

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# PUBLIC NOTICE - ADVERTISEMENT FOR BIDS CITY OF MANCHESTER, NH , DEPARTMENT OF AVIATION

NOTICE IS HEREBY GIVEN that sealed bids are sought and requested for performance of a contract, according to specifications, by the City of Manchester, Department of Aviation, Manchester - Boston Regional Airport (AIRPORT) for the following:

## MANCHESTER - BOSTON REGIONAL AIRPORT AIRPORT TERMINAL BUILDING IMPROVEMENTS AWIP : BHS-TC2/TC4 : A-Wing Offices MHT / City Bid # FY24-805-45

This project consists of architectural/structural, mechanical, electrical, fire alarm & sprinkler system modifications in five work areas within the existing airport terminal building at Manchester-Boston Regional Airport, in Manchester, NH. The approximate value of the project is estimated to be between \$800,000 to \$1,300,000.

Bids will be accepted only from General Contractors that are pre-qualified with the Department of Aviation. Refer to the Construction Contracts information available at the Manchester-Boston Regional https://www.flymanchester.com/doing-business-with-Airport website at mht/procurement-services/ for the pre-qualification requirements. Contractors who have submitted prequalification statements for the Miscellaneous Building Improvements as solicited in January 2024 will be considered pre-qualified for this project. Additionally, other prospective bidders for this project may submit a pre-qualification application package in accordance with the instructions provided at the website above. **Pre-qualification packages** will be accepted for review anytime until 2:00 pm on June 12, 2024, and the applicant will be notified of prequalification status within one business day following receipt of the pre-qualification package. Prequalification packages will be accepted in hardcopy or in electronic PDF format submitted via email to cadams@flymanchester.com.

**<u>Bid Documents will be available</u>** to be viewed and downloaded at 5:00 pm on <u>May 24, 2024</u>, at no cost, in Portable Document Format (.PDF) at the Manchester-Boston Regional Airport website at <u>https://www.flymanchester.com/doing-business-with-mht/procurement-opportunities/</u>.

A <u>Mandatory Pre-Bid Meeting and Site Tour</u> will be held in-person at the Airport administrative offices boardroom located on the third floor of the Airport terminal at One Airport Road, Manchester, NH on <u>June 3, 2024 at 1:30 pm</u>. Prospective Bidders shall RSVP not less 24 hours prior to the meeting to Ms. Christina Adams at the Airport Administration Office who can be reached at (603) 624-6539 or by email at cadams@flymanchester.com.

**<u>Bids will be received until</u>** and publicly opened and read aloud on <u>June 14, 2024 at 2:00 pm</u> at the Airport Administration Office on the third floor of the Airport Terminal located at One Airport Road, Manchester, NH. The contract will be awarded to lowest responsive and responsible Bidder.

Each Bidder must deposit with his/her Bid, security in the amount of 5% of the total Base Bid. A 100% performance and payment bond will be required with the execution of the contract. The Bidder shall refer to all Federal, State, and Local bidding and contract requirements within the Documents.

The AIRPORT reserves the right to waive any informality in the bidding or to reject any or all bids.

<u>All Bid-related inquiries shall be submitted in writing at any time until 2:00 pm (eastern time)</u> on June 6, 2024, to John G. Goudreault, P.E., Associate Vice President at AECOM, via email to John.Goudreault@aecom.com. Inquiries received after the deadline will not be accepted.

# **Title VI Solicitation Notice:**

Manchester-Boston Regional Airport, in accordance with the provisions of Title VI of the Civil Rights Act of 1964 (78 Stat. 252, 42 USC §§ 2000d to 2000d-4) and the Regulations, hereby notifies all bidders or offerors that it will affirmatively ensure that for any contract entered into pursuant to this advertisement, businesses or disadvantaged business enterprises will be afforded full and fair opportunity to submit bids in response to this invitation and no businesses will be discriminated against on the grounds of race, color, national origin (including limited English proficiency), creed, sex (including sexual orientation and gender identity),or age in consideration for an award.

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# SECTION 00 21 13 - INSTRUCTIONS TO BIDDERS

### 1.01 RECEIPT AND OPENING BIDS

The City of Manchester, Department of Aviation, Manchester, New Hampshire (herein called the Owner or Airport), invites Bids on the form attached hereto, all blanks of which must be appropriately filled in. Bids will be received by the Manchester-Boston Regional Airport Administration Offices on the third floor of the Airport Terminal located at One Airport Road, Suite 300, Manchester, NH 03103 until <u>2:00 p.m. on June 14</u>, <u>2024</u>, and then at said office publicly opened and read aloud.

Bids will be accepted only from General Contractors <u>that are pre-qualified</u> with the Department of Aviation. Refer to Section 1.20 BIDDER'S QUALIFICATIONS below for additional information.

The envelopes containing the Bid must be sealed, addressed to the Airport and designated as:

# Bid for: AIRPORT TERMINAL BUILDING IMPROVEMENTS AWIP : BHS-TC4/TC2 : A-Wing Offices FY24-805-45

The Owner may consider irregular any Bid not prepared and submitted in accordance with the provisions hereof and may waive any informalities or reject any and all Bids. Any Bid may be withdrawn prior to the above scheduled time for the opening of bids or authorized postponement thereof. Any Bid received after the time and date specified shall not be considered. No Bidder may withdraw a bid within 90 days after the actual date of the opening thereof.

#### 1.02 DESCRIPTION OF WORK

In general, this project consists of architectural/structural, mechanical, electrical, fire alarm & sprinkler system modifications, and other miscellaneous work in five work areas within the existing airport terminal building and shall include but is not limited to: removal of portions of partitions, construction of new partitions, doors, ceilings, finishes, modification of existing concourse light trays, and related sprinkler, mechanical and electrical work.

All areas of the airport disturbed by the Contractor's operations not within the construction limits as set forth by the Owner shall be restored at least equal to original condition at no cost to the Owner.

Some of the Work occurs in secure areas of the airport and will require security badge applications and training of Contractor personnel as appropriate.

Attention shall be directed to the Contract Documents for specific information of the Work to be performed.

#### 1.03 ISSUANCE OF PROPOSAL (BID) FORMS

Bidders shall utilize proposal forms contained herein. All papers bound with or attached to the proposal forms are necessary parts and must not be detached.

The plans, specifications, and other documents designated in the proposal form shall be considered a part of the proposal whether attached or not.

The Owner reserves the right to refuse to issue a proposal form to a prospective Bidder should such Bidder be in default for any of the following reasons:

a. Failure to comply with any pre-qualification regulations of the Owner, if such regulations are cited, or otherwise included, in the proposal as a requirement of bidding.

- b. Failure to pay, or satisfactorily settle, all bills due for labor and materials on former contracts in force (with the Owner) at the time the Owner issues the proposal to a prospective Bidder.
- c. Contractor default under previous contracts with the Owner.
- d. Unsatisfactory work on previous contracts with the Owner.

# 1.04 EXAMINATION OF PLANS, SPECIFICATIONS AND SITE

The Bidder is expected to carefully examine the site of the proposed work, the proposal, plans, specifications, and contract forms. Prior to submission of a Bid, the Bidder shall be fully satisfied as to the character, quality, and quantities of work to be performed, materials to be furnished, and as to the requirements of the proposed contract. The submission of a proposal shall be prima facie evidence that the Bidder has made such examination and is satisfied as to the conditions to be encountered in performing the work and as to the requirements of the proposed contract plans, and specifications.

#### 1.05 PREPARATION OF PROPOSAL

The Bidder shall submit his/her proposal on the forms contained herein. All blank spaces in the proposal forms must be correctly filled in where indicated for each and every item. The Bidder shall state the price (written in ink or typed) both in words and numerals for which he/she proposes to do the work. In case of conflict between words and numerals, the words, unless obviously incorrect, shall govern.

The Bidder shall sign his/her proposal correctly and in ink. If the proposal is made by an individual, his/her name and post office address must be shown. If made by a partnership, the name and address of each member of the partnership must be shown. If made by a corporation, the person signing the proposal shall give the name of the state under the laws of which the corporation was chartered and the name, titles, and business address of the president, secretary, and the treasurer. Anyone signing a proposal as an agent shall file evidence of his/her authority to do so and that the signature is binding upon the firm or corporation.

The following forms must be submitted by a Bidder as part of the proposal:

- a. Proposal (Bid) Documents
- b. Bid Security Forms

#### 1.06 IRREGULAR PROPOSALS (BID)

Proposals shall be considered irregular for the following reasons:

- a. If the proposal is on a form other than that furnished by the Owner, or if the Owner's form is altered or if any part of the proposal form is detached.
- b. If there are unauthorized additions, conditional or alternate pay items, or irregularities of any kind which make the proposal incomplete, indefinite, or otherwise ambiguous.
- c. If the proposal is not accompanied by the proposal guaranty specified by the Owner.

The Owner reserves the right to reject any irregular proposal for any reason and the right to waive technicalities, if such waiver is in the best interest of the Owner and conforms to local laws and ordinances pertaining to the letting of construction contracts.

# 1.07 PROPOSAL GUARANTY BID SECURITY

Each Bid must be accompanied by a certified check of the Bidder, or a bid bond prepared on the form of bid bond included in the Contract Documents, duly executed by the Bidder as principal and having as Surety thereon a surety company approved by the Owner, in the amount of 5% of the Bid. Such check, or collateral, shall be made payable to the Owner. The Bid bond shall be executed or countersigned for the Surety by a person who has current power of attorney for the Surety.

The Bid security will be returned to all except the three lowest Bidders within three days after the opening of the bids, and the remaining cash, checks, or bid bonds will be returned promptly after the Owner and the accepted Bidder have executed the Contract, or, if no award has been made within 100 days after the date of the opening of Bids, upon demand of the Bidder at any time thereafter, so long as he/she has not been notified of the acceptance of his/her Bid.

#### 1.08 DELIVERY OF PROPOSAL

Each proposal submitted shall be placed in a sealed envelope plainly marked with the project name, location of airport, and name and business address of the Bidder on the outside. When sent by mail, preferably registered, the sealed proposal, marked as indicated above, should be enclosed in an additional envelope. No proposal will be considered unless received at the place specified in the advertisement before the time specified for opening all Bids. Proposals received after the bid opening time will be returned to the Bidder unopened.

# 1.09 WITHDRAWAL OR REVISION OF PROPOSALS

A Bidder may withdraw or revise (by withdrawal of one proposal and submission of another) a proposal provided that the Bidder's request for withdrawal is received by the Owner in writing before the time specified for opening Bids. Revised proposals must be received at the place specified in the advertisement before the time specified for opening all Bids. All requirements applicable to the original proposal apply to any revised proposals.

# 1.10 PUBLIC OPENING OF PROPOSALS

Proposals shall be opened and read publicly at the time and place specified in the advertisement. Bidders, their authorized agents, and other interested persons are invited to attend. Proposals that have been withdrawn (by written request) or received after the time specified for opening Bids will be returned to the Bidder unopened.

#### 1.11 CONSIDERATION OF PROPOSALS

After the proposals are publicly opened and read, they will be compared on the basis of the summation of the products obtained by multiplying the estimated quantities shown in the proposal by the unit Bid prices. If a Bidder's proposal contains a discrepancy between unit bid prices written in words and unit Bid prices written in numbers, the unit price written in words shall govern.

Until the award of a contract is made, the Owner reserves the right to reject a Bidder's proposal for any of the following reasons:

- a. If the proposal is irregular as specified in Section 00 21 13, Subsection 6 titled, Irregular Proposals.
- b. If the Bidder is disqualified for any of the reasons specified in Section 00 21 13 subsection 12 titled, Disqualification of Bidders.

c. All Bids may be rejected if the lowest responsive bid received exceeds the Owner's budget estimate.

In addition, until the award of a contract is made, the Owner reserves the right to reject any or all proposals, waive technicalities, if such waiver is in the best interest of the Owner and is in conformance with applicable State and Local laws or regulations pertaining to the letting of construction contracts; advertise for new proposals; or proceed with the work otherwise. All such actions shall promote the Owner's best interests.

#### 1.12 DISQUALIFICATION OF BIDDERS

A Bidder shall be considered disqualified for any of the following reasons:

- a. Submitting more than one proposal from the same partnership, firm, or corporation under the same or different name.
- b. Evidence of collusion among Bidders. Bidders participating in such collusion shall be disqualified as Bidders for any future work of the Owner until such participating Bidder has been reinstated by the Owner as a pre-qualified Bidder.
- c. If the Bidder is considered to be in "default" for any reason specified in Section 00 21 13, subsection 3 titled, Issuance of Proposal Forms.
- d. Lack of competency as revealed by the financial statement, experience, or plant and equipment statements submitted.
- e. Lack of responsibility as shown by past work judged from the standpoint of workmanship and progress.
- f. Uncompleted work which, in the judgment of the Owner, might hinder or prevent the prompt completion of additional work if awarded.
- g. If the proposal is considered irregular in accordance with Section 00 21 13, subsection 6 titled, Irregular Proposals.
- h. Surety fails necessary solvency test or is shown not to have sufficient financial resources to sustain bonds.

#### 1.13 AWARD OF CONTRACT

The Award of Contract, if it is to be awarded, shall be made within 90 calendar days of the date specified for publicly opening proposals, unless otherwise specified herein.

Award of Contract shall be made by the Owner to the lowest, qualified Bidder whose proposal conforms to the cited requirements of the Owner.

#### 1.14 CANCELLATION OF AWARD

The Owner reserves the right to cancel the award without liability to the Bidder, except return of proposal guaranty, at any time before a contract has been fully executed by all parties and is approved by the Owner in accordance with Section 00 21 13 subsection 18 titled, Approval of Contract.

## 1.15 RETURN OF PROPOSAL GUARANTY

All proposal guaranties, except those of the three lowest Bidders, will be returned immediately after the Owner has made a comparison of bids as hereinbefore specified in Section 00 21 13, subsection 11 titled Consideration of Proposals. Proposal guaranties of the three lowest Bidders will be retained by the Owner until such time as an award is made, at which time, the unsuccessful Bidders' proposal guaranties will be returned. The successful Bidder's proposal guaranty will be returned as soon as the Owner receives the contract bonds as specified in Section 00 21 13, subsection 1.16 titled, Requirements of Contract Bonds.

## 1.16 REQUIREMENTS OF CONTRACT BONDS

At the time of the execution of the Contract, the successful Bidder shall furnish the Owner a Surety bond or bonds which have been fully executed by the Bidder and the Surety guaranteeing the performance of the work and the payment of all legal debts that may be incurred by reason of the Contractor's performance of the work. The Surety and the form of the bond or bonds shall be acceptable to the Owner. Unless otherwise specified in this subsection, the Surety bond or bonds shall be in a sum equal to the full amount of the Contract.

#### 1.17 EXECUTION OF CONTRACT

The successful Bidder shall sign (execute) the necessary Agreement Documents for entering into the Contract as included in the Project Manual and return such signed documents to the Owner, along with the fully executed Surety bond or bonds specified in Section 00 21 13, subsection 1.16 titled, Requirements of Contract Bonds, within 7 calendar days from the date of the Bidder's receipt of the Owner's Notice of Intent to Award Contract as delivered to the successful Bidder, unless otherwise specified herein or as directed by the Notice of Intent to Award Contract. If the Contract is mailed, registered mail is recommended.

#### 1.18 APPROVAL OF CONTRACT

Upon receipt of the Contract and contract bond or bonds that have been executed by the successful Bidder, the Owner shall complete the execution of the contract in accordance with local laws or ordinances and return the fully executed contract to the Contractor. Delivery of the fully executed contract to the Contractor shall constitute the Owner's approval to be bound by the successful Bidder's proposal and the terms of the Contract.

#### 1.19 FAILURE TO EXECUTE CONTRACT

Failure of the successful Bidder to execute the Contract and furnish an acceptable Surety bond or bonds within period specified in Section 00 21 13, subsection 1.17 titled, Execution of Contract, shall be just cause for cancellation of the award and forfeiture of the proposal guaranty, not as a penalty, but as liquidation of damages to the Owner.

#### 1.20 BIDDER'S QUALIFICATIONS

All Bidders for projects with an estimated cost in excess of \$250,000 must be pre-qualified.

Refer to the Construction Contracts information available at the Manchester-Boston Regional Airport website at <u>https://www.flymanchester.com/doing-business-with-mht/procurement-services/</u> for the pre-qualification requirements. **Contractors who have submitted prequalification statements for the Miscellaneous Building Improvements as solicited in January 2024 will be considered pre-qualified for this project.** Additionally, other prospective bidders for this project may submit a pre-qualification application package in accordance with the instructions provided at the website above. **Pre-qualification packages** will be accepted for review anytime until **2:00 pm on June 12, 2024,** and the applicant will be notified of pre-qualification status (by email to the contact email address provided for such with the qualification submittal) within one business day following receipt of the pre-qualification packages. **Pre-qualification packages will be accepted in hardcopy or in electronic PDF format submitted via email** to <u>cadams@flymanchester.com</u>.

For Bids on projects with an estimated cost less than \$250,000, each Bidder not previously pre-qualified shall furnish the owner satisfactory evidence of his/her competency to perform the proposed work. Such evidence of competency, unless otherwise specified, shall consist of statements covering the Bidder's past experience on similar work, a list of equipment that would be available for the work, and a list of key personnel that would be available. In addition, each Bidder shall furnish the owner satisfactory evidence of his/her financial responsibility. Such evidence of financial responsibility, unless otherwise specified, shall consist of a confidential statement or report of the bidder's financial resources and liabilities as of the last calendar year or the Contractor's last fiscal year. Such statements or reports shall be certified by a public accountant. At the time of submitting such financial statements or reports, the Bidder shall further certify whether his/her financial responsibility is approximately the same as stated or reported by the public accountant. If the bidder's financial responsibility has changed, the Bidder shall qualify the public accountant's statement or report to reflect his/her (Bidder's) true financial condition at the time such qualified statement or report is submitted to the Owner.

Unless otherwise specified, a Bidder may submit evidence that he is pre-qualified with the State Highway Division and is on the current "bidder's list" of the state in which the proposed work is located. Such evidence of State Highway Division pre-qualification may be submitted as evidence of financial responsibility in lieu of the certified statements or reports hereinbefore specified.

Each Bidder shall submit "evidence of competency" and "evidence of financial responsibility" to the Owner at the time of Bid opening.

# 1.21 BID MODIFICATION

Any Bidder may modify his/her Bid by written communication at any time prior to the schedule closing time for receipt of Bids, providing such written communication is received by the Owner prior to the Bid closing time. The written communication should not reveal the bid price but should provide the addition or subtraction or any other modification so that the final prices or terms will not be known by the Owner until the sealed Bid is opened.

#### 1.22 SUBCONTRACTOR LIST

Each Bidder shall provide the following information for each Subcontractor who will perform any portions of the work in excess of one percent (1%) of the Bidder's total bid amount, at the request of the Owner:

- a. Name and address of Subcontractor,
- b. Brief description of work to be performed under subcontract,
- c. Price under subcontract,
- d. Subcontractor's license number (electricians and plumbers).

#### 1.23 SUBCONTRACTOR APPROVAL

The Bidder is specifically advised that any person, firm, or other party to whom it is proposed to award a subcontract under this contract must be acceptable to the Owner, and the owner reserves the right to reject the use of any subcontractor that it deems unsatisfactory.

#### 1.24 TIME OF COMPLETION

The Bidder must agree to commence Work before the date to be specified in the written Notice To Proceed of the Owner and to fully complete the project as specified in the Contract.

It is anticipated that the <u>Work will commence on or before 9 July 2024 and shall be completed by 15</u> <u>November 2024 with interim required milestone completion dates for each Work AREA as specified in the</u> <u>Summary of Work Section 01 01 00</u>.

# 1.25 SECURITY FOR FAITHFUL PERFORMANCE

Simultaneously with his/her delivery of the executed Contract, the successful bidder shall furnish Surety bonds as security for faithful performance of this Contract and for the payment of all persons performing labor on the project under this Contract and furnishing materials in connection with this Contract, as specified in the General Provisions included herein. The bonds shall be of the form provided hereinafter and shall be executed by Surety acceptable to the Owner. The bonds shall be executed by or countersigned by an agent for Surety and said agent to have current power of attorney for the Surety. Each bond shall be in the amount of 100% of Contract awarded. Contractors should also submit with all bonds evidence showing the financial strength of the Surety.

#### 1.26 ADDENDA AND INTERPRETATIONS

No interpretation of the meaning of the plans, specifications or other pre-bid documents will be made to any Bidder orally.

Every request for such interpretation shall be in writing addressed to John G. Goudreault, P.E., Associate Vice President at AECOM, via email to John.Goudreault@aecom.com, and to be given consideration, must be received before 2:00 pm (eastern time) on June 6, 2024. Any and all such interpretations and any supplemental instructions will be in the form of written addenda to the specifications which, if issued, will be posted on the Airport's website and emailed to all prospective Bidders (at the respective address furnished for such purposes), not later than one (1) working day prior to the date fixed for the opening of Bids. Failure of any Bidder to receive any such Addendum or interpretation shall not relieve such Bidder from any obligation under his/her Bid as submitted. All Addenda so issued shall become part of the Contract Documents.

#### 1.27 POWER OF ATTORNEY

Attorneys-in-fact or others who sign bid bonds or contract bonds must file with each bond a certified and effectively dated copy of their power of attorney.

#### 1.28 LAWS AND REGULATIONS

The Bidder's attention is directed to the fact that all applicable Federal and State laws, municipal ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the project shall apply to the Contract throughout, and they will be deemed to be included in the Contract the same as though therein written out in Full. The Contractor shall be responsible for payment of all taxes, fees, and assessments as levied by Federal, State and Local authorities.

#### 1.29 NOTICE OF SPECIAL CONDITIONS

Attention is particularly called to those parts of the Contract Documents which deal with the following:

- a. Inspection of work.
- b. Insurance requirements.
- c. Scheduling the contract work.
- d. Airport safety and security.
- e. Work by Others.

#### 1.30 CONSTRUCTION SCHEDULE

The successful Bidder shall submit a Schedule outlining a proposed sequence of construction work plan identifying all key project milestones within 5 working days after execution of the contract or before the preconstruction meeting, whichever comes first.

#### END OF SECTION 00 21 13

# SECTION 00 21 17 - PRE-BID CONFERENCE

#### DESCRIPTION

Pre-qualification of Construction Contractors is required on this project.

A mandatory pre-bid meeting and site tour will be held at the Airport administrative offices boardroom located on the third floor of the Airport Terminal at One Airport Road, Manchester, NH, on June 3, 2024, at 1:30 p.m.

<u>Prospective Bidders shall RSVP not less 24 hours prior to the meeting to Ms. Christina Adams at the</u> <u>Airport Administration Office who can be reached at (603) 624-6539 or by email at</u> <u>cadams@flymanchester.com.</u>

#### END OF SECTION 00 21 17

#### **SECTION 00 41 00**

### **PROPOSAL (BID) DOCUMENTS**

#### MANCHESTER-BOSTON REGIONAL AIRPORT

for

# AIRPORT TERMINAL BUILDING IMPROVEMENTS AWIP : BHS-TC2/TC4 : A-Wing Offices MHT / City Bid # FY24-805-45

at

#### MANCHESTER-BOSTON REGIONAL AIRPORT

#### City of Manchester, New Hampshire

NOTE: The Bidder shall complete and submit the Proposal Documents in a sealed envelope as per instructions in Section 00 21 13.

#### PROPOSAL

#### for

#### AIRPORT TERMINAL BUILDING IMPROVEMENTS AWIP : BHS-TC2/TC4 : A-Wing Offices MHT / City Bid # FY24-805-45

#### at Manchester-Boston Regional Airport

Proposal of	*	hereinafter	called	"Bidder")	а
corporation organized under the laws of the State of			_, a part	nership, or	an
individual** doing business as		, to the	City of	Mancheste	er,
New Hampshire, Department of Aviation (hereinafter called "Own	er"	').			

The Bidder, \_\_\_\_\_\_\_ in compliance with your invitation for Bids for the construction of the Airport Terminal Building Improvements, having examined the plans and specifications with related documents and the site of the proposed work if required, and being familiar with all of the conditions surrounding the construction of the proposed project including the availability of materials and labor, hereby proposes to furnish all plant, labor, materials, supplies, equipment, services, and to construct the work in accordance with the Contract Documents, within the time set forth therein, and at the amount in U.S. dollars provided herein. This price is to cover all expenses incurred in performing the work required under the Contract Documents, of which this proposal is a part.

Bidder hereby agrees to commence work under this Contract on the date to be specified in written "Notice to Proceed" of the Owner, and to fully complete the Project within the specified contract period.

Bidder acknowledges receipt of the addenda shown on the attached form entitled, **ACKNOWLEDGMENT OF ADDENDA**.

\*The name of the Bidder must be exactly the same as the name under which the Bidder was prequalified with the City of Manchester.

\*\* Strike out inapplicable terms.

Manchester - Boston Regional Airport AIRPORT TERMINAL BUILDING IMPROVEMENTS AWIP : BHS-TC2/TC4 : A-Wing Offices BID FORM							
		BASE BID					
ITEM DESIGNATION	QUANTITY / UNIT	DESCRIPTION AND UNIT PRICE (IN WORDS)	FIGURES UNIT PRICE Dollars Cents				
A-1	1 / LS	AREA 1: WORKER CHECKPOINTDollars andCents					
A-3	1 / LS	AREA 3: TICKET COUNTER #4 (TC-4) Dollars and Cents					
A-4	1 / LS	AREA 4: A-WING OFFICES Dollars and Cents					
A-5	1 / LS	AREA 5: PRODUCT CHECKPOINT Dollars and Cents					
ADD ALTERNATES							
ADD- ALTERNATE A-2	1 / LS	AREA 2: TICKET COUNTER #2 (TC-2) Dollars and Cents					

# **BID SUMMARY**

# TOTAL BASE BID (Items A1, A3, A4, A5):

			dollars
	(amount in words)		
(\$		).	
	(amount in figures)		
ADD-ALTERNATE (Item A2).			
······································			
			dollars
	(amount in words)		
(\$		)	
(\$	(amount in figures)	).	

The stated prices shall include all plant, labor, materials, supplies, equipment, services, incidentals, expenses, overhead, profit, insurance, etc., as necessary to perform all work required by the Contract Documents.

The Bidder agrees that the Owner may base low bid on the Base Bid plus any or all of the Additive Alternates, if applicable.

The Bidder understands that the Owner reserves the right to reject any or all Bids and to waive any informalities in the Bidding.

The Bidder agrees that this Bid shall be good and may not be withdrawn for a period of 90 calendar days after the actual date of the Bid opening.

The Bidder agrees that the Owner may reduce the quantities or may delete work items altogether if necessary to bring the contract awarded within funds available to finance the project. Such reduction or deletion of work shall not constitute a basis for withdrawal of this proposal.

Upon receipt of written notice of acceptance of this Bid, Bidder will <u>execute the formal contract Agreement</u> <u>Documents attached within 7 calendar days</u> and deliver the Surety Bonds as required by the General Provisions. The Bid security attached in the sum of

(in words) is to become the property of the Owner in the event the contract and bonds are not executed within the time above set forth, as liquidated damages for the delay and additional expenses to the Owner caused thereby.

Respectfully submitted:

Name of Bidder:

By:

Name and Title:

Business Address:

(Affix corporate seal if bid is by a corporation)



#### CERTIFICATE AS TO CORPORATE PRINCIPAL

## PROPOSAL

I,c	certify that I am the	_of				
the corporation named as Bidder in the above	e Proposal; that					
	who signed the said Proposal on behalf of the Bidd	er				
was then	of said Corporation; that I know his/her					
signature and his/her signature thereto is genu	uine; and that said Proposal was duly signed, sealed an	b				
attested to for and in behalf of said Corporation	on by authority of its governing body and is within the	;				
scope of its corporate powers. *						
	(Corporate Seal)					
(Signature)						

\*If said Corporation is a Sole Directorship, then a notarized statement indicating such and signed by the President / Sole Director shall accompany this certification.

## ACKNOWLEDGMENT OF ADDENDA

Addendum No	Date:
Addendum No	_ Date:
Addendum No	_ Date:
Addendum No	_ Date:
Addendum No.	Date:

# END OF SECTION 00 41 00

#### CERTIFICATE AS TO CORPORATE PRINCIPAL

#### **SECTION 00 41 01**

#### **BID BOND**

KNOW ALL MEN BY THESE PRESENTS, THAT WE, THE UNDERSIGNED,

(Name of Principal)

as PRINCIPAL, and

(Name of Surety)

as SURETY, are held and are firmly bound unto **The City of Manchester**, **New Hampshire**, **Department of Aviation** hereinafter called the Owner, in the penal sum of

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, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the Principal has submitted the

accompanying Bid, _	_for	

(Enter Title and Number of Contract/Project)

NOW, THEREFORE, if the Principal shall not withdraw said bid within 90 calendar days after the opening thereof, and shall within fifteen (15) calendar days after the prescribed forms are presented to him/her for signature, enter into a written Contract with the Owner in accordance with the bid as accepted, and give bonds with good and sufficient Surety or sureties, as may be required, for the faithful performance and proper fulfillment of such Contract; or in the event of the withdrawal of said bid within the period specified, or the failure to enter into such Contract and give such bonds within the time specified, if the Principal shall pay the Owner the difference between the amount specified in said bid and the amount for which the Owner may procure the required work or supplies or both, if the latter amount be in excess of the former, then the above obligation shall be void and of no effect, otherwise to remain in full force and virtue.

IN WITNESS WHEREOF, the above named Principal and Surety have executed this instrument under their several seals this \_\_\_\_\_\_day of \_\_\_\_\_\_, name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

In presence of:			SEA
-		Individual Principal	
		Business Address	
		Individual Principal	SEA
		Business Address	
Attest.			
		Corporate Principal	
	Bv:	Business Address Af Corp Se	fix orate al
Attest:			
		Corporate Surety	
		Business Address Af Corpo Se	fix orate al
	By:		
		Attorney-in-Fact	

\* Power of attorney for person(s) signing for surety company must be attached to this bond.

I,	, certify that I am the
	_ of the Corporation named as principal in the within
bond; that	, who signed the said bond on
behalf of the Principal was then	
of said Corporation; that I know his/her si	gnature, and his/her signature thereto is genuine, and
that said bond was duly signed, sealed, an	nd attested to for and in behalf of said Corporation by
authority of its governing body.	

Affix Corporate Seal

#### AGREEMENT (CONTRACT) DOCUMENTS

#### MANCHESTER-BOSTON REGIONAL AIRPORT

for

# AIRPORT TERMINAL BUILDING IMPROVEMENTS AWIP : BHS-TC2/TC4 : A-Wing Offices MHT / City Bid # FY24-805-45

at

#### MANCHESTER-BOSTON REGIONAL AIRPORT

City of Manchester, New Hampshire

This AGREEMENT, made the	nis, day	/ of	by and
between the City of Manches	ter, New Hampshire, Department of A	viation herein called "Ow	ner", and
	, a	org	ganized under the laws
of the State of	, hereinafter called "Co	ontractor", for the	

# AIRPORT TERMINAL BUILDING IMPROVEMENTS, AWIP : BHS-TC2/TC4 : A-Wing Offices Project FY24-805-45

WITNESSETH, that the Contractor and the Owner for the consideration stated herein mutually agree as follows:

#### ARTICLE 1. STATEMENT OF WORK

The Contractor shall furnish all means and methods to perform and complete all Work, including but not necessarily limited to plant, labor, material, equipment, supplies and services including all extra Work directed, as required in strict accordance with all requirements stated or shown in the Contract Documents including Addenda to said Contract Documents which Addenda are numbered and dated as follows:

Addendum No.	Dated

#### ARTICLE 2. THE CONTRACT PRICE

The Owner shall pay the Contractor for this satisfactory performance of the Contract, in current funds, subject to additions and deductions as provided in the Contract Documents, the sum of:

(in words)

\_

(in figures)

#### ARTICLE 3. CONTRACT DOCUMENTS

The executed Contract Documents shall consist of the following component parts:

- a) This Agreement
- b) Addenda as listed in Article 1
- c) Signed Copy of Proposal
- d) Required Certifications of Compliance
- e) Specifications Project Manual
- f) Drawings (as listed in the Schedule of Drawings)
- g) Performance and Payment Bonds

This instrument, together with the other documents enumerated in this Article 3, which said other documents are as fully a part of the Contract as if hereto attached or herein repeated, from the Contract. The various conditions in Addenda shall be construed in the order of preference of the component part of the Contract which each modified.

#### ARTICLE 4. SITE AVAILABILITY AND TIME FOR COMPLETION

The Contractor hereby acknowledges the following scheduled availability dates:

through \_\_\_\_\_\_.

The Contractor agrees to complete work under this Contract within the time specified below.

#### ARTICLE 5. CERTIFICATES OF INSURANCE

The Contractor shall furnish Certificates of Insurance as described in Section 00 82 20 – Insurance Requirements, and shall list the policies as follows:

Type of Insurance:	Limits of Policy Coverage	/	Policy Number	/	Insurance Co.	/	Expiration Date
Workman's Compensation							
General Liability							
Automobile Liability							
Builder's Risk							

These Insurance Certificates as well as Performance and Payment Bonds must be furnished at or before the time of the execution of this document.

Such Certificates Of Insurance shall, with respect to comprehensive general liability, umbrella liability, and auto liability insurance, <u>name the City of Manchester</u>, <u>Department of Aviation and Department of Risk Management and the Engineer/Architect</u>, <u>AECOM Technical Services</u>, <u>Inc. as additional insured</u> (except worker's compensation).

**IN WITNESS WHEREOF**, the parties to these presents have executed this Contract in two (2) counterparts each of which shall be deemed an original, as of the year and day first above mentioned.

	(Affix corpo	rate seal if by a corporation		
	(F			
ATTEST:				
	By:			
Witness		Contractor	Date	
	Bv:			
Witness		Department of Aviation	Date	

#### SECTION 00 41 04 - PERFORMANCE BOND

#### DESCRIPTION

#### FORM OF PERFORMANCE BOND

#### KNOW ALL MEN BY THESE PRESENTS

That we,			
in individual*, a partnership*, a corporation organized under the laws of the State of			
* having a usual place of business in the State of			
as Principal, and			
a corporation organized under the laws of the State of			
and having a usual place of business in the State of			
as Surety, are holden and stand firmly bound and obligated unto the City of Manchester, New Hampshire,			
Department of Aviation (hereinafter the Owner), its successors and assigns, in the sum of			
Oollars (\$ ).			
lawful money of the United States of America, to and for the true payment whereof, we bind ourselves			
and each of us, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly			
by these presents. WHEREAS, the said Principal has by means of a written agreement dated			
, 20, entered into a Contract with the Owner for:			

(Statement of Work/Project)

a copy of which Contract is attached hereto and by reference made a part hereon.

\*Strike out inapplicable terms.

NOW, THEREFORE, THE CONDITION of this obligation is such that if the said Principal and his/her subcontractors shall well and truly keep and perform all the agreements, terms and conditions in said Contract set forth and specified to be by said Principal kept and performed, and shall well and truly indemnify and save harmless the Owner against all counsel fees paid or incurred by the Owner as a result of a breach of any condition of this bond, and against all claims and suits for damage to person or property arising from carelessness or want of due care, or any act or omission on the part of said Principal during the performance of said Contract, then this obligation shall be void; otherwise, it shall remain in full force and virtue.

PROVIDED, FURTHER, that said Surety, for value received, hereby stipulates and agrees that no extension of time, or change in, alteration or addition to the terms of the Contract or to the work to be performed there under or the Contract Documents accompanying the same and no failure or refusal of the Owner to withhold any monies from the Principal shall in any way affect its obligations on this bond, and it does hereby waive notice of any such extension of time, change, alterations or addition to the terms of the Contract or the Work or to the Contract Documents.

In the event that the Contract is abandoned by the Principal, or is terminated by the Owner under the provisions of said Contract, said Surety hereby further agrees that said Surety shall, if requested in writing by the Owner, take action as is necessary to complete said Contract.

This bond shall become effective at the same time as the Contract annexed hereto for the work hereinbefore mentioned.

IN WITNESS WHEREOF, we have set our hands and seals to this bond, this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_ In presence of:

SEAL

Individual Principal

Business Address

\_SEAL

Individual Principal

Business Address

Attest:

Attest:

SEAL

Corporate Principal

By:

By:

SEAL

Corporate Surety

Business Address

Countersigned:

By:

#### CERTIFICATE AS TO CORPORATE PRINCIPAL

#### PERFORMANCE BOND

I,,	certify that I am the	
of the Corporation named as Principal in the within bond	that,w	'nho
signed the said bond on behalf of the principal was then	,	
of said Corporation; that I know his/her signature and his/	her signature thereto is genuine; and that said	l
bond was duly signed, sealed and attested to for and in behalf of said Corporation by authority of its		
governing body and is within the scope of its corporate po	wers.	

SEAL

(Power of attorney of person(s) signing Bond for Surety Company must be attached.)

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

#### SECTION 00 41 05 - PAYMENT BOND

#### FORM OF PAYMENT BOND

#### KNOW ALL MEN BY THESE PRESENTS

That we,	,
an individual *, a partnership*, a corporation organized under the laws of the State of	
* having a usual place of business in the State of,	as
Principal, and,	
a corporation organized under the laws of the State of, a	and
having a usual place of business in the State of,	
as Surety, are holden and stand firmly bound and obligated unto the City of Manchester, New Hampsh	ire,
Department of Aviation (hereinafter the Owner), its successors and assigns, in the sum of	

Dollars (\$	), lawful
money of the United States of America, to and for the true payment wh	ereof, we bind ourselves and each of

us, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, the said Principal has by means of a written agreement dated \_\_\_\_\_\_, 20\_\_\_\_\_ entered into a Contract with the Owner for:

(Enter Title and No. of Contract/Project)

a copy of which Contract is attached hereto and by reference made a part hereof.

\* Strike out inapplicable terms.

NOW, THEREFORE, THE CONDITION Of this obligation is such that is the said Principal and his/her subcontractors shall pay for all labor performed or furnished, for all equipment hired, including trucks, for all material used or employed in such construction, including lumber so employed which is not incorporated in the work, and for fuels, lubricants, power, tools, hardware, and supplies purchased by said principal and used in carrying out said Contract, and for labor and parts furnished upon the order of said contractor for the repair of equipment used in carrying out said Contract, this agreement to make such payments being in compliance with the requirements of Section 16 of Chapter 447, of New Hampshire Revised Statutes, Annotated, 1955, to furnish security there under and being in fact such security, and if said Principal shall well and fully indemnify and save harmless the Owner against all counsel fees paid or incurred by the Owner as a result of a breach of any condition of this bond, and against all claims and suits for damage to person or property arising

from carelessness or want of due care, or any act or omission on the part of said Principal during the performance of said Contract, then this obligation shall be void; otherwise, it shall remain in full force and virtue.

PROVIDED, FURTHER, that said Surety, for value received, hereby stipulates and agrees (1) that no extension of time, or change in, alteration or addition to the terms of the Contract or to the Work to be performed there under or the Contract Documents accompanying the same and no failure or refusal of the Owner to withhold any monies from the Principal shall in any way affect its obligations on this bond, and it does hereby waive notice of any such extension of time, change, alterations, or addition to the terms of the Contract or the Work or to the Contract Documents; (2) that in case of liabilities not covered by said Section 16 of Chapter 447 RSA, as amended, but covered by this bond, then the provisions of this bond shall control.

In addition to the obligations of the undersigned enumerated above, the bond is also made for the use and benefit of all persons, firms and corporations, who may furnish any material or perform any labor on account of said Contract, or rent or hire out any appliances or equipment used or employed in the execution of said Contract and they and each of them are hereby made Obligees hereunder the same as if their own proper respective names were written herein as such, and they and each of them may proceed or sue hereon, and in case of failure of said Principal to carry out the foregoing provisions made for the use and benefit of any said persons, firms and corporations, the Owner as an additional remedy may maintain an action against the undersigned in its own name, but in trust for and for the benefit of said persons, firms and corporations.

This bond shall become effective at the same time as the Contract annexed hereto for the work hereinbefore mentioned.

IN WITNESS WHEREOF, we l	have set our ha	nds and seals to this bond, this	day of
	, 20	In presence of:	

\_\_SEAL

Individual Principal

Business Address

SEAL

Individual Principal

Business Address

Attest:

SEAL

Corporate Principal

By:\_\_\_\_\_

Attest:

\_SEAL

Corporate Surety

**Business Address** 

Countersigned:

By:

By: \_\_\_\_\_

#### CERTIFICATE AS TO CORPORATE PRINCIPAL

#### PAYMENT BOND

I,	<u> </u>	, certify that I am the	
	of the Corporation	named as Principal in	
the within bond; that,		who signed the said	
bond on behalf of the principal was then		,	
of said Corporation; that I know his/her signature and his/her signature thereto is genuine; and that said			
bond was duly signed, sealed and attested to for and in behalf of said Corporation by authority of its			
governing body and is within the scope of its corporate power	ers.		

SEAL

(Power of attorney of person(s) signing Bond for Surety Company must be attached.)

NOTE: Date of Bond must not be prior to date of Contract. If Principal is Partnership, all partners must execute bond.
#### SECTION 00 71 00 - DEFINITION OF TERMS

#### DESCRIPTION

Whenever the following terms are used in these specifications, in the contract, in any documents or other instruments pertaining to construction where these specifications govern, the intent and meaning shall be interpreted as follows:

**ACCEPTANCE**. "Acceptance" is when the Architect determines that all of the Contract requirements have been completed (based on the closeout procedures set forth herein). A copy of Owner's acceptance will be sent to the Contractor. Upon receipt of the acceptance, the Contractor will be relieved of the duty of maintaining and protecting the work. After acceptance of the Work, the Owner will initiate final settlement and payment in accordance with state statutes.

ACCESS ROAD. The right-of-way, the roadway and all improvements constructed thereon connecting the airport to a public highway.

**ACT OF GOD**. "Act of God" means an earthquake of magnitude 4.5 or greater on the Richter scale, flood, tornado, or other cataclysmic phenomenon of nature or rain, snowstorm, windstorm, high water, or other natural phenomenon in excess of the norm as established by NOAA weather data.

**ADDENDUM.** A document issued by the Architect during the bid period which modifies, supersedes, or supplements the original Contract Documents.

**ADVERTISEMENT.** A public announcement, as required by local law, inviting bids for work to be performed and materials to be furnished.

**AIR OPERATIONS AREA (AOA).** For the purpose of these Specifications, the term air operations area shall mean any area of the airport used or intended to be used for the landing, takeoff, or surface maneuvering of aircraft. An air operation area shall include such paved or unpaved areas that are used or intended to be used for the unobstructed movement of aircraft in addition to its associated runway, taxiway, or apron.

**AIRPORT.** Airport means an area of land or water which is used or intended to be used for the landing and takeoff of aircraft, and includes its buildings and facilities, if any.

**ARCHITECT.** When designated, the Architect shall mean the Owner's duly authorized representative to the Contractor with respect to this project during construction and until the final completion of the Project.

**ASTM.** American Society for Testing and Materials.

AUTHORITY. The term, where used herein, shall mean the Manchester – Boston Regional Airport (MHT).

**AWARD.** The acceptance, by the Owner, of the successful Bidder's proposal.

**AWARDING AUTHORITY OR AGENT OF CITY.** The person or group authorized by the Owner to award the Contract.

**BENEFICIAL OCCUPANCY.** The right of the Owner to occupy all or any portion of the Project prior to final completion of the Work. Such occupancy does not constitute acceptance or substantial completion by the Owner of the Work or any portion thereof, nor will it relieve the Contractor of the responsibility for correcting the defective work or materials at any time before acceptance of the Work.

**BID.** The offer of the Bidder to perform the Work when made out and submitted on the prescribed bid form, properly executed and guaranteed (see PROPOSAL).

**BID FORM.** The approved form upon which the Architect and Owner require a formal bid be prepared and submitted for the work (see PROPOSAL).

**BIDDER.** The pre-qualified individual, partnership, firm, or corporation, acting directly or through a duly authorized representative, who submits a proposal for the Work contemplated.

**BUILDING AREA.** An area in the airport to be used, considered, or intended to be used for airport buildings or other airport facilities or rights-of-way together with all airport buildings and facilities located thereon.

**CALENDAR DAY.** Every day shown on the calendar.

**CHANGE ORDER.** A written order to the Contractor covering changes in the Construction Documents, for the work affected by such changes. This order may contain one or several Cost Proposals.

**CONSTRUCTION CHANGE DIRECTIVE.** The form and procedure established when the Owner and the Contractor are not in total agreement on the terms of a Cost Proposal Request. The Architect issues a Construction Change Directive instructing the Contractor to proceed with the change in the Work, for subsequent inclusion in a Change Order.

**CONTRACT.** The written agreement covering the Work to be performed. The awarded Contract shall include, but is not limited to: The Advertisement; The Contract Form; The Proposal; The Performance Bond; The Payment Bond; any required insurance certificates; The Specifications; The Drawings, and all Addenda issued to Bidders.

**CONTRACT BOND.** The approved form of security furnished by the Contractor and his/her Surety as a guarantee of good faith and ability on the part of the Contractor to execute the work in accordance with the terms of the Contract Documents; this may include either or both a payment bond and a performance bond.

**CONTRACT DOCUMENTS.** All documents listed in the Contract Agreement as being component parts of the Contract Documents. Also, all applicable Federal and State laws, Municipal ordinances, and Rules and regulations of all authorities having jurisdiction over construction of the Project shall be deemed to be included in the Contract Documents the same as therein written out in full.

**CONTRACT DRAWINGS.** "Contract Drawings" or "Drawings" mean and include (a) all drawings which have been prepared on behalf of the Owner and are included in the Contract Documents and all modifying drawings issued by Addenda thereto; (b) all drawings submitted pursuant to the terms of the Contract by the Contractor with his/her proposal to the Owner during the progress of the Work which are accepted by the Owner; and (c) all drawings provided by the Architect to the Contractor during the progress of the Work.

**CONTRACT ITEM (PAY ITEM).** A specific unit of work for which a price is provided in the Contract.

**CONTRACT TIME.** The number of calendar days or working days, stated in the proposal, allowed for completion of the Contract, including authorized time extensions. If a calendar date of completion is stated in the proposal, in lieu of a number of calendar or working days, the Contract shall be completed by that date.

**CONTRACTOR.** The individual, partnership, firm, or corporation primarily liable for the acceptable performance of the Work contracted and for the payment of all legal debts pertaining to the Work who acts directly or through lawful agents or employees to complete the Contract Work.

**COST PROPOSAL.** The form and procedure established to identify and communicate the cost related to changes in the Work for consideration and approval prior to inclusion in a Change Order.

**CRITICAL PATH METHOD** (**CPM**). "Critical path method" is a schedule technique.

**DAY.** "Day" or "working day" means calendar day and shall include every day including Saturdays, Sundays, and legal holidays.

**DIRECTED.** "Directed," "designated," "permitted," "required," "accepted," and words of like import, wherever and in whatever manner used, with or without reference to the Architect or Owner, means as directed, designated, permitted, required, and accepted by the Architect and Owner.

**ENGINEER.** When designated, the Engineer shall mean the Owner's duly authorized representative to the Contractor with respect to this project during construction and until the final completion of the Project.

**EQUIPMENT.** All machinery, together with the necessary supplies for upkeep and maintenance. Also, all tools and apparatus necessary for the proper construction and acceptable completion of the Work.

**EXTRA WORK.** An item of work not provided for in the awarded contract as previously modified by change order or supplemental instruction, but which is found by the Architect to be necessary to complete the Work within the intended scope of the Contract as previously modified.

**FAA.** The Federal Aviation Administration of the U.S. Department of Transportation. When used to designate a person, FAA shall mean the Administrator or his/her duly authorized representative.

**FEDERAL SPECIFICATIONS.** The Federal Specifications and Standards, and supplements, amendments, and indices thereto prepared and issued by the General Services Administration of the Federal Government.

**FIELD INSTRUCTION.** Is an instruction given during the course of the Work.

**FINAL COMPLETION.** "Final completion" is that point in the Contract as determined by the Architect through a final inspection that the Contractor has completed all physical work and is ready to prepare for final closeout and acceptance as prescribed herein. All work is complete, accessible, operable, and usable by the Owner, all parts and systems are 100% complete and cleaned for the Owner's use. The Architect shall issue a Certificate of Final Completion.

**FORCE ACCOUNT.** Force account construction work is construction that is accomplished through the use of material, equipment, labor, and supervision provided by the Owner or by another public agency pursuant to an agreement with the Owner.

**GENERAL NOTES.** The written instructions, provisions, conditions, or other requirements appearing on the Drawings, and so identified thereon, which pertain to the performance of the Work.

HEREIN. "Herein," "hereinafter," and words of similar import shall refer to the Contract Documents.

**INSPECTOR.** An authorized representative of the Testing Agency assigned to make all necessary inspections and/or tests of the Work performed or being performed, or of the materials furnished or being furnished by the Contractor.

**INSTALL.** "Install," wherever and in whatever manner used, shall mean the installation complete in place of any item or equipment or material.

**INTENTION OF TERMS.** Whenever, in these Specifications or on the Drawings, the words "directed", "required", "permitted", "ordered", "designated", "prescribed", or words of the like import are used, it shall

be understood that the direction, requirement, permission, order, designation, or prescription of the Architect and Owner is intended; and similarly, the words "reviewed", "approved", "acceptable", "satisfactory", or words of like import, shall mean reviewed by, approved by, or acceptable to, or satisfactory to the Architect and Owner.

Any reference to a specific requirement of a numbered paragraph of the Contract Specifications or a cited standard shall be interpreted to include all general requirements of the entire Section, Specification item, or cited standard that may be pertinent to such specific reference.

**LABORATORY.** The official testing laboratory of the Owner.

**LESSEE.** A person, company or corporation leasing space at the Airport from the Manchester-Boston Regional Airport Authority.

**LIGHTING.** A system of fixtures providing or controlling the light sources used on or near the airport or within the airport buildings. The field lighting includes all luminous signals, markers, floodlights, and illuminating devices used on or near the airport or to aid in the operation of aircraft landing at, taking off from, or taxiing on the airport surface.

**LIQUIDATED DAMAGES.** The amount prescribed in the Contract to be paid to the Owner or to be deducted from any payments due or to become due the Contractor for each day's delay in completing the whole or any specified portion of the Work beyond the time allowed in the Contract plus approved time extensions.

**MAJOR AND MINOR CONTRACT ITEMS.** A major contract item shall be any item that is listed in the proposal, the total cost of which is equal to or greater than 20 percent of the total amount of the award Contract. All other items shall be considered minor Contract items.

**MATERIALS.** Any substance specified for use in the construction of the Contract Work.

MAY. "May", wherever and in whatever manner used, is permissive.

**NETWORK.** The graphic representation of the construction project schedule prepared using the Critical Path Method. The Network shows the sequence and interdependence of activities, and planned and actual progress by activity, required for complete performance of the Work.

**NOTAM.** Notice to Airmen.

**NOTICE OF AWARD.** A written notice to the successful bidder stating that his/her bid has been accepted and that, in accordance with the terms of the notice and the specifications, he is required to execute the contract and furnish satisfactory contract bond.

**NOTICE TO PROCEED.** A written notice to the Contractor to begin the actual Contract Work on a previously agreed-to date. If applicable, the Notice to Proceed shall state the date on which the Contract time begins.

**OTHERS.** Other Contractors, this Contractor under another contract agreement, organizations not connected with this Contractor which are performing functions in relation to this project, or personnel retained by the Owner.

**OWNER.** City of Manchester, Department of Aviation, or other designee acting as the Owner's representative with respect to this project and its administration.

**OWNER'S REPRESENTATIVE.** Whosoever the Owner may designate as his/her representative.

**PAYMENT BOND.** The approved form of security furnished by the Contractor and his/her Surety as a guaranty that he will pay in full all bills and accounts for materials and labor used in the construction of the Work.

**PERFORMANCE BOND.** The approved form of security furnished by the Contractor and his/her Surety as a guaranty that the Contractor will complete the Work in accordance with the terms of the Contract.

**PLANS.** The official drawings or exact reproductions which show the location, character, dimensions and details of the airport and the work to be done and which are to be considered as a part of the Contract, supplementary to the specifications.

**PROJECT.** The agreed scope of Work for accomplishing specific airport development with respect to a particular airport.

**PROPOSAL.** The written offer of the Bidder (when submitted on the approved proposal form) to perform the contemplated work and furnish the necessary materials in accordance with the provisions of the Contract Documents.

**PROPOSAL GUARANTY.** The security furnished with a proposal to guarantee that the Bidder will enter into a contract if his/her proposal is accepted by the Owner.

**PROVIDE.** "Provide," wherever and in whatever manner used, shall be understood to mean provide complete in place, that is, furnish and install.

**RECORD DOCUMENTS.** A complete set of Contract Drawings indicating as constructed conditions prepared by the Contractor throughout the Project Work and delivered to the Architect for acceptance review upon Substantial Completion of the Project. Also Operation and Maintenance data provided by the Contractor to the Owner providing the operating instructions and maintenance data for the Contract specified equipment.

**REQUEST FOR CHANGE.** Shall mean any detailed request for a Contract change or equitable adjustment.

**REQUEST FOR INFORMATION.** The form and procedure established, for requesting information, between the Contractor and Architect to clarify or interpret the Contract Documents or discover conflicts, omissions, or errors in these documents. In addition, the Request for Information may be a precursor to Cost Proposals and Change Orders.

**RIGHT-OF-WAY.** All lands or other property interests provided or acquired for the development and operation of an airport and its appurtenances.

**RUNWAY.** The area on the airport prepared for the landing and takeoff of aircraft.

**SHALL OR WILL.** "Shall" or "will", whenever used to stipulate anything is mandatory, means shall or will be done or be performed by either the Contractor or the Owner and means that the Contractor or the Owner has thereby entered into a covenant with the other party to do or perform the same.

**SHOWN.** "Shown", "indicated", "detailed", and words of like import, wherever and in whatever manner used, with or without reference to the Drawings, means shown, indicated, or detailed on the Drawings (or other documents).

**SITE.** An area or areas on the Airport provided to the Contractor in which to work, store materials and/or equipment, and perform other activities associated with performing the Work.

**SPECIALIST.** The term "Specialist" as used in the Contract Specification shall mean an individual or firm of established reputation (or, if newly organized, whose personnel have previously established a reputation in the same field), which is regularly engaged in, and which maintains a regular work force of workmen skilled in either (as applicable) manufacturing or fabricating items required by the Contract, installing items required by the Contract, or otherwise performing work required by the Contract. Where the Contract Specifications require installation by a specialist, that term shall also be deemed to mean either the manufacturer of the item, an individual or firm licensed by the manufacturer, or an individual or firm who will perform the Work under the manufacturer's direct supervision.

**SPECIFICATIONS.** A part of the Contract Documents containing the written directions and requirements for completing the Contract Work. Standards for specifying materials or testing which are cited in the Contract Specifications by reference shall have the same force and effect as if included in the Contract physically.

**SPECIFIED.** "Specified", "described", or "noted", wherever and in whatever manner used, means as specified, described, shown or noted in the Contract Documents.

**STRUCTURES.** Airport facilities such as bridges, culverts, catch basins, inlets, retaining walls, cribbing; storm and sanitary sewer lines; water lines; under drains; electrical ducts, manholes, hand holes, lighting fixtures and bases; transformers; flexible and rigid pavements; navigational aids; buildings; vaults; and, other manmade features of the airport that may be encountered in the work and not otherwise classified herein.

**SUBCONTRACTOR.** A person, firm or corporation supplying labor and materials or only labor for work at the site of the project for, approved by the owner, and under separate contract or agreement with, the Contractor.

**SUBGRADE.** The soil which forms the foundation.

**SUBMITTALS.** The term "submittals" shall include shop drawings, calculations, samples, schedules, procedures, manufacturer's brochures, pamphlets, catalog cuts, color charts, or other descriptive data, clearly defining the article, material, equipment, or device proposed for use in the Work. The shop drawings are the drawings and diagrams showing details of fabrication and erection which the Contractor is required to submit to the Architect.

**SUBMITTED.** "Submitted", wherever and in whatever manner used, means submitted to the Architect for review or acceptance.

**SUBSTANTIAL COMPLETION.** "Substantial Completion" is when the Architect determines the Contract Work can be used for its intended purpose as prescribed by the closeout procedures contained herein. The Contractor will be so notified when the Work is substantially complete and it is the point at which guarantees or warranties begin. Substantial completion does not constitute acceptance or final completion of the Work. Remaining omissions and defects must be completed prior to final completion and acceptance.

**SUFFICIENT.** "Sufficient", "necessary", "proper", "acceptable", "satisfactory", "desirable", and words of like import wherever and in whatever manner used, with or without reference to the Architect and Owner, means sufficient, necessary, proper, acceptable, satisfactory, and desirable in the judgment of the Architect and Owner.

**SUPERINTENDENT.** The Contractor's executive representative who is present on the work site during construction progress, authorized to receive and fulfill instructions from the Architect, and who shall supervise and direct the construction.

**SUPPLEMENTAL AGREEMENT.** A written agreement between the Contractor and the Owner which amends or supplements the original agreement. (1) work that would increase or decrease the total amount of

the awarded Contract, or any major contract item, by more than 25 percent, such increased or decreased work being within the scope of the originally awarded contract; or (2) work that is not within the scope of the originally awarded Contract.

**SUPPLEMENTAL INSTRUCTION.** The form and procedure established to transmit information to the Contractor from the Architect to clarify or interpret the contract documents and to notify the Contractor of changes in the Work.

**SUPPLIER.** "Supplier" shall mean an individual, partnership, firm, or corporation, or legally-constituted Joint Venture entering into an agreement with the Owner, Contractor or subcontractor for furnishing materials or equipment to be incorporated in the work by the Owner, Contractor or Subcontractor.

**SURETY**. The corporation, partnership, or individual, other than the Contractor, executing payment or performance bonds which are furnished to the Owner by the Contractor.

**TAXIWAY**. For the purpose of this document, the term taxiway means the portion of the air operations area of an airport that has been designated by competent airport authority for movement of aircraft to and from the airport's runways or aircraft parking areas.

**TSA.** The Transportation Security Administration. When used to designate a person, TSA shall mean the Administrator or his/her duly authorized representative.

**WORK**. The furnishing of all plant labor, materials, tools, equipment, supplies, services, and incidentals necessary or convenient to the Contractor's performance of all duties and obligations imposed by the Contract Documents.

**WORKING DAY**. A working day shall be any day other than a legal holiday, Saturday, or Sunday on which the normal working forces of the Contractor may proceed with regular work for at least 6 hours toward completion of the contract. Saturdays, Sundays and holidays on which the Contractor's forces engage in regular work, requiring the presence of an inspector, will be considered working days.

# END OF SECTION 00 71 00

#### SECTION 00 72 00 - CONDITIONS RELATING TO SCOPE OF WORK

#### 1.01 INTENT OF CONTRACT

The intent of the Contract Documents is to provide for construction and completion, in every detail, of the Work described. It is further intended that the Contractor shall provide all plans, labor, materials, equipment, tools, transportation, services, and supplies required to complete the Work in accordance with the Contract Documents,

#### 1.02 ALTERATION OF WORK AND QUANTITIES

The Owner reserves and shall have the right to make such alterations in the Work as may be necessary or desirable to complete the Work originally intended in an acceptable manner.

#### 1.03 OMITTED WORK

The Owner may, in the Owner's best interest, omit any Work. Work may be omitted by a supplemental agreement and shall not invalidate any other contract provision or requirement. Should any contract Work be omitted or otherwise ordered to be non-performed, the Contractor shall be paid for all Work performed toward completion of such item prior to the date of the order to omit such item. Payment for Work performed shall be in accordance with the subsection titled PAYMENT FOR OMITTED WORK of Section 00 76 50.

#### 1.04 EXTRA WORK

Should acceptable completion of the Contract require the Contractor to perform an item of work for which no basis of payment has been provided in the original contract or previously issued change orders or supplemental agreements, the same shall be called Extra Work. Extra work that is within the general scope of the Contract shall be covered by written change order. Change orders for such extra Work shall contain agreed prices for performing the change order work in accordance with the requirements specified in the order, and shall contain any adjustment to the contract time that, in the Owner's opinion, is necessary for completion of such extra Work.

When determined to be in the Owner's best interest, the Owner may order the Contractor to proceed with extra Work by force account as provided in the subsection entitled, PAYMENT FOR EXTRA AND FORCE ACCOUNT WORK of Section 00 76 50.

Extra work necessary for acceptable completion of the Project, but is not within the general scope of the Work covered by the original Contract, shall be covered by a Supplemental Agreement as hereinbefore defined in Section 00 71 00, DEFINITION OF TERMS.

Any claim for payment of extra work not covered by written agreement (change order or supplemental agreement) shall be rejected by the Owner.

#### 1.05 MAINTENANCE OF TRAFFIC

It is the explicit intention of the contract that the safety of aircraft, as well as the Contractor's equipment and personnel, is the most important consideration. It is understood and agreed that the Contractor shall provide for the free and unobstructed movement of aircraft in the air operations areas of the airport, pedestrians and vehicles outside the Air Operations Area (AOA) with respect to his/her own operations and the operations of all his/her subcontractors.

With respect to his/her own operations and the operations of all his/her subcontractors, the Contractor shall provide marking, lighting, and other acceptable means of identifying: personnel; equipment; vehicles; storage areas; and any work area or condition that may be hazardous to the operation of aircraft, road traffic, fire-rescue equipment, or maintenance vehicles at the airport.

The contract requires the maintenance of vehicular traffic on an existing road, street, highway, parking lots, pedestrian walkways during the Contractor's performance of work that is otherwise provided for in the contract, plans, and specifications, the Contractor shall keep such road, street, or highway open to all traffic and shall provide such maintenance as may be required to accommodate traffic. The Contractor shall furnish, erect, and maintain barricades, warning signs, flagmen, guards and other traffic control devices in reasonable conformity with the Manual of Uniform Traffic Control Devices for Streets and Highways (MUTCD ,published by the United States Government Printing Office), unless otherwise specified herein. The Contractor shall also construct and maintain in a safe condition any temporary connections necessary for ingress to and egress from abutting property or intersecting roads, streets, highways, parking lots, ramps and pedestrian bridges. Unless otherwise specified herein, the Contractor will not be required to furnish snow removal for such existing road, street, or highway.

The Contractor shall make his/her own estimate of all labor, materials, equipment, and incidentals necessary for providing the maintenance of aircraft, vehicular and pedestrian traffic as specified in this subsection.

# The Owner can assess a monetary fine of up to \$2,500 per day for the non-conformance of any aspect of this section.

The cost of maintaining the aircraft and vehicular traffic specified in this subsection shall not be measured or paid for directly, but shall be included in the contract amount.

# 1.06 PROTECTION OF WORK AND PROPERTY

The Contractor shall at all times safely guard the Owner's property from injury or loss in connection with this contract. He shall at all times safely guard and protect his own work, and that of adjacent property from damage. The Contractor shall replace or make good any such damage, loss or injury unless such be caused directly by errors contained in the Contract or by the Owner, or the Owner's duly authorized representatives.

In case of an emergency which threatens loss or injury of property, and/or safety of life, the Contractor will be allowed to act, without previous instructions from the Owner, in a diligent manner. He shall notify the Owner immediately thereafter. Any claim for compensation by the Contractor due to such extra work shall be promptly submitted to the Owner for approval.

Where the Contractor has not taken action but has notified the Owner of an emergency threatening injury to persons or damage to the work or any adjoining property, he shall act as instructed or authorized by the Owner.

The amount of reimbursement claimed by the Contractor on account of any emergency action shall be determined in the manner provided in subsection entitled EXTRA WORK of this section.

#### 1.07 FINAL CLEAN UP

Upon completion of the work and before acceptance and final payment will be made, the Contractor shall remove from the site all machinery, equipment, surplus and discarded materials, rubbish and temporary structures. Additional clean-up requirements are shown in Division 1 of the Contract Documents.

#### END OF SECTION 00 72 00

#### SECTION 00 72 20 - SITE CONDITIONS

#### 1.01 SITE INVESTIGATION AND CONDITIONS AFFECTING THE WORK

The Contractor acknowledges that it has taken steps reasonably necessary to ascertain the nature and location of the Work, and that it has investigated and satisfied itself as to the general and local conditions which can affect the work or its cost, including but not limited to: (1) conditions bearing upon transportation, disposal, handling, and storage of materials; (2) the availability of labor, water, electric power, and roads; (3) the scope of work to be executed by others under other projects; (4) the character of equipment and facilities needed preliminary to and during work performance. Any failure of the Contractor to take the actions described and acknowledged in this paragraph will not relieve the Contractor from responsibility for estimating properly the difficulty and cost of successfully performing the Work, or for proceeding to successfully perform the Work without additional expense to the Owner.

#### 1.02 DIFFERING SITE CONDITIONS

The Contractor shall promptly (no more than one day), and before the conditions are disturbed, give a written notice to the Owner as to (1) physical conditions at the site which differ materially from those indicated in this Contract, or (2) unknown physical conditions at the site of an unusual nature, which differ materially from those normally encountered and generally recognized as inherent in the Work of the character provided for in the Contract Documents.

The Architect and Owner shall investigate the conditions related to the Contractor's Notice-To-Proceed promptly after receiving the notice. If the conditions do materially so differ and cause an increase or decrease in the Contractor's cost of, or the time required for, performing any part of the work under this contract, whether or not changed as a result of the conditions, a change order shall be made under this clause and the contract documents modified in writing in accordance with the changes clause and the Contract Documents modified in writing accordingly.

No request by the Contractor for an equitable adjustment to the Contract Documents under this clause shall be allowed unless the Contractor has given the written notice required.

No request by the Contractor for a change to the Contract for differing conditions shall be allowed if not made within 7 days of discovering the condition.

END OF SECTION 00 72 20

#### SECTION 00 73 00 - CONDITIONS RELATING TO CONTROL OF WORK

#### 1.01 CONFORMITY WITH PLANS AND SPECIFICATIONS

All work and all materials furnished shall be in conformity with the dimensions, layout and material requirements that are specified in the Contract Documents.

If the Architect finds the materials furnished, work performed, or the finished product not within reasonably close conformity with the Contract Documents but that the portion of the Work affected will, in his/her opinion, result in a finished product having an acceptable appearance, level of safety, durability, and workmanship, he/she will advise the Owner of his/her determination that the affected work be accepted and remain in place.

In this event, the Architect will document his/her determination and recommend to the Owner a basis of acceptance providing for an adjustment in the Contract price for the affected portion of the Work. The Architect's determination and recommended contract price adjustments will be based on good judgment and such tests or retests of the affected work as are, in his/her opinion, needed. Changes in the Contract price shall be covered by Contract modifications (change order or supplemental agreement) as applicable.

If the Architect finds the materials furnished, work performed, or the finished product are not in reasonably close conformity with the Contract Documents and have resulted in an unacceptable finished product, the affected work or materials shall be removed and replaced or otherwise corrected by and at the expense of the Contractor in accordance with the Architect's written orders.

For the purpose of this subsection, the term "reasonably close conformity" shall not be construed as waiving the Contractor's responsibility to complete the Work in accordance with the Contract Documents. The term shall not be construed as waiving the Architect's right to insist on strict compliance with the requirements of the Contract Documents during the Contractor's prosecution of the work, when, in the Architect's opinion, such compliance is essential to provide an acceptable finished portion of the Work.

For the purpose of this subsection, the term "reasonably close conformity" is also intended to provide the Architect with the authority to use good judgment in his/her determinations as to acceptance of Work that is not in strict conformity but will provide a finished product equal to or better than that intended by the requirements of the Contract Documents.

The Architect shall not be responsible for the Contractor's means, methods, techniques, sequences, or procedures of construction or the safety precautions incident thereto.

# 1.02 COORDINATION OF CONTRACT, DRAWINGS, AND SPECIFICATIONS

The Contract, Drawings, Specifications, Addendum, and all referenced standards cited are essential parts of the Contract requirements. A requirement occurring in one is as binding as though occurring in all. They are intended to be complementary and to describe and provide for a complete work.

The Contractor shall not take advantage of any apparent error or omission on the drawings or specifications. In the event the Contractor discovers any apparent error or discrepancy, he shall immediately submit a Request for Information to the Architect for his/her interpretation and decision, and such decision shall be final.

The entire Work provided in these Contract Documents shall be constructed and finished in every respect. All parts necessary for the proper and complete execution of the Work whether the same may have been specifically mentioned or not, or indicated on the Drawings, shall be provided in a manner corresponding with the rest of the Work as if the same were particularly described and specifically provided for herein. It is not intended that the Drawings shall show every detailed piece of material or equipment, but such parts and pieces as may be necessary to satisfactorily complete any system in accordance with the best practices and regulatory requirements, even though not shown, shall be furnished and installed.

# 1.03 COOPERATION OF CONTRACTOR

The Contractor shall have available on the work site at all times one copy of all the Construction Documents. Copies of plans and specifications may be obtained by the Contractor for the cost of reproduction.

The Contractor shall supervise and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the work in accordance with the Contract Documents. The Contractor shall cooperate with the Architect, Owner and his/her inspectors and with other contractors in every way possible. The Contractor shall have a competent superintendent on the work site at all times who is fully authorized as his/her agent to supervise and direct the Work. The superintendent shall be capable of reading and thoroughly understanding the plans and specifications and shall receive and fulfill instructions from the Architect. The superintendent shall not be replaced without written notice to and approval by the Architect and Owner. The superintendent shall speak and fully understand the English language.

The Contractor shall be solely responsible for the means, methods, techniques, sequences and procedures of the construction of the work. The Contractor shall be responsible to see that all completed Work complies with the Contract Documents.

#### 1.04 COOPERATION BETWEEN CONTRACTORS

The Owner reserves the right to contract for and perform other or additional work on or near the Work covered by this contract.

When separate contracts are let within the limits of any one project, each Contractor shall conduct his/her work so' as not to interfere with or hinder the progress of completion of the work being performed by other Contractors. Contractors working on the same project shall cooperate with each other as directed.

Each Contractor involved shall assume all liability, financial or otherwise, in connection with his/her contract and shall protect and save harmless the Owner from any and all damages or claims that may arise because of inconvenience, delays, or loss experienced by him/her because of the presence and operations of other Contractors working within the limits of the same project.

The Contractor shall arrange his/her work and shall place and dispose of the materials being used so as not to interfere with the operations of the other Contractors within the limits of the same project; He shall join his/her work with that of the others in an acceptable manner and shall perform it in proper sequence to that of the others.

In the event of a conflict arising between contractors, or a coordination dispute which cannot resolved by the Contractors, the Architect shall decide the conflict and his decision shall be final.

# 1.05 AUTHORITY AND DUTIES OF INSPECTORS

Inspectors employed by the Owner shall be authorized to inspect all Work done and all material furnished. Such inspection may extend to all or any part of the Work and to the preparation, fabrication, or manufacture of the materials to be used. Inspectors are not authorized to revoke, alter, or waive any provision of the contract. Inspectors are not authorized to issue instructions contrary to the Contract Documents, or to act as foreman for the Contractor.

Inspectors employed by the Owner are authorized to notify the Contractor or his/her Representatives of any failure of the work or materials to conform to the requirements of the Contract Documents and to reject such nonconforming materials in question until such issues can be referred to the Architect for his/her decision.

## 1.06 INSPECTION OF THE WORK

All materials and each part or detail of the Work shall be subject to inspection by the Architect and Owner or his representatives. The Architect and Owner shall be allowed access to all parts of the Work and shall be furnished with such information and assistance by the Contractor as is required to make a complete and detailed inspection.

If the Architect requests, the Contractor, at the time of the request or at a time acceptable to both parties, shall remove or uncover such portions of the finished work as may be directed. After examination, the Contractor shall restore said portions of the Work to the standard required by the Construction Documents. Should the Work thus exposed or examined prove acceptable, the uncovering, or removing, and the replacing of the covering or making good of the parts removed will be paid for as extra work; but should the Work so exposed or examined prove unacceptable, the uncovering, and the replacing of the covering or making good of the parts removed will be paid for as extra work; but should the Work so exposed or examined prove unacceptable, the uncovering, and the replacing of the covering or making good of the parts removed shall be at the Contractor's expense.

Any materials used without approval of the Architect may be ordered removed and replaced at the Contractor's expense.

# 1.07 REMOVAL OF UNACCEPTABLE AND UNAUTHORIZED WORK

All work not conforming to the requirements of the Contract Documents will be considered unacceptable, unless otherwise determined acceptable by the Architect as provided in the subsection titled CONFORMITY WITH PLANS AND SPECIFICATIONS of this Section.

Unacceptable work, whether the result of non-conformance, poor workmanship, use of defective materials, damage through carelessness, or any other cause found to exist prior to the final acceptance of the work, shall be removed immediately and replaced in an acceptable manner in accordance with the provisions of the subsection titled CONTRACTOR'S RESPONSIBILITY FOR WORK, Article 1.12 of Section 00 75 00.

Non-conforming work, or any extra work done without authority, will be considered as unauthorized and will not be paid for under the provisions of the Contract. Work so done may be ordered removed or replaced at the Contractor's expense.

Upon failure on the part of the Contractor to comply with any order of the Architect made under the provisions of this subsection, the Owner will have authority to cause unacceptable work to be remedied or removed and replaced and unauthorized work to be removed and to deduct the costs incurred by the Owner from any monies due or to become due the Contractor.

#### 1.08 MAINTENANCE DURING CONSTRUCTION

The Contractor shall maintain the Work during construction and until the Work is accepted. This maintenance shall constitute continuous and effective work prosecuted day by day, with adequate equipment and forces so that the work is maintained in satisfactory condition at all times.

All costs of maintenance work during construction and before the project is accepted shall be included in the bid and the Contractor will not be paid an additional amount for such work.

# 1.09 FAILURE TO MAINTAIN THE WORK

Should the Contractor at any time fail to maintain the Work as provided in the subsection titled MAINTENANCE DURING CONSTRUCTION of this Section, the Architect shall immediately notify the Contractor of such non-compliance. Such notification shall specify a reasonable time within which the Contractor shall be required to remedy such unsatisfactory maintenance condition. The time specified will give due consideration to the situation that exists.

Should the Contractor fail to respond to the Architect's notification, the Owner may suspend any work necessary for the Owner to correct such unsatisfactory maintenance condition, depending on the situation that exists. Any maintenance cost incurred by the Owner, shall be deducted from monies due or to become due the Contractor.

# 1.10 PARTIAL ACCEPTANCE

If at any time during the prosecution of the Project the Contractor substantially completes a usable unit or portion of the work, the occupancy of which will benefit the Owner, he may request the Owner to make final inspection of that unit. If the Owner finds upon inspection that the unit has been satisfactorily completed in compliance with the contract, he may accept it as being completed, and the Contractor may be relieved of further responsibility for that unit. Such partial acceptance and beneficial occupancy by the Owner shall not void or alter any provision of the contract. Partial acceptance must be made in writing to the Contractor.

#### 1.11 FINAL ACCEPTANCE

Upon due notice from the Contractor of substantial completion of the entire project, the Architect will make an inspection. If all construction provided for and contemplated by the contract is found to be completed in accordance with the Contract Documents, such inspection shall constitute the final inspection. The Architect shall notify the Contractor in writing of final acceptance as of the date of the final inspection.

If, however, the inspection discloses any work, in whole or in part, as being unsatisfactory, the Architect will give the Contractor the necessary instructions for correction of same and the Contractor shall immediately comply with and execute such instructions. Upon correction of the work, another inspection will be made which shall constitute the final inspection, provided the work has been satisfactorily completed. In such event, the Architect will make the final acceptance and notify the Contractor in writing of this acceptance as of the date of final inspection.

# 1.12 CLAIMS FOR ADJUSTMENT AND DISPUTES

If for any reason the Contractor deems that additional compensation is due him/her for work or materials not clearly provided for in the Contract Documents or previously authorized as extra work, he shall notify the Architect in writing of his/her intention to claim such additional compensation before he begins the work on which he bases the claim. If such notification is not given or the Owner is not afforded proper opportunity by the Contractor for keeping strict account of actual cost as required, then the Contractor hereby agrees to waive any claim for such additional compensation. Such notice by the Contractor and the fact that the Owner has kept account of the cost of the work shall not in any way be construed as proving or substantiating the validity of the claim. When the work on which the claim for additional compensation is based has been completed, the Contractor shall, within 10 calendar days, submit his/her written claim to the Architect for consideration in accordance with local laws or ordinances.

Nothing in this subsection shall be construed as a waiver of the Contractor's right to dispute final payment based on differences in measurements or computations. Additional details and procedures for claims and disputes are shown in Section 00 85 00.

# 1.13 ADDITIONAL INSTRUCTIONS AND DETAIL DRAWINGS

The Contractor shall be furnished additional instructions and detail drawings if necessary to carry out the Work included in the Contract. The drawings enumerated in Section 00 73 10 may be supplemented or superseded by such additional general and/or detail drawings as may be necessary or desirable as the work progresses. Any such additional drawings shall become part of the Contract and shall be as binding upon the parties hereto as if they were enumerated herein.

The Contractor shall carry out the Work in accordance with the additional detail drawings and instructions. The Contractor and the Architect shall prepare jointly (a) a schedule, fixing the dates at which special detail drawings will be required, such drawings, if any, to be furnished by the Architect in accordance with said schedule, and (b) a schedule fixing the respective dates for the submission of shop drawings, the beginning of manufacture, testing and installation of materials, supplies and equipment, and the completion of the various parts of the work; each such schedule to be subject to change from time to time in accordance with the progress of the Work.

# 1.18 SHOP DRAWINGS AND SAMPLES

#### a. General

The Architect may require shop drawings and/or samples for any materials or equipment to be furnished or for any construction methods to be employed. No work will be allowed to proceed for which shop drawings or samples have been requested until such drawings or samples have been provided by the Contractor and approved by the Architect.

#### b. Contractor's Responsibilities

All materials and construction shall be in accordance with finally reviewed shop drawings, material tests, or the like as required. The purchase of, manufacture, or delivery to the site of any materials before final approval of applicable shop drawings, material tests, etc. will be entirely at the risk of the Contractor.

The Contractor shall be solely responsible for the correctness of all shop drawings, material quantities, and for the correct fitting of the members and parts shown on the shop drawings. The Architect's review shall be only for conformance with the design concepts of the Contract work and for conformance with the information given in the plans and specifications. The Architect's review of separate items shall not be taken as an approval of any complete assembly in which the separate items are incorporated.

It shall be understood that the Architect's review of shop drawings does not in any way relieve the Contractor of his/her sole responsibility for completing all work in strict accordance with the plans and specifications nor of his/her sole responsibility to see that all parts of the work fit with each other so that the completed work is entirely satisfactory to the Architect.

#### c. Submission to Architect / Engineer

Before submittal to the Architect / Engineer, the Contractor shall check all shop drawings or samples for conformance with the Contract Documents for suitability and satisfactory incorporation in the completed Contract work, and for correct dimensions, ratings and assembly, and shall note legibly on each drawing or sample that he has verified its acceptability and that he approves it. If there are any deviations in the shop drawings or samples from the plans and specification, the Contractor shall so note it legibly on the shop drawings or samples and also inform the Architect separately in writing of any such deviation. The Contractor shall submit shop drawings and samples in orderly sequence matched to the construction work, with sufficient completeness to enable review, with reasonable promptness, and allowing sufficient time for the Architect to review them. All shops drawings related to building finishes shall be submitted at one time, so that all finishes may be reviewed simultaneously; All shop drawings and samples shall be properly identified as to their location and application in the Contract work and as to their association with various parts of the plans and specifications.

#### d. Form of Shop Drawings

Shop drawings may include general, assembly and detail drawings, diagrams, illustrations, material and equipment schedules with manufacturer's name and catalog numbers and description, performance charts, catalog cuts, brochure and such other information and data as is necessary and required by the Architect for any part of the Contract work.

#### e. Resubmittal

If shop drawings or samples are not accepted by the Architect, the Contractor shall correct or make changes as noted and shall resubmit revised shop drawings or new samples until accepted by the Architect.

#### f. Shop Drawings Required

The Architect may require, and the Contractor shall provide, shop drawings giving information on any part of the Contract work which in the opinion of the Architect are necessary or desirable to evaluate conformance to the Construction Documents.

#### 1.19 RECORD DOCUMENTS AND OPERATIONS & MAINTENANCE DATA

A complete set of Contract Documents shall be kept at the job site that shall have all approved changes clearly and accurately marked on them by the Contractor in accordance with Section 01 78 08 – Record Documents. The Architect and Owner shall be entitled to rely upon the completeness and accuracy of the record document information provided by the Contractor without further verification.

Operations and maintenance data required by the Contract shall be provided in accordance with Section 01 78 09 - Operations and Maintenance Data.

Release of retainage shall not be authorized by the Architect until complete and accurate Record Documents and Operations and Maintenance Data are delivered to and accepted by the Architect. The Architect and Owner shall require a minimum of 30 days to review the Record Documents and Operating & Maintenance Data.

END OF SECTION 00 73 00

# 1.01 DESCRIPTION

When the Work requires the Contractor to conduct his/her operations within an Aircraft Operations Area (AOA) of the airport, the Work shall be coordinated with the Owner at least 48 hours prior to commencement of such Work. The Contractor shall not close an AOA until so authorized by the Owner and until the necessary temporary marking and associated lighting is in place.

When the Work requires the Contractor to work within an AOA of the airport on an intermittent basis (intermittent opening and closing of a portion of the AOA), the Contractor shall maintain constant communications as hereinafter specified; immediately obey all instructions to vacate the AOA; immediately obey all instructions to resume work in such AOA. Failure to maintain the specified communications or to obey instructions shall be cause for suspension of the Contractor's operations in the AOA until the satisfactory conditions are provided.

#### 1.02 AIR OPERATIONS AREA (AOA)

The Contractor will keep his personnel and equipment at least 50 feet from the edge of taxiways and aprons for aircraft movements.

Runway 17, 35 and 6 are the precision instrument runways at Manchester-Boston Regional Airport and may be used during IFR weather conditions, i.e., reduced visibility due to rain, fog, low clouds, etc. During IFR conditions, Contractor operations will be restricted to those operations which the Airport Operations Coordinator determines do not affect airport operations.

#### 1.03 AIRPORT OPERATIONS SPECIALISTS

The Director of Operations and the Airport Operations Specialist shall have the authority to open and close facilities, issue and cancel NOTAM's, and coordinate with the airlines and other airport users.

At the completion of Work each day and prior to the opening of the runways, the Director of Operations, the Engineer, and the Contractor Superintendent shall inspect the facilities to be opened to insure they are ready for use. The Contractor shall immediately correct any deficiencies to the satisfaction of the Director of Operations designee in accordance with these specifications.

#### 1.04 WEATHER LIMITATIONS

At the daily work meetings the Airport Operations Specialist will determine which areas can be worked in and discuss the weather forecast. Changing weather conditions may require the Contractor to remove his personnel and equipment from a given area upon one (1) hour's notice.

#### 1.05 AIRPORT SECURITY

The Contractor shall comply with all airport security requirements and regulations as directed by the airport operations coordinator. Security regulations include the Transportation Security Administration (TSA) 49 CFR Part 1542 – Airport Security, as well as Airport rules and regulations.

The Contractor shall be responsible for controlling access to the work area and insuring that airport security is maintained at all times. The TSA can impose fines of \$11,000.00 or more for security violations and incursions into active aircraft operation areas. In addition, the Owner may impose fines and penalties for violations to Airport rules, regulations and security procedures. The Contractor shall pay all fines assessed against the airport due to violations caused by the Contractor and his personnel, subcontractors and vendors.

Security measures at the airport will require that the Contractor's employees park their personal cars in the areas designated by the Owner that purpose. Parking of personal cars at the work site will not be permitted. The Contractor, as a subsidiary obligation shall provide adequate and safe transportation for his employees from the area where the cars are parked to and from the work area. Employees and drivers of work vehicles will be instructed as to proper access roads and will be cautioned that unauthorized use of aircraft pavements or other areas outside the designated work area may lead to their arrest and subsequent payment of fines.

Trucks delivering material to an actual work area will be subject to search and provided with an escort unless the driver has been previously cleared for operating a vehicle on the airfield.

All orders for material shall instruct the supplier of the procedures to be followed.

The Contractor shall submit to the Owner within 10 days after signing of the Contract a written method of operations detailing the precautions he proposed for the control of vehicle traffic including flagmen, signs, escorts, search and identification procedures and any other measures he proposes. A signage and security plan for the project shall be included in this information and shall be approved by the Owner prior to the commencement of work. After approval of his/her operating schedule, security and signage, the Contractor shall follow it explicitly. The Owner may close the work at any time this schedule is violated so as to not endanger aircraft operations. Such closure shall not be considered a valid reason for extending the contract time or for any claim for extras by the Contractor.

Controlled access points to the work area that impact the AOA shall be manned by an approved and trained gate guard. The Contractor shall contract through the Owner for gate guards.

All security arrangements shall be subject to the approval of the Owner.

The Contractor's personnel and vehicles will not have access to the entire airport, but shall be limited to the work area and the staging area.

#### 1.06 FLAGPERSONS

The Contractor shall provide flagpersons at each active taxiway, and apron pavement being crossed by his/her equipment to assure that moving aircraft are given the right-of-way at all times. Flagpersons shall also be required when vehicles on a service road are crossing the approach to an active runway in addition to previously specified radio cars. The flagpersons shall be carefully selected and fully instructed as to their duties in regulating the Contractor's equipment crossing the aircraft pavement. They shall also be provided with broom, shovel, and brush and instructed to remove any debris that might be left by the equipment on the aircraft pavement where it might be ingested by an aircraft engine. Each Flagperson shall be provided with and shall wear at all times he/she is directing traffic, an approved striped vest of a type specifically designed for use by traffic control personnel.

The Contractor shall also provide flagpersons or uniformed officers at locations where the haul routes enter public streets or highways from airport property in accordance with the applicable local requirements.

#### 1.07 BARRICADES

The Contractor shall furnish and place, as required, barricades to clearly define and close work areas to aircraft operations and prevent inadvertent access by vehicles and personnel.

The barricades shall be placed as directed by the Owner. The barricades shall be low profile type, a maximum of 24 inches high, shall be painted alternating bright orange and white and when used to define hazardous areas at night, shall be lighted in a manner approved by the Owner. No open flame lighting shall be used.

All temporary lights and barricades shall be weighted against jet blasts (100 mph).

# 1.08 OPERATIONAL SAFETY ON AIRPORT DURING CONSTRUCTION

Normal airport operation will be conducted on the airfield during construction and the Work shall be carried on in such a manner as not to interfere with the necessary operation of the airport. The Contractor shall take all precautions necessary to insure the safety of operating aircraft as well as his own equipment and personnel

All Contractors' operations shall be conducted in accordance with the provisions set forth within the current version of Advisory Circular 150/5370-2 and herein. The advisory circular conveys minimum requirements for operational safety on the airport during construction activities. The Contractor shall prepare and submit a safety plan that details how it proposes to comply with the requirements presented within the safety plan.

The Contractor shall implement all necessary safety plan measures prior to commencement of any work activity. The Contractor shall conduct routine checks of the safety plan measures to assure compliance with the safety plan measures.

The Contractor is responsible to the Owner for the conduct of all subcontractors it employs on the Project. The Contractor shall assure that all subcontractors are made aware of the requirements of the safety plan and that they implement and maintain all necessary measures.

No deviation or modifications may be made to the approved safety plan unless approved in writing by the Owner or Architect.

Specific requirements are as follows:

- a. When the Work requires the Contractor to conduct his/her operations within an AIR OPERATIONS AREA of the airport, the work shall be coordinated with airport operations at least 48 hours prior to commencement of such Work. The Contractor shall not close an AIR OPERATIONS AREA until so authorized by the Owner and until the necessary temporary marking and associated lighting is in place.
- b. When the Work requires the Contractor to work within an AIR OPERATIONS AREA (AOA) of the airport on an intermittent basis (intermittent opening and closing of the AIR OPERATIONS AREA), the Contractor shall maintain constant communications as hereinafter specified; immediately obey all instructions to vacate the AIR OPERATIONS AREA; immediately obey all instructions to resume work in such AIR OPERATIONS AREA. Failure to maintain the specified communications or to obey instructions shall be cause for suspension of the Contractor's operations in the AIR OPERATIONS AREA until the satisfactory conditions are provided.
- c. No construction operations shall be carried on within 50 feet from the edge of any taxiway or within 250 feet of the centerline of any active runway or within the limits of active runway approach zones unless prior approval has been obtained. When permission has been granted to work inside these limits, no equipment shall be left within the lines when not actually working. During lunch hour breaks in the daily work schedule, nights, weekends, and the days when work is not permitted or is not progressing, the equipment shall be located outside of these restriction lines. All booms shall be lowered when the equipment is not in operation. No construction operations, including an open flame such as welding or burning, shall be carried on near any aircraft.
- d. Each Contractor's motorized vehicle operating in an aircraft movement area shall be equipped with an amber flashing light and a 3 foot square flag consisting of international orange and white squares not less than one foot square displayed in full view above the vehicle.

- e. In addition, all Contractor's vehicles shall have the company identification plainly visible on both sides of the vehicle in order to identify the vehicle.
- f. The Contractor shall obey all instructions as to the operation and routes to be taken by equipment traveling on Airport property. Any signs, lights, signals, markings, traffic control and other devices which may be required shall be provided and maintained by the Contractor during the course of the work, subject to the approval of the Owner. No aircraft pavement or navigation aid currently in services shall be left out of service overnight unless closed to all operations.
- g. The Contractor shall check all permanent and temporary lighting to assure its operating condition before leaving the job each day.
- h. The Contractor shall stake and permanently mark on the ground with a readily recognizable marking (football field marking or similar material) the restrictions lines parallel to the taxiways and runways adjacent to the work and the approach zone limits so that workers can readily recognize the limitations.
- i. For nighttime and twilight operation all cranes must be marked with red obstruction lights to provide increased conspicuity. Provide two or more flashing (L864) beacons at the highest point of each rig, installed in a manner to ensure an unobstructed view of one or more lights by a pilot.
- j. All crane booms must be painted aviation orange and topped with a 3-foot by 3-foot aviation orange and white checkerboard patterned flag. Such flag shall be up at all times when the crane is in operation during daylight hours. Flags must have a stiffener to keep them from drooping in calm wind.

#### 1.09 HAUL ROUTES

When public highway must be used for haul routes, it will become the Contractor's responsibility to obtain the proper permits needed for this function and to obey rules and regulations pertinent to the public highways.

Haul routes on the Airport shall be as determined by the Owner. The Contractor shall stake or otherwise delineate the haul routes. The Contractor's vehicles and equipment shall operate within the limits of the marked haul route.

Contractor's vehicles will not be allowed access to portions of the Airport other than the work and staging areas.

#### 1.10 INDOOR AIR QUALITY IMPROVEMENT

The Contractor shall implement the following procedures in an effort to improve indoor air quality during the Owner's occupancy:

- a. All adhesives (for construction, floor and wall coverings), paints, thinners, solvents shall, among other technical qualifications, be selected in consideration to indoor air pollution. The use of these items in or near occupied areas is prohibited during normal operating hours;
- b. Provide maximum all-outside-air ventilation during the installation of strong emitting materials. This shall be done for the purpose of reducing the contamination of order materials by absorption of solvents and other volatile components;

c. On projects where the Owner (or other user) occupies all or portions of the building during construction, the Contractor shall make every practical effort to minimize their exposure to fumes and dusts from construction. Such efforts shall include items a and b above, as well as the construction of temporary air-tight barriers, isolation of ventilation systems and all other appropriate means as determined by the Contractor.

END OF SECTION 00 73 04

#### SECTION 00 73 10 - SPECIFICATIONS AND DRAWINGS

#### 1.01 DESCRIPTION

For convenience, the Specifications are arranged into Sections, but such separation shall not be considered as the limits of the Work required of any separate trade. The terms and conditions of such limitations are wholly between the Contractor and his/her subcontractors. Requirements contained in any Section are required as if contained in all Sections and are the responsibility of the Contractor. The Contractor, prior to awarding subcontracts, will assure the Work required as a whole has been coordinated among the subcontracts.

#### 1.02 SUMMARY OF THE ORDER OF PRECEDENCE

In case of conflicts between the Contract Documents the order of precedence shall be as follows:

- a. Modifications or changes last in time are first in precedence.
- b. Addenda.
- c. Specifications Project Manual.
- d. Drawings. In case of discrepancy, calculated dimensions will govern over scaled dimensions.
- e. Cited standards for materials or testing.
- f. Cited FAA advisory circulars.
- g. In the event where provisions of codes, safety orders, contract documents, referenced manufacturer's specifications or industry standards are in conflict, the more restrictive and higher quality shall govern.
- Note: Should there be a conflict within the Specifications Project Manual, the more stringent shall apply.

END OF SECTION 00 73 10

#### SECTION 00 74 00 - CONTROL OF MATERIALS

#### 1.01 SOURCE OF SUPPLY AND QUALITY REQUIREMENTS

The materials used in the Work shall conform to the requirements of the Contract Documents. Unless otherwise specified, such materials that are manufactured or processed shall be new (as compared to used or reprocessed).

In order to expedite the inspection and testing of materials, the Contractor shall furnish complete statements to the Architect as to the origin, composition, and manufacture of all materials to be used in the work. Such statements shall be furnished promptly after execution of the contract, but in all cases, prior to delivery of such materials.

It is the intent of this Contract that the use of asbestos containing materials and/or other hazardous materials be prohibited. Prior to Substantial Completion, the Contractor shall submit written certification that no asbestos and/or other hazardous substances have been incorporated into the Work.

#### 1.02 SAMPLES, TESTS AND CITED SPECIFICATIONS

All materials used in the Work shall be reviewed by the Architect before incorporation in the Work. Testing shall conform to Contract Document requirements. All contractor provided testing costs to shall be absorbed by the Contractor and treated as incidental to the total Contract amount. Any work in which materials are used without approval or written permission of the Architect shall be performed at the Contractor's risk. Materials found to be unacceptable and unauthorized will not be paid for and, if directed by the Architect, shall be removed at the Contractor's expense. Unless otherwise designated, tests in accordance with the cited standard methods of AASHTO or ASTM which are current on the date of advertisement for bids will be made by and at the expense of the Contractor. All materials being used are subject to inspection, test, or rejection at any time prior to or during incorporation into the Work. Copies of all tests shall be furnished to the Architect and Owner. Owner's right to inspect and test materials to be used in the Work shall not diminish in any way the Contractor's responsibility for determining that all materials furnished for the work fully meet all requirements of the Contract Documents.

#### 1.03 CERTIFICATION OF COMPLIANCE

The Architect may accept materials or assemblies when accompanied by manufacturer's certificates of compliance stating that such materials or assemblies fully comply with the requirements of the Contract. The certificate shall be signed by the manufacturer. Each lot of such materials or assemblies delivered to the Project shall be accompanied by a certificate of compliance in which the lot is clearly identified.

Materials or assemblies used on the basis of certificates of compliance may be sampled and tested at any time and if found not to be in conformity with Contract requirements will be subject to rejection whether in place or not.

The form of certificates of compliance shall be as approved by the Architect.

When a material or an assembly is specified by "brand name or approved equal" and the Contractor elects to furnish the specified "approved equal", the Contractor shall be required to furnish the manufacturer's certificate of compliance for each lot of such material or assembly delivered to the work. Such certificate of compliance shall clearly identify each lot delivered and shall certify as to:

a. Conformance to the specified performance, testing, quality or dimensional requirements and suitability of the material or assembly for the use intended in the Work.

Should the Contractor propose to furnish an "or approved equal" material or assembly, he shall furnish the manufacturer's certificates of compliance as hereinbefore described for the specified brand name material or assembly. However, the Architect shall be the sole judge as to whether the proposed "or approved equal" is suitable for use in the Work.

The Architect reserves the right to refuse permission for use of materials or assemblies on the basis of certificates of compliance.

# 1.04 IN-PLANT INSPECTION

The Architect, Owner or his/her authorized representative may inspect, at its source, any specified material or assembly to be used in the Work. Manufacturing plants may be inspected from time to time for the purpose of determining compliance with specified manufacturing methods or materials to be used in the work and to obtain samples required for his/her acceptance of the material or assembly.

Should the Owner's representative conduct plant inspections, the following conditions shall exist:

- a. Full cooperation and assistance of the Contractor and the producer with whom he has contracted for materials.
- b. Full entry at all reasonable times to such parts of the plant that concern the manufacture or production of the materials being furnished.

It is understood and agreed that the Owner shall have the right to retest any material which has been tested and approved at the source of supply after it has been delivered to the site. The Owner shall have the right to reject only material which, when retested, does not meet the requirements of the Contract Documents.

# 1.05 STORAGE OF MATERIALS

Materials shall be so stored as to assure the preservation of their quality and fitness for the Work. Stored materials, even though approved before storage, may again be inspected prior to their use in the Work. Stored materials shall be located so as to facilitate their prompt inspection. The Contractor shall coordinate the storage of all materials with the Owner. Materials to be stored on airport property shall not create an obstruction to air navigation nor shall they interfere with the free and unobstructed movement of aircraft. Unless otherwise shown on the plans, the storage of materials and the location of the Contractor's plant and parked equipment or vehicles shall be as directed by the Owner. Private property shall not be used for storage purposes without written permission of the owner or lessee of such property. The Contractor shall make all arrangements and bear all expenses for the storage of materials on private property. Upon request, the Contractor shall furnish the Owner a copy of the property owner's permission.

All storage sites on private or airport property shall be restored to their original condition by the Contractor at his/her entire expense, except as otherwise agreed to (in writing) by the owner or lessee of the property.

#### 1.06 UNACCEPTABLE MATERIALS

Any material or assembly that does not conform to the requirements of the Contract Documents shall be considered unacceptable.

No rejected material or assembly, the defects of which have been corrected by the Contractor, shall be returned to the site of the Work until such time as the Architect has approved its used in the Work.

#### 1.07 OWNER-FURNISHED MATERIALS

The Contractor shall furnish all materials required to complete the Work, except those specified herein (if any) to be furnished by the Owner. Owner-furnished materials shall be made available to the Contractor at the location specified herein.

All costs of handling, transportation from the specified location to the site of work, storage, and installing Owner-furnished materials shall be included in the bid for the contract item in which such Owner-furnished material is used.

After any Owner-furnished material has been delivered to the location specified, the Contractor shall be responsible for any demurrage, damage, loss, or other deficiencies which may occur during the Contractor's handling, storage, or use of such Owner-furnished material. The Owner will deduct from any monies due or to become due the Contractor any cost incurred by the Owner in making good such loss due to the Contractor's handling, storage, or use of Owner-furnished materials.

#### 1.08 CONTRACTOR'S TITLE TO MATERIALS

No materials or supplies for the Work shall be purchased by the Contractor or by any Subcontractor subject to any chattel mortgage or under a conditional sales contract or other agreement by which an interest is retained by the seller. The Contractor warrants that he/she has good title to all materials and supplies used by him/her in the work, free from all liens, claims or encumbrances.

#### END OF SECTION 00 74 00

#### SECTION 00 75 00 - LEGAL REGULATIONS & RESPONSIBILITY TO PUBLIC

#### 1.01 LAWS TO BE OBSERVED

The Contractor shall keep fully informed of all Federal and State laws, all local laws including Manchester – Boston Regional Airport rules and regulations, ordinances, regulations and security directives and all orders and decrees of bodies or tribunals having any jurisdiction or authority, which in any manner affect those engaged or employed on the work, or which in any way affect the conduct of the Work. He/she shall at all times observe and comply with all such laws, ordinances, regulations, orders, and decrees; and shall protect and indemnify the Owner and all his/her officers, agents, representatives or servants against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order, or decree, whether by himself/herself or his/her representatives, employees, subcontractors, suppliers, or material men.

#### 1.02 PERMITS, LICENSES, AND TAXES

The Contractor shall procure all permits and licenses, pay all charges, fees, and taxes, and give all notices necessary and incidental to the due and lawful prosecution of the Work.

#### 1.03 PATENTED DEVICES, MATERIALS, AND PROCESSES

If the Contractor is required or desires to use any design, device, material, or process covered by letters of patent or copyright, he shall provide for such use by suitable legal agreement with the patentee or owner and shall pay all appropriate license fees, royalties and all costs incident to the use in performance of the Work. The Contractor and the Surety shall indemnify and save harmless the Owner, any third party, or political subdivision from any and all claims for infringement by reason of the use of any such patented design, device, material or process, or any trademark or copyright, and shall indemnify the Owner and any third party for any costs, expenses, and damages which it may be obliged to pay by reason of an infringement, at any time during the prosecution or after the completion of the work.

#### 1.04 RESTORATION OF SURFACES DISTURBED BY OTHERS

The Owner reserves the right to authorize the construction, reconstruction, or maintenance of any public or private utility service, or a utility service of another government agency at any time during the progress of the Work.

Should the owner of a public or private utility service, or a utility service of another government agency be authorized to construct, reconstruct, or maintain such utility service or facility during the progress of the Work, the Contractor shall cooperate with such owners by arranging and performing the Work in this Contract so as to facilitate such construction, reconstruction or maintenance by others. When ordered as extra work by the Architect, the Contractor shall make all necessary repairs to the Work which are due to such authorized work by others, unless otherwise provided for in the Contract Documents. It is understood and agreed that the Contractor shall not be entitled to make any claim for damages due to such authorized work by others or for any delay to the Work resulting from such authorized work.

# 1.05 SANITARY, HEALTH, AND SAFETY PROVISIONS

Before beginning the Work, the Contractor shall notify the Architect and Owner in writing that the Contractor has prepared a Contractor's safety program that implements all of the Contractor's responsibilities hereunder. The Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the work. The Contractor shall take all necessary precautions for the safety of and shall provide the necessary protection to prevent damage, injury or loss to:

a. All employees on the Project and other persons and organizations who may be affected thereby;

- b. All the Work and materials and equipment to be incorporated therein, whether in storage on or off the site; and
- c. Other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities and underground facilities not designated or removal, relocation or replacement in the course of construction.

The Contractor shall comply with all applicable laws and regulations of any public body having jurisdiction for the safety of persons or property or to protect them from damage, injury or loss and shall erect and maintain all necessary safeguards for such safety and protection.

In emergencies affecting the safety or protection of persons of the work or property at the site or adjacent thereto, the Contractor, without special instruction or authorization from the Owner, is obligated to act to prevent threatened damage, injury or loss. The Contractor shall give the Architect and Owner prompt written notice if the Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby.

The Contractor shall designate a responsible representative at the site whose duty shall be the prevention of accidents. The person shall be designated in writing by the Contractor and accepted by the Owner.

# 1.06 PUBLIC CONVENIENCE AND SAFETY

The Contractor shall control his/her operations and those of his/her subcontractors and all suppliers, to assure the least inconvenience to the traveling public. Under all circumstances safety shall be the most important consideration.

The Contractor shall maintain the free and unobstructed movement of aircraft and vehicular traffic with respect to his/her own operations and those of his/her subcontractors and all suppliers in accordance with Section 00 72 10 and shall limit such operations for the convenience and safety of the traveling public as specified in Section 00 76 00.

# 1.07 RESPONSIBILITY FOR DAMAGE CLAIMS

The Contractor shall indemnify, defend and hold harmless the Architect, and the Owner and their officers, employees, representatives, sub-consultants, and agents from all suits, actions, claims, damages or costs (including attorneys' fees and costs) of any character brought because of any injuries or damage received or sustained by any person, persons, or property on account of the operations of the Contractor; or on account of or in consequence of any neglect in safeguarding the work; or through use of unacceptable materials in constructing the work; or because of any act or omission, neglect, or misconduct of said Contractor; or because of any claims or amounts recovered from any infringements of patent, trademark, or copyright; or from any claims or amounts arising or recovered under the "Workmen's Compensation Act", or any other law, ordinance, order, or decree. Money due the Contractor under and by virtue of his/her contract as may be considered necessary by the Owner for such purpose may be retained for the use of the Owner or, in case no money is due, his/her Surety may be held until such suit or suits, action or actions, claim or claims for injuries or damages as aforesaid shall have been settled and suitable evidence to that effect furnished to the Owner, except that money due the Contractor will not be withheld when the Contractor produces satisfactory evidence that he is adequately protected by public liability and property damage insurance.

# 1.08 THIRD PARTY BENEFICIARY CLAUSE

It is specifically agreed between the parties executing the contract that it is not intended by any of the provisions of any part of the Contract to create in the public or any member thereof a third party beneficiary of any right created by the Contract Documents or by operation of law.

# 1.09 OPENING SECTIONS OF THE WORK TO TRAFFIC

Should it be necessary for the Contractor to complete portions of the contract work for the beneficial occupancy of the Owner prior to completion of the entire contract, such "phasing" of the work shall be specified herein and indicated on the plans. When so specified, the Contractor shall complete such portions of the work on or before the date specified or as otherwise specified. The Contractor shall make his/her own estimate of the difficulties involved in arranging his/her work to permit such beneficial occupancy by the Owner.

Upon completion of any portion of the work to allow beneficial occupancy by the Owner, such portion shall be accepted by the Owner in accordance with the subsection titled PARTIAL ACCEPTANCE of Section 00 73 00.

No portion of the Work may be opened by the Contractor for public use until accepted by the Owner in writing. Should it become necessary to open a portion of the work to public traffic on a temporary or intermittent basis, such openings shall be made when, in the opinion of the Owner, such portion of the work is in an acceptable condition to support the intended traffic. Temporary or intermittent openings are considered to be inherent in the work and shall not constitute either acceptance of the portion of the Work so opened or a waiver of any provision of the contract. Any damage to the portion of the Work so opened that is not attributable to traffic which is permitted by the Owner shall be repaired by the Contractor at his/her expense.

The Contractor shall make his/her own estimate of the inherent difficulties involved in completing the work under the conditions herein described and shall not claim any added compensation by reason of delay or increased cost due to opening a portion of the Contract Work.

# 1.10 CONTRACTOR'S RESPONSIBILITY FOR WORK

Until the Owner's final written acceptance of the entire completed work, excepting only the portions of the Work accepted in accordance with the subsection titled PARTIAL ACCEPTANCE of Section 00 73 00, the Contractor shall have the charge and care thereof and shall take every precaution against injury or damage to any part due to the action of the elements or from any other cause, whether arising from the execution or from the non-execution of the work. The Contractor shall rebuild, repair, restore, and make good all injuries or damages to any portion of the work occasioned by any of the above causes before final acceptance and shall bear the expense thereof except damage to the work due to unforeseeable causes beyond the control of and without the fault or negligence of the Contractor, including but not restricted to acts of God such as earthquake, tidal wave, tornado, hurricane or other cataclysmic phenomenon of nature, or acts of the public enemy or of government authorities.

If the work is suspended for any cause whatever, the Contractor shall be responsible for the Work and shall take such precautions necessary to prevent damage to the Work

# 1.11 PERSONAL LIABILITY OF PUBLIC OFFICIALS

In carrying out any of the contract provisions or in exercising any power or authority granted to him/her by this Contract, there shall be no liability upon the Owner, his/her authorized representatives, or any officials of the Owner either personally or as an official of the Owner. It is understood that in such matters they act solely as agents and representatives of the Owner.

# 1.12 NO WAIVER OF LEGAL RIGHTS

Upon completion of the Work, the Architect and Owner will expeditiously make final inspection and notify the Contractor of final acceptance. Such final acceptance, however, shall not preclude or stop the Owner from correcting any measurement, estimate, or certificate made before or after completion of the Work, nor shall the Owner be precluded or stopped from recovering from the Contractor or his/her Surety, or both, such overpayment as may be sustained, or by failure on the part of the Contractor to fulfill his/her obligations under the Contract. A waiver on the part of the Owner of any breach of any part of the Contract shall not be held to be a waiver of any other or subsequent breach.

The Contractor, without prejudice to the terms of the contract, shall be liable to the Owner for latent defects, fraud, or such gross mistakes as may amount to fraud, or as regards the Owner's rights under any warranty or guaranty.

# 1.13 HAZARDOUS MATERIALS

- a. Hazardous Materials
- 1. The Contractor is responsible for the proper handling, storage, and/or disposal of hazardous materials used or generated during the course of the project. Such materials may include, but are not limited to motor vehicle fuels, waste oils and lubricants, paints, lacquers, paint thinners, and solvents. Should a spill or accidental release of hazardous materials occur during the course of the project, the Contractor shall be responsible for transmitting all pertinent data through the Airport Communications Center. As directed by the Owner, the Contractor shall be required to subsequently report the spill to the New Hampshire Department of Environmental Services (NHDES) and proceed under NHDES direction to effect such clean up measures as may be deemed necessary by the NHDES. The Contractor shall be responsible for cost of testing, removal, and proper disposal of any hazardous material released as a result of their actions, or those of their employees, consultants, or subcontractors. The Airport's Environmental Compliance Specialist will inspect hazardous material storage, including petroleum products. Hazardous materials shall be properly labeled to identify contents, stored out of contact with storm water, and shall not adversely affect water, soil, or air quality. The Contractor shall contact the Owner.
- 2. In the event of a spill, the Contractor's EPA Generator Identification number will be used on all documents for all disposal/removal purposes.
- 3. At no time shall any Contractor personnel work in a potentially hazardous environment unless certified to do so under 29 CFR 1910.
- 4. At all times the Contractor shall be responsible for satisfying the City of Manchester Department of Aviation, State of New Hampshire, US Environmental Protection Agency, and the Occupational Safety and Health Administration requirements for handling, storage, and disposal of potentially hazardous materials.
- b. Additional Considerations
  - 1. Aside from the environmental regulations and permit conditions specified above, the Contractor is responsible for understanding and following all other applicable federal, state, and local laws and regulations.

# 1.14 ADDITIONAL OR SUBSTITUTE BOND

If at any time the Owner for justifiable cause shall be or become dissatisfied with any Surety or sureties, then upon the Performance or Payment Bonds, the Contractor shall within five (5) days after notice from the Owner to do so, substitute an acceptable bond (or bonds) in such form and sum signed by such other surety or sureties as may be satisfactory to the Owner. The premiums on such bond shall be paid by the Contractor. No further payments shall be deemed due nor shall be made until the new surety or sureties shall have furnished such an acceptable bond to the Owner.

#### 1.15 GENERAL GUARANTY

Neither the final certificate of payment nor any provision in the Contract Documents, nor partial or entire occupancy of the premises by the Owner, shall constitute any acceptance of work not done in accordance with the Contract Documents or relieve the Contractor of liability in respect to any express warranties or responsibility for faulty materials or workmanship. The Contractor shall remedy any defects in the work and pay for any damage to other work resulting there from, which shall appear within a period of one year from the date of final acceptance of the work unless a longer period is specified. The Owner will give notice of observed defects with reasonable promptness.

#### 1.16 NOTICE AND SERVICE THEREOF

Any notice to the Contractor from the Owner relative to any part of the Contract shall be in writing and considered delivered and the service thereof completed, when said notice is posted, by certified or registered mail, to the said Contractor at his last given address, or delivered in person to the said Contractor or his authorized representative on the Work.

#### 1.17 PRESS RELEASES

All press releases or other published information in any way concerning this Contract or the Work hereunder, which the Contractor of any of its subcontractors desires to make, shall be subject to approval by the Owner prior to release. Request for such releases shall be sent to the Owner for review and approval.

#### END OF SECTION 00 75 00

# SECTION 00 76 00 - PROSECUTION AND PROGRESS

#### 1.01 SUBLETTING OF CONTRACT

The Contractor shall at all times when work is in progress be represented either in person, by a qualified superintendent, or by other designated, qualified representative who is duly authorized to receive and execute orders of the Architect.

Should the Contractor elect to assign his/her Contract, said assignment shall be concurred in by the Surety, shall be presented for the consideration and approval of the Owner, and shall be consummated only on the written approval of the Owner. In case of approval, the Contractor shall file copies of all subcontracts with the Owner.

#### 1.02 NOTICE TO PROCEED

The Notice To Proceed shall state the date on which it is expected the Contractor will begin the construction and from which date contract time will be charged. The Contractor shall begin the Work to be performed under the Contract on the date set by the written Notice To Proceed and shall notify the Owner at least 72 hours in advance of the time actual construction operations will begin.

#### 1.03 PROSECUTION AND PROGRESS

As specified in Section 01 30 28 – Progress Schedule, the Contractor shall submit his/her progress schedule to the Architect and Owner for review on or before the effective date of the Notice To Proceed. The Contractor's progress schedule, when approved, may be used to establish major construction operations and to check on the progress of the work. The Contractor shall provide sufficient materials, equipment, and labor to guarantee the completion of the project in accordance with the Contract Documents within the time set forth in the Contract.

#### 1.04 CONTROL OF OPERATIONS

When the Contractor is required to work within the AIRCRAFT OPERATIONS AREAS (AOA), the Contractor shall control his/her operations and the operations of his/her subcontractors and all suppliers so as to provide for the free and unobstructed movement of aircraft in the AOA.

#### 1.05 CHARACTER OF WORKERS, METHODS, AND EQUIPMENT

The Contractor shall, at all times, employ sufficient competent labor and equipment for prosecuting the Work to full completion in the manner and time required by the Contract Documents.

All workers shall have sufficient skill and experience to perform properly the work assigned to them. Workers engaged in special work or skilled work shall have sufficient experience in such work and in the operation of the equipment required to perform the Work satisfactorily.

Any person employed by the Contractor, any subcontractor and their agents who in the opinion of the Architect, does not perform the Work in proper and skillful manner, is disorderly or disrespectful, argumentative, or otherwise deemed undesirable, shall, at the written request of the Architect, be removed forthwith by the Contractor, subcontractor, or their agents employing such person and shall not be employed again in any portion of the Work without prior approval of the Owner.

Should the Contractor fail to remove such persons or person, or fail to furnish suitable and sufficient personnel for the proper prosecution of the work, the Owner may suspend the Work by written notice until compliance with such orders.

All equipment which is proposed to be used on the Work shall be of sufficient size and in such condition as to meet requirements of the work and to produce a satisfactory quality of work. Equipment used on any portion of the Work shall be such that no injury to previously completed work, adjacent property, or existing airport facilities will result from its use.

The Contractor shall not proceed with any Work not clearly and consistently defined in detail in the Contract Documents, but shall request additional drawings, specifications, or instructions from the Architect by means of a Request for Information (RFI). If the Contractor proceeds with such work without obtaining further drawings or instructions, he shall assume full responsibility for the results thereof, and if such work is discovered to be incorrect he shall correct it at his/her own expense.

The Contractor shall supervise and direct the Work, using the Contractor's best skill and judgement. The Contractor shall be solely responsible and have control over construction means, methods, techniques, sequences, procedures, safety precautions, and for coordinating all portions of the Work under the Contract. Should the Contract Documents refer to particular construction means, methods, techniques, sequences or procedures, or indicate or imply that such are to be used on the work, such mention is intended only to indicate that the operations of the Contractor shall be such as to produce at least the quality of work implied by the operations described, but that the actual determination of whether or not the described operations may be safely and suitably employed on the Work shall be the sole responsibility of the Contractor. All injury, loss, damage or cost of correcting defective work arising from the employment of any construction means, methods, techniques, sequences or procedures shall be the sole responsibility of the Contractor, notwithstanding that such construction means, methods, techniques, sequences or procedures are referred to, indicated or implied by the Contract Documents, unless the Contractor has given timely notice to the Owner in writing that such means, methods, techniques, sequences or procedures are not safe or suitable, and the Contractor has then been instructed in writing to proceed at the Owner's risk.

# 1.06 TEMPORARY SUSPENSION OF THE WORK

The Owner may suspend the Work wholly, or in part, for such period or periods as he may deem necessary, due to unsuitable weather, or such other conditions as are considered unfavorable for the prosecution of the Work, or for such time as is necessary due to the failure on the part of the Contractor to carry out orders given or perform any or all provisions of the Contract.

In the event that the Contractor is ordered by the Owner, in writing, to suspend work for some unforeseen cause not otherwise provided for in the Contract Documents and over which the Contractor has no control, the Contractor may be reimbursed for actual money expended on the work during the period of shutdown. No allowance will be made for anticipated profits. The period of shutdown shall be computed from the effective date of the Owner's order to suspend work to the effective date of the Owner's order to resume the work. Claims for such compensation shall be filed with the Owner within the time period stated in the Owner's order to resume work. The Contractor shall submit with his/her claim information substantiating the amount shown on the claim.

No provision of this article shall be construed as entitling the Contractor to compensation for delays due to inclement weather, for suspensions made at the request of the Contractor, or for any other delay provided for in the Contract Documents.

If it should become necessary to suspend work for an indefinite period, the Contractor shall store all materials in such manner that they will not become an obstruction nor become damaged in any way. He shall take every precaution to prevent damage or deterioration of the work performed.

# 1.07 DETERMINATION AND EXTENSION OF CONTRACT TIME

The number of calendar or working days allowed for completion of the Work is stated in the proposal and Contract Documents and will be known as the CONTRACT TIME.

Should the contract time require extension for reasons beyond the Contractor's control, it shall be adjusted as follows:

- a. CONTRACT TIME based on CALENDAR DAYS shall consist of the number of calendar days stated in the contract counting from the effective date of the notice to proceed and including all Saturdays, Sundays, holidays, and non-work days. All calendar days elapsing between the effective dates of the Owner's orders to suspend and resume all work, due to causes not the fault of the Contractor, shall be excluded.
- b. When the contract time is a specified completion date, it shall be the date on which all Contract work shall be completed.

If the Contractor finds it impossible for reasons beyond his/her control to complete the work within the Contract time as specified, or as extended in accordance with the provisions of this subsection, he/she may, at any time prior to the expiration of the contract time as extended, made a written request to the Architect for an extension of time setting forth the reasons which he/she believes will justify the granting of his/her request. The Contractor's pleas that insufficient time was specified is not a valid reason for extension of time. If the Architect finds that the work was delayed because of conditions beyond the control and without the fault of the Contractor, the Architect may extend the time for completion in such amount as the conditions justify. The extended time for completion shall then be in full force and effect, the same as though it were the original time for completion.

#### 1.08 DEFAULT AND TERMINATION OF CONTRACT

The Contractor shall be considered in default of his/her Contract and such default will be considered as cause for the Owner to terminate the contract for any of the following reasons if the Contractor:

- a. Fails to begin the work under the contract within the time specified in the "Notice to Proceed"; or
- b. Fails to perform the work or fails to provide sufficient workers, equipment or materials to assure completion of work in accordance with the terms of the contract; or
- c. Performs the work unsuitable or neglects or refuses to remove materials or to perform anew such work as may be rejected as unacceptable and unsuitable; or
- d. Discontinues the prosecution of the work; or
- e. Fails to resume work which has been discontinued within a reasonable time after notice do so; or
- f. Becomes insolvent or is declared bankrupt, or commits any act of bankruptcy or insolvency; or
- g. Allows any final judgment to stand against him/her unsatisfied for a period of 10 days; or
- h. Makes an assignment for the benefit of creditors; or
- i. For any other cause whatsoever, fails to carry on the work in an acceptable manner.

Should the Owner consider the Contractor in default of the Contract for any reason hereinbefore, he shall immediately give written notice to the Contractor and the Contractor's Surety as to the reasons for considering the Contractor in default and the Owner's intentions to terminate the Contract.

If the Contractor or Surety, within a period of 10 days after such notice, does not proceed in accordance therewith, then the Owner will have full power and authority to take the prosecution of the work out of the hands of the Contractor. The Owner may appropriate or sue any or all materials and equipment that have been mobilized for use in the work and are acceptable and may enter into an agreement for the completion of said contract according to the terms and revisions thereof, or use such other methods for the completion of said contract in an acceptable manner.

All costs and charges incurred by the Owner, together with the cost of completing the work under Contract, will be deducted from any monies due or which may become due the Contractor. If such expense exceeds the sum which would have been payable under the Contract, then the Contractor and the Surety shall be liable and shall pay to the Owner the amount of each excess.

# 1.09 TERMINATION FOR NATIONAL EMERGENCIES

The Owner shall terminate the Contract or portion thereof by written notice when the Contractor is prevented from proceeding with the construction contract as a direct result of an Executive Order of the President with respect to the prosecution of war or in the interest of national defense.

When the Contract, or any portion thereof, is terminated before completion of all items of work in the contract, payment will be made for the actual number of units or items of work completed at the Contract price or as mutually agreed for items of work partially completed or not started. No claims or loss of anticipated profits shall be considered.

Reimbursement for organization of the work, and other over head expenses, (when not otherwise included in the Contract) and moving equipment and materials to and from the job will be considered, the intent being that an equitable settlement will be made with the Contractor.

Acceptable materials, obtained or ordered by the Contractor for the work and that are not incorporated in the Work shall, at the option of the Contractor, be purchased from the Contractor at actual cost as shown by receipted bills and actual cost records as such points of delivery as may be designated by the Owner.

Termination of the Contract or a portion thereof shall neither relieve the Contractor of his/her responsibilities for the completed work nor shall it relieve his/her Surety of its obligation for and concerning any just claim arising out of the Work performed.

#### 1.10 TERMINATION FOR CONVENIENCE

The Owner may whenever the interests of the Owner so require, terminate this Contract, in whole or in part, for the convenience of the Owner. The Owner shall give written notice of the termination to the Contractor specifying the extend of termination and the effective date of termination.

- a. The Contractor shall incur no further obligations in connection with the terminated work, and, on the date set in the notice of termination, the Contractor shall stop work to the extent specified. The Contractor shall also terminate outstanding orders and subcontracts as they relate to the terminated work. With approval or ratification of the Owner, the Contractor shall settle the liabilities and claims arising out of the termination of subcontracts and orders connected with the terminated work. The Owner may direct the Contractor to assign the Contractor's right, title, and interest under the terminated orders of subcontracts to the Owner. The Contractor must still complete the work not terminated by the notice of termination and may incur obligations as are necessary to do so.
- b. The Owner may require the Contractor to transfer title and deliver to the Owner in the manner and to the extent directed by the Owner: (I) the fabricated or unfabricated parts, work in process, completed work, supplies, and other material produced or acquired for the work terminated; and (ii) the completed or partially completed plans, drawings, information, and

other property that, if the Contract had been completed, would be required to be furnished to the Owner. The Contractor shall, upon direction of the Owner, protect and preserve property in the possession of the Contractor in which the Owner has an interest. If the Owner does not exercise this right, the Contractor shall use its best efforts to sell such supplies and manufacturing materials. The proceeds of any transfer or disposition will be applied to reduce any payments to be made by the Owner, credited to the price or cost of the Work, or paid in any other manner directed by the Owner.

- c. After termination, the Contractor shall submit a final termination settlement proposal to the Owner in the form and with the certification prescribed by the Owner. The Contractor shall submit the proposal promptly, but no later than four (4) months from the effective date of termination, unless extended in writing by the Owner upon written request of the Contractor within this 1-year period. However, if the Owner determines that the facts justify it, a termination settlement proposal may be received and acted on after four (4) months or any extension. If the Contractor fails to submit the proposal within the time allowed, the Owner may determine, on the basis of information available, the amount, if any, due the Contractor because of the termination and shall pay the amount determined.
- d. Subject to paragraph c. above, the Contractor and the Owner may agree upon the whole or any part of the amount to be paid because of the termination. The amount may include a reasonable allowance for profit on work done. However, the agreed amount, whether under this paragraph (d), or paragraph (f) below, exclusive of costs shown in subparagraph (e)(2) below, may not exceed the total Contract price as reduced by (1) the amount of payments previously made and (2) the contract price of work not terminated. The Contract shall be amended, and the Contractor paid the agreed amount.
- e. If the parties are unable to agree on the amount of a termination settlement, the Owner shall pay the Contractor the following amounts:
  - 1. For Contract Work performed before the effective date of termination, the total (without duplication of any item) of:
    - i. the cost of this Work;
    - ii. the cost of settling and paying termination settlement proposals under terminated subcontracts that are properly chargeable to the terminated portion of the Contract if not included in subparagraph (I) above; and
    - iii. a sum, as profit on 1. above, determined by the Owner to be fair and reasonable; however, if it appears that the Contractor would have sustained a loss on the entire Contract had it been completed, the Owner shall allow no profit under this subparagraph, and shall reduce the settlement to reflect the indicated rate of loss.
- f. The reasonable costs of settlement of the work terminated, including:
  - 1. accounting, legal, clerical, and other expenses reasonably necessary for the preparation of termination settlement proposals and supporting data;
  - 2. the termination and settlement of subcontracts (excluding the amounts of such settlements); and
  - 3. storage, transportation, and other costs incurred, reasonably necessary for the preservation, protection, or disposition of the termination inventory.

#### 1.11 WORK AREA, STORAGE AREA AND SEQUENCE OF OPERATIONS

The Contractor shall obtain approval from the Owner prior to beginning any work in all areas of the airport. No operating runway, taxiway, or Air Operations Area (AOA) shall be crossed, entered, or obstructed while it is operational. The Contractor shall plan and coordinate his/her work in such a manner as to insure safety and a minimum of hindrance to flight operations.

All equipment and materials shall not hinder the Runway Visual Range per AC 150/5300 nor hinder a runway to taxiway line of sight. No equipment will be allowed to park within the approach area of an active runway at any time. No equipment shall be within 250 feet of an active runway at any time, unless approved by Owner's representative.

#### 1.12 FULFILLMENT OF CONTRACT

The Contract will be considered fulfilled when all the Work has been completed, and the final inspection acceptance has been made. The Contractor will then be released from further obligation except as may be required by law, by his/her Surety, and by the general guarantee provided for herein by subsection entitled GENERAL GUARANTY of Section 00 75 00.

END OF SECTION 00 76 00
### SECTION 00 76 50 - MEASUREMENT AND PAYMENT

## 1.01 DESCRIPTION

This Section describes the process involved in payment of the Contractor, including payment and submittal procedures, payment for stored materials, retainage, interim withholds, payment for extra and force account work, measurement, payment of subcontractors, payment of omitted items, acceptance and final payment, and audits.

## 1.02 PAYMENT

The Contractor shall receive and accept compensation provided for in the Contract as full payment for furnishing all materials, for performing all Work under the contract in a complete and acceptable manner, and for all risk, loss, damage, or expense of whatever character arising out of the nature of the Work or the prosecution thereof, subject to the provisions of Section 99 75 00, subsection NO WAIVER OF LEGAL RIGHTS.

Payment for Work performed on this Contract shall be based on the dollar value of completed Work in place.

The Contractor will break out itemized payments for major stored materials as individual activities.

When the "basis of payment" subsection of a technical specification requires that the contract price (price bid) include compensation for certain work or material essential to the item, this same work or material will not also be measured for payment under any other contract item which may appear elsewhere in the Contract Documents.

### 1.03 SUBMITTAL PROCEDURE

- a. Requests for payment will include the following steps:
  - 1. The Contractor submits to the Architect a marked-up copy of the previous month's schedule including his evaluation of the Work which has been completed in that period by percentage of activity complete.
  - 2. The Contractor, Owner and Architect shall conduct a joint review of all Record Documents to ensure that the field set is being maintained properly. Lack of current as-built conditions indicated on the Record Documents may result in payment delay.
  - 3. The Architect shall review submission within 5 days.
  - 4. The Contractor shall meet with the Owner and Architect to review and reach an agreement upon percentages. When an agreement cannot be reached, the Architect's value shall be used.
  - 5. The Contractor shall submit 4 copies of the Application for Payment on standard AIA G-series forms.
- b. The Contractor shall execute certification with signature of a responsible officer of the Contractor's firm, as the first signature on the Application for Payment.
- c. Progress Payments shall not be construed as acceptance of any part of the Work.

### 1.04 TIMING AND TURNAROUND OF PROGRESS PAYMENTS

Prior to submitting the first payment request, the Contractor shall have an approved construction schedule and a schedule of values for each element of work. Once the schedule of values has been accepted, it will be the basis of payment.

The Progress Payment Estimate prepared by the Contractor shall indicate the percentages of completion and the materials for which payments are to be requested. A review will be performed by the Architect and Owner to confirm that the general accounts are acceptable.

After agreement on final determination of quantities and their associated value, based on percent complete, the Contractor shall submit a completed Request For Payment for that pay period, and shall perform all extensions and arithmetic, and provide backup documentation, etc., on the prescribed forms.

The end date for each monthly pay period shall be established as the last day of each month. The payment request will be accompanied by certified payrolls, where required.

Where progress payments are approved prior to the 15th of the month, it is the intention of the Owner to make payments to the Contractor by the 20th of the following month. Failure on the part of the Owner to make said payment shall not be cause for an increase to cost unless such delay of payment exceeds 90 days from date of approval.

Final payment shall be in accordance with the Construction Agreement and General Conditions after all of the requirements of Section 01 78 00 – Project Closeout, have been met.

### 1.05 PAYMENT FOR MATERIALS ON HAND

- a. Submit separate schedule of prices of material and/or equipment to be stored on or off the work site. The schedule will show the quantities, prices and types of materials to be stored. Stored material prices shall be shown separately.
- b. Payment Requests may include the value of acceptable equipment and materials not yet incorporated into the work, provided that all of the following conditions are met:
  - 1. Such acceptable material/equipment are either furnished and delivered to the site or furnished and stored for use.
  - 2. Stockpiled material shall inspected by the Architect or Owner's authorized agents and shall be segregated and marked as the property of the City of Manchester/Department of Aviation. Transportation and travel expense to verify stored material will be at the Contractor's expense.
  - 3. After delivery of the material, if any inherent or acquired defects are discovered, defective material shall be removed and replaced with suitable material at the Contractor's expense.
  - 4. At his expense, the Contractor shall insure material against theft, fire, vandalism and malicious mischief and shall deliver the policy or certificate of such insurance to the Owner naming the City of Manchester, Department of Aviation as the insured. Insurance shall not be cancelable for at least 30 days and cancellation shall not be effective until certificate thereof is given to the Owner. Proof of insurance must be presented with each Request for Payment.

- 5. Submit bills of sale or paid invoices for all stored materials on which payment is requested. Payment for stored materials will only be approved for major equipment and materials in excess of \$10,000.
- 6. Nothing in the above conditions shall relieve the Contractor of his responsibility for incorporating material into the work in conformity with the Contract Documents.
- 7. Maximum payment for stored products will be the cost of the item plus applicable taxes. Submit supplier's invoice and receipt as evidence of purchase and payment. Such payment shall in no case exceed the bid price for the item of work for which the equipment or material is furnished.
- 8. The Contractor has furnished the Architect with acceptable evidence of the quantity and quality of such stored or stockpiled materials.
- 9. The Contractor has furnished the Architect with satisfactory evidence that the material and transportation costs have been paid.
- c. The Contractor, in submitting an Application for Payment certifies that he has visited all locations of materials and equipment stored off-site and verified the types and quantities of materials and equipment stored, as well as the suitability and security of the storage facilities
- d. Title to stockpiled material shall be vested in the Owner at time of payment to the Contractor.
- e. It is understood and agreed that the transfer of title and the Owner's payment for such stored or stockpiled materials shall in no way relieve the Contractor of his/her responsibility for furnishing and placing such materials in accordance with the requirements of the contract, plans, and specifications.
- f. In no case will the amount of partial payments for materials on hand exceed the contract price for such materials or the contract price for the contract item in which the material is intended to be used.
- g. No partial payment will be made for stored or stockpiled living or perishable plant materials.
- h. The Contractor shall bear all costs associated with the partial payment of stored or stockpiled materials in accordance with the provisions of this subsection.

## 1.06 RETAINAGE

From the total of the amount determined to be payable on a progress payment, 10 (ten) percent of such total amount will be deducted and retained as further security for the full performance of the Contract work. The balance (90 percent) of the amount payable, less all previous payments, shall be certified for payment.

Upon substantial completion of all Work the Contractor shall make a request in writing to the Architect requesting the remainder of the Contract price for the work be paid to him. If the Work is substantially and satisfactorily completed as determined by the Architect, the Contractor shall be paid the remainder of the Contract price for the Work, as increased or decreased in accordance with the terms of the Contract, less two times the value of any remaining items to be completed, as determined by the Architect, less an amount necessary to satisfy claims, liens or judgments against the Contractor which have not been satisfactorily resolved, and subject to the deduction of liquidated damages for delay; if any, and to any other provision of the Contract expressly permitting the withholding or deduction of monies by the Owner.

The Owner shall retain the right to withhold full retainage until such time as acceptable Record Documents and Operations & Maintenance manuals and data are submitted to and accepted by the Owner.

# 1.07 PAYMENT FOR EXTRA AND FORCE ACCOUNT WORK

Extra work will be paid for at the agreed prices specified in the change order or supplemental agreement authorizing the extra work. When the change order or supplemental agreement authorizing the extra work requires that it be done by force account, such force account shall be measured and paid for based on expended labor, equipment, and materials plus a negotiated and agreed upon allowance for overhead and profit.

- a. Miscellaneous. No additional allowance will be made for general superintendence, the use of small tools, or other costs for which no specific allowance is herein provided.
- b. Comparison of Record. The Contractor and the Owner shall compare records of the cost of force account work at the end of each day. Agreement shall be indicated by signature of the Contractor and the Owner or their duly authorized representatives.
- c. Statement. No payment will be made for work performed on a force account basis until the Contractor has furnished the Owner with duplicate itemized statements of the cost of such force account work detailed as follows:
  - 1. Name, classification, date, daily hours, total hours, rate and extension for each laborer and foreman.
  - 2. Designation, dates, daily hours, total hours, rental rate, and extension for each unit of machinery and equipment.
  - 3. Quantities of materials, prices, and extensions.
  - 4. Transportation of materials.
  - 5. Cost of property damage, liability and workman's compensation insurance premiums, unemployment insurance contributions, and social security tax.

Statements shall be accompanied and supported by a receipted invoice for all materials used and transportation charges. However, if materials used on the force account work are not specifically purchased for such work but are taken from the Contractor's stock, then in lieu of the invoices the Contractor shall furnish an affidavit certifying that such materials were taken from his/her stock, that the quantity claimed was actually used, and that the price and transportation claimed represent the actual cost to the Contractor.

## 1.08 PARTIAL PAYMENTS

Partial payments will be made at least once each month as the Work progresses. Said payments will be based upon estimates prepared by the Contractor and reviewed by the Architect and Owner of the value of the work performed and materials complete in place in accordance with the contract, plans, and specifications. Such partial payments may also include the delivered actual cost of those materials stockpiled and stored in accordance with the subsection titled PAYMENT FOR MATERIALS ON HAND of this Section.

- a. No partial payment will be made when the amount due the Contractor since the last estimate amounts to less than five hundred dollars.
- b. From the total of the amount determined to be payable on a partial payment, 10 percent of such total amount will be deducted and retained by the Owner until the final payment is made, except as may be provided (at the Contractor's option) in the subsection titled

PAYMENT OF WITHHELD FUNDS of this Section. The balance (90 percent) of the amount payable, less all previous payments, shall be certified for payment. Should the Contractor exercise his/her option, as provided in the subsection titled PAYMENT OF WITHHELD FUNDS of this section, no such 10 percent retainage shall be deducted.

- c. When not less than 95 percent of the Work has been completed, the Contractor may, at the Owner's discretion and with the consent of the surety, prepare an estimate from which will be retained an amount not less than twice the contract value or estimated cost, whichever is greater, of the work remaining to be done. The remainder, less all previous payments and deductions, will then be reviewed by the Architect for payment to the Contractor.
- d. It is understood and agreed that the Contractor shall not be entitled to demand or receive partial payment based on quantities of work in excess of those provided in the proposal or covered by approved change orders or supplemental agreements, except when such excess quantities have been determined by the Architect to be a part of the final quantity for the item of work in question.
- e. No partial payment shall bind the Owner to the acceptance of any materials or work in place as to quality or quantity. All partial payments are subject to correction at the time of final payment as provided in the subsection titled ACCEPTANCE AND FINAL PAYMENT of this section.
- f. In accordance with State and Local regulation that shall not void the Contract, the Contractor shall deliver to the Owner a complete release of all claims for labor and material arising out of this contract before the final retained percentage or final payment is made. If any subcontractor or supplier fails to furnish such a release in full, the Contractor may furnish a bond or other collateral satisfactory to the Owner to indemnify the Owner against any potential lien or other such claim. The bond or collateral shall include all costs, expenses, and attorney fees the Owner may be compelled to pay in discharging any such lien or claim.

## 1.09 PAYMENT OF SUBCONTRACTORS

The Contractor agrees to pay each subcontractor under this Contract for satisfactory performance of its contract no later than ten (10) days from the receipt of each payment the Contractor receives from the City of Manchester, Department of Aviation. The Contractor agrees further to return retainage payments to each subcontractor within ten (10) days after the subcontractor's work is satisfactorily completed. Any delay or postponement of payment from the above referenced time frame may occur only for good cause following written approval of the City of Manchester, Department of Aviation. This cause applies to both DBE and non-DBE subcontractors.

The Owner shall monitor and enforce compliance with prompt payment requirements by requiring release and waiver of liens from all subcontractors and major material suppliers on a monthly basis. The Contractor shall submit the release and waiver liens with their submittal of any partial or final payment request. The subcontractors or suppliers shall certify that they have received payment current to the previous Contractor's payment request for which the Owner had processed payment. A sample release form is provided at the end of this Section.

# 1.10 PAYMENT FOR OMITTED WORK

As specified in the subsection titled OMITTED WORK of Section 00 72 00, the Owner shall have the right to omit from the Work (order nonperformance) any contract item, including major contract items, in the best interest of the Owner. Omitted work will be deleted by change order. Acceptable materials ordered by the Contractor or delivered on the work prior to the date of the Owner's order will be paid for at the actual cost to the Contractor and shall thereupon become the property of the Owner.

In addition to the reimbursement hereinbefore provided, the Contractor shall be reimbursed for all actual costs incurred for the purpose of performing the omitted contract item prior to the date of the Owner's order. Such additional costs incurred by the Contractor must be directly related to the deleted contract item and shall be supported by certified statements by the Contractor as to the nature the amount of such costs.

TO: City of Manchester, Dept. of Aviation One Airport Road, Suite #300 Manchester, NH 03103

## **CONTRACT NO:**

## **CONTRACT FOR:**

### **CONTRACT DATE**:

#### PROJECT:

In accordance with the provisions of the Contract between Manchester Airport Authority and the Contractor, as indicated above, the (here insert name and address of Surety Company)

\_\_\_\_\_,SURETY COMPANY,

on bond of (here insert name and address of Contractor)

,CONTRACTOR,

hereby approves of the final payment to the Contractor, and agrees that final payment to the Contractor shall not relieve the Surety Company of any of its obligations to

**The Manchester Airport One Airport Road Suite #300** Manchester, NH 03103

As set forth in the said Surety Company's Bond.

IN WITNESS WHEREOF, The Surety Company has hereunto set its hand this day of \_\_\_\_\_20\_\_\_\_

Surety Company

Signature of Authorized Representative

Attest: (Seal):

Title

### 1.11 ACCEPTANCE AND FINAL PAYMENT

When the contract work has been accepted in accordance with the requirements of the subsection titled FINAL ACCEPTANCE of Section 00 73 00, the Contractor will prepare the final cost statement of work actually performed. The Owner shall approve the Contractor's final cost statement or advise the Contractor of his/her objections to the final cost statement which are based on disputes in measurements or computations of the final quantities to be paid under the contract as amended by change order or supplemental agreement. The Contractor and the Owner shall resolve all disputes (if any) in the measurement and computation of final quantities to be paid within 30 calendar days of the Owner's receipt of the Contractor's final estimate. If, after such 30-day period, a dispute still exists, the Contractor may accept the Owner's final quantities under protest of the quantities in dispute, and such disputed quantities shall be considered by the Owner as a claim in accordance with the subsection titled CLAIMS FOR ADJUSTMENT AND DISPUTES of Section 00 73 00.

After the Owner has approved, the Contractor's final cost statement, final payment will be processed based on the entire sum, or the undisputed sum in case of acceptance under protest determined to be due the Contractor less all previous payments and all amounts to be deducted under the provisions of the contract. All prior progress estimates and payments shall be subject to correction in the final estimate and payment.

If the Contractor has filed a claim for additional compensation under the provisions of the subsection titled CLAIMS FOR ADJUSTMENTS AND DISPUTES of Section 00 73 00 or under the provisions of this subsection, such claims will be considered by the Owner in accordance with local laws or ordinances. Upon final adjudication of such claims, any additional payment determined to be due the Contractor will be paid pursuant to a supplemental final cost statement.

## 1.12 AUDIT

- a. The Owner shall have the right to examine and audit all books, estimates, records, contracts, documents, bid documents, subcontracts, and other data of the Contractor (including computations and projections) related to negotiating, pricing, or performing the modification in order to evaluate the accuracy, completeness, and currency of the cost or pricing data at no additional cost to the Owner.
- b. The Contractor shall make available at its office at all reasonable times the materials described in paragraph (a) above, for examination, audit, or reproduction, until 4 years after final payment under this contract.
- c. The Contractor shall insert a clause containing all the provisions of this clause, including this paragraph (c), in all subcontracts over \$10,000 under this contract.

## 1.13 PAYMENT APPLICATION FORMS

- a. Use AIA Document G702 and continuation sheets G703 for lump sum contracts.
- b. Contractor computer generated formats may be used subject to approval from the Owner.
- c. Subcontractor and Supplier release and waiver of liens and claims forms

## END OF SECTION 00 76 50

## SECTION 00 82 20 - INSURANCE REQUIREMENTS

## 1.01 INSURANCE

## CONTRACTOR AGREEMENT

### INDEMNIFICATION AND INSURANCE REQUIREMENTS:

The consideration of the utilization of Contractor's services by the City of Manchester and other valuable consideration, the receipt of which is hereby acknowledged, Contractor agrees that all persons furnished by Contractor shall be considered the Contractors employees or agents and that Contractor shall be responsible for payment of all unemployment, social security and other payroll taxes including contributions from them when required by law.

Contractor hereby agrees to protect, defend, indemnify and hold the Owner, Authority and Architect and their respective employees, agents, officers, sub-consultants and servants free and harmless from any and all losses, claims, liens, demands and causes of action of every kind and character including but not limited to, the amounts of judgments, penalties, interests, court costs, legal fees and all other expenses incurred by the Owner, Authority and Architect arising in favor of any party, including claims, liens, debts, personal injuries, including employees of the Owner, Authority or Architect death or damages to property (including property of the Owner, Authority or Architect) and without limitation by enumeration, all other claims or demands of every character occurring or in any way incident to, in connection with or arising or directly indirectly out of this Contractor Agreement. Contractor agrees to investigate, handle, respond to, provide defense for and defend any such claims, demands or suits at the sole handle, of the Contractor. Contractor also agrees to bear all other costs and expense related thereto, even if the claim or claims alleged are groundless, false or fraudulent. This provision is not intended to create any cause of action in favor of any third party against Contractor or the City or to enlarge in any way the Contractor's liability but is intended solely to provide for indemnification of the City from liability for damages or injuries to third persons or property arising from Contractor's performance hereunder.

Contractor agrees to maintain in full force and effect:

- A. <u>Comprehensive General Liability insurance</u> written on occurrence form, including completed operations coverage, personal injury liability coverage, broad form property damage liability coverage, XCU coverage, and contractual liability coverage insuring the agreements contained herein. The minimum limits of liability carried on such insurance shall be \$2,000,000 each occurrence and, where applicable, in the aggregate combined single limit for bodily injury and property damage liability; \$5,000,000 annual aggregate personal injury liability.
- B. <u>Automotive liability insurance</u> for owned, non-owned and hired vehicles. The minimum limit of liability carried on such insurance shall be \$1,000,000 each accident, combined single limit for bodily injury and property damage.
- C. <u>Excess Liability Coverage, or Umbrella Coverage</u>, for Commercial General Liability and Automobile Liability shall be \$ 5,000,000.
- D. <u>Worker's compensation insurance</u> whether or not required by the New Hampshire Revised Statutes Annotated, 1955, as amended, with statutory coverage and including employer's liability insurance with limits of liability of at least \$100,000 for each accidental injury and, with respect to bodily injury by disease, \$100,000 each employee and \$500,000 per policy year.
- E. <u>The Contractor will provide All-Risks Builder's Risk Insurance</u> in an amount equal to 100% of the insurable value of the work, Completed Value Form including materials delivered and labor performed. This policy will be written in the name of the City of Manchester, Department of Aviation, the Contractor, Sub-Contractors, and Sub-subcontractors as their interests may appear.

Such policy will also be endorsed so that loss, if any, shall be adjusted with and made payable to the Owner as Trustee for the insureds as their interests may appear; such insurance shall be specific as to coverage and not contributing insurance with any permanent insurance maintained as the present premises. The All-Risks insurance includes full flood and earthquake coverage. Materials stored offsite and materials in transit will be covered up to \$100,000 per occurrence.

- F. Any and all deductibles on the above described insurance policies shall be assumed by and be for the account of, and at the sole risk of Contractor.
- G. Insurance companies utilized must be admitted to do business in New Hampshire or be on the Insurance Commissioners list of approved non-admitted companies and shall have a rating of (A) or better in the current edition of Best's Key Rating Guide.
- H. Contractor agrees to furnish certificate(s) of the above mentioned insurance to the Manchester -Boston Regional Airport at the same time as or within seven (7) days from the date of this agreement and, with respect to the renewals of the current insurance policies, at least thirty (30) days in advance of each renewal date. Such certificates shall, with respect to comprehensive general liability and auto liability insurance, name the City of Manchester Department of Aviation, the City of Manchester Department of Risk Management, and the Engineer/Architect: AECOM Technical Services, Inc. as an addition insured (except worker's compensation) and, with respect to all policies shall state that in the event of cancellation or material change, written notice shall be given to the Manchester • Boston Regional Airport, at the Airport Administration office at One Airport Road, suite 300, Manchester, New Hampshire, 03103 at least thirty (30) days in advance of such cancellation or change.
- I. The purchase of the insurance required or the furnishing of the aforesaid certificate shall not be a satisfaction of Contractor's liability hereunder or any way modify the Contractor's indemnification responsibilities to the Manchester Boston Regional Airport.
- J. It shall be the responsibility of Contractor to ensure that all subcontractors comply with the same insurance requirements that he is required to meet.

## 1.02 SPECIAL HAZARDS

The Contractor's and subcontractor's Public Liability, Property Damage, Vehicle Liability, and Vehicle Property Damage insurance coverages shall provide adequate protection against the following special hazards:

a. Damage or injury to aircraft or persons in aircraft operating on or near the project site, resulting from any operations under this Contract.

## END OF SECTION 00 82 20

### SECTION 00 84 00 - EXTENSIONS OF TIME

## 1.01 UNAVOIDABLE DELAYS

## a. Time Extension

- 1. The Contractor will be granted an extension of time for completion of the Work beyond that named in the Contract Documents, for delays which may result through causes beyond the control of the Contractor and which he could not have avoided by the exercise of care, prudence, foresight and diligence.
- 2. The Contractor shall be allowed extensions of time in which to complete the Work equal to the sum of all unavoidable delays plus any adjustments of contract time due to contract change orders.
- 3. Unavoidable delays within the meaning of this Section shall be those caused by acts or neglect of the Owner, its employees, or those under it by contract or otherwise; by Acts of God (including weather or of the public enemy, fire, epidemics, or strikes). Material shortages and delays in utility company connections may be classified as an unavoidable delay if the Contractor can produce satisfactory evidence that he acted in a timely manner. There will be no damages for delays caused by Acts of God, public enemy, fire, epidemics, strikes, material shortages, and utility companies.
- 4. Delays in the prosecution of parts of the Work which may in themselves be unavoidable, but do not necessarily prevent or delay the prosecution of other parts of the work nor the completion of the work within the time specified, which do not necessarily prevent the completion of the whole Work within the time herein specified, will not be considered as unavoidable delays within the meaning of the contract.
- b. Notice
  - 1. Whenever the Contractor foresees any delay in the prosecution of the controlling (critical path) work activity, and in any event immediately upon the occurrence of any delay which he regards as an unavoidable delay, the Contractor shall notify the Architect in writing of such delay and its cause, in order that the Architect and Owner may take immediate steps to prevent, if possible, the occurrence or continuance of the delay, and may determine whether the delay is to be considered avoidable or unavoidable, how long it continues, and to what extent the prosecution and completion of the work are to be delayed thereby.
- c. Request for Time Extension

In the event the Contractor requests an extension of contract time for unavoidable delay, or for changes, such justification shall be submitted no later than seven (7) days after the initial occurrence of any such delay. When requesting time for proposed change orders they must be submitted with the proposed change order with full justification. If the Contractor fails to submit justification with the proposed change order they will waive their right to a time extension at a later date. Such justification must be based on the official contract schedule as updated at the time of occurrence of delay or execution of work related to any changes to the scope of work. The justification must include, but is not limited to, the following information:

- 1. The duration to perform the activity relating to the changes in the work and the resources (manpower, equipment, material, etc) required to perform these activities within the stated duration.
- 2. Logical ties to the contract schedule for the proposed changes and/or delay showing the activity/activities in the schedule whose start or completion dates are affected by the change and/or delay.

The Architect, after receipt of such justification and supporting evidence, shall make its finding of fact. The Architect's decision shall be final and conclusive, and the Architect shall advise the Contractor in writing of such decision. If the Architect finds that the Contractor is entitled to any extension of contract time, the Architect's determination as to the total number of days of extension shall be based upon the latest updated version of the contract schedule. Such data will be included in the next updating of the schedule.

END OF SECTION 00 84 00

### SECTION 00 85 00 - DISPUTES - CLAIMS

### 1.01 GENERAL

"Dispute" or "Claim," as used in this Section, means a written demand or written assertion by one of the contracting parties seeking, as a matter of right, the payment of money in a sum certain, the adjustment or interpretation of contract terms, or other relief arising under or relating to this Contract. A claim arising under a contract, unlike a claim relating to that contract, is a claim that can be resolved under a contract clause that provides for the relief sought by that claimant. A voucher, invoice, or other routine request for payment that is not in dispute when submitted is not a claim or dispute under the contract. The submission may be converted to a claim under the contract, by complying with the submission requirements of this clause, if it is disputed either as to liability or amount.

Disputes under this agreement shall not be submitted to arbitration. Should any dispute arise respecting the true value of any work done, of any work omitted, or of any extra work which said Contractor may be required to do, or respecting the size of any payment to said Contractor during the performance of this contract, said dispute shall be decided by the Architect and the decision of the latter shall be final and conclusive.

A claim by the Contractor shall be made in writing and submitted to the Architect for a written decision. A claim by the Owner against the Contractor shall be provided to the Contractor in writing.

## 1.02 PROCEDURE

Contractor and Owner shall make good-faith attempts to resolve any and all claims/disputes that may from time to time arise during the performance of the Work covered by this Contract. If the Contractor considers any work demanded of him/her to be outside the requirements of the Contract, or if he considers any instruction, meaning, requirement, ruling, or decision of the Architect to be unauthorized, he shall, within seven (7) calendar days after such demand is made, or instruction is given, file a written protest (dispute) with the Architect stating clearly and in detail his/her objections, and reasons therefore. The Contractor shall promptly comply with the Work demanded of him/her even though a written protest has been filed. If a written protest is not issued within seven days, the Contractor shall waive his/her right to further claim on the specific issue.

The Architect will review the Contractor's written protest (dispute) and recommend a resolution from which the Owner will make a decision. If, after receiving the decision, the Contractor still considers the work demanded of him/her to be outside the requirements of the contract, he shall so notify the Owner in writing within seven days after receiving the decision that a formal claim will be submitted. Within thirty (30) days of receiving the decision, the Contractor shall submit his/her claim and all arguments, justification, cost or estimates, CPM schedule analysis, and detailed documentation' supporting his/her position. Failure to provide notification within (7) seven days and all justifying documentation within (30) thirty days will result in the Contractor waiving his/her night to the subject claim.

Upon receipt of the Contractor's formal claim including all arguments, justification, cost or estimates, CPM schedule analysis, and documentation supporting his/her position as outlined above, the Architect will review the issue and within thirty (30) days from receipt of the Contractor's claim render a final determination.

### 1.03 CERTIFICATION

The Contractor (and subcontractors) shall submit with the claim a certification that:

- a. The claim is made in good faith;
- b. Supporting data are accurate and complete to the best of the Contractor's knowledge and belief.

- c. The amount requested accurately reflects the contract adjustment for which the Contractor believes the Owner is liable.
- d. If the Contractor is an individual, the certification shall be executed by that individual.
- e. If the Contractor is not an individual, the certification shall be executed by an officer or general partner of the Contractor having overall responsibility for the conduct of the Contractor's affairs.

Failure to provide certification in accordance with paragraph 3(e) above will result in the Contractor waiving the right to the subject claim. If a false claim is submitted it will be considered fraud and the contractor may be subject to criminal prosecution.

### 1.04 CLAIM FORMAT

The Contractor will submit the claim justification in the following format:

- a. Summary of claim merit and quantum plus clause under which the claim is made.
- b. List of documents relating to claim:
  - 1. Specifications.
  - 2. Drawings.
  - 3. Clarifications, Supplemental Instructions, Requests for Information.
  - 4. Construction Change Directive.
  - 5. Cost Proposals.
  - 6. Other.
- c. Chronology of events and correspondence.
- d. Analysis of claim merit.
- e. Analysis of claim cost.
- f. Cover letter and certification.
- g. Attachments:
  - 1. Relevant Specifications
  - 2. Relevant Drawings
  - 3. Relevant Clarifications
  - 4. Relevant Correspondence
  - 5. Other

## END OF SECTION 00 85 00

### SECTION 01 01 00 - SUMMARY OF WORK

#### 1.01 DESCRIPTION

- a. This Section includes a description of the Contractor's responsibilities in regard to the Scope of Work included in the Contract, the phasing and sequence of the work, progress and completion of the Project including scheduling milestones / requirements, examination of the site and work, contractor submittals and approvals, the Contractor's use of the premises, the protection of existing utilities, protective measures, and contractor management / coordination.
- b. Project Identification: Airport Terminal Building Improvements AWIP : BHS-TC2/TC4 : A-Wing Offices FY24-805-45
- c. Project Location: Manchester-Boston Regional Airport, One Airport Road, Manchester, NH 03103
- d. Owner: City of Manchester, NH, Department of Aviation, also may be referred to as "Airport" or "MHT" in these or other related documents
- e. Architect / Engineer Identification: The Contract Documents were prepared for this Project by AECOM Technical Services, Inc. (AECOM), 1155 Elm Street, Suite 401, Manchester, NH 03101

#### 1.02 RELATED DOCUMENTS

- a. Plans (Drawings) and all provisions of the Contract Documents, including Bid Forms and Contract Requirements and other Division Specification Sections, apply to this Section.
- b. Work either described or called for by this section or as may or may not be noted in other parts of the Contract Documents shall be considered as called for by both.
- c. Specification Format: The Specifications are organized into Divisions and Sections based on the CSI "MasterFormat" numbering system.
  - 1. Section Identification: The Specifications use section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete. Consult the table of contents at the beginning of the Project Manual to determine numbers and names of sections included in the Contract Documents.
  - 2. Specifications and Plans Notes Content: The Specifications and notes provided on the Plans use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.

Imperative mood and streamlined language are generally used in the Specifications and Plans notes. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.

The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

3. Materials and work requirements specifications / notes are provided on the Plans to a significant extent which shall be considered part of and/or supplementary to technical specifications provided in the Project Manual . All necessary material and work (temporary and permanent) for the complete and functional code compliant installation as defined by the intent of the Contract Documents shall be included in the Contractor's Scope of Work and Bid Proposal, whether or not specifically shown, detailed, or noted on the plans.

Materials, products, and appurtenances called for on the plans by notation of a Make / Model / Manufacturer etc., are done so as basis of design (specification) and shall be subject to "Or Approved Equal" upon consideration of the Contractor's product data submittal to the Owner in accordance with Specification Sections 01 30 00, 01 30 10, and 01 60 01.

All materials, products, and appurtenances shall be confirmed by the Contractor to be as recommended by the manufacturer for the application(s) in this project and shall be installed in accordance with the manufacturers written instructions.

Colors for materials, products, and appurtenances shall be as specified, or otherwise selected by the Owner from the manufacturer's standard available colors pallet and/or submitted samples.

Necessary materials, products, and appurtenances that may not specified on the plans shall be provided in accordance with best industry standards and practices, subject to data submittal to the Owner.

## 1.03 WORK COVERED BY CONTRACT DOCUMENTS

a. The Airport Terminal Building Improvements AWIP : BHS-TC2/TC4 : A-Wing Offices Project consists of architectural/structural, mechanical, electrical, fire alarm & sprinkler system modifications in five work areas within the existing airport terminal building at Manchester-Boston Regional Airport.

Each of the five generally defined major work areas for building modifications are related to specific needs of the Airport for varying purposes including the Airport Worker Inspection Program (AWIP), the Baggage Handling System modifications for Ticket Counter #2 and Ticket Counter #4 (BHS-TC2/TC4), and new and renovated airport operations office spaces in the southern end of the terminal building commonly referred to as the A-Wing area (A-Wing Offices).

- b. The five work areas have varying construction phasing priorities and individual partial or substantial completion milestones to facilitate initiation of certain airport operational needs.
- c. The five major work areas of the project include multiple rooms and assigned sub-areas and miscellaneous work tasks that may or may not be contiguous to the main concentration of work. The work areas are generally designated and defined as follows:

### **AREA 1: WORKER CHECKPOINT** (1<sup>st</sup> floor) – **Base Bid Item**

This work area includes modifications to the existing corridor (#1220.1) and adjacent rooms (#1224 and #1225) to facilitate Airport Worker Inspection Program operations and the related installation of Product / Package X-Ray Inspection Systems equipment.

The existing operations in this area include daily inspections of airport workers that will be accessing the Secure Identification Display Area (SIDA) through existing Door #1220-6. The Owner will temporarily conduct the inspection operations in the adjacent corridor #1220. Access through the work area to Door #1220-6 (in/out) must be maintained at all times during construction. The Contractor shall coordinate all construction activities that may affect that access with the Owner including providing temporary contractor-designed measures to protect persons walking adjacent or through the work area (warning signs, dust curtains, barricades/delineators, etc.) or performing portions of the work as may be necessary during adjusted off-hours or nightwork.

The back portion of existing Break Room #1225 shall remain accessible to airport operations during construction activities except for certain periods as necessary for performance of the work such as wall and door demolition / construction or when work in that room or in the access path to it could present a physical hazard to the occupants. Coordinate room access closures with the Owner.

The construction work includes modifications to the walls that separate the SIDA and the non-secure / public access areas. <u>Special care must be taken</u> at all times to maintain the secure access control including construction of the new separation walls inside room #1224 before demolition of the existing walls commences.

The glass film application work called for at Door #1190-2 near the center of the terminal building (Plan 4 - A6.101) is grouped with the AREA 1 work as a sub-area for the purposes of scheduling and cost allocation.

## AREA 2: TICKET COUNTER #2 (TC-2) (1<sup>st</sup>floor) - Contract Add-Alternate No.1

This work area includes modifications to the existing TSA Training/Offices Rooms (#1175 & 1176 & 1179) and the adjacent TC-2 Baggage Handling Equipment area.

The existing TC-2 baggage handling equipment (L3 inspection unit and related conveyors system) will be demolished and removed by Owner/others prior to commencement of work in the Baggage Handling Equipment area. Work inside the vacated TSA Training/Offices area may begin independently of the work in the Baggage Handling Equipment area if approved to do so by the Owner.

The TSA training and office operations in the work area will be vacated prior to the commencement of work.

The construction work includes modifications to the walls that separate the Secure Identification Display Area (SIDA) and the airline ticket office (ATO) secure controlled access corridor (#1169) and public access Ticket Hall area. <u>Special care must be taken</u> at all times to maintain the secure (SIDA) access control including construction of the new separation walls (vestibule #1170) before demolition of the existing walls commences.

This work area includes modifications to existing airline ticket office (ATO) controlled access corridors (#1156 and #1139) and multiple adjacent rooms to facilitate the interconnection of TC-4 and TC-5 baggage conveyors. The baggage conveyor interconnection work will be performed by the Owner.

The construction work includes modifications to the walls that separate the public access Ticket Hall area and the airline ticket office (ATO) secure controlled access corridors. Special care must be taken at all times to maintain the secure access control including construction of the new separation walls (vestibule #1170) before demolition of the existing walls commences. The new ATO Corridor (#1156) must be constructed and functionally complete for egress before the removal and closure of the existing doorway (Door #1XXX-1) from the public Ticket Hall into the TC-4 ATO corridor can commence.

The work in AREA 3 also includes the construction of an Emergency Egress Corridor (#1202) across the existing Outbound Baggage Make-Up room behind the TC-4 operations area. <u>The new Emergency Egress Corridor (#1202) must be constructed and functionally complete for egress before the removal and closure of the existing doorway (Door #1XXX-1) from the public Ticket Hall into the TC-4 ATO corridor can commence.</u>

The installation of new door 1200-1 will be performed by the Owner and must also be completed before the removal and closure of the existing doorway (Door #1XXX-1) from the public Ticket Hall into the TC-4 ATO corridor can commence.

The wall construction and other related work at the TSA Locker Room #1910 (Plan 1 - A6.101) near the southern part of the terminal building is grouped with the AREA 3 work as a sub-area for the purposes of scheduling and cost allocation.

The glass film application work called for at the TSA Security Checkpoint – A Room #1153 (Plan 2 - A6.101) near the southern part of the terminal building is grouped with the AREA 3 work as a sub-area for the purposes of scheduling and cost allocation.

## AREA 4: A-WING OFFICES (1<sup>st</sup> floor) – Base Bid Item

This work area includes the construction of new office rooms in the oversize baggage service room that services the Bag Claim #1 & #2 area at the southern end of the terminal building referred to as the A-Wing.

The work in AREA 4 also includes modifications to the existing service corridor (#1021) and adjacent rooms (#1174 & #1031-closet) to facilitate Airport Worker Inspection Program operations.

## AREA 5: PRODUCT CHECKPOINT (2<sup>nd</sup> floor) – Base Bid Item

This work area includes modifications to the existing corridor (#2088 & #2089) and the adjacent passenger concourse (#2200) to facilitate Airport Worker Inspection Program operations and the related installation of Product / Package X-Ray Inspection Systems equipment.

The existing operations in this area include daily inspections of airport concessions products and materials that will be transferred into the Secure Identification

Display Area (SIDA) through existing (and proposed relocated) Door #2089-3. This door access (in/out) must be maintained at all times during construction and the Contractor shall coordinate all construction activities that may affect that access with the Owner including providing temporary contractor-designed measures to protect persons walking adjacent or through the work area (warning signs, dust curtains, barricades/delineators, etc.).

The Owner will be conducting daily product inspections in Corridor #2089 generally in the morning hours with some exceptions. The work in AREA 5 for the Product Checkpoint shall be performed between the hours of 11:00 am and 11:00 pm unless requested in writing and approved otherwise by the Owner on an as-needed basis. Work shall be coordinated to facilitate access through the work area for inspected product deliveries into the concourse area at any time.

The construction work includes modifications to the walls that separate the SIDA and the non-secure / public access areas. <u>Special care must be taken</u> at all times to maintain the secure access control including construction of the new separation walls before demolition of the existing walls commences.

The glass film application work called for at the North Stair Access Hallway #2095 (Plan 3 - A6.101) near the center of the terminal building is grouped with the AREA 5 work as a sub-area for the purposes of scheduling and cost allocation.

# **REQUIREMENTS FOR ALL AREAS:**

The Contractor shall coordinate and perform portions of the work that would inhibit ongoing airport operations or impact public areas occupancy (such as utility outages for tie-ins, obstruction of areas that would preclude designated access / egress, excessive noise / dust / odor generation, etc.) as may be required by the Owner, during adjusted off-hours scheduling or nightwork.

# 1.04 WORK SEQUENCE AND MILESTONE COMPLETION DATES:

- a. The relative priorities of the work in the various project areas and the resulting milestone completion dates are established by the operational needs of the Airport. Sub-phasing of work in some areas as noted may be necessary in order to facilitate the Owner's intent for the project.
- b. The following work sequence priority and milestone dates shall be incorporated into the Contractor work plan and project schedule:
  - 8/15/2024: AREA 3 Partial Ticket Counter #4 (TC-4) Completion of the extents of the work in this area as defined to be necessary to allow removal of Door #1XXX-1, including closure of the door opening.
  - 9/15/2024: AREA 1 Worker Checkpoint Completion
  - 9/15/2024: AREA 5 Product Checkpoint Completion
  - 9/15/2024: AREA 4 A-Wing Service Corridor #1021 and Room #1022 Completion

- 9/25/2024: AREA 3 Remaining Ticket Counter #4 (TC-4) Work Completion
- 9/25/2024: AREA 2 Ticket Counter #2 (TC-2)
- 11/15/2024: AREA 4 A-Wing New Offices Rooms #1025 and #1026

### 1.05 PROTECTIVE MEASURES

- a. The Contractor shall provide and maintain substantial and adequate protection as may be required to protect new and existing work and all items of equipment and furnishing for the duration of Work. The Contractor shall repair or make good any and all damage or loss he may cause to the building or other Owner property to the full satisfaction of the Owner.
- b. The Contractor shall provide temporary contractor-designed dust / debris containment, and odor ventilation as may be necessary, at all locations to prevent migration outside of the work areas. Sketches and descriptions of temporary containment and protection measures shall be submitted in advance and approved by owner.

### 1.06 CONTRACTOR MANAGEMENT

- a. The Contractor will provide a superintendent which have previously constructed projects of similar size and scope. The superintendent shall be on the job-site at all times while Work is in progress, including overtime operations by the Contractor's forces or by subcontractors. The Contractor will provide the names and resumes of the superintendent to the Owner.
- b. The Contractor and superintendent shall not be changed except with the consent of the Owner, unless the project manager/superintendent proves to be unsatisfactory to the Contractor or to the Owner or ceases to be in the Contractor's employ. The Owner shall be notified immediately of any pending change of superintendent appointed to the Work and the Contractor shall submit qualifications for approval.

## 1.07 COORDINATION WITH OTHER CONTRACTORS

- a. Cooperation and coordination between contractors working for the Owner under separate contracts in these areas at the same time on related systems and appurtenances will be required.
- b. Work under other contracts:
  - 1. Security Systems including CCTV surveillance equipment and controlled access door equipment throughout various areas of the project.
  - 2. Product / Package X-Ray Scanner Inspection Systems including equipment installations at the Worker Checkpoint Area and the Product Checkpoint Area.
  - 3. Owner's Maintenance Department and IT Department (force account) Work including supplemental building architectural and building systems modifications.

#### END OF SECTION 01 01 00

### 1.01 DESCRIPTION

This Section describes the requirements for the submission of a submittal schedule, shop drawings, product data, samples and other items as specified. Other miscellaneous submittals include, but are not limited to, bonds, warranties, project photographs, quality testing and certifications, record drawings, operating and maintenance manuals.

### 1.02 SCHEDULE OF SUBMITTALS

- a. The Contractor shall submit a comprehensive and complete Submittal Schedule within (10) calendar days after the notice to proceed.
- b. The schedule shall identify all of the submittal items required by the Contract Documents governing the work.
- c. For each submittal item on the schedule, the following shall be indicated:
  - 1. The specification reference number.
  - 2. A place for a submittal number to be assigned by the Contractor.
  - 3. The date by which that item will be submitted.
  - 1. Whether the submittal is for review or for the record.
  - 5. The date by which the submittal is required to be returned to the Contractor.
  - 6. The date by which the material or equipment must be on the site so as not to delay the progress of the work.
  - 7. Description of the submittal.
  - 8. Name, address, and phone number of subcontractors and suppliers.
- d. In preparing the submittal schedule, the Contractor shall consider the nature and complexity of each submittal item and allow ample time for review, revision, correction, re-submittal, and approval sufficiently in advance of the construction requirements.
  - 1. Allow at least fourteen (14) calendar days for review of each submittal or resubmittal by the Architect / Engineer unless otherwise indicated.
  - 2. Allow at least thirty (30) calendar days for review of complex submittals and resubmittals.
  - 3. No claim for delay will be granted to the Contractor when the delay is caused by failure to make submittals in a timely manner and in accordance with the accepted Submittal Schedule.
  - 4. Allow adequate time beyond the required review time for processing and distribution of each submittal or re-submittal.
- e. The submittals shall be in sequence with the schedule for work except as required for products known to require long lead time. For submittals of items requiring long lead time, submit written verification of the required lead time from the supplier.
- f. The Submittal Schedule shall be considered a part of the Progress Schedule.
- g. At weekly progress meetings, the Contractor shall submit a detailed, updated and accurate schedule of anticipated submittals for the next three week time period for review by the Architect. In addition, a list of those submittals which have been provided since the last weekly meeting, submittals which have been returned since the last weekly meeting, any

submittals which are overdue as compared to the requested return date, and a current list of all submittals and re-submittals shall be submitted.

- h. To the greatest extent possible, the Contractor shall make single submissions covering the entire work of individual Specification Sections. Partial or 'phased' submittals for work of the same Section will not be reviewed unless prior written approval is obtained from the Architect.
- i. Fifteen (15) days after notice to proceed, the Contractor shall provide a listing to the Architect of all administrative submittals required by the Contract, including such items as the Work Plan, CPM schedule, submittal schedule, etc. It will include a description of the item to be provided and the number of days after notice to proceed for submission.
- j. All submittals related to interior finish selections shall be delivered as a single, comprehensive package in order to allow for a simultaneous and comparative review.

## 1.03 SUBMITTAL TRANSMITTAL FORM AND SUBMITTAL REQUIREMENTS

The Contractor shall include in each transmittal the following information and forward to the Architect an accompanying transmittal.

- a. The number of the submittal.
- b. The date of the submittal.
- c. The Contractor's name.
- d. The subcontractor's name.
- e. The Project name.
- f. The Project number.
- g. The Specification Section and paragraph.
- h. The Drawing reference.
- i. On the transmittal record, note the date sent and the requested due date from the Architect.
- j. Note the quantity and type of submittal.
- k. Note the Drawing/item, date, and description of the submittal.
- 1. Note any deviations from the Contract Documents.
- m. The Contractor's certification review of the submittal and compliance with the requirements of the Contract Documents.
- n. Field dimensions identified as such.
- o. Any other pertinent information.
- p. All attachments to the transmittal record will be identified with the submittal number.

## 1.04 SUBMITTAL NUMBERING SYSTEM

Submittals shall be numbered sequentially by Specification Section. Re-submittals shall be followed by "-1", "-2", "-3" etc. as necessary for each resubmission. For example, the first submittal regarding Section 09 90 00 shall be "09 90 00-001". The second submittal in that Section shall be 09 90 00-002". The first resubmittal of 09 90 00-002" shall be 09 90 00-002-01."

## 1.05 CONTRACTOR'S RESPONSIBILITIES

a. The Contractor shall maintain a log of submittals showing the submittal number, description, specification section, schedule submittal date, date to the Architect, requested due date, date received from Architect, submittal review action code, and comments. The Contractor shall submit a current copy of the submittal log each month.

- b. The following information shall be included, where applicable:
  - 1. Field measurements.
  - 2. Field construction criteria.
  - 3. Catalog numbers and similar data.
  - 4. Relation to adjacent structure or materials.
  - 5. Field dimensions, clearly identified as such.
  - 6. Applicable standards, such as ASTM numbers.
  - 7. A 4" x 4" blank space for the Architect's stamp.
  - 8. Notes identifying deviations from the Contract documents.
  - 9. "Clouds" on re-submittals showing revised areas.
- c. The Contractor shall submit drawings and samples in accordance with the approved schedule of submittal dates.
- d. The Architect shall be notified in writing, at the time of submission, of deviations in submittals from the requirements of the Contract Documents. The Contractor's responsibility for deviations in submittals shall not be relieved by the Architect's review of the submittals, unless the Architect gives written acceptance of specific deviations. No changes shall be made without an approved Change Order.
- e. The Contractor shall indicate by signed stamp that the submittal has been thoroughly checked and that it is in strict accordance with the Contract requirements.
- f. The Contractor's responsibility for errors and omissions in the submittals shall not be relieved by the Architect's review.
- g. The Contractor shall be responsible for the accuracy of the submittals and for the proper fitting, verification of dimension, verification of quantities, construction of the work, furnishing of materials, and work required by the Contract Documents but not indicated on the submittals.
- h. Submission of shop drawings, calculations, product data, etc. in either original submission or when resubmitted with corrections, constitutes evidence that the Contractor has checked all information thereon, and that he/she accepts and is willing to perform the work as shown, in a workmanlike manner, and in accordance with the best standard practice.
- i. The Contractor shall not submit drawings, samples, or data for products that have not been specified unless such products have been formally approved as a substitute. (Section 01 60 01 Product Options & Substitutions)
- j. No work which requires submittals shall begin until such submittals have been reviewed by the Architect and returned to the Contractor.
- k. The Contractor shall notify the Architect immediately if he/she considers any comments, notations, instructions, notes, etc. applied to the submittals by the Architect to be a change to the Contract requirements. The Contractor shall initiate an RFI (Request for Information) identifying the scope of the work which they consider to be a change to the Contract requirements. The RFI will be submitted in accordance with the IR processing requirements contained within the Specification.
- 1. The Contractor shall perform no portion of the work requiring submittal until such submittal is made to the Architect and the review process is completed.

### 1.06 ARCHITECT'S RESPONSIBILITIES

- a. The Architect will review submittals with reasonable promptness as defined below for design concept and compliance with the Contract Documents.
- b. The Architect's review of the shop drawings will be for general conformance with design conditions only and will not relieve the Contractor of his/her responsibility for quantity, fit, dimensions, coordination and full compliance with all of the Contract documents.
- c. The Architect reserves the right to reject submittals which, in its opinion, are incomplete and/or lack sufficient information to enable them to accomplish a thorough review.
- d. The Architect may reject re-submittals which do not clearly indicate where revisions have been made to the original submittal.
- e. The Architect will reject submittals for product which have not been specified unless such products have been formally approved as acceptable substitutes. (Section 01 60 01 –Product Options & Substitutions).
- f. The Architect's review of the submittals shall not be construed as approving departures from the Contract requirements.
- g. The Architect's review of the submittals shall not relieve the Contractor from responsibility for any violation, indicated on such submittals, of local, City, State, or Federal laws, rules, ordinances, or rules and regulations of commissions, boards, or other authorities or public utilities having jurisdiction.
- h. The Architect's review of separate items does not constitute review of an assembly in which the item functions.

## 1.07 RESUBMISSION REQUIREMENTS

- a. Shop drawings:
  - 1. The Contractor shall revise initial shop drawings as required.
  - 2. Areas of the revision shall be indicated by drawing a "cloud" around the revised areas and identify revisions by a revision number and date. The Architect's review of a resubmission shall not constitute acceptance of any changes not specifically requested on the prior submission.
- b. Product data and samples:
  - 1. New data and samples shall be submitted as required for initial submittal.

## 1.08 DISTRIBUTION OF SUBMITTALS AFTER REVIEW

- a. The Contractor shall distribute copies of submittals which carry the Architect's stamp to:
  - 1. The Contractor's project site file and the project record file.
  - 2. Subcontractors as appropriate.
  - 3. Others as appropriate.

#### END OF SECTION 01 30 00

## SECTION 01 30 05 - PROJECT COORDINATION

## 1.01 CONTRACTOR'S RESPONSIBILITIES

The Contractor's project coordination responsibilities include, but may not be limited to the following. The Contractor shall:

- a. Coordinate the work of all subcontractors and provide copies of coordination schedules as requested by the Architect.
- b. Establish lines of authority and communication; supply the Owner with list a list of 24 hr. emergency contact numbers of all supervisors and subcontractor supervisors.
- c. Include in the scheduled weekly meetings, the coordination of various entities and activities. Where necessary, schedule additional coordination meetings for the purpose of coordinating the work, daily security issues, and resolving conflicts,
- d. Provide all subcontractors with reasonable opportunity for the introduction and storage of their materials and equipment and the execution of their work.
- e. Make provisions to accommodate items installed by the Owner or by others under separate contracts and/or controls.
- f. Prepare, utilize and submit for information, coordination drawings to indicate how work shown by separate shop drawings will be interfaced and sequenced for installation.
- g. Establish and maintain procedures to ensure that persons performing work at site are skilled in methods and craftsmanship needed to produce required quality-levels. Remove and replace (at no additional cost to the Owner) work which does not comply with workmanship standards as specified and as recognized in the construction industry for applications indicated.
- h. In advance of installation of every major unit of work which requires coordination and interfacing with other work, meet at project site with installers and representatives of manufacturers and fabricators who are involved in or affected by unit of work. Review progress of other work and preparations for particular work under consideration.
- i. Require installer of each major unit of work to inspect substrate to receive work, and conditions under which work will be performed, and to report (in writing to Contractor) unsatisfactory conditions. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to installer.
- j. Where installation includes manufactured products, comply with manufacturer's instructions and recommendations, to extent these are more explicit or more stringent than requirements indicated in contract documents.
- k. Inspect each item of materials or equipment immediately prior to installation, and reject damaged and defective items.
- 1. Provide proper and structurally sound connection devices and methods for securing work as it is installed; true to line and level, and within recognized industry tolerances if not otherwise indicated. Allow for expansion and building movements. Provide uniform joint widths in exposed work. Refer appearance choices to Architect for final decision,
- m. As an integral step of starting each installation, recheck measurements of the Work.

- n. Install work during conditions of temperature, humidity, exposure, weather, and status of project which will ensure satisfactory results. Coordinate with entire work. Isolate each unit of work from non-compatible work, as required to prevent rust, electrolysis, and deterioration or any kind due to incompatibility of materials. Where units of work touch, use only materials proven to be compatible.
- o. Coordinate closing-in of work with required inspections and tests, so as to minimize uncovering work.
- p. Where mounting heights are not indicated, refer to Architect for final decision. Submit manufacturer's recommendations.
- q. Coordinate the tolerances of all materials.
- r. Coordinate with the other Contractors.
- s. Require training for subcontractor field supervision personnel for Airport operations and security.

## 1.02 MUTUAL RESPONSIBILITY

If any part of the Contractor's Work depends for proper-execution or results upon the work of the Owner or any separate contractor, the Contractor shall, prior to proceeding with the Work, inspect and promptly report to the Owner any apparent discrepancies or defects in such other work that render it unsuitable for such proper execution and results.

Failure of the Contractor to so inspect and report shall constitute acceptance of the work of others as fit and proper to receive the work, except as to defects which may subsequently become apparent in such work by others.

Any costs caused by defective or ill-timed work shall be borne by the responsible party to whom the Architect attributes the cause of the defect(s).

Should the Contractor wrongfully cause damage to the work or property of others or to other work or property on the site, the Contractor shall promptly remedy such damage.

## 1.03 NOTICE AND UTILITY SERVICES

If the Contractor is to tie into existing utilities either in the form of a temporary tie-in or permanent tie-in, the Contractor shall make arrangements with the utility companies and local authorities at no expense to the Owner. Also, if the Contractor damages any existing utilities with his equipment and/or manpower, he shall arrange with the utility company to repair the damaged utilities to their original condition at his expense.

Where such tie-in requires utility shut down, the Contractor must notify the Owner in writing, 7 days in advance of such shut down.

## 1.04 OVERTIME AND HOLIDAY WORK

Overtime, multiple shift, weekend and holiday work may be required to complete the work within the allotted time of this Contract. If it becomes necessary to perform any work after regular working hours, on Saturdays, Sundays, or legal holidays in order to bring the Contractor's work into conformance with the Schedule due to delays for which the Contractor is responsible, the overtime, weekend, or holiday work shall be performed by the Contractor at no additional cost to the Owner.

## 1.05 COORDINATION WITH OWNER PERSONNEL

The Contractor shall coordinate and cooperate with Owner personnel throughout the Project as they visit the site.

# END OF SECTION 01 30 05

### 1.01 SHOP DRAWINGS

- a. Submit to the Architect an electronic PDF markable file of submittals. For large shop drawings, not to exceed 30" x 42", submit one reproducible copy.
- b. Each shop drawing shall have blank spaces large enough to accept 4" x 4" review stamps of the Contractor, Architect and/or Engineer.
- c. Shop drawings shall include plans, sections, and details including complete information for making connections with other work and any other information necessary to adequately describe the unit of work.
- d. Materials and finishes shall be clearly identified and, where applicable, Specification Sections and paragraph numbers shall be included as reference.
- e. Identify details by reference to sheet and detail numbers shown on the Contract Documents.
- f. Identify applicable standards, such as ASTM numbers, Federal or State Specification numbers on the drawings.
- g. Identify deviations from the Contract Documents.

### 1.02 PRODUCT DATA

- a. Submit an electronic PDF markable file of manufacturer's catalog cuts, brochures, diagrams, schedules, performance charts, illustrations, and other descriptive data as required by the Specification Sections. When manufacturer's printed literature is required to be submitted it shall be submitted in original form. Make one coordinated submittal for each unit of work of system. An electronic copy shall be returned to the Contractor.
- b. Mark the manufacturer's data to clearly indicate the items to be included as a part of the work. Product data submitted with multiple items and no clear indication as to which item is to be used in the work will be returned to the Contractor without being reviewed.
- c. Submit manufacturer's standard printed recommendations for application and use. Supplement standard information to provide additional information applicable to the Project.
- d. Include dimensions and clearances required. Indicate field dimensions which have been checked and verified.
- e. Show performance characteristics and capacities; wiring diagrams and controls.
- f. Review product data prior to submission to the Architect. Stamp and sign each submittal to indicate that the Contractor has reviewed the submittal for compliance with the Contract Documents.

### 1.03 SAMPLES

a. The purpose of sample installations shall be to clearly establish standards of quality for the project prior to proceeding with the work. The Contractor shall construct, prepare, or otherwise provide samples/sample installations as directed by the Architect. All costs related to providing, maintaining and removing required samples shall be paid by the Contractor.

- b. Submit four (4) samples as specified. Unless otherwise specified, samples shall be of sufficient size and quantity to clearly indicate:
  - 1. Functional characteristics of the product or material, with integrally related parts and attachment devices.
  - 2. Full range of color samples.
- c. Requirements for field samples and mockups:
  - 1. Erect at site in locations acceptable to the Architect.
  - 2. Construct each mockup or field sample; include all items required in the finish work.
  - 3. Mockups or field samples shall remain in place until the work it represents has been completed and accepted by the Architect.
- d. Label each sample to indicate the name of the Project, Contractor, manufacturer, brand.
- e. Provide units identical with final condition of proposed materials or products for the work. Include "range" samples (not less than three units) where unavoidable variations may be expected, and describe or identify the variations between units of each set. Provide full set of optional samples where Architect's selection is required.
- f. Prepare samples to match the Architect's samples where so indicated. Include information with each sample to show generic description, source or product name and manufacturer, limitations, and compliances with standards. Submit samples for the Architect's review and conformation of color, pattern, and texture.
- g. After a sample has been accepted, no change in brand or manufacturer will be permitted unless satisfactory written evidence is presented to, and accepted by the Architect, that the manufacturer cannot make scheduled delivery of the accepted material, or that the material delivered has been rejected and substitution of suitable material is an urgent necessity.
- h. Maintain returned final set of samples at project site, properly protected and in suitable condition and available for quality control comparisons by the Architect and others. Quality control set shall serve as the basis for comparison for following work, and shall establish the standard of color, pattern, texture, workmanship, and other qualities as applicable.
- i. Returned samples which are intended or permitted to be incorporated in the work are so indicated in individual sections, but must be undamaged at the time of use.
- j. Where colors are specified or described by the Architect to match a manufacturer's standard paint color number, secure sample color chips of sufficient size from the manufacturer and prepare matching samples for review by the Architect.

# END OF SECTION 01 30 10

### SECTION 01 30 20 - PROJECT ADMINISTRATION

### 1.01 DESCRIPTION

- a. The Work on this Project will be subject to inspection by Owner's representative. No inspector, superintendent, or administrator is authorized to change any provisions of the Specifications without written authorization of the Architect, nor shall the presence or absence of the inspector relieve the Contractor from any requirements of the Contact.
- b. The Contractor shall adhere to the following procedures which include, but are not limited to, the following:
  - 1. Prepare a daily construction report, recording the following information concerning events at the site; and submit copies to the Architect and Owner at weekly intervals:
    - a) List of Subcontractors at the site.
    - b) Approximate count of personnel at the site.
    - c) Accidents and unusual events.
    - d) Meetings and significant decisions.
    - e) Stoppages, delays, shortages, losses, etc.
    - f) Meter readings and similar recordings.
    - g) General weather conditions, high & low temperatures.
    - h) Emergency procedures.
    - i) Orders and requests of governing authorities.
    - j) Change Orders received, implemented.
    - k) Services connected, disconnected.
    - 1) Equipment or system tests and start-ups.
    - m) Partial Completions, occupancies.
    - n) Substantial Completions authorized.
  - 2. Be responsible for the quality of the work performed, and take primary responsibility and authority for quality control in accordance with these specifications.
  - 3. Provide written advance notice to the Owner at least 3 working days prior to the start of work which requires testing as required by governing authorities and/or by these specifications.
  - 4. Follow the field instructions issued by the Architect / Engineer.
  - 5. Prepare and submit Cost Proposals, review with the Architect and submit final proposed Change Order Requests in accordance with the procedures established in the Specifications.
  - 6. Submit Applications for Payment as required. Submit claims in accordance with established procedures as outlined in the General and General Supplemental Conditions.
  - 7. Coordinate the closeout of the Project. Follow the procedures for closeout as established in the Specifications.
  - 8. Comply with the Architect's notices of noncompliance and utilize the notice of noncompliance form to notify when and how the work is in compliance.
  - 9. Have subcontractors attend project meetings as requested by the Architect. END OF SECTION 01 30 20

## SECTION 01 30 25 - CLARIFICATION & INSTRUCTION

### 1.01 DESCRIPTION

Should the Contractor discover conflicts, omissions, or errors in the Contract Documents, or have any question concerning interpretation of the Contract Documents; or if it appears to the Contractor that the work to be done is not sufficiently detailed or explained in the Contract Documents, the Contractor shall immediately notify the Architect in writing with a Request for Information (RFI), for interpretation or additional detailed instructions concerning the Work.

In event of failure to agree as to scope of Contract requirements, Contractor shall follow procedure set forth in Section 00 85 00 – DISPUTES-CLAIMS.

If the Contractor considers a clarification to be a change, he must submit a cost proposal request within ten (10) calendar days following receipt of instruction or waive his right to the change.

a. Clarification:

The Contractor shall ask for any clarification immediately upon discovery of an issue as outlined under Section A. The Contractor shall submit all requests for clarification and/or additional information to the Architect in writing on a Request for Information form. Subcontractor requests for information or clarification must be made through the Contractor. The Architect, whose decision shall be final and conclusive, shall resolve such questions and issue instructions to Contractor within a reasonable amount of time but in no more than fourteen (14) calendar days. Only responses written and signed by the Architect are binding. Should the Contractor proceed with work affected before receipt of instructions from the Architect, the Contractor shall remove and replace or adjust work which is not in accordance therewith and shall be responsible for resultant damage, defect or added cost.

b. Supplemental Instructions:

The Architect may furnish additional detailed written instructions to further explain the Work, and such instructions shall be a part of the Contract requirements. Should additional detailed instructions, in the opinion of Contractor, constitute work in excess of scope of the Contract, he must submit written notice thereof immediately to the Architect but not more than seven (7) calendar days following receipt of such instruction, and in any event prior to commencement of work thereon. The Architect will then consider such notice and, if the judgment is justified, the Architect's instructions will be revised or the extra work authorized. The Contractor shall have no claim for additional compensation because of such additional instructions unless Contractor gives the Architect written notice thereof within the seven (7) days specified above.

c. Field Reports:

A field report issued by the Architect will be used to document items of Work performed incorrectly or omitted by the Contractor that are non-conforming to Contract Documents.

- 1. All field reports shall be provided to the Contractor and Owner in writing.
- 2. The Contractor will be directed to advise the Architect of impacts on the schedule as a result of any field report.
- 3. All field reports shall be discussed at project meetings.
- 4. Field reports shall not be closed until a corrective action plan, prepared by the Contractor, is accepted by the Architect.

### END OF SECTION 01 30 25

## SECTION 01 30 26 - CHANGE ORDER PROCEDURES

### 1.01 CHANGES

There will be no changes to the Contract except as by written notification in the form of an approved change order issued by the Architect and signed by the Owner and Contractor.

Should the Architect or Owner at any time during the progress of the Work, request any extra work including but not necessarily limited to alterations, deviations, additions, or omissions from the Contract Documents, it shall be at liberty to do so. Changes may include but may not be limited to:

- a. Scope or materials.
- b. Facilities, equipment, materials, services, or site by others.
- c. Directing acceleration in the performance of the Work.
- d. Extra terms or time.

### 1.02 CHANGE ORDER WORK NOTIFICATION

If any change causes an increase or decrease in the Contractor's cost of, or the time required for, the performance of any part of the Work under this Contract, whether or not changed by any such order, the Architect will make an equitable adjustment and modify the Contract in writing as a Change Order, signed by the Owner and Contractor.

No proposal by the Contractor for an equitable adjustment shall be allowed if asserted after final payment under this Contract.

Changes will be performed in accordance with the original Contract requirements unless otherwise indicated.

## 1.03 CHANGE ORDER PROCESS

- a. Where the Architect and Owner concur that a change is due or requests a change, a Proposal Request (PR) will be issued. Proposal requests issued by the Architect are for information only. Do not consider them as instruction either to stop work in progress, or to execute the proposed change. This information will be issued by means of a numbered Proposal Request.
- b. Upon receipt of the Proposal Request, the Contractor shall submit a cost proposal, in accordance with the requirements and limitations set forth below, for work involving contemplated changes covered by the proposed change. The Contractor's written proposal for an equitable adjustment for a change shall be submitted in the following form:
  - 1. The proposal shall include a lump sum amount supported by a detailed itemized breakdown of all increases and decreases in the Contract, including all labor, equipment and materials, as required by the following paragraphs. The Contractor will use a cost proposal form acceptable to the Architect and Owner. The Contractor shall upon request by the Architect permit inspection of the original unaltered contract bid estimate, subcontract agreements, or purchase orders relating to the change; and documents substantiating all costs associated with the Cost Proposal.
  - 2. The Contractor shall identify any adjustment in time of the final completion of the Work as a whole which is directly attributable to the changed work. The Contractor's request for a change in time will be supported by a detailed schedule analysis indicating the activities which have been affected and the additional time being

requested. For a change in time for the Work, the Contractor shall be entitled only to such adjustments in time by which completion of the entire Work is delayed due to the performance of the changed work. Failure to request extra time when submitting such estimate shall constitute waiver of the right to subsequently claim adjustment in time for final completion based upon such changed work.

- 3. If the Architect disagrees with the request for change it will notify the Contractor in writing and the Contractor may elect to issue a dispute notification according to the disputes clause.
- 4. The Contractor must submit the cost proposal within ten (10) days upon receipt of the proposal request. The Contractor shall submit cost proposals in less than 10 days if requested by the Architect or as required by schedule limitations.
- c. If the Contractor fails to submit the cost proposal within the 10-day period (or as requested), the Architect has the right to order the Contractor in writing to commence the work immediately on a force account basis and/or issue a lump sum change to the Contract price in accordance with the Architect's estimate of cost. If the change is issued based on the Architect's estimate, the Contractor will waive his right to dispute the action unless within 10 days following completion of the added/deleted work, the Contractor presents proof that the Architect's estimate was in error.
- d. If the Architect and the Contractor fail to agree as to the proposed change order, the Contractor upon written order from the Architect shall proceed immediately with the changed work. This written notice will be issued as a Construction Change Directive (CCD). The Contractor shall be directed to proceed according to one or more of the following methods:
  - 1. Unit Prices, as provided in the Contract proposal.
  - 2. Unit Prices, as subsequently and mutually agreed upon by the Owner and the Contractor.
  - 3. Lump Sum Amount, mutually agreed upon by the Owner and the Contractor.
  - 4. Time and Material, on a time and materials (T&M) (force account) basis.

When there has been failure to agree as to the cost, no payment will be made to the Contractor until completion of the Work called for in the change order or in the written order authorizing performance of the work.

- e. The Architect will establish a budget not-to-exceed (NTE) price for the T&M change order which may be increased with the approval of the Owner. The Contractor will notify the Architect when he has reached 80% of the not-to-exceed budget. The Contractor shall proceed and shall maintain a daily job force account record containing detailed cost summary of labor, materials, and equipment required for the changed work. Upon being signed and agreed to by the Owner on a daily basis, the force account record will become the basis for payment of the changed work, but such agreement shall not preclude subsequent adjustment based upon later audit by the Owner. The Contractor will provide a weekly accounting of cost compared to the NTE budget.
- f. Upon completion of the work under the T&M change order, the Contractor shall submit its invoice therefore containing only the items of labor, materials, and equipment which are in addition to the requirements of the contract and as approved by both parties, together with the allowable markups.
- g. A change order may adjust the Contract price either upward or downward in accordance with one or a combination of the following bases as the Owner may elect:

- 1. On a lump sum basis as supported by the breakdown of estimated costs.
- 2. On a unit price basis.
- 3. On a time and material (force account) basis.
- h. Costs associated with change orders include:
  - 1. Overhead Rates
    - a) The overhead rate shall include profit, small tools, cleanup, bonds, engineering, supervision, warranties, job-site overhead and home office overhead.
    - b) The Contractor will provide at the beginning of the Project a certified statement and detailed calculation from its accountant establishing the job site and prorate home office overhead rates for itself and its major subcontractors. The overhead and profit shall be against labor and materials only. Where Work is subcontracted, no mark up will be allowed on overhead or profit of others including second and third layer subcontractors or material suppliers. In no case shall the total accumulated overhead and profit on any change order work exceed 15% on a lump sum or unit price basis and 10% on a time and materials basis. In a credit situation the Contractor will utilize the same overhead and profit rates against labor and materials in preparing the change order.
    - c) The Owner shall have the right to review and approve the overhead rate. Where the Contractor and Owner fail to come to an agreement for Contractor's overhead rate, the Owner shall set such rate based in current industry and the Contractor shall be entitled to dispute the action if he does so within 15 days following notice.
    - d) The Contractor at the beginning of the project shall provide a complete listing of all Contractor and subcontractor hourly labor rates.
  - 2. Direct Costs
    - a) Cost for labor shall include any employer payments to or on behalf of the workmen for health, welfare, pension, vacation, and similar purposes. Labor rates will not be recognized when in excess of those prevailing in the locality and time the work is being performed. The costs for all supervision including General Superintendents and Foremen will be included in the markups established by the Contract. The only exception to this will be working foremen who perform actual manual labor. No labor charges will be accepted for engineering or proposal preparation. These costs will be included in the markups established by the Contract. A breakdown of the payroll rates for each trade will be provided for all change orders 15 days after notice to proceed including the base rate, benefits, payroll taxes, and insurance.

Overtime and premium time pricing will only be allowed for labor which, based on mutual agreement, shall be performed after normal working hours.

b) The actual cost to the Contractor for the materials directly required for the performance of the changed Work. Such cost of materials may include the

cost of transportation and no delivery charges will be allowed unless the delivery is specifically for the changed Work

If a trade discount by an actual supplier is available to the Contractor, it shall be credited to the Owner. If the materials are obtained from a supplier or source owned wholly by or in part by the Contractor, payment thereof will not exceed the current wholesale price for the materials. The term 'trade discount' includes the concept of cash discounting.

If in the opinion of the Architect, the cost of the materials is excessive or if the Contractor fails to furnish satisfactory evidence of a cost to him from the actual supplier thereof, then, in either case, the cost of the materials shall be deemed to be the lowest current wholesale price at which similar materials are available in the quantities required. The Owner reserves the right to furnish such materials as it deems advisable and the Contractor shall have no claims for cost or profits on materials furnished by the Owner.

c) The actual cost to the Contractor for the use of equipment directly required in the performance of the changed work. In computing the hourly rental of equipment, any time less than 30 minutes shall be considered one-half hour. No payment will be made for time while equipment is inoperative due to breakdown or for non- workdays. In addition, the rental time shall not include the time required to move the equipment to the work for rental of such equipment, and to return it to the source. No mobilization or demobilization will be allowed for equipment already on site. If such equipment is not moved by its own power, then loading and transportation costs will be paid in lieu or rental time thereof. However, neither moving time nor loading and transportation costs will be paid if the equipment is used on the project in any other way than upon the changed work.

Individual pieces of equipment having a replacement value of \$1,000 or less shall be considered to be small tools or small equipment and no payment will be made therefore.

The rental rate for equipment will not exceed that as recommended by the lower of the rental rates as contained in the current edition of the Rental Rate Blue Book applicable to the specific extra work or force account work.

For equipment owned, furnished, or rented by the Contractor no cost thereof shall be recognized in excess of the rates established by the Rental Rate Blue Book.

The amount to be paid to the Contractor for the use of equipment as set forth above shall constitute full compensation to the Contractor for the cost of fuel, power, oil, lubricants, supplies, small tools, small equipment necessary attachments, repairs and maintenance of any kind, depreciation, storage, insurance, labor (except for equipment operators) and any and all costs to the Contractor incidental to the use of the equipment.

i. The Contractor shall maintain his records in such a manner as to provide a clear distinction between the direct costs of extra work and the cost of other operations. This requirement pertains to proposed change orders change orders and work the Contractor considers to be potential change orders.

- j. Changes in the Work made necessary due to unexpected or unforeseen site conditions, discovery of errors or omissions in plans or specifications requiring immediate clarifications in order to avoid serious work stoppage, or other changes where the extent cannot be determined until completed, or under any circumstances whatsoever deemed necessary by the Architect, are types of emergency changes which may be authorized by the Architect in writing to the Contractor. The Contractor shall commence performance of emergency changes immediately upon authorization. These changes will be performed on a time and material (force account) basis as aforementioned.
- k. The Contractor may not reserve a right to assess impact cost or time, extended job site costs, extended overhead, and/or constructive acceleration at some later date as related to any and all changes. These costs or estimated costs must be supported with full schedule and cost documentation with each proposed change within the prescribed submission times. If a request for a change is denied and the Contractor disputes the denial, the Contractor must supply the aforementioned documentation to support his claim under the dispute clause of this contract. The Contractor shall waive his right to impact, extended overhead costs and construction acceleration due to the multiplicity of changes and clarifications.
- 1. Contractor and subcontractors by submission of a bid acknowledges and waives the right to claim extended overhead, delay, impact, disruption, etc. if changes issued are within 5 percent of the award amount and/or the number of Requests for Information (RFIs) is less than 2,000.
- m. If the changes exceed 10 percent of the contract and/or RFIs exceed 2,000 in number, the Contractor must demonstrate on a case-by-case basis the effect on the Contract as a whole with detailed schedule and cost analysis.
- n. Should the Contractor find that a change has not been processed which may effect the immediate controlling activity(s), he shall request a Construction Change Directive (CCD) to proceed on a T&M basis.

END OF SECTION 01 30 26
# SECTION 01 30 27 - CONTRACTOR'S WORK PLAN

### 1.01 DESCRIPTION

This Section describes the requirements for finishing a work plan describing Contractor's approach and methods for prosecuting the Work.

It is expressly agreed that time is of the essence of this Contract, and the Contractor agrees to perform the Work within the time and in the manner specified, or within the time of such extensions as may be granted.

The Contractor's scheduling of work crews, equipment and materials will be of utmost importance for completing the work within the time allowed. The Contractor may be required to employ one or more of the following measures to build the project within the time constraints:

- a. Utilize extra equipment and manpower.
- b. Work more than the normal 8-hour shift per day, 5-day week. Overtime, two or three 8-hour shifts per day, 6 or 7 days per week may be required.
- c. Employ extra staff to plan, schedule, coordinate and expedite the work.

In addition to employing additional resources as described above, the Contractor will be expected to take whatever additional steps are necessary to ensure timely completion of the Project.

Submission of a bid by the Contractor constitutes acknowledgment that the foregoing requirements have been taken into account in the Contractor's bid price.

# 1.02 CONTRACTOR'S WORK PLAN

<u>Ten working days after</u> notice to proceed, the lowest responsive, responsible bidder is required to submit a Work Plan describing in detail the Contractor's approach and methods for prosecuting the Work in accordance with the construction and time constraints. The Work Plan shall include but not be limited to the following:

- a. A summary schedule of the Work with milestone completion dates clearly indicated. The schedule shall show the major critical path trades and their respective activity constraints. As a minimum, the Contractor shall show the activities for concrete, miscellaneous steel, doors, finishes, mechanical and electrical systems.
- b. A narrative and schedule describing how the Contractor intends to staff, equip and supply the job by trade in order to meet contractual time constraints. Include number of crews, crew sizes, total workers for each phase, activity, number and types of major equipment to be used, method of material procurement, hours per work shift, work shifts per day, anticipated production rates, etc. Production rates shall be provided for at least the concrete, miscellaneous steel, doors, mechanical and electrical systems, interior finishes.
- c. A breakdown by Specification Section, of the work Contractor, subcontractor, or major supplier is responsible to complete.
- d. An organization chart describing: (a) the hierarchy and relationships of the Contractor's project management staff and the hierarchy of subcontractors and suppliers including the trade(s) or portion(s) of work for which each is responsible. Of particular interest is how the Contractor intends organize and coordinate off-site work that involved the combined effort of subcontractors and suppliers.

- e. A description of what additional methods will be used by the Contractor, should actual progress of the Work not meet the time constraints specified herein, as defined in Section 01 30 28.
- f. A directory of the Contractor and all subcontractors including 24-hour emergency telephone numbers.

The Architect and Owner will review the Contractor's Work Plan for reasonableness and for conformance with Contract requirements. If the Work Plan does not meet specific Contract requirements or if, in the Architect's opinion, the Work Plan does not give a reasonable assurance of the Contractor's commitment to timely completion, the Architect will notify the Contractor of the deficiencies or his concerns with the Work Plan. Preconditions for payment shall be that the Contractor responds satisfactorily to the Architect's concerns. A completed and approved construction schedule is required prior to a submission of an Application For Payment.

END OF SECTION 01 30 27

#### 1.01 DESCRIPTION

- a. The Contractor shall prepare, maintain and update detailed progress schedules. The schedules shall be a true and accurate representation of the Contract's Work Plan and shall accurately reflect and report the actual performance and progress of the Work.
- b. The Contractor's attention is specifically directed to the fact that submission and approval of Interim and Contract CPM Progress Schedules as well as CPM Progress Schedule updates, are required in order for the Architect to certify the approximate amount of work performed and compensation earned by the Contractor. (Section 00 76 50 - Measurement and Payment)

#### 1.02 REQUIREMENTS

- a. The Contractor shall submit a complete computer-generated project CPM Project Schedule. This *Baseline* Schedule shall reflect the Contractor's projected plan and schedule to compete all work within Contract time specified.
- b. Schedule submittals are subject to review and acceptance by the Architect. The Owner retains the right to withhold progress payments until the Contractor submits a Progress Schedule acceptable to the Owner.
- c. The Contractor shall submit monthly progress review and update of the schedule as basis of each progress payment.
- d. A computer scheduling system shall be utilized for producing CPM Progress Schedule drawings and network reports. The preferred scheduling software shall be MS Project Primavera or equal compatible, and approved, software.
- e. Where system testing is required in no case shall more than 90-percent of the value be paid prior to the system passing all applicable tests.
- f. Mobilization activities shall include any costs necessary for the Contractor to set-up operations on-site, including but not be limited to: bonds, permits, field office, utilities, equipment, insurance, and storage trailers.
- g. At the head of the schedule, provide a two item cost correlation line indicating "Pre calculated" and "Actual" costs. On the line, show dollar - volume of work performed as of the dates used for preparation of payment applications.

#### 1.03 PREPARATION GUIDELINES

- a. The Progress Schedule shall represent a practical plan to complete the work within the Contract time for completion. The Progress Schedule shall be consistent in every way with the Contractor's Work Plan submitted previously.
  - 1. A schedule extending beyond the Contract time will not be acceptable.
  - 2. A schedule showing the Work completed in less than the Contract time may be found by the Architect to be impractical.
  - 3. A schedule found to be impractical for the preceding reason or any other reason shall be revised by the Contractor and resubmitted.

found to be practical by the Architect, shall be considered to have float. The float is the time between the scheduled completion of the work and Contract completion date. Float is a resource available to both the Owner and the Contractor.

- 5. Approval of the Contractor's schedule if based on less time than the maximum time allowed does not serve to change the specified time of completion, nor serve as a waiver of the Contractor's nor the Owner's right to the full amount of time specified as the time of completion, unless the time of completion is changed by a formal change order to this Contract.
- 6. Not less than 20-calendar days will be established prior to completion for punch list completion and cleanup.
- 7. No more than 15-percent of the activities shall be critical or near critical. Near critical is defined as float in the range of 1 to 10 workdays.
- 8. No activity shall have duration greater than 15 days.
- b. The Progress Schedule shall clearly show the sequence and interdependence of construction activities and shall specifically as a minimum indicate:
  - 1. The start and completion of all items of work, their major components, and interim milestone completion dates, if any.
  - 2. Activities for procurement, delivery, installation and completion of each major piece of equipment, materials, and other supplies, including:
    - a) Time for submittals, resubmittals, and reviews.
    - b) Time for fabrication and delivery of manufactured products for the Work.
    - c) The interdependence of procurement and construction activities.
  - 3. Items related to action by others (Owner, regulatory agencies, other contractors) that may cause interference or be required to be completed by other before Work can start or finish.
- c. The schedule shall:
  - 1. Be in sufficient detail to assure adequate planning and execution of the Work. Activities should generally range in duration from 3- to 15-work days each. Except for procurement items which shall have a duration which starts with approval of shop drawings and ends with delivery to construction site.
  - 2. Be suitable, in the judgment of the Architect, to allow monitoring and evaluation of progress in the performance of the Work.
  - 3. Show detailed subcontractor work activities. The Contractor will provide a schedule for all subcontractor/ Contractor CPM schedule meetings which are to be held prior to the submission of the CPM schedule to the Owner. The Architect and Owner shall be allowed to attend the scheduled sessions as an observer. In addition to the Contractor / subcontractor meetings, the Architect may require Contractor and subcontractors to attend scheduled development meetings to ascertain information for approval of the CPM schedule.
  - 4. Be calendar time-scaled in the form of an activities-on-arrow network diagram:

- a) The activities shall include:
  - (1) Description; what is to be accomplished and where.
  - (2) Calendar day duration.
  - (3) Responsibility code; identifiers who performs the activity. One per activity.
- b) The network shall show continuous flow from left to right.
- 5. Identify days per week and hours/shifts per day that Contractor intends to work.
- 6. Include time for the Architect to review submittals (14 calendar days) or observe the work.
- 7. Identify the activities which constitute the controlling operations or critical path.
- 8. Include activities for start up and testing of equipment and/or systems, completion of punch list items and demobilization.
- d. Submittal of the Progress Schedule shall be understood to be the Contractor's representation that the schedule meets the requirements of the Contract Documents and that Work will be executed in the sequence indicated on the schedule. The Contractor shall distribute progress schedule to subcontractors for review and acceptance which will be noted on the subcontractor's letterhead to the Contractor and transmitted to the Architect and Owner for record.

#### 1.04 SCHEDULE OF SUBMITTALS

- a. Within 15 days after the Notice to Proceed, the Contractor shall provide the Architect with the complete Contract CPM Progress Schedule.
- b. Within 30 days after Notice to Proceed, the Contractor shall provide to the Architect and Owner a copy of a project calendar delineating days and hours of work and holidays included in the schedule.
- c. Not later than the last day of each month thereafter during duration of Project, the Contractor shall provide the Architect and Owner with copies of an updated schedule showing work progress. Submittal of the updated schedule shall be attached with the request for payment and will be a condition of monthly payment.
- d. An updated schedule shall be prepared and submitted each month and shall include as a minimum the following:
  - 1. Approved changes to Contract.
  - 2. Any "slippage" due to procurement delays, rain, strikes and other delays.
  - 3. Changes in activity sequencing or duration as modified from previous submittals.

#### 1.05 FORM OF SUBMITTAL

a. All schedule submittals shall include seven (7) copies of the submittal report and seven (7) copies of the CPM network diagram. In addition, the Contractor shall submit the schedule electronically.

- b. Costs for preparation and reproduction of all schedule submittals shall be borne by the Contractor. Contractor is presumed to have allocated such costs to the bid items he/she deemed most appropriate.
- c. Specifically, all schedule submittals shall consist of a computer-generated, time-scaled detailed graphic network diagram; a detailed narrative report; a current activity tabulation report; schedule activity analysis reports.
  - 1. The activity tabulation report generated by the current computerized schedule shall include a tabulation of each activity. The following information shall be furnished as a minimum for each activity or work items:
    - a) Preceding and succeeding event numbers.
    - b) Activity description and number.
    - c) Estimated current duration of each activity.
    - d) Earliest start date (by calendar date).
    - e) Earliest finish date (by calendar date).
    - f) Latest start date (by calendar date).
    - g) Latest finish date (by calendar date).
    - h) Scheduled float.
    - i) Percentage of activity completed, or number of working days remaining (for updates only).
    - j) Actual start date (by calendar date) (for updates only).
    - k) Actual finish date (by calendar date) (for updates only).
  - 2. The computer-generated mathematical analysis reports shall be consistent with the information shown on the detailed graphic network diagram. The computer generated mathematical analysis reports shall include the following:
    - a) A network report sorted by early start.
      - (1) A network report sorted by total float.
      - (2) A network logic report indicating the preceding and succeeding activities.
      - (3) A six (6) week look ahead schedule based on early start sort.
  - 3. The detailed narrative report shall include a summary of progress this period; describe any special problems (with proposed solutions) or assumptions underlying the CPM schedule. The report shall also include a tabulation of all activities completed or partially completed, a discussion of all activities added or deleted or changed in either logic and/or duration during the report period. The report shall state the percentage of the work actually completed as of the report date, and the progress along the critical path in terms of days ahead or behind the allowable dates.

# 1.06 ANALYSIS AND UPDATING OF THE SCHEDULE

- a. The Contractor is responsible for accuracy of the information contained in the schedule reports including the computerized CPM, and subsequent updates of the CPM. Producing computerized CPM schedule drawings and revisions to schedule drawings is the responsibility of the Contractor.
- b. Once each month, the Contractor shall participate with the Architect and Owner in a schedule review to update the activity progress.
- c. As part of the detailed analysis the Contractor shall discuss any planned changes in the work, planned restraints, logic, sequence or timing of work shall be submitted in a written revision

to any impacted portion of the progress schedule for the Authorities approval. Upon approval, the Contractor shall revise the computerized progress schedule in the next scheduled update.

- d. If, according to the updated CPM schedule, the Contractor is behind the milestone completion date(s), considering all approved time extensions, the Contractor shall submit a recovery schedule showing a workable plan to complete the Project on time. The Architect may assess interim withholds pursuant to Section Measurement and Payments.
- e. Scheduling of approved changes is the responsibility of the Contractor. The Contractor shall revise the schedule drawing to incorporate all activities involved in completing the change orders and submit it to the Architect for review and approval.
- f. If the Architect finds the Contractor is entitled to an extension of the completion date under the provisions of the Contract, the Architect's determination of the total number of days extension will be based upon the current analysis of the schedule and upon the data relevant to the extension.
- g. The Contractor acknowledges and agrees that delays to non-critical activities (those with float), will not be the basis for a time extension. Non-critical activities are those activities which, when delayed, do not affect the final Contract completion date.

#### 1.07 RECOVERY SCHEDULE

- a. Where the Contractor is 7 days behind schedule the Contractor shall submit a written recovery schedule indicating how the Contractor intends to bring the Work back on schedule within the next 45 day period.
- b. Such recovery schedule shall be submitted within 7 days of submission of a current progress schedule which indicates a 7 or more day delay.
- c. The recovery schedule shall indicate any proposed adjustment to labor hours, work hours, sequencing of Work activities and/or any other approach to the construction in order to accomplish recovery of lost rime or to overcome a specific obstacle or obstacles that would otherwise hold up Work.
- d. Should the Contractor fail to submit and implement such a recovery schedule the Architect may assess interim withholds.

#### 1.08 APPROVAL OF CPM PROGRESS SCHEDULE

- a. Neither the acceptance, review or approval of any CPM Progress Schedule or other data submitted by the Contractor pursuant to this Section, nor any other action on the part of the Architect under this Section shall in any way be deemed as a representation by the Architect that the Contract can or will be permitted to follow a particular schedule or sequence of operations or that by following any such schedule or sequence he/she can or will complete the Work by the time(s) required by the Contract or by any other time(s). Nor shall the approval of any CPM progress Schedule or other such data relieve the Contractor of his/her obligation to complete the Contract by the time(s) required in the Contact, even though such CPM Progress Schedule approved may be inconsistent with such completion.
- b. Any approval under this Section shall be construed merely to mean that the Architect and Owner knew of no good reason at that time to object thereto. No acceptance, review or approval any other action under this Section shall limit, affect or impair the Contractor's

obligation to perform all Work by time(s) required by the Contract and in accordance with all other provisions of the Contract.

#### 1.09 PERFORMANCE OF WORK

- a. The performance of the Work by the time(s) required in the Contract after taking into account extensions to which the Contractor may be entitled may require the use by the Contractor of overtime labor, additional shifts or additional plant and equipment and/or other measures. In any event, the Contractor shall anticipate, avoid and mitigate the effects of all delays, whether or not such delays involve activities with float. The Architect and Owner shall have the right at any time when in their judgment the Work is not proceeding in accordance with the approved CPM Progress Schedule or at any time when it is likely that the Work might not be completed by the time(s) required in the Contract even though the Contractor without additional compensation, to employ additional shifts to increase the number of field staff employed, to use additional plant or equipment, or to take such other steps as may be necessary or required to assure the completion of the various operations within the time(s) allotted therefore in the approved schedule or by the aforesaid completion time(s).
- b. No action on the part of the Contractor pursuant to this Section shall be construed as request by him/her for an extension of the time(s) for completion required by the Contract. A request for an extension of time shall be deemed made only if it complies with the requirements of Section 00 74 00 - Extensions. No extension of the time(s) for completion shall be inferred because of any action, omission to act, or statement on behalf of the Owner pursuant to this Section.

END OF SECTION 01 30 28

### SECTION 01 30 30 - PROJECT MEETINGS

# 1.01 PRECONSTRUCTION CONFERENCE

- a. Prior to commencement of the Work, the Contractor will be required to attend a preconstruction meeting at a time and a place selected by the Architect and Owner, to discuss procedures to be followed during the course of the work. The Contractor shall follow the procedures as set forth by the Architect.
- b. The purpose of the pre-Construction meeting will be to introduce the Owner's and Architect's key personnel and to review the Contract provisions, project procedures, and any other items pertaining to the Project.
- c. Attending shall be:
  - 1. Owner's Representatives
  - 2. Architect / Engineer
  - 3. Contractor Project Manager
  - 4. Contractor's Superintendent /Quality Control Rep
  - 5. Major subcontractors
  - 6. Others as appropriate
- d. At the preconstruction conference, the Architect will outline the procedures for payment, requests for information, change orders, disputes, submittals, quality control, testing, Contractor's reports, safety, field instructions, meetings, and job closeout. Contractor shall follow procedures provided at the meeting.

# 1.02 WEEKLY PROGRESS MEETINGS

- a. Once a week, on an agreed upon day and time, the Architect will conduct a progress meeting to review the progress and the status of the work, and to discuss any problems that may arise. The Contractor shall attend all weekly progress meetings. Subcontractor's and vendors' representatives shall attend the progress meetings as appropriate to the particular stage of the work.
- b. Weekly Progress Meetings will be held at the Airport Administration Offices One Airport Road, Suite 300 Manchester, NH.
- c. Attending shall be:
  - 1. Owner's Representatives
  - 2. Architect / Engineer
  - 3. Contractor's Project Manager/Quality Control Rep
  - 4. Contractor's Superintendent
  - 5. Major subcontractors
  - 6. Others as appropriate
- d. The Contractor shall provide the Architect at least a day before the Progress Meeting, a three-week rolling schedule indicating the past week, current week, and the upcoming week at the weekly Meeting. The schedule will be provided in a bar chart form with information derived from the project CPM schedule, The schedule will include an item designation, activity description, start and finish dates (both scheduled and actual), a time scaled bar chart for each activity, and a remarks section. In addition, each activity will be coded to note those activities on the critical path and those activities which are behind schedule. At the meeting,

the Contractor will provide a verbal status utilizing the three week schedule indicating the progress to date and the forecast for completion.

- e. Meeting notes will be recorded and distributed to the meeting attendees by the Contractor. Attendees taking exception to anything in the meeting notes shall state their objections in writing, within 5 working days following the receipt of the notes.
- f. Contractors are to submit at the biweekly or weekly progress meetings, a sheet listing work done last week/two weeks and work proposed for the next week/two weeks, along with a CPM schedule identifying all work proposed for the next week/two weeks.

# 1.03 MONTHLY PROGRESS MEETINGS

- a. Each month the Contractor is required to take part in a schedule update and progress payment meeting with the Architect and Owner to agree on the percentage of the work completed up to the last working day of the current month and establishes an amount to be requested in the Application for Payment. This meeting may be combined with the weekly meeting.
- b. Monthly Progress meetings will be held at the Owner's office on or near the tenth of the month.
- c. Attending shall be:
  - 1. Owner
  - 2. Architect / Engineer
  - 3. Contractor's Project Manager
  - 3. Subcontractors as required
- d. The Contractor shall bring to the meeting, an itemized draft of the month's proposed billing for review with the Owner. For subcontracts in excess of \$10,000, the Contractor shall break down line items as to the cost of the material and the labor.
- e. Following review of the proposed billing, the Contractor shall prepare an Application for Payment and submit it to the Architect and Owner not later than the fifteenth of each month.

# 1.04 SPECIAL MEETINGS

From time to time as required by job conditions, the Architect may call special meetings among the representatives of the Contractor, subcontractors, and the Owner to discuss particular situations or problems which may arise. The Contractor and his/her subcontractors and/or suppliers, as appropriate, will be expected to attend.

# 1.05 CONTRACTOR MEETINGS

This Section does not limit meetings among the Contractor, subcontractors and others as the Contractor deems necessary. The Architect and Owner may attend the Contractor/subcontractor's meetings.

# 1.06 SCHEDULE APPROVAL MEETINGS

Prior to approval of the CPM schedule, the Architect may require that the Contractor and his/her subcontractors attend meetings to ascertain information for approval of the CPM schedule. This information may include, but will not be limited to, productivity, manpower loading, activity durations, logic, cost

loading, etc. The location will be at the Owner's office. Attending will be the Owner, Architect, Contractor, subcontractors as appropriate, suppliers as appropriate, others as appropriate.

# 1.07 OTHER REQUIRED MEETINGS

- a. Thirty days prior to the estimated final completion, the Contractor shall hold a meeting to review outstanding punch list items, maintenance manuals, guarantees, close out submittals, bonds, and service contracts for materials and equipment. Implement repair and replacement of defective items, and extend service and maintenance contracts as desired by the Owner.
  - b. Location shall be the
  - c. Airport Administration Offices One Airport Road, Suite 300 Manchester, NH.
- d. Attending shall be:
  - 1. Owner
  - 2. Architect / Engineer
  - 3. Contractor
  - 4. Subcontractors, as appropriate
  - 5. Suppliers, as appropriate
  - 6. Others, as appropriate

#### END OF SECTION 01 30 30

# SECTION 01 35 50 - GENERAL SITE SECURITY

#### 1.01 DESCRIPTION

- a. The Contractor shall comply with all applicable federal, state and local laws. This includes but is not limited to 14 CFR Part 77 (Obstructions to Navigable Airspace), 14 CFR Part 139 (Certification of Airports) and 49 CFR Part 1542 (Airport Security).
- b. Provide protection for materials, tools and equipment being employed on the Project including the tools of workers. The Owner shall not be held to have incurred any liability for loss of, and damage to, materials, tools and equipment of the Contractor, or of those employed by him, by contract or otherwise.
- c. The Contractor shall employ such security service as he may deem necessary to properly protect and safeguard the work. The Owner shall not in any way be liable or responsible for the damage or loss to the Work due to trespass or theft.
- d. The Owner may provide such security service as he deems necessary to protect his interest during the progress of the Work. Any protection provided by the Owner shall not in any way relieve the Contractor of the responsibility for the safety of the Work and acceptance thereof.
- e. The Contractor shall be responsible for controlling access to the work area and insuring that airport security is maintained at all times, including set-back security clearances enforced at the Airport, parking garage(s) and parking lots. The Federal Aviation Administration (FAA) and Transportation Security Administration (TSA) may impose fines of \$11,000.00 or more for security violations and incursions into active aircraft operation areas. In addition, the Owner may impose additional fines and/or penalties for such violations. The Contractor shall pay all fines assessed against the airport due to violations caused by the Contractor and his personnel, subcontractors, and vendors.
- f. Parking of personal cars at the Work site will not be permitted, except in areas approved by the Owner. The Contractor, as a subsidiary obligation shall provide adequate and safe transportation for his employees from the area where the cars are parked, to and from the work area. Employees and drivers of work vehicles will be instructed as to proper access roads and will be cautioned that unauthorized use of aircraft pavements or other areas outside the designated work area may lead to their arrest and subsequent payment of fines.
- g. All orders for material shall instruct the supplier of the procedures to be followed.
- h. The Contractor shall submit to the Owner within 10 days after signing of the contract a written Safety Plan detailing his methods of operations including but not limited the precautions he proposes for the control of vehicle traffic including flag person, signs, escorts and any other measures he proposes. After Owner approval of the Operations, the Contractor shall follow it explicitly. The Owner may close the work at any time this schedule is violated so as not to endanger airport or aircraft operations. Such closure shall not be considered a valid reason for extending the contract time or for any claim for extras by the Contractor.
- i. All security arrangements shall be subject to the approval of the Owner.
- j. The Contractor's personnel and vehicles will not have access to the entire airport, but shall be limited to work areas and the staging area.

#### 1.02 PROTECTION

- a. Continuously maintain protection as necessary to protect the work as a whole and in part, and adjacent property and improvements from accidents, injuries or damage.
- b. Properly protect the work:
  - 1. With lights approved by the Owner, guard rails, temporary covers, and barricades.
  - 2. Enclose excavations with proper barricades.
  - 3. Brace and secure all parts of the work against storm and accident.
  - 4. Provide such additional forms of protection which may be necessary under existing circumstances.
- c. Provide and maintain in good condition all protective measures required to adequately protect the public from hazards resulting from the work and to exclude unauthorized persons from the work area. When regulated by Building Code, OSHA or other authority, such legal requirements for protection shall be considered as minimum requirements; be responsible for the protection in excess of such minimum requirements as required.

#### 1.03 WORK IN THE AIR OPERATIONS AREA

a. If the Contractor is required to perform work within the AIR OPERATIONS AREA (AOA), the Contractor shall be required to follow the requirements of Section 01 35 53 – Security Procedures.

These requirements include but are not limited to the following:

- 1. Badging and identifying Contractor personnel;
- 2. Securing access point to the AOA.

#### 1.04 CONTROL OF SITE

- a. The Contractor shall ensure that no alcohol, firearm, weapon or controlled substance enters or is used at the Project site. The Contractor shall immediately remove from the site and terminate the employment of any employee found in violation of this provision.
- b. Install approved temporary enclosure of partially completed construction areas to prevent unauthorized entrance, vandalism and theft.
- c. Secure temporary storage areas as required to prevent theft.
- d. To the extent possible through reasonable control and protection methods, supervise performance of work in a manner and by means which will ensure that none of the work, whether completed or in progress, will be subjected to harmful, dangerous, damaging, or otherwise deleterious exposures during construction period. Such exposures include (where applicable, but not by way of limitation) static loading, dynamic loading, internal pressures, external pressures, high or low temperatures, thermal shock, high or low humidity, air contamination or pollution, water, solvents, chemicals, light, radiation, puncture, abrasion, heavy traffic, soiling, bacteria, insect infestation, combustion, electrical current, high-speed operation, improper lubrication, unusual wear, misuse, incompatible interface, destructive testing, misalignment excessive weathering, unprotected storage, improper shipping and handling, theft and vandalism.

#### END OF SECTION 01 35 50

# 1.01 DESCRIPTION

- a. All security badge costs shall be considered incidental to the cost of the Contract and shall not be paid for separately.
- b. In addition to the below, the Contractor shall reference the requirements of the Manchester-Boston Regional Airport Safety and Security Phasing Plan for the project badging and gate security requirements.

# 1.02 IDENTIFICATION OF EMPLOYEES

- a. AIRPORT SIDA BADGES: Full-time competent and responsible employees of the Contractor, such as superintendents and foremen, shall obtain an Airport SIDA badge. The SIDA badge requires finger printing screening and a criminal history check. The badge application process may take up to 14 days, the Contractor shall plan accordingly.
- b. CONTRACTOR ESCORTED BADGES: The Contractor shall furnish and issue, to each of his employees and the employees of all subcontractors, an escorted identification badge which the employees will be required to wear at all times on the site. The escorted badge shall be a minimum of 2.5 inches by 4 inches, laminated in plastic, and have a clip for attaching. The escorted badge shall have the following information:
  - 1. Employee's Name (1/8" high lettering);
  - 2. Contractor's name (1/8" high lettering);
  - 3. Subcontractor's name, if applicable (1/8" high lettering);
  - 4. Manchester-Boston Regional Airport (1/8" high lettering);
  - 5. "CONTRACTOR", "ESCORTED", "MHT" (1/4" high lettering);
  - 6. Badge Number (1/4" high lettering);
  - 7. 2" by 2" color photo of employee.
  - 8. Background color of the badge to be determined by the Owner.
- c. The Contractor shall submit a sample of the proposed badge to the Owner for approval.
- d. Escorted badged persons shall be escorted and within sight-line and control of an AIRPORT SIDA BADGED person at all times. The Contractor shall provide the SIDA badged escort to accompany the persons to be escorted and shall plan accordingly.
- e. TEMPORARY BADGES: Temporary badges may be issued for employees to be on the site less than one week. The temporary badges shall be as described above except for item (7).
- d. The Contractor shall provide the Owner with a list of employees on the job site and their badge number. The list shall include subcontractors and employees. The list shall be updated and submitted weekly.
- e. The Contractor's employees may be required to undergo a finger-print based criminal history records check. The Contractor's employees shall attend an Airport Security briefing prior to operating on the AOA.

# 1.03 CONTROL OF SITE

a. Controlled access points to the work area that impact the AOA shall be manned by an approved and trained gate guard. The Contractor shall contract through the Owner for gate guards.

#### END OF SECTION 01 35 53

# SECTION 01 38 00 - CONSTRUCTION PHOTOGRAPHS

### 1.01 QUALITY ASSURANCE

a. The Contractor shall utilize a digital camera with no less than 5 mega pixel resolution. The hiring of a professional photographer is not required.

### 1.02 SUBMITTALS

- a. The Contractor shall comply with pertinent provisions of Section 01 34 10 Shop Drawings, Product Data and Samples.
- b. Except as otherwise directed and paid for, the Contractor shall furnish photographs of the project, in a variety of views. The photographs shall show the Project prior to construction, demolition, the Work in progress and the Project at the completion of Work.

A minimum of 10 color photographs shall be taken during each 7 day period of the Contract. A Digital or 35 mm camera shall be used to take photographs.

- c. On the back of each print, or in the filename if electronically submitted, *attach a printed label*, in a manner not damaging to the print, showing:
  - 1. Job name;
  - 2. *A descriptive* location from which photographed;
  - 3. Date of photograph;
  - 4. Photographer's name, address and photograph number.
- c. At the completion of each 30-day period of the project, the Contractor shall deliver to the Owner two color prints of each view and the negatives, or an electronic file, by a date stipulated by the Owner.
- e. The Contractor shall not permit prints to be issued for any other purpose without specific written approval from the Owner.

#### 2.01 CONSTRUCTION PHOTOGRAPHY

- a. Photographs
  - 1. Each photograph shall be clear, in focus, with high resolution and sharpness, and with minimum distortion. Provide adequate lighting to produce clear photographs.
  - 2. The Architect may direct the Contractor to change locations as the construction progresses.

# END OF SECTION 01 38 00

# SECTION 01 40 00 - QUALITY CONTROL

# 1.01 GENERAL

- a. The Contractor shall establish, provide, and maintain an effective Quality Control Program that details the methods and procedures that will be taken to assure that all materials and completed construction required by this contract conform to contract plans, technical specifications and other requirements, whether manufactured by the Contractor, or procured from subcontractors or vendors. Although guidelines are established and certain minimum requirements are specified herein and elsewhere in the contract technical specifications, the Contractor shall assume full responsibility for accomplishing the stated purpose.
- b. The intent of this Section is to enable the Contractor to establish a necessary level of control that will:
  - 1. Adequately provide for the production of acceptable quality materials.
  - 2. Provide sufficient information to assure both the Contractor and the Architect that the specification requirements can be met.
  - 3. Allow the Contractor as much latitude as possible to develop his or her own standard of control.
- c. The Contractor shall be prepared to discuss and present, at the preconstruction conference, his/her understanding of the quality control requirements.
- d. The quality control requirements contained in this Section and elsewhere in the contract technical specifications are in addition to and separate from the Owner's testing requirements.

# 1.02 OWNER'S DUTIES AND RESPONSIBILITIES

The Owner has the right, but not the duty to monitor and inspect all work performed by the Contractor to insure performance of the work to the Contract Drawings and Specifications. All work shall be subject to inspection and test by the Owner at all reasonable times and at all places prior to acceptance. Any such inspection and test is for the sole benefit of the Owner and shall not relieve the Contractor of responsibility for providing quality control measures to assure that the work strictly complies with the contract requirements. No inspection or test by the Owner shall be construed as constituting or implying acceptance.

#### 1.03 CONTRACTOR'S DUTIES AND RESPONSIBILITIES

- a. The Contractor is responsible for the quality of the work performed under this Contract as well as the quality of the material, equipment, and supplies furnished by him/her to be incorporated into the work.
- b. The Contractor shall designate a Quality Control Representative who will be on-site at all times while the respective Contractor's work is in progress and will have the authority and responsibility to accept or reject items of work. The Contractor's Quality Control Representative may delegate his/her duties but the primary responsibility and authority rest in him/her.
- c. The Contractor's Quality Control Representative shall coordinate the submittal of all shop drawings, product data and samples to the Architect. Any submittal that is a change to the Contract requirements shall be identified as such and transmitted to the Architect. No work

requiring submittal of a shop drawing, product data or sample shall be commenced until the submittal has been reviewed and accepted by the Architect.

- d. Where the Owner chooses to test any materials or equipment, the Contractor shall cooperate with the Owner's material testing laboratory. The Contractor shall notify the Owner when any material or equipment is in place in accordance with the Contract Documents and ready for testing or inspection.
- e. The Contractor shall notify the Owner two working days prior to when testing/inspection is required. The Contractor will request all tests and inspections in accordance with the Owner's request and approval for testing services procedures on the form supplied by the Owner. The Contractor will not contact the testing firms directly.
- f. The Contractor's Quality Control Representative shall review his/her drawings, procurement documents and Contracts to insure that the technical information provided and all work performed is in accordance with latest revisions of the Contract Drawings and Specifications.
- g. The Contractor's Quality Control Representative shall perform an inspection upon receipt at the site of all materials, equipment and supplies. Items which are damaged or not in conformance with the respective submittals, quality standards, Contract Drawings and Specifications will be identified and segregated from accepted items. Items thus identified shall not be incorporated into the work until corrective action acceptable to the Architect is completed. Items determined unsalvageable will be removed from the job site.
- h. The Contractor will establish a performance testing plan for all equipment and systems for mechanical, electrical, plumbing, heating or air conditioning, security, communications, and hardware.

# 1.04 PROJECT PROGRESS SCHEDULE

The Contractor shall submit a coordinated construction schedule for all work activities. The schedule shall be prepared as a network diagram in Critical Path Method (CPM), PERT, or other format, or as otherwise specified in the contract. As a minimum, it shall provide information on the sequence of work activities, milestone dates, and activity duration.

The Contractor shall maintain the work schedule and provide an update and analysis of the progress schedule on a twice monthly basis, or as otherwise specified in the contract. Submission of the work schedule shall not relieve the Contractor of overall responsibility for scheduling, sequencing, and coordinating all work to comply with the requirements of the contract.

# 1.05 SUBMITTALS SCHEDULE

The Contractor shall submit a detailed listing of all submittals (e.g., mix designs, material certifications) and shop drawings required by the technical specifications. The listing can be developed in a spreadsheet format and shall include:

- a. Specification item number;
- b. Item description;
- c. Description of submittal;
- d. Specification paragraph requiring submittal; and

e. Scheduled date of submittal.

# END OF SECTION 01 40 00

# SECTION 01 40 10 - TESTING LABORATORY SERVICES

# 1.01 OWNER'S INDEPENDENT TESTING AGENCY

- a. The Owner shall use their independent testing agency to perform tests, inspections and sampling of the Work. Materials anticipated to be tested shall include concrete.
- b. The Owner's use of the independent testing agency shall in no way relieve the Contractor of his/her obligations to perform the work in accordance with Contract requirements.
- c. Testing costs incurred to the Owner's Independent Testing Agency for excessive repeated testing as a result of the Contractor's poor quality control of any material, shall be the responsibility of the Contractor.
- d. The testing agency is not authorized to release, revoke, alter, or enlarge on, the requirements of the Contract Documents, approve or accept any portion of the work, and perform any of the Contractor's duties.

# 1.02 QUALITY CONTROL/ASSURANCE

- a. The Contractor shall employ and pay their own approved Testing Laboratory, separate from the Owner's and to prepare mix designs for concrete.
- b. The Contractor's testing laboratory will be qualified to the Owner's approval in accordance with ASTM E329.
- c. Testing, when required, will be in accordance with all pertinent codes and regulations, and with selected standards of ASTM.

# 1.03 CONTRACTOR'S RESPONSIBILITIES

- a. Initiate and coordinate tests and inspections required by Contract Documents and public authorities having jurisdiction of the work.
- b. Notify the Owner a sufficient time in advance of the manufacture of materials to be supplied which, by requirements of the Contract Documents, must be tested at the source of supply so that the Owner may arrange for testing if appropriate.
- c. When the Owner is ready to test according to the established schedule, but is prevented from testing or taking specimens due to incompleteness of the work, all extra charges for testing attributable to the delay may be backcharged to the Contractor and shall not be borne by the Owner.
- d. Provide access, facilities, tools and labor necessary for duties to be performed at the site by the Owner including furnishing ladders, hoisting, lighting, water supply and like services.
- e. Provide and maintain, for the sole use of the Owner, adequate facilities for the safe storage and proper curing of concrete test cylinders on the Project site as required by ASTM C31.
- f. Furnish and deliver samples of materials to be tested at no extra cost to Owner.
- g. Contractor's Test Reports:
  - 1. Furnish 3 copies of each test and inspection report.

# 1.05 PAYMENT FOR TESTING PERFORMED BY THE OWNER

- a. Initial Services:
  - 1. The Owner will pay for initial testing services when initial tests indicate compliance with the Contract Documents.
  - 2. When initial tests indicate noncompliance with the Contract Documents, the costs of re-tests associated with that noncompliance will be deducted by the Owner from the Contract Sum.
- b. When initial tests indicate noncompliance with the Contract Documents, subsequent retesting occasioned by the noncompliance shall be performed by the same testing agency, and costs thereof will be deducted by the Owner from the Contract Sum.
- c. The Contractor shall reimburse the Owner all of the inspection and testing costs incurred by the Owner due to:
  - 1. Failure of materials to pass initial tests.
  - 2. Contractor's failure to complete the work within the Contract time, and any previously authorized extensions thereof.
  - 3. Covering of work before the required inspections or tests are performed.
  - 4. Additional inspections required for Contractor's correction of defective work.
  - 5. Overtime costs of acceleration of work done for Contractor's convenience.

# 1.06 CONTRACTOR'S CONVENIENCE TESTING

a. Inspecting and testing performed exclusively for the Contractor's convenience shall be the sole responsibility of the Contractor.

END OF SECTION 01 40 10

# SECTION 01 42 19 - REFERENCE STANDARDS

# 1.01 REFERENCE STANDARDS AND SPECIFICATIONS

Whenever reference standards and specifications published by technical societies, institutions, associations and governmental agencies, such as ASTM, ANSI, FS and the like are referenced in the specifications, the applicable edition shall be the latest date of issue as of the time the bids are received, except that issues listed in governing building code and regulations supersede the above requirements.

In case of conflict between referenced documents and Contract Documents, or between referenced documents, the one having more stringent requirements shall apply.

No provisions of any referenced standards or specifications (whether or not specifically incorporated by reference in the Contract Documents) shall be effective to change the duties and responsibilities of the Owner, the Architect, their offices and the Contractor, or any of their consultants, agents or employees from those set forth in the Contract Documents.

Where copies of standards are needed for proper performance of the work, the Contractor shall obtain such copies directly from the publication source. Copies of specified standards shall be maintained at the job-site by the Contractor and made available for review on request by the Owner.

Where reference standard specifications require weather protection, it shall be provided by the Contractor at no additional cost to the Owner and shall be deemed necessary in order to construct the Project within the specified time period.

# END OF SECTION 01 42 19

# SECTION 01 50 01 - FIELD ENGINEERING

# 1.01 FIELD MEASUREMENTS AND LAYOUTS

The Contractor shall be responsible for complete, timely and accurate field measurements as necessary for proper coordination, fabrication and installation of his materials and equipment. The Contractor agrees to cooperate with the Architect, if required, to accommodate any discovered variations or deviations from the Drawings and Specifications so that the progress of the Work is not adversely affected.

END OF SECTION 01 50 01

# SECTION 01 51 00 - TEMPORARY FACILITIES

# 1.01 SUMMARY

This Section specifies requirements for temporary services and facilities, including utilities, construction and support facilities, security and protection. All costs associated with temporary facilities are to be paid by the Contractor until Substantial Completion. The Contractor is to set up a separate new account with all utility agencies for billing purposes. Utility billed invoices are to be addressed and paid by the Contractor under this new account.

a. <u>Temporary utilities</u> required include but are not limited to:

Temporary electric power and light. Telephone service.

b. <u>Temporary construction and support facilities</u> required include but are not limited to:

Field offices and storage sheds. Sanitary facilities, including drinking water. Temporary enclosures. Temporary Project identification signs. Construction aids and miscellaneous services and facilities.

c. <u>Security and protection facilities</u> required include but are not limited to:

Temporary fire protection. Barricades, warning signs, lights.

# 1.02 SUBMITTALS

- a. <u>Temporary Utilities</u>: Submit reports of tests, inspections, meter readings and similar procedures performed on temporary utilities.
- b. <u>Implementation and Termination Schedule</u>: Submit a schedule indicating implementation and termination of each temporary utility within 15 days of the date established for commencement of the Work.

#### 1.03 QUALITY ASSURANCE

a. <u>Regulations</u>: Comply with industry standards and applicable laws and regulations if authorities having jurisdiction, including but not limited to:

Building Code requirements.Health and safety regulations.Utility company regulations.Police, Fire Department and Rescue Squad rules.Environmental protection regulations.Federal Aviation Administration.

b. <u>Standards</u>: Comply with NFPA Code 241, "Building Construction and Demolition Operations", ANSI-A10 Series standards for "Safety Requirements for Construction and Demolition", and NECA Electrical Design Library "Temporary Electrical Facilities." Refer to "Guidelines for Bid Conditions for Temporary Job Utilities and Services", prepared jointly by AGC and ASC, for industry recommendations.

For detour roads and maintenance of traffic, refer to applicable sections of the NHDOT standard specifications for road and bridge construction.

- c. <u>Electrical Service</u>: Comply with NEMA, NECA and UL standards and regulations for temporary electric service. Install service in compliance with National Electric Code (NFPA 70).
- d. <u>Inspections</u>: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

# 1.04 PROJECT CONDITIONS

- a. <u>Temporary Utilities</u>: Prepare a schedule indicating dates for implementation and termination of each temporary utility. At the earliest feasible time, when acceptable to the Owner, change over from use of temporary service to use of the permanent service.
- b. <u>Conditions of Use</u>: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do not overload facilities, or permit them to interfere with progress. Do not allow hazardous dangerous or unsanitary conditions, or public nuisances to develop or persist on the site.

# 1.05 MATERIALS

- a. <u>General</u>: Provide new materials; if acceptable to the Architect, undamaged previously used materials in serviceable condition may be used. Provide materials suitable for the use intended.
- b. <u>Lumber and Plywood</u>: Lumber shall not be used for temporary enclosures. For signs and directory boards, provide exterior type, Grade B-B High Density Concrete Form Overlay Plywood conforming to PS-1, of sizes and thickness indicated.
- c. <u>Gypsum Wallboard</u>: Provide gypsum wallboard complying with requirements of ASTM C 36 on interior walls.
- d. <u>Roofing Materials</u>: Provide UL Class "A" standard weight asphalt shingles complying with ASTM D 3018, or UL Class "C" mineral surfaced roll roofing complying with ASTM D 249 on roofs of job- built temporary offices, shops and sheds.
- e. <u>Paint</u>: For temporary interior walls provide two coats interior latex flat wall paint.
- f. <u>Tarpaulins</u>: Provide waterproof, fire-resistant, UL labeled tarpaulins with flame-spread rating of 15 or less. For temporary enclosures provide translucent nylon reinforced laminated polyethylene or polyvinyl chloride fire retardant tarpaulins.
- g. <u>Water</u>: Provide potable water approved by local health authorities.

#### 1.06 EQUIPMENT

a. <u>General</u>: Provide new equipment; if acceptable to the Architect, undamaged, previously used equipment in serviceable condition may be used. Provide equipment suitable for use intended.

- b. <u>Water Hoses</u>: Provide 3/4" heavy-duty, abrasion-resistant, flexible rubber hoses 100 ft. long, with pressure rating greater than the maximum pressure of the water distribution system; provide adjustable shut-off nozzles at hose discharge.
- c. <u>Electrical Outlets</u>: Provide properly configured NEMA polarized outlets to prevent insertion of 110-120 volt plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button and pilot light, for connection of power tools and equipment.
- d. <u>Electrical Power Cords</u>: Provide grounded extension cords; use "hard-service" cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords, if single lengths will not reach areas where construction activities are in progress.
- e. <u>Lamps and Light Fixtures</u>: Provide general service incandescent lamps of wattage required for adequate illumination. Provide guard cages on all lights. Provide exterior fixtures where exposed to moisture.
- f. <u>Heating Units</u>: Provide temporary heating units that have been tested and labeled by UL, FM or another recognized trade association related to the type of fuel being consumed.
- g. <u>Temporary Offices</u>: Provide prefabricated or mobile units or similar job-built construction with lockable entrances, operable windows and serviceable finishes. Provide heated and air-conditioned units on foundations adequate for normal loading.
- h. <u>Temporary Toilet Units</u>: Provide self-contained single-occupant toilet units of the chemical, aerated recirculation, or combustion type, properly vented and fully enclosed with a glass fiber reinforced polyester shell or similar nonabsorbent material.
- i. <u>First Aid Supplies</u>: Comply with governing regulations.
- j. <u>Fire Extinguishers</u>: Provide hand-carried, portable UL-rated, class "A" fire extinguishers for temporary offices and similar spaces. In other locations provide hand-carried, portable, UL-rated, class "ABC" dry chemical extinguishers, or a combination of extinguishers of NFPA recommended classes for the exposures.

Comply with NFPA 10 and 241 for classification, extinguishing agent and size required by location and class of fire exposure.

# 1.07 INSTALLATION

- a. Use qualified personnel for installation of temporary facilities. Locate facilities where they will serve the Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.
- b. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed, or are replaced by authorized use of completed permanent facilities.

# 1.08 TEMPORARY UTILITY INSTALLATION

a. <u>General</u>: Engage the appropriate local utility company to install temporary service or connect to existing service. Where the company provides only part of the service, provide the remainder with matching, compatible materials and equipment; comply with the company's recommendations.

Arrange with the company and existing users for a time when service can be interrupted, where necessary, to make connections for temporary services.

Provide adequate capacity at each stage of construction. Prior to temporary utility availability, provide trucked-in services.

- b. <u>Use Charges</u>: Cost or use charges for temporary facilities are not chargeable to the Owner or Architect, and will not be accepted as a basis of claims for a Change Order.
- c. <u>Temporary Electric Power Service</u>: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include meters, transformers, overload protected disconnects, automatic ground-fault interrupters and main distribution switch gear.

Except where overhead service must be used, install electric power service underground.

- d. <u>Power Distribution System</u>: Install wiring overhead, and rise vertically where least exposed to damage. Where permitted, wiring circuits not exceeding 125 Volts, AC 20 ampere rating, and lighting circuits may be nonmetallic sheathed cable where overhead and exposed for surveillance.
- e. <u>Temporary Lighting</u>: Whenever overhead floor or roof deck has been installed, provide temporary lighting with local switching.

Install and operate temporary lighting that will fulfill security and protection requirements, without operating the entire system, and will provide adequate illumination for construction operations and traffic conditions.

f. <u>Temporary Telephones</u>: Provide temporary telephone service for all personnel engaged in construction activities, throughout the construction period. Install telephone on a separate line for each temporary office and first aid station. Where an office has more than two occupants, install a telephone for each additional occupant or pair of occupants.

At each telephone, post a list of important telephone numbers. Follow OSHA requirements for emergency numbers.

Each prime contractor shall provide an answering machine at the jobsite and each prime contractor shall have a fax machine in the temporary office.

### 1.09 TEMPORARY CONSTRUCTION AND SUPPORT FACILITIES INSTALLATION

a. Locate field offices, storage sheds, sanitary facilities and other temporary construction and support facilities as directed by the Owner.

Maintain temporary construction and support facilities until near Substantial Completion. Remove prior to Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to the Owner.

Provide incombustible construction for offices, shops and sheds located within the construction area, as indicated on the phasing plan. Comply with requirements of NFPA 241.

- b. <u>Temporary Heat</u>: Existing building HVAC system is anticipated to remain intact in the Work area. In addition the Work is anticipated for the summer, therefore temporary heat is not anticipated to be required.
- c. <u>Field Offices</u>: Provide insulated, weathertight temporary offices of sufficient size to accommodate required office personnel at the Project site. Keep the office clean and orderly for use for small progress meetings. Furnish and equip offices adequately and as required to operate in an efficient manner.
- d. <u>Storage and Fabrication Sheds</u>: Install storage and fabrication sheds, sized, furnished and equipped to accommodate materials and equipment involved, including temporary utility service. Sheds may be open shelters or fully enclosed spaces within the building or elsewhere on the site.
- e. <u>Sanitary facilities</u> include temporary toilets, wash facilities and drinking water fixtures. Comply with regulations and health codes for the type, number, location, operation and maintenance of fixtures and facilities. Install where facilities will best serve the Project's needs.

Provide toilet tissue, paper towels, paper cups and similar disposable materials for each facility. Provide covered waste containers for used material.

- f. <u>Toilets</u>: Use of the Owner's existing toilet facilities will not be permitted. Install self-contained toilet units. Shield toilets to ensure privacy. Use of pit-type privies will not be permitted.
- g. <u>Wash Facilities</u>: Install wash facilities supplied with potable water at convenient locations for personnel involved in handling materials that require wash-up for a healthy and sanitary condition. Dispose of drainage properly. Supply cleaning compounds appropriate for each condition.

Provide safety showers, eye-wash fountains and similar facilities for convenience, safety and sanitation of personnel.

- h. <u>Drinking Water Facilities</u>: Provide containerized tap-dispenser bottled-water type drinking water units, including paper supply.
- i. <u>Temporary Enclosures</u>: Provide temporary enclosure for protection of construction in progress and completed, from public use areas, exposure, foul weather, other construction operations and similar activities. See Drawings for temporary partition construction requirements. Any temporary wall that will not be removed in less than 5 working days shall be painted, color as selected by Architect.
- j. <u>Temporary Lifts and Hoists</u>: Provide facilities for hoisting materials and employees. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
- <u>Collection and Disposal of Waste</u>: Collect waste from construction areas and elsewhere daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than 7 days during normal weather or 3 days when the temperature is expected to rise above 80 deg F (27 deg C). Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material in a lawful manner.

# 1.10 SECURITY AND PROTECTION FACILITIES INSTALLATION

Except for use of permanent fire protection as soon as available, do not change over from use of temporary security and protection facilities to permanent facilities until Substantial Completion, or longer as requested by the Architect.

a. <u>Temporary Fire Protection</u>: Until fire protection needs are supplied by permanent facilities, install and maintain temporary fire protection facilities of the types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 10 "Standard for Portable Fire Extinguishers," and NFPA 241 "Standard for Safeguarding Construction, Alterations and Demolition Operations."

Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher on each floor at or near each usable stairwell.

Store combustible materials in containers in fire-safe locations.

Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways and other access routes for fighting fires. Prohibit smoking in hazardous fire exposure areas.

Provide supervision of welding operations, combustion type temporary heating units, and similar sources of fire ignition.

- b. <u>Permanent Fire Protection</u>: At the earliest feasible date in each area of the Project, complete installation of the permanent fire protection facility, including connected services, and place into operation and use. Instruct key personnel on use of facilities.
- c. <u>Barricades, Warning Signs and Lights</u>: Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate and needed provide lighting, including flashing red or amber lights.
- d. <u>Security Enclosure and Lockup</u>: Install substantial temporary enclosure of partially completed areas of construction. Provide locking entrances to prevent unauthorized entrance, vandalism, theft and similar violations of security.
- e. <u>Storage</u>: Where materials and equipment must be stored, and are of value or attractive for theft, provide a secure lockup. Enforce discipline in connection with the installation and release of material to minimize the opportunity for theft and vandalism.
- f. <u>Environmental Protection</u>: Provide protection, operate temporary facilities and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways and subsoil might be contaminated or polluted, or that other undesirable effects might result. Avoid use of tools and equipment which produce harmful noise. Restrict use of noise making tools and equipment to hours that will minimize complaints from persons or firms near the site. Proper storage, handling, and disposal of hazardous materials are required at temporary facilities, and TSA will inspect temporary facilities during biweekly and rain event inspections. Additionally, installation and maintenance erosion and sediment controls may be necessary dependent upon site conditions. These controls should be included in the Contractor's submittal of the Temporary Erosion and Sediment Control Plan.

# 1.11 OPERATION, TERMINATION AND REMOVAL

- a. <u>Supervision</u>: Enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.
- b. <u>Maintenance</u>: Maintain facilities in good operating condition until removal. Protect from damage by freezing temperatures and similar elements.

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

- c. <u>Protection</u>: Prevent water filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.
- d. <u>Termination and Removal</u>: Unless the Architect requests that it be maintained longer, remove each temporary facility when the need has ended, or when replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with the temporary facility. Repair damaged Work, clean exposed surfaces and replace construction that cannot be satisfactorily repaired.

Materials and facilities that constitute temporary facilities are property of the Contractor. The Owner reserves the right to take possession of Project identification signs.

Remove temporary paving that is not intended for or acceptable for integration into permanent paving. Where the area is intended for landscape development, remove soil and aggregate fill that does not comply with requirements for fill or subsoil in the area. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances which might impair growth of plant materials or lawns. Repair or replace street paving, curbs and sidewalks at the temporary entrances, as required by the governing authority.

At Substantial Completion, clean and renovate permanent facilities that have been used during the construction period, including but not limited to:

Replace air filters and clean inside of ductwork and housings.

Replace significantly worn parts and parts that have been subject to unusual operating conditions.

Replace lamps that are burned out or noticeably dimmed by substantial hours of use.

# END OF SECTION 01 50 00

# SECTION 01 52 13 - CONTRACTOR'S FIELD OFFICE & SHEDS

### 1.01 DESCRIPTION

- a. The Contractor shall furnish, install, and maintain field office and sheds as may be required for the performance of contract work.
- b. No existing facilities at the Project site will be available for use as field office or secured storage areas.
- c. The Contractor shall construct, install, and maintain field offices and sheds in accordance with applicable regulatory requirements.
- d. The Contractor's Staging Area shall be on the Airport property, where authorized by the Owner.
- e. The construction of the field office shall be structurally sound, weathertight, with floors raised above the ground. Doors shall be sturdy and shall be provided with provisions for dead bolt locking, temperature transmission resistance compatible with occupancy and storage requirements, and painted as directed by the Owner.
- f. Portable or mobile buildings complying with the specified requirements may be used.
- g. Storage Sheds:
  - 1. Number and Sizes: Adequate for material storage and handling requirements.
  - 2. Ventilation: Comply with specified and regulatory requirements for stored products.
  - 3. Heating: Adequate to maintain temperatures specified in the Specification Sections for the products to be stored.
  - 4. Lighting: As required to facilitate product handling and inspection.
- h. The Contractor shall obtain the Owner's approval of locations for field offices and sheds prior to commencing site preparation for the structures.
- i. The Contractor shall maintain the telephone, electrical, water, heat and sanitary systems to the trailer at all times during construction. Relocate the utility poles and other utility lines as necessary to maintain construction work at no additional cost to the Owner.
- j. Provide permanent nameplate on each item of service connected or power-operated equipment. Indicate manufacturer, product name, model number, serial number, capacity, speed, ratings and similar essential operating data. Locate nameplates on an easily accessed surface which, in occupied areas, is not conspicuous.
- k. Where available, provide standard products of types which have been produced and used previously and successfully on other projects and in similar applications.
- 1. Where additional amounts of a product, by nature of its application, are likely to be needed by Owner at a later date for maintenance and repair or replacement work, provide a standard, domestically produced product which is likely to be available to Owner at such later date. When specified in individual Sections, provide extra stock of products, materials, or equipment, stored at locations designated by the Owner.

# END OF SECTION 01 52 13

### 1.01 DESCRIPTION

- a. The Contractor (and his subcontractors) shall, at all time, exercise reasonable precautions for the safety of all persons. All rules, regulations, and laws concerning safety that are in effect at the work site, and in particular, all applicable regulations of the Occupational Safety and Health Administration (OSHA) of the U.S. Government, in addition to all the requirements of these specifications, shall be complied with in all respects.
- b. The Contractor shall provide adequate equipment and facilities as are necessary and required for first aid service to any person who may be injured in the prosecution the Work under this Contract whether they are his own personnel, his subcontractor's personnel, the owner's representative, or other persons who may for any reason enter within the limits of the contract Work. Also, the Contractor shall have standing arrangements for or have effective written procedure on site, to care, and for removal and hospital treatment of any person who may be injured. Such equipment or facilities and arrangements shall be satisfactory to the Owner.
- c. Attention shall be directed to the requirements that the Contractor comply with all pertinent provisions of the "Manual of Accident Prevention in Construction" issued by the Associated General Contractors of America, Inc.
- d. Within 15 days after Notice to Proceed, Contractor shall submit a Safety Plan for review. The Safety Plan shall not be paid for separately but shall be considered incidental to the project. The Contractor shall be required to comply with the Safety Program Plan and all applicable Federal, State, and local regulation codes, rules, laws and ordinances. When work is required in the Air Operation Areas (AOA), the Safety Program Plan shall address the provisions set forth within specification Section 00 73 04 SPECIAL PROJECT PROCEDURES.
- e. Review of the Safety Program Plan shall not relieve the Contractor of any responsibility for complying with all applicable safely regulations nor, by reviewing the Safety Program Plan, will the Owner and Architect assume any of the Contractor's responsibilities for compliance with the said safety regulations.
- f. The Contractor further agrees to indemnify and hold the Owner and Architect harmless for, of and from any loss including but not limited to fines, legal fees, penalties and corrective measures. The Owner may sustain by reason of the Contractor's failure to comply with said laws, rules and regulations in connection with the performance of this Contract.
- g. It is essential that each Contractor and Subcontractor implement an effective and vigorous Safety and Health Program to cover his portion of the work. It shall be understood that the full responsibility for providing a safe place to work with respect to his portion of the work rests with each individual contractor.

# 1.02 SAFETY REQUIREMENTS

- a. Standards: Maintain the Project in accordance with State and local safety and insurance standards.
- b. The wearing of non-conducting, hard, safety hats on the job is mandatory. The Contractor shall be responsible for and shall enforce the wearing of such safety hats by his personnel and the personnel of his subcontractors. The Contractor shall keep at least 5 safety hats at the work site for use by others inspecting or visiting the work site.

- c. All employees must wear approved safety shoes unless special shoes for the types of work are required.
- d. All tools and devices that require electric power shall be properly grounded.
- e. Safety glasses shall be worn by all workmen when performing operations hazardous to the eyes, and all welders shall be provided with suitable welding masks.
- f. Hazards Control:
  - 1. Store volatile wastes in covered metal containers, and remove from premises daily.
  - 2. Prevent accumulation of wastes which create hazardous conditions.
  - 3. Provide adequate ventilation during use of volatile or noxious substances.
  - 4. Cover trash containers and dumpsters to eliminate attraction of birds and other wildlife as well as avoid wind-blown debris.
- i. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.
  - 1. Do not burn or bury rubbish and waste materials on Project site.
  - 2. Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.
  - 3. Do not dispose of wastes into streams or waterways.
- j. Provide accident information on the forms provided by the Owner. This information will be provided on the same day as the occurrence of said incident.
- k. The Owner will identify safety issues as they become apparent and will issue Notices of Noncompliance to the Contractor. These notices, however, do not relieve the Contractor of the sole responsibility for safety on the job site.
- 1. In the event of any emergency constituting an immediate hazard to health or safety of Owner employees, property, or licensees, the Owner may undertake at the Contractor's expense, without prior notice, all work necessary to correct such hazardous conditions when it was caused by work of the Contractor not being in accordance with requirements of this contract.
- m. If, at any time, in the sole judgment of the Owner, the work is not properly lighted, barricaded or in any other respects safe in regard to public travel, persons on or about the work, or public or private property, the Owner shall have the right to order such safeguards to be erected and such precautions to be taken as he deems advisable, and the Contractor shall comply promptly with such orders. If, under such circumstances, the Contractor does not or cannot immediately put the work and the safeguards into proper and approved condition or if the Contractor or his representative is not upon the site so that he can be notified immediately of the insufficiency of safety precautions, the Owner may put the work into such a condition that it shall be, in his opinion, in all respects safe. *The Owner has the right to shut down the job site if the Contractor does not comply with the Owner written requests of Non-Compliance in the form of a D/O. In such an occurrence the Contractor abandons his/her rights for claiming cost or schedule compensation for any related delays.*

The Contractor shall pay all costs and expenses incurred by the Owner in so doing. Such action of the Owner, or their failure to take such action, shall in no way relieve or diminish the responsibility of the Contractor for any and all costs, expenses, losses, liability, suits, proceedings, judgments, awards or damages resulting from, by reason of or in connection

with any failure to take safety precautions of the insufficiency or the safety precautions taken by him or by the Owner acting under authority of this paragraph.

n. Fire Prevention: All operations in connection with the contract work shall be so performed that no fire hazards are needlessly created or permitted to exist. If the contract work involves a fire hazard, sufficient fire fighting equipment with trained, capable operators shall be in the area to contain any fire until the local fire department is able to arrive. Particular care shall be exercised with regard to the disposition of waste materials, the nature of quality of which might create or increase a fire hazard. The Contractor shall make sure that persons employed directly or indirectly by him while working in connection with this contract comply with any fire prevention regulations of the Owner. The Contractor shall also have a procedure for promptly notifying local fire fighting organizations in case of fire. The Contractor shall be responsible for compliance by personnel of his organization for their cooperation in fire prevention, fire reporting, and protective measures to minimize loss.

# 1.03 ENVIRONMENTAL CONTROL OFFICER

a. The Contractor shall designate one of his staff as "Environmental Control Officer", whose duties shall include the responsibility for enforcing the environmental protection provisions of these Specifications including safety and health; the requirements of the Occupational Safety and Health Act; and other applicable Federal, State, and local standards. Contractor shall submit, for information his intended traffic flow plan, security plan, program for temporary structures, housecleaning plan, demolition program, and safety and health plan.

END OF SECTION 01 54 09

### SECTION 01 57 01 - TEMPORARY CONTROLS

### 1.01 DESCRIPTION

- a. Noise and Vibration Control:
  - 1. Comply with all applicable state and local laws, ordinances, and regulations relative to noise control.
- b. Dust and Dirt Control:
  - 1. Conduct construction operations to prevent windblown dust and dirt from interfering with the progress of the work.
  - 2. Periodically water construction area as required to minimize the generation of dust and dirt.
  - 3. Hauling equipment and trucks carrying loads of soil and debris shall have their loads sprayed with water or covered with tarpaulins.
  - 4. Prevent dust and dirt from accumulating on walls, roadways, parking areas, and planting, and from washing into sewer and storm drains.
  - 5. Take special precautions to assure that dust and dirt does not affect the various communications and control systems.
  - 6. The Engineer reserves the right to employ outside assistance to provide corrective measures if the Contractor fails to provide proper dust control. Such incurred direct costs plus project engineering costs will be charged to the Contractor and appropriate deductions made form the Contractor's period cost estimates.
- c. Pollution Control:
  - 1. No burning of refuse, debris, or other materials will be permitted on or in the vicinity of the Project site.
  - 2. Comply with regulatory requirements and anti-pollution ordinances during the performance of construction and disposal operations, including the disposal of solid, liquid and gaseous contaminants.
- d. Cleaning:

During handling and installation of work at Project site, clean and protect work in progress and adjoining work on a basis of perpetual maintenance. Apply suitable protective covering on newly installed work where reasonably required to ensure freedom from damage or deterioration at time of substantial completion; otherwise, clean and perform maintenance on newly installed work as frequently as necessary through remainder of construction period. Adjust and lubricate operable components to ensure operability without damaging effects. See Section 01 71 01 – Cleaning.

# END OF SECTION 01 57 01

# 1.01 SUMMARY

- a. This Section specifies administrative and procedural requirements governing the Contractor's selection of products for use in the Project.
- b. The Contractor's Construction Schedule and the Schedule of Submittals are included under Section 01 30 00 Submittals.
- c. <u>Standards</u>: Refer to Section "Definitions and Standards" for applicability of industry standards to products specified.
- d. Administrative procedures for handling requests for substitutions made after award of the Contract are included under Section "Product Substitutions."

# 1.02 DEFINITIONS

- a. <u>Definitions</u> used in this Article are not intended to change the meaning of other terms used in the Contract Documents, such as "specialties," "systems," "structure," "finishes," "accessories," and similar terms. Such terms such are self-explanatory and have well recognized meanings in the construction industry.
- b. <u>"Products"</u> are items purchased for incorporation in the Work, whether purchased for the Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
- c. <u>"Named Products"</u> are items identified by manufacturer's product name, including make or model designation, indicated in the manufacturer's published product literature, that is current as of the date of the Contract Documents.
- d. <u>"Materials"</u> are products that are substantially shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.
- e. <u>"Equipment"</u> is a product with operational parts, whether motorized or manually operated, that requires service connections such as wiring or piping.

# 1.03 SUBMITTALS

a. <u>Product List Schedule</u>: Prepare a schedule showing products specified in a tabular form acceptable to the Architect. Include generic names of products required. Include the manufacturer's name and proprietary product names for each item listed.

Coordinate the product list schedule with the Contractor's Construction Schedule and the Schedule of Submittals.

- b. <u>Form</u>: Prepare the product listing schedule with information on each item tabulated under the following column headings:
  - 1. Related Specification Section number.
  - 2. Generic name used in Contract Documents.
  - 3. Proprietary name, model number and similar designations.
  - 4. Manufacturer's name and address.
  - 5. Supplier's name and address.
  - 6. Installer's name and address.
  - 7. Projected delivery date, or time span of delivery period.

- c. <u>Initial Submittal</u>: Within 7 days after date of commencement of the Work, submit 3 copies of an initial product list schedule. Provide a written explanation for omissions of data, and for known variations from Contract requirements.
- d. <u>Completed Schedule</u>: Within 30 days after date of commencement of the Work, submit 3 copies of the completed product list schedule. Provide a written explanation for omissions of data, and for known variations from Contract requirements.
- e. <u>Architect's Action</u>: The Architect will respond in writing to the Contractor within 2 weeks of receipt of the completed product list schedule. No response within this time period constitutes no objection to listed manufacturers or products, but does not constitute a waiver of the requirement that products comply with Contract Documents. The Architect's response will include the following:
  - 1. A list of unacceptable product selections, containing a brief explanation of reasons for this action.

# 1.04 QUALITY ASSURANCE

- a. <u>Source Limitations</u>: To the fullest extent possible, provide products of the same kind, from a single source.
  - 1. When specified products are available only from sources that do not or cannot produce a quantity adequate to complete project requirements in a timely manner, consult with the Architect for a determination of the most important product qualities before proceeding. Qualities may include attributes relating to visual appearance, strength, durability, or compatibility. When a determination has been made, select products from sources that produce products that possess these qualities, to the fullest extent possible.
- b. <u>Compatibility of Options</u>: When the Contractor is given the option of selecting between two or more products for use on the Project, the product selected shall be compatible with products previously selected, even if previously selected products were also options.
- c. <u>Nameplates</u>: Except for required labels and operating data, do not attach or imprint manufacturer's or producer's nameplates or trademarks on exposed surfaces of products which will be exposed to view in occupied spaces or on the exterior.
- d. <u>Labels</u>: Locate required product labels and stamps on a concealed surface or, where required for observation after installation, on an accessible surface that is not conspicuous.
- e. <u>Equipment Nameplates</u>: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate on an easily accessible surface which is inconspicuous in occupied spaces. The nameplate shall contain the following information and other essential operating data:
  - 1. Name of product and manufacturer.
  - 2. Model and serial number.
  - 3. Capacity.
  - 4. Speed.
  - 5. Ratings.
### 1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

- a. Deliver, store and handle products in accordance with the manufacturer's recommendations, using means and methods that will prevent damage, deterioration and loss, including theft.
- b. Schedule delivery to minimize long-term storage at the site and to prevent overcrowding of construction spaces.
- c. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft and other losses.
- d. Deliver products to the site in the manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting and installing.
- e. Inspect products upon delivery to ensure compliance with the Contract Documents, and to ensure that products are undamaged and properly protected.
- f. Store products at the site in a manner that will facilitate inspection and measurement of quantity or counting of units.
- g. Store heavy materials away from the Project structure in a manner that will not endanger the supporting construction.
- h. Store products subject to damage by the elements above ground, under cover in a weather tight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.

## 1.06 PRODUCT SELECTION

- a. <u>General Product Requirements</u>: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, unused at the time of installation.
  - 1. Provide products complete with all accessories, trim, finish, safety guards and other devices and details needed for a complete installation and for the intended use and effect.
- b. <u>Standard Products</u>: Where available, provide standard products of types that have been produced and used successfully in similar situations on other projects.
- c. <u>Product Selection Procedures</u>: Product selection is governed by the Contract Documents and governing regulations, not by previous Project experience.
- d. <u>Semi-Proprietary Specification Requirements</u>: Where three or more products or manufacturers are named, provide one of the products indicated. No substitutions will be permitted.
- e. <u>Non-Proprietary Specifications</u>: When the Specifications list less than three products or manufacturers that are available and may be incorporated in the Work, but do not restrict the Contractor to use of these products only, the Contractor may propose any available product that complies with Contract requirements. Comply with Contract Document provisions concerning "substitutions" to obtain approval for use of an unnamed product.
- f. <u>Performance Specification Requirements</u>: Where Specifications require compliance with performance requirements, provide products that comply with these requirements, and are

recommended by the manufacturer for the application indicated. General overall performance of a product is implied where the product is specified for a specific application.

- 1. Manufacturer's recommendations may be contained in published product literature, or by the manufacturer's certification of performance.
- g. <u>Compliance with Standards, Codes and Regulations</u>: Where the Specifications only require compliance with an imposed code, standard or regulation, select a product that complies with the standards, codes or regulations specified.
- h. <u>Visual Matching</u>: Where Specifications require matching an established Sample, the Architect's decision will be final on whether a proposed product matches satisfactorily.
  - 1. Where no product available within the specified category matches satisfactorily and also complies with other specified requirements, comply with provisions of the Contract Documents concerning "substitutions" for selection of a matching product in another product category, or for noncompliance with specified requirements.
- i. <u>Visual Selection</u>: Where specified product requirements include the phrase "...as selected from manufacturer's standard colors, patterns, textures..." or a similar phrase, select a product and manufacturer that complies with other specified requirements. The Architect will select the color, pattern and texture from the product line selected.
- j. <u>Allowances</u>: Refer to individual Specification Sections and "Allowance" provisions in Division-1 for allowances that control product selection, and for procedures required for processing such selections.

# 1.07 INSTALLATION OF PRODUCTS

- a. Comply with manufacturer's instructions and recommendations for installation of products in the applications indicated. Anchor each product securely in place, accurately located and aligned with other Work.
  - 1. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

END OF SECTION 01 60 00

### SECTION 01 60 01 - PRODUCT OPTIONS & SUBSTITUTIONS

### 1.01 PRODUCTS

- a. The term "product" includes materials, systems, and equipment. Products shall be new, undamaged, of the types specified, and furnished in ample quantities to facilitate proper execution of the work.
- b. When requesting a product substitution, select an option which is compatible with other products already specified
- c. Where available, provide standard products or types which have been produced and used previously and successfully on other Projects and in similar applications.

#### 1.02 LIST OF PRODUCTS

- a. Include substitutions in the required submittal list (Section 01 30 00 Submittals), showing the names of the manufacturers proposed to be used for each of the products identified in the Specifications, and, where applicable, the name of the installer.
- b. The Architect will reply, in writing, to the Contractor stating whether, after due investigation, there is reasonable objection to any such proposal. If adequate data on any proposed manufacturer or installer is not available, the Architect may state that action will be deferred until the Contractor provides further data. No reply by the Architect shall not constitute waiver of any requirement.
- c. Up to and until 60 days after the date of the Notice to Proceed, the Architect will consider the Contractor's formal requests for substitutions in place of the specified items under the conditions set forth in this Section, assuming the item was listed in paragraph A above. No requests will be considered 60 days after the Notice to Proceed except as specified in this Section.

#### 1.03 CONTRACTOR'S OPTIONS

- a. The Contractor has the following options:
  - 1. For products specified only by reference standards, select any product meeting those standards, by any manufacturer.
  - 2. For products specified by naming several products or manufacturers, select one of the specified products or manufacturers or submit a request, as required by this Section, for substitution, for any product not specifically named. Where only one manufacturer is specified but other manufacturers are listed as acceptable, their products shall be treated as a substitution and submitted in accordance with the requirements specified in this Section.
  - 3. For products specified by naming one or more products, but indicating the option of selecting equivalent products by stating "or equal", "equal to", or "approved equal", "equivalent to"; submit a request, as required by this Section, for substitution, for any product not specifically named.
  - 4. If it is known that a specified product is not a feasible or acceptable selection, notify the Architect in writing before proceeding with the purchase of the product.

- 5. Where only compliance with an imposed standard, code, or regulation is required, select any product satisfying the requirement.
- 6. Where matching with an existing sample is required, the final decision whether a product proposed matches the sample satisfactorily is the Architect's judgment.
- 7. Except as otherwise indicated, where Specifications include the statement: "as selected from manufacturer's standard colors, patterns, textures..." or words of similar effect, the selection of manufacturer and basic product (complying with Specifications) is the Contractor's option, and the selection of color, pattern, and texture shall be the Architect's selection.

# 1.04 REQUIREMENTS FOR SUBSTITUTIONS

- a. Products proposed for substitution shall comply with specific performances indicated and/or specified, and which are recommended by the manufacturer (in published product literature or by individual certification) for application indicated. Overall performance of a product is implied where product is specified with only certain specific performance requirements.
- b. Products proposed for substitution shall have been produced in accordance with prescriptive requirements, using specified ingredients and components, and complying with specified requirements for fabricating, finishing, testing, and similar operations in manufacturing process.
- c. A proposed substitution shall not be purchased or installed by the Contractor without written acceptance from the Architect. Acceptance of any substitution shall not relieve the Contractor from responsibility for the proper execution of the work and any other requirements specified in the Contract Documents.
- d. The Contractor shall be responsible for the effect of a substitution of related work in the Project, and shall pay additional costs generated by a substitution, including the costs of the Architect's additional services.
- e. The burden of proving that the proposed substitution is "equal to the specified product is upon the Contractor and such proof shall include sufficient factual and comparative data and information necessary to establish that the requested substitution is equal in quality, utility, structural strength, mechanical and technical performance, finish, arrangement of plan, repair and maintenance, compatibility with other existing or specified items, and any other relevant data.
- f. By making a request for substitution, the Contractor:
  - 1. Represents that he has personally investigated the proposed substitute product and has determined that it is equal or superior in all respects to the specified product.
  - 2. Represents that he will provide the same warranty for the substitution that he would have for the specified product.
  - 3. Certifies that the cost data presented is complete and includes all related costs under the contract.
  - 4. Waives all claims for additional costs or schedule impact related to the substitution which subsequently become apparent.

- 5. Will coordinate the installation of the substitute, making sure changes as may be required for the work to be complete in all respects.
- g. Substitutions will not be considered if:
  - 1. They are indicated or implied on shop drawings or product data submittals without formal request submitted in accordance with this Section.
  - 2. Acceptance will require substantial revision of the Contract Documents.
  - 3. The proposed product is inferior to the specified product as judged by the Architect.
  - 4. Request does not include sufficient data for the Architect to make a reasonable judgment regarding the acceptability of the proposed substitution.
- h. The Architect will be the judge of the acceptability of proposed substitutions, and his determination will be final.
- i. Approval of a substitution shall not relieve the Contractor from responsibility for the proper execution of the work and other requirements of the Contract Documents.
- j. If a substitution is rejected, provide the product originally specified.

# 1.05 REQUESTS FOR SUBSTITUTIONS

- a. Submit 7 copies of a written request for a substitution and data substantiating the request to the Architect in enough advance notice to allow a thorough evaluation by the Architect. Each request shall include the following:
  - 1. Complete technical data of all characteristics of the originally specified item, including drawings, reference standards, performance specifications, cost data, samples, and test reports of the product proposed for substitution. Submit additional information if requested by the Architect. Annotate the specific salient characteristics which are being compared to those of the originally specified item. The mere submission of catalog cuts and/or other data without the annotation is not acceptable. See the following paragraph which requires line-by-line comparison.
  - 2. Data similar to that specified for the item for which the substitution is proposed. Include a line-by-line comparison of characteristics between specified item and proposed substitute documenting equal status. Highlight by underlining or other means characteristics that are different from those of the specified item. Equivalency will be based on salient characteristics as determined by the Architect.
  - 3. Effect on the progress schedule.
  - 4. Complete breakdown of costs indicating the cost amount to be added to or deducted from the Contract Sum if the proposed substitution is accepted.
  - 5. Certification by the Contractor that the proposed substitution is in compliance with the Contract Documents and applicable regulatory requirements.
  - 6. List of other work, if any, which may be affected by the substitution.
  - 7. Availability of maintenance service and source of replacement materials.

- 8. Samples, if requested, of both the originally specified product and the proposed substitute product.
- 9. Name and address of similar Projects on which the proposed substitute product was used. Include name, address and telephone numbers of the Architect for each Project.
- 10. Sample of standard form of guarantee or warranty offered by the manufacturer for the substitute product proposed.

## 1.06 REQUESTS FOR SUBSTITUTIONS AFTER TIME SPECIFIED

- a. No substitution of materials, products, or equipment will be considered after the time described in the above paragraphs unless the specified material cannot be delivered or incorporated into the work in the time allowed due to conditions beyond the control of the Contractor.
- b. The Contractor shall reimburse the Architect's cost for additional services required by the Architect to review and process substitutions.
- c. Written requests for substitutions shall include reasons for the request, proof that delivery is impossible, complete description and data of the proposed substitute necessary for a complete evaluation of costs, delivery time, and other necessary information.
- d. Costs of delays which could have been avoided by the timely submission of requests for substitutions shall be borne by the Contractor.

### 1.07 SUBSTITUTION PROCESSING

a. Submit substitutions on a Request for Information form; follow the request for information processing requirements. In addition, maintain a Request for Substitution log which will indicate the following: The RFI number, description, the date submitted to the Architect, the date required for return, the date returned from the Architect, and comments. This log will be reviewed at the weekly progress meetings.

END OF SECTION 01 60 01

#### SECTION 01 60 02 - DELIVERY, STORAGE & HANDLING

#### 1.01 TRANSPORTATION AND HANDLING

- a. Manufactured products shall be delivered in the manufacturer's original unbroken containers or packaging, with identifying labels intact and legible.
- b. Immediately on delivery, inspect shipments to assure compliance with requirements of Contract Documents and approved submittals, and verify that products are properly protected and undamaged.
- c. Handle products and packages in a manner to avoid soiling or damaging. Promptly remove damaged or defective products from the site, and replace at no increase in Contract Sum.
- d. Tight wood sheathing shall be laid under any materials that are stored or moved over finished surfaces. Reinforced non-staining kraft building paper and plywood or planking shall be laid over all types of finished floor surfaces in traffic areas before moving any material over these finished areas. Wheelbarrows, if used over such areas, shall have rubber-tired wheels.

#### 1.02 STORAGE

- a. Store manufactured products in accordance with the manufacturer's instructions, with seals and labels intact and legible.
  - 1. Store products subject to damage by the elements in weathertight enclosures. Maintain temperature and humidity within the ranges specified by the manufacturers.
  - 2. Control delivery schedules to minimize long-term storage at site, particularly for products recognized to be flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other sources of loss.
- b. Exterior Storage:
  - 1. Store fabricated products above the ground on blocking or skids to prevent soiling and staining.
  - 2. Cover products subject to deterioration with impervious sheet coverings; provide adequate ventilation to avoid condensation.
- c. Periodically inspect stored products to assure that specified conditions are maintained and the products are free from damage or deterioration.
- d. Protection after Installation:
  - 1. Provide coverings necessary to protect installed products from damage due to traffic or construction operations. Remove coverings when no longer needed.
  - 2. Maintain temperature and humidity conditions for interior equipment and finish products in accordance with the manufacturers' instructions.
- e. The Contractor will be permitted to store equipment needed for the immediate work on hand within the Work area as approved by the Owner. Equipment not in use will be returned to the appropriate Contractor's staging area. All equipment booms shall be lowered at the close of each day's work or when stored. All equipment will be parked in the staging area at the close of work each day and whenever it is not in use.

#### END OF SECTION 01 60 02

#### 1.01 DESCRIPTION

- a. This Section describes the requirements for cleaning.
  - 1. Keep premises free from accumulations of waste, debris, and rubbish, caused by operations.
  - 2. At completion of Work, remove waste materials, rubbish, tools, equipment, machinery and surplus materials, and clean all exposed surfaces; leave Project clean and ready for occupancy.

#### 1.02 MATERIALS

- a. Use only cleaning materials recommended by manufacturer of surface to be cleaned.
- b. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

#### 1.03 COORDINATION

- a. The Contractor shall assume all financial responsibilities incurred by the Airport, its tenants, and/or customers in the event life safety systems of the Airport are activated by Contractor's cleaning activities (e.g., sweeping dust and tripping a smoke alarm).
- b. The Contractor shall coordinate cleaning activities with the Owner. The Contractor shall comply with all Airport policies regarding cleaning activities.

### 1.04 CLEANING DURING CONSTRUCTION

- a. Keep premises free from accumulations of waste materials and rubbish.
- b. At least once a week, or sooner if required, clean work area and dispose of waste materials, debris and rubbish off the site in a legal manner. Remove combustible materials such as paper and cardboard daily.
- d. Provide on-site containers for collection of waste materials, debris and rubbish. Provide a collection can at each location used as an eating area. Pick up all garbage daily.
- e. Remove waste materials, debris and rubbish from site and legally dispose of legally off Owner's property. Do not bury or burn waste materials at the site.
- f. Vacuum clean interior areas when ready to receive finish painting, and continue vacuum cleaning on an as-needed basis until work area is ready for substantial completion or occupancy.
- g. All rubbish shall be lowered by way of chutes or taken down on hoists or lowered into receptacles. Under no circumstances shall rubbish or waste be dropped or thrown from one level to another within or outside the building.
- h. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet newly painted surfaces.

#### 1.05 FINAL CLEANING

- a. Employ experienced workmen or professional cleaners for final cleaning.
- b. In preparation for Substantial Completion or Occupancy, conduct final inspection of sight-exposed interior and exterior surfaces, and of concealed spaces.
- c. Remove grease, dust, dirt, stains, labels, fingerprints and other foreign materials from sightexposed interior finished surfaces; polish bright surfaces to shine finish.
- d. Repair, patch and touch-up marred surfaces to specified finish to match adjacent surfaces.
- e. Broom clean paved surfaces; rake clean other surfaces of grounds.
- f. Keep Project clean until it is occupied by Owner.
- g. Wipe surfaces of mechanical and electrical equipment clean, remove excess lubrication and other substances.
- h. Replace all used filters.
- i. Clean non-occupied spaces and limited-access spaces (such as plenums, shafts, equipment vaults, attics, and similar spaces) broom clean and free of surface dust.
- j. Vacuum clean carpeted surfaces and similar soft surfaces.
- k. Clean plumbing fixtures to a sanitary condition, free of stains including those resulting from water exposure.
- 1. Clean light fixtures and lamps so as to function with full efficiency.
- m. Except as otherwise indicated or requested by Owner, remove temporary protection devices and facilities.
- n. Where extra materials of value remain dispose of these to Owner's best advantage as directed.
- o. Clean all electronic detectors so as to function with full efficiency.

# END OF SECTION 01 71 00

## SECTION 01 71 10 - CUTTING AND PATCHING

## 1.01 DESCRIPTION

- a. The Contractor shall perform all cutting, fitting or patching required to:
  - 1. Make parts fit properly.
  - 2. Uncover work to permit the installation of ill-timed work.
  - 3. Remove and replace work not conforming to requirements of Contract Documents.
  - 4. Remove samples of installed work as may be required for testing.
- b. In addition to Contract requirements, upon the Architect's written instructions the Contractor shall:
  - 1. Uncover work to permit the Architect's observation of covered work.
  - 2. Remove samples of installed materials for testing.
  - 3. Perform any other cutting and patching directed by the Architect.
- c. The Contractor shall not endanger any work by cutting or altering work or any part of it.

### 1.02 QUALITY ASSURANCE

- a. Design Criteria:
  - 1. Patching shall achieve security, strength, and weather protection, and shall preserve continuity of existing fire ratings.
  - 2. Patching shall successfully duplicate undisturbed adjacent finishes, colors, textures, and profiles. Where there is dispute as the whether duplication is successful or has been achieved, the Architect's judgment will be final.

#### 1.03 SUBMITTALS

- a. The Contractor shall submit written notice to the Architect requesting permission to proceed with cutting before any cutting, which affects:
  - 1. Structural integrity of any element of the Work.
  - 2. Integrity of weather-exposed or moisture-resistant element.
  - 3. Efficiency, maintenance, or safety of any operational element.
  - 4. Visual qualities of sight-exposed elements.
  - 5. Work of separate contractor.
- b. Include in request:
  - 1. Identification of the Work.

- 2. Location and description of affected work.
- 3. Necessity for cutting or alteration.
- 4. Description of proposed work, and products to be used.
- 5. Alternatives to cutting and patching.
- 6. Effect on work of separate contractor.
- 7. Written permission of affected separate contractor.
- 8. Date and time-work will be executed.
- c. Should conditions of work or schedule indicate change of materials or methods, the Contractor shall submit written recommendation to the Architect, including:
  - 1. Conditions indicating change.
  - 2. Recommendations for alternative materials or methods.
  - 3. Submittals as required for substitutions.
- d. The Contractor shall submit 2 working days advanced written notice to the Architect designating the time the Work will be uncovered.

# 1.04 MATERIALS

a. Materials shall be as specified in the applicable sections of the Specifications (and as required to match existing construction).

# 1.05 INSPECTION

- a. Inspect existing conditions of work, including elements subject to movement or damage during cutting and patching, and excavating and backfilling.
- b. After uncovering work, inspect conditions affecting installation of new products.
- c. Beginning of cutting or patching means acceptance of existing conditions.

# 1.06 PREPARATION PRIOR TO CUTTING

- a. Provide shoring, bracing and support as required to maintain structural integrity.
- b. Provide protection for other portions of Project.
- c. Provide protection from elements.

# 1.07 PERFORMANCE

- a. Fit and adjust products to permit the finished installation to comply with specified tolerances and finishes.
- b. Perform cutting and demolition by methods which will prevent damage to other work, and will provide proper surfaces to receive installation of repairs and new work.

- c. Perform cutting, associated structural reinforcing, and patching not required to be performed as part of the work of other Sections.
- d. Perform cutting, associated structural reinforcing, and patching to prevent damage to other work and to provide proper surfaces for the installation of materials, equipment, and repairs.
- e. Do not cut or alter structural members without prior approval of the Architect.
- f. Employ original installer or fabricator providing work under this Contract to perform cutting and patching for new:
  - 1. Weather-exposed and moisture-resistant products.
  - 2. Fireproofing.
  - 3. Finished surfaces exposed to view.
- g. Adjust and fit products to provide a neat installation.
- h. Finish or refinish cut and patched surfaces to match adjacent finishes. Paint over complete surface plane, unless otherwise indicated. Over patched wall or ceiling surfaces, paint to nearest cutoff line for entire surface, such as intersection with adjacent wall or ceiling, beam pilasters, or to neatest opening frame, unless otherwise indicated. Surfaces shall not present a spotty, touched-up appearance.

# END OF SECTION 01 71 10

### SECTION 01 78 00 - PROJECT CLOSEOUT

## 1.01 PREPARATION FOR SUBSTANTIAL COMPLETION

- a. When the work is substantially complete, submit the following to the Architect:
  - 1. A written notice that the work is substantially complete.
  - 2. A detailed, complete, and comprehensive list of items to be completed or corrected.
  - 3. Certification that all mechanical, electrical, plumbing, security, communications, and hardware equipment has been tested and is operational. The Contractor will provide copies of all test results and reports including a binder by division fully indexed, outlining all equipment and performance tests. In addition, the Contractor will certify the Airport's maintenance and operational personnel have received the specified training. (Section 01 78 09 Operating and Maintenance Data.)
- b. After receipt of the above items, the Architect shall set up an inspection to determine whether or not the Project, or portion of the Project, is ready for Punch List Inspection.
- c. Should the Architect determine that the work is so incomplete it does not warrant a punch list inspection, the Architect shall:
  - 1. Within a reasonable amount of time, notify the Contractor in writing that the work is incomplete. Charges may be assessed for reinspection.
  - 2. Instruct the Contractor to promptly remedy the deficiencies in the work, and send a second notice of substantial completion to the Owner.

### 1.02 ACHIEVING SUBSTANTIAL COMPLETION

- a. When the Architect determines that the Work is ready for the Punch List Inspection, the Contractor will arrange for the inspection by the Architect and representatives of the Owner as necessary.
- b. The Architect shall prepare a coordinated Punch List and will determine which items shall be completed by the Contractor to achieve substantial completion.
- c. The Architect will transmit the Punch List to the Contractor and Owner and will advise the Contractor as to the items that he must complete to achieve Substantial Completion.
- d. Beneficial Occupancy and Substantial Completion are not one and the same. The Owner has the right to beneficially occupy any portion of the Project, or the Project as a whole, at any time in accordance with the General Conditions.

#### 1.03 SUBSTANTIAL COMPLETION

- a. When the specific Punch List items have been completed to the extent that the Work can be utilized for the intended use, the Architect will prepare a Certificate of Substantial Completion for the Owner and will attach a list of the balance of the punch list items to be completed for final completion. Other items which do not conform to the Contract Documents may be added to the list at any time.
- b. At Substantial Completion, the Owner has the right to move in furnishings and equipment, and initiate its security control system. On all final Punch List work after the security system has been activated, the Contractor's work force, equipment, and material may be subject to security procedures, including searches. Any delay associated with this process is part of the base Contract and will not be considered as an extra cost under the Contract.

#### 1.04 FINAL COMPLETION

- a. When the Contractor considers the work to be complete for final inspection, he shall submit written certification that:
  - 1. Contract Documents have been reviewed.
  - 2. Work has been inspected for compliance with the Contract Documents.
  - 3. Work has been completed in accordance with the Contract Documents.
  - 4. Work is completed and ready for final inspection.
  - 5. Obtain the required 'Certificate of Occupancy".
- b. After receipt of the above, the Architect will set up an inspection to determine whether or not the Project is ready for final inspection. The review shall consist of verifying that the remaining Punch List items from the Substantial Completion inspection have been completed.
- c. Should the Architect find the work to be incomplete, the Architect shall advise the Contractor in writing that the work is not acceptable. The Contractor may be assessed for additional inspection costs.
- d. The Contractor shall send another Certificate when the work is complete.
- e. After the Architect has completed the final inspection and finds that the work is complete under the Contract Documents, the 'The Date of Final Completion' shall be determined and the Contractor notified. The Contractor shall proceed to prepare for final closeout/acceptance and shall make final closeout submittals.

### 1.05 CLOSEOUT/ACCEPTANCE

- a. Responsibilities of the Contractor, prior to acceptance by the Architect, shall include but may not be limited to:
  - 1. Submitting a statement showing accounting of changes to the Contract Sum.
  - 2. Submitting warranties, maintenance agreements, final certifications, and similar documents required by the Contract Documents.
  - 3. Submit certification that materials used are asbestos free.
  - 4. Advising the Owner of pending insurance change-over requirements.
  - 5. Obtaining and submitting releases enabling the Owner's full and unrestricted use of the work and access to services and utilities, including where required, occupancy permits, operating certificates, and similar releases. Provide all release of liens from subcontractors and suppliers.
  - 6. Submitting final record documents, operations & maintenance manuals and data, damage or settlement surveys, property surveys, and similar final record information as required by the Contract Documents. The Owner may withhold final payment of retainage until the record documents and operations & maintenance manuals and data have been accepted.
  - 7. Delivering tools, spare parts, extra stocks of materials, and similar physical items to the Owner.
  - 8. Removing all temporary facilities and services, along with construction tools and equipment mock-ups, and similar elements.
  - 9. Preparing final Application for Payment in accordance with the General Conditions and these Specifications.
  - 11. Submitting signed lien waiver forms.
- b. After acceptance of the Work, the final payment will be made.

#### END OF SECTION 01 78 00

#### SECTION 01 78 08 - RECORD DOCUMENTS

### 1.01 DESCRIPTION

- a. This Section describes the requirements for maintaining records of actual conditions in the field and for changes in the work.
- b. The purpose of final Record Documents is to provide factual information regarding all aspects of the work, both concealed and visible, to enable future modifications of the work to proceed without lengthy and expensive site measurements, investigation, and examination.
- c. The Owner and Architect shall have access to record documents at any time prior to final turn over to the Owner.

### 1.02 DOCUMENTS REQUIRED

- a. Maintain at the site the following record documents:
  - 1. Complete Contract Drawing set.
  - 2. Specifications and Addenda.
  - 3. Change Orders and other modifications to the Contract.
  - 4. Field Instructions and other written instructions from the Architect.
  - 5. Reviewed shop drawings, product data, and samples.
  - 6. Test Reports.
  - 7. Requests for Information.
  - 8. General Correspondence.
  - 9. Record Document Drawings.

## 1.03 MAINTENANCE OF DOCUMENTS AND SAMPLES

- a. Store record documents and samples in Contractor's field office apart from documents used for construction. Provide files and racks for storage of documents. Provide locked cabinets or secure storage space for storage of samples.
- b. Make documents and samples available at all times for inspection by the Architect and Owner.
- c. Update the documents within 24-hours after receiving information that a change has occurred or clarification has been issued.

#### 1.04 MARKING DEVICES

a. Non-fade felt tip marking pens shall be used for recording information. Green marks shall be used for added items; red marks shall be used for deleted items; and yellow marks shall be used for unchanged items.

### 1.05 RECORDING

- a. Record information concurrently with the construction process. Legibly mark drawings to record actual construction. The Contractor shall comply with the following:
  - 1. Do not conceal any work until required information is recorded.
  - 2. Completely, accurately, and legibly record, to the satisfaction of the Architect, all deviations in construction.

- 3. Record any deviations caused by approved changes and/or clarifications to the work.
- 4. Use additional copies of prints, if necessary, to insure legible recording of data
- 5. Date all entries.
- 6. Call attention to the entry by drawing a 'cloud' around the area affected on each drawing.
- 7. Post details not on original contract drawings.
- 8. All Record Documents shall show both the original design and the final design. (Example: if a utility location, type, etc. has deviated from the original design, the old data should be crossed out and new data shall be shown.)
- 9. All elevations and coordinates shall be in the same horizontal and vertical datum as the contract documents.
- b. Stamp each Record Document drawing with the following information:
  - 1. "RECORD DOCUMENT"
  - 2. Prepared by: Contractor's name, permanent address.
  - 3. Date prepared.
  - 4. Contractor's (Principal of firm) typed name and signature.
  - 5. In typed words on each drawing the following statement:

"\_\_\_\_\_(Insert Contractor firm name) hereby certifies that to best of our knowledge that these Record Document drawings represent a true and accurate record of the work in-place."

- c. Legibly mark each section of the specifications to record the following:
  - 1. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment installed.
  - 2. Changes made reflecting approved changes to the Work.
- d. Maintain shop drawings as record drawings. Legibly annotate shop drawings to record changes made after approval.

# 1.06 CONVERSION OF SCHEMATIC LAYOUTS

- a. In some cases on the drawings, arrangement of conduits, circuits, piping, ducts, and similar items are shown schematically and are not intended to portray precise physical layout. The final physical arrangement is determined by the Contractor, subject to the approval of the Owner, and shall be accurately recorded by the Contractor on the record documents.
- b. Show on the job set of record drawings, by dimension accurate to one-inch, the centerline of each run of all items specified in the preceding paragraph.
  - 1. Clearly identify the item by accurate note such as "cast iron drain", or 'galvanized flashing", etc.
  - 2. Show by symbol or note the vertical location of the item ("6-inches below slab", 'in ceiling plenum', "exposed", etc.
  - 3. Make all identification sufficiently descriptive that it may be related reliably to the Technical Specifications.

# 1.07 SUBMITTAL

a. Thirty (30) calendar days after Substantial Completion, submit the record documents prepared in accordance with this specification. The Architect shall have thirty (30) calendar

days from receipt of the record documents for review and comment. Record documents found deficient shall be returned to the Contractor after the specified review period. The Contractor shall have fourteen (14) calendar days to correct deficiencies and return corrected record documents. The Contractor shall be required to meet with the Architect and Owner to review the contents of the Record Documents.

### 1.08 PAYMENT

- a. Prior to submitting each request for payment, status of Record Documents shall be reviewed.
- b. Periodic Payments or portions thereof to the Contractor may be withheld until the Owner verifies that as-built information has been properly recorded on the Record Documents.
- c. The Owner may withhold final payment of retainage until the Record Documents have been accepted by the Owner.

### 1.09 RESPONSIBILITY

a. The Contractor shall be fully responsible for the accuracy and completeness of record documents and shall bear all costs of damages incurred by the Owner of any nature whatsoever due to inaccuracies or incompleteness of said records, except to the extent that conditions are disturbed by subsequent construction.

### END OF SECTION 01 78 08

## 1.01 DESCRIPTION

- a. This Section describes the requirements for furnishing product data and related information appropriate for Owner maintenance and operation of products furnished under the Contract.
  - 1. The Contractor shall prepare operating and maintenance data as specified in this Section and as referenced in other Sections.
  - 2. The Contractor shall be responsible for the instruction of Owner personnel in the maintenance of products and in the operation of equipment and systems.

### 1.02 QUALITY ASSURANCE

a. Preparation of data shall be done by personnel trained and experienced in maintenance and operation of the described products, completely familiar with specified requirements, skilled as a technical writer to the extent required to communicate essential data, and skilled as a draftsman competent to prepare required drawings.

# 1.03 FORM OF SUBMITTAL

- a. Prepare data in the form of an instructional manual for use by Owner personnel. The instructional/users manual will be prepared to organize and synthesize documents along with operating instructions and functional information. The manual will be used as the single source of information about the equipment and systems operations, and functions.
- b. Format:
  - 1. Size: 8-1/2-inch x 11-inch.
  - 2. Paper: 24-pound minimum, white, for typed pages.
  - 3. Electronic Media: In addition to paper, submit in duplicate Operation & Maintenance Manuals and Data on CD/DVD.
  - 4. Text: Manufacturer's printed data, or neatly typewritten.
  - 5. Drawings: Provide reinforced punched binder tab, bind in with text. Fold larger drawing to the size of the text pages.
  - 6. Provide fly-leaf for each separate product, or each piece of operating equipment. Provide typewritten description of product, and major component parts of equipment. Provide indexed tabs.
  - 7. Cover: Identify each volume with typed of printed title 'OPERATING AND MAINTENANCE INSTRUCTIONS'. List title of Project, identity of separate structure as applicable, and identity of general subject matter covered in the manual.
- c. Binders: Commercial quality three-ring binders with durable and cleanable plastic covers.

# 1.04 CONTENT OF MANUAL

- a. Neatly typewritten table of contents for each volume, arranged in a systematic order.
  - 1. Contractor, name of responsible principal, address and telephone number.
  - 2. A list of each product and certification warranty/guarantee required to be included, indexed to the content of the volume.
  - 3. List, with each product, the name, address, and telephone number of:
    - a) Subcontractor or installer.
    - b) Maintenance contractor, as appropriate.

- c) Identify the source of responsibility of each.
- d) Local source of supply for parts and replacements.
- 4. Identify each product by product name and other identifying symbols as set forth in the Contract Documents.
- b. Product Data:
  - 1. Include only those sheets which are pertinent to the specific product.
  - 2. Annotate each sheet to:
    - a) Clearly identify the specific product or part installed.
    - b) Clearly identify the data applicable ro the installation.
    - c) Delete references to inapplicable information.
- c. Drawings:
  - 1. Supplement product data with drawings as necessary to clearly illustrate:
    - a) Relations of component parts of equipment and systems.
    - b) Control and flow diagrams.
  - 2. Coordinate drawings with information on Project Record Documents to assure correct illustration of completed installation.
  - 3. Do not use Project Record Documents as maintenance drawings.
- d. Written text is required to supplement product data for the particular installation for all mechanical, electrical, plumbing, heating, air conditioning, security, hardware, and communication systems.
  - 1. Organize in a consistent format under separate headings for different procedures.
  - 2. Provide a logical sequence of instructions for each procedure.
- e. Copy of each warranty, bond and service contract issued.
  - 1. Provide information sheet for Owner personnel; include:
    - a) Proper procedures in the event of failure.
    - b) Instances which might affect the validity of warranties or bonds.
- f. Provide copies of performance tests.

# 1.05 MANUAL FOR MATERIALS AND FINISHES

- a. Submit three copies of complete manual in final form.
- b. Content, for architectural products, applied materials and finishes:
  - 1. Manufacturer's data, giving full information on products.
    - a) Catalog number, size, composition.
    - b) Color and texture designations.
  - 2. Information required for re-ordering special-manufactured products.

- 3. Instructions for care and maintenance:
  - a) Manufacturer's recommendation for types of cleaning agents and methods.
  - b) Cautions against cleaning agents and methods which are detrimental to the product.
  - c) Recommended schedule for cleaning and maintenance.
- c. Content, for moisture-protection and weather-exposed products:
  - 1. Manufacturer's data, giving full information on products.
    - a) Applicable standards.
    - b) Chemical composition.
    - c) Details of installation.
  - 2. Instructions for inspection, maintenance and repair.
- d. Additional requirements for maintenance data: As per respective Sections of Specifications.
- e. Provide complete information for finished products or surfaces specified in each Section.

# 1.06 MANUAL FOR EQUIPMENT AND SYSTEMS

- a. Submit three copies of complete manual in final form.
- b. Content, for each unit of equipment and system, as appropriate:
  - 1. Description of unit and component parts.
    - a) Function, normal operating characteristics, and limiting conditions.
    - b) Performance curves, engineering data and tests.
    - c) Complete nomenclature and commercial number of all replaceable parts.
  - 2. Operating procedures:
    - a) Start-up, break-in, routine and normal operating instructions.
    - b) Regulation, control, stopping, shutdown and emergency instructions.
    - c) Summer and winter operating instructions.
    - d) Special operating instructions.
  - 3. Maintenance procedures:
    - a) Routine operations.
    - b) Guide to 'trouble-shooting.
    - c) Disassembly, repair and reassembly.
    - d) Alignment, adjusting and checking.
    - e) Schedule for recommended service and preventive maintenance.
  - 4. Servicing and lubricating schedule.
    - a) List of lubricants required.
  - 5. Manufacturer's printed operating and maintenance instructions.
  - 6. Description of sequence of operation by control manufacturer.

- 7. Original manufacturer's parts list, illustrations, assembly drawings and diagrams required for maintenance.
  - a) Predicted life of parts subject to wear.
  - b) Items recommended to be stocked as spare parts.
- 8. As-installed control diagrams by controls manufacturer.
- 9. Each Contractor's coordination drawings.
  - a) As-installed color coded piping diagrams.
- 10. Charts of valve tag numbers, with the location and function of each valve.
- 11. List of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.
- 12. Other data as required under pertinent Specification Sections.
- c. Content, for each electrical and electronic system, as appropriate:
  - 1. Description of system and component parts.
    - a) Function, normal operating characteristics, and limiting conditions.
    - b) Performance curves, engineering data and tests.
    - c) Complete nomenclature and commercial number of replaceable parts.
  - 2. Circuit directories of panelboards.
    - a) Electrical service.
    - b) Controls.
    - c) Communications.
  - 3. As-installed color coded wiring diagrams.
  - 4. Operating procedures:
    - a) Routine and normal operating instructions.
    - b) Sequences required.
    - c) Special operating instructions.
  - 5. Maintenance procedures:
    - a) Routine operations.
    - b) Guide to 'Trouble-Shooting".
    - c) Disassembly, repair, and reassembly.
    - d) Adjustment and checking.
    - e) Schedule for preventive maintenance
  - 6. Manufacturer's printed operating and maintenance instructions.
  - 7. List of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.

- 8. Other data as required under pertinent Specification Sections.
- d. Prepare and include additional data when the need for such data becomes apparent during instruction of Owner personnel.
- e. Additional requirements for operating and maintenance data: As per respective Specifications Sections.
- f. Provide complete information for operating products and equipment specified in each Section, including security hardware.

# 1.07 SUBMITTAL SCHEDULE

- a. Submit two copies of completed data in final form 30-days prior to the estimated date of Substantial Completion for the Owner's review, use by the inspectors, and training of Owner personnel. One copy will be returned after inspection for Substantial Completion with comments.
- b. Submit three copies of accepted data in final form 10-days after Final Inspection.

### 1.08 INSTRUCTION OF OWNER PERSONNEL

a. Prior to Owner's inspection for Substantial Completion, fully instruct Owner designated operating and maintenance personnel in the operation, adjustment and maintenance of all products installed.

# END OF SECTION 01 78 09

## SECTION 01 78 10 - WARRANTIES AND BONDS

## 1.01 DESCRIPTION

- a. Requirements Included:
  - 1. Compile specified guarantees, warranties, bonds and certificates.
  - 2. Compile specified service and maintenance contracts.
  - 3. Co-execute submittals when so specified.
  - 4. Review submittals to verify compliance with Contract Documents.
  - 5. Submit for review and transmittal to Architect.

### 1.02 SUBMITTAL REQUIREMENTS

- a. Provide list and assemble all guarantees, warranties, bonds, certificates and service and maintenance contracts, executed by the Contractor and each of the respective manufacturers, suppliers, and subcontractors. Submit within 10 days after Final Inspection.
- b. Number of original signed copies required: Two each.
- c. Table of Contents: Neatly typed, in orderly sequence. Provide complete information for each item. Product or work item. Firm, with name of principal, address and telephone number. Type and duration of guarantee or warranty.

## 1.03 FORM

a. In addition to other requirements of the Contract Documents regarding the general one year warranty, as a condition preceding certifying final payment, the Contractor shall provide extended guarantees/warranties for certain work, as specified in the applicable Specification Sections, on the following form (next page) written on the Contractor's own letterhead. The guarantees/warranties shall commence on the Date of Substantial Completion of the Work by the Owner, unless specifically indicated otherwise.

"Guarantee/Warranty for \_\_\_\_\_\_ under warranty identified by Specification Section)

Project:

Address:

Date:

We agree to repair or replace any or all of our work, together with any or all other work which may be damaged or displaced by so doing, that may prove to be defective in its workmanship, materials, or failure to conform to Contract provisions and requirements within a period of \_\_\_\_\_\_years from the Date of Substantial Completion of the above named structure by the Owner without expenses whatever to the said Owner, ordinary wear and tear and unusual abuse or neglect excepted.

In the event of our failure to comply with the foregoing conditions within 10-days after being notified in writing by the Owner, we collectively or separately do hereby authorize the Owner to proceed to have said defects repaired and made good at our expense and we will honor and pay the costs and charges therefore upon demand.

Date:

Date:

Signed:		Date:
0	(Contractor)	

Or

Signed: \_\_\_\_\_

(Subcontractor)

Countersigned:

(Contractor)

Manchester-Boston Regional Airport Warranties and Bonds

# 1.04 CORRECTION OF GUARANTEED/WARRANTED WORK

- a. Unless repair is agreed to by Owner, Contractor shall correct failed work by removal and replacement of the failed portions with new materials.
- b. In connection with Contractor's correction of warranted work which has failed, remove and replace other work of Project which has been damaged as a result of such failure, or which must be removed and replaced to provide access for correction of warranted work.
- c. Except as otherwise indicated or required by governing regulations, special Project warranties and product warranties are not extended to cover damage to building contents (other than work of Contract), which occurs as a result of failure of warranted work.
- d. Except as otherwise indicated, when work covered by a special Project warranty or product warranty has failed and has been corrected by replacement or restoration, reinstate warranty by written endorsement for the specified time period, starling on date of acceptance of replaced or restored work.
- e. Except as otherwise indicated, costs of replacing or restoring failing warranted units or products is Contractor's obligation, without regard for whether Owner has already benefitted from use through a portion of anticipated useful service lives.
- f. Do not purchase, subcontract for, or allow others to purchase or sub-subcontract for materials or units of work for Project where a special Project warranty, specified product warranty, certification or similar commitment is required, until it has been determined by the Contractor that entities required to countersign such commitments are willing to do so.

END OF SECTION 01 78 10

### SECTION 04 22 00 - CONCRETE UNIT MASONRY

### PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Concrete masonry units.
  - 2. Mortar and grout.
  - 3. Steel reinforcing bars.
  - 4. Masonry joint reinforcement.
  - 5. Miscellaneous masonry accessories.

#### 1.3 DEFINITIONS

- A. CMU(s): Concrete masonry unit(s).
- B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

#### 1.4 PERFORMANCE REQUIREMENTS

- A. Provide unit masonry that develops indicated net-area compressive strengths at 28 days.
  - 1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.

### 1.5 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Owner will engage a qualified independent testing agency to perform preconstruction testing indicated below. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.
  - 1. Concrete Masonry Unit Test: For each type of unit required, according to ASTM C 140for compressive strength.
  - 2. Mortar Test (Property Specification): For each mix required, according to ASTM C 109/C 109M for compressive strength.
  - 3. Grout Test (Compressive Strength): For each mix required, according to ASTM C 1019.

#### 1.6 SUBMITTALS

A. Product Data: For each type of product indicated.

- B. Shop Drawings: For the following:
  - 1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
  - 2. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement." Show elevations of reinforced walls.
- C. Samples for Verification: For each type and color of the following:
  - 1. Exposed CMUs.
- D. Qualification Data: For testing agency.
- E. Material Certificates: For each type and size of the following:
  - 1. Masonry units.
    - a. Include data on material properties and material test reports substantiating compliance with requirements.
  - 2. Cementitious materials. Include brand, type, and name of manufacturer.
  - 3. Grout mixes. Include description of type and proportions of ingredients.
  - 4. Reinforcing bars.
  - 5. Joint reinforcement.
  - 6. Anchors, ties, and metal accessories.
- F. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
  - 1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.
  - 2. Include test reports, according to ASTM C 1019, for grout mixes required to comply withcompressive strength requirement.
- G. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
- H. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

# 1.7 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM C 1093 for testing indicated.
- B. Source Limitations 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 single sourcefrom single manufacturer for each product required.
- C. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality,

including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

- D. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.
- E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination."

### 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If unitsbecome wet, do not install until they are dry.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirtand oil.

### 1.9 PROJECT CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry whenconstruction is not in progress.
  - 1. Extend cover a minimum of 24 inches (600 mm) down both sides of walls and hold coversecurely 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 from mortar splatter by spreadingcoverings on ground and over wall surface.
  - 2. Protect sills, ledges, and projections from mortar droppings.
  - 3. Protect surfaces of window and door frames, 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 onto 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 substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

- 1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40deg F (4 deg C) and higher and will remain so until masonry has dried, but not less than 7days after completing cleaning.
- D. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

# PART 2 - PRODUCTS

# 2.1 MASONRY UNITS, GENERAL

- A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.
- B. Fire-Resistance Ratings: Where indicated, provide units that comply with requirements for fire- resistance ratings indicated as determined by testing according to ASTM E 119, by equivalent masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

### 2.2 CONCRETE MASONRY UNITS

- A. Regional Materials: CMUs shall be manufactured within 500 miles (800 km) of Project site from aggregates and cement that have been extracted, harvested, or recovered, as well asmanufactured, within 500 miles (800 km) of Project site.
- B. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
  - 1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
  - 2. Provide square-edged units for outside corners unless otherwise indicated.
- C. CMUs: ASTM C 90.
  - 1. Density Classification: Normal weight.
  - 2. Size (Width): As indicated on Drawings. Manufactured to dimensions 3/8 inch less than nominal dimensions.

#### 2.3 MORTAR AND GROUT MATERIALS

- A. Regional Materials: Aggregate for mortar and grout, cement, and lime shall be extracted, harvested, or recovered, as well as manufactured, within 500 miles (800 km) of Project site.
- B. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for coldweather construction. Provide natural color or white cement as required to produce mortar color indicated.
- C. Hydrated Lime: ASTM C 207, Type S.
- D. Aggregate for Mortar: ASTM C 144.

- 1. For mortar that is exposed to view, use washed aggregate consisting of natural sand orcrushed stone.
- 2. For joints less than 1/4-inch (6 mm) thick, use aggregate graded with 100 percent passingthe No. 16 (1.18-mm) sieve.
- E. Aggregate for Grout: ASTM C 404.
- F. Water: Potable.

# 2.4 REINFORCEMENT

- A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60 (Grade 420).
- B. Masonry Joint Reinforcement, General: ASTM A 951/A 951M.
  - 1. Interior Walls: Hot-dip galvanized, carbon steel.
  - 2. Exterior Walls: Hot-dip galvanized, carbon steel.
  - 3. Wire Size for Side Rods: 0.148-inch (3.77-mm) diameter.
  - 4. Wire Size for Cross Rods: 0.148-inch (3.77-mm) diameter.
  - 5. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches (407 mm) o.c.
  - 6. Provide in lengths of not less than 10 feet (3 m), with prefabricated corner and tee units.
- C. Masonry Joint Reinforcement for Single-Wythe Masonry: Either ladder or truss type with singlepair of side rods.

#### 2.5 TIES AND ANCHORS

- A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated.
  - 1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 1064/A 1064M; withASTM A 153/A 153M, Class B-2 coating.
  - 2. Galvanized Steel Sheet: ASTM A 653/A 653M, Commercial Steel, G60 (Z180) zinccoating.
  - 3. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Partition Top anchors: 0.105-inch- (2.66-mm-) thick metal plate with 3/8-inch- (9.5-mm-) diameter metal rod 6 inches (152 mm) long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from steel, hot-dip galvanized after fabrication.
- C. Rigid Anchors: Fabricate from steel bars 1-1/2 inches (38 mm) wide by 1/4 inch (6.35 mm) thick by 24 inches (610 mm) long, with ends turned up 2 inches (51 mm) or with cross pins unless otherwise indicated.
  - 1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A 153/A 153M.

# 2.6 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene, or PVC.
- B. Preformed Control-Joint Gaskets: Made from PVC, complying with ASTM D 2287, Type PVC- 65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
- C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).
- D. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and hold reinforcing bars in center of cells. Units are formed from 0.148-inch (3.77- mm) steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.

### 2.7 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.
  - 2. Use Portland cement-lime mortar unless otherwise indicated.
- B. Mortar for Unit Masonry: Comply with ASTM C 270, Property Specification. Provide the following types of mortar for applications stated unless another type is indicated or needed to provide required compressive strength of masonry.
  - 1. For masonry below grade or in contact with earth, use Type M.
  - 2. For reinforced masonry, use Type N.
  - 3. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.
  - 4. For interior non-load-bearing partitions, Type O may be used instead of Type N.
- C. Grout for Unit Masonry: Comply with ASTM C 476.
  - 1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that willcomply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
  - 2. Proportion grout in accordance with ASTM C 476, Table 1 or paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 2000 psi (14 MPa).
  - 3. Provide grout with a slump of 8 to 11 inches (203 to 279 mm) as measured according to ASTM C 143/C 143M.

PART 3 - EXECUTION

# 3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
  - 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimentalto performance of work.
  - 2. Verify that foundations are within tolerances specified.
  - 3. Verify that reinforcing dowels are properly placed.
- B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.
- 3.2 INSTALLATION, GENERAL
  - A. Build chases and recesses to accommodate items specified in this and other Sections.
  - B. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.
  - C. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

### 3.3 TOLERANCES

- A. Dimensions and Locations of Elements:
  - 1. For dimensions in cross section or elevation do not vary by more than plus 1/2 inch (12mm) or minus 1/4 inch (6 mm).
  - 2. For location of elements in plan do not vary from that indicated by more than plus orminus 1/2 inch (12 mm).
  - 3. For location of elements in elevation do not vary from that indicated by more than plus orminus 1/4-inch (6 mm) in a story height or 1/2 inch (12 mm) total.
- B. Lines and Levels:
  - 1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2-inch (12 mm) maximum.
  - 2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch (12 mm) maximum.
  - 3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12 mm) maximum.
  - 4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and

expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch (12 mm) maximum.

- 5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12 mm) maximum.
- 6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2-inch (12 mm) maximum.
- C. Joints:
  - 1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch(3 mm), with a maximum thickness limited to 1/2 inch (12 mm).
  - 2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by morethan 1/8 inch (3 mm).
  - 3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8inch (9 mm) or minus 1/4 inch (6 mm).
  - 4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm).

### 3.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, atother locations.
- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.
- C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 2 inches (50 mm). Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.
- D. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar before laying fresh masonry.
- E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- F. Fill space between steel 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, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core.
- H. Fill cores in hollow CMUs with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

- I. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.
  - 1. Install compressible filler in joint between top of partition and underside of structure above.
  - 2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch (13-mm) clearance between end of anchor rod and end of tube. Space anchors 48 inches (1200 mm) o.c. unless otherwise indicated.
  - 3. Wedge non-load-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.
  - 4. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Section 078446 "Fire-Resistive Joint Systems."

# 3.5 MORTAR BEDDING AND JOINTING

- A. Lay hollow CMUs as follows:
  - 1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
  - 2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
  - 3. With webs fully bedded in mortar in grouted masonry, including starting course onfootings.
  - 4. With entire units, including areas under cells, fully bedded in mortar at starting course onfootings where cells are not grouted.
- B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
- C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

# 3.6 MASONRY JOINT REINFORCEMENT

- General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch (16 mm) on exterior side of walls, 1/2 inch (13 mm) elsewhere. Lap reinforcement a minimum of 6 inches (150 mm).
  - 1. Space reinforcement not more than 16 inches (406 mm) o.c.
  - 2. Provide reinforcement not more than 8 inches (203 mm) above and below wall openings and extending 12 inches (305 mm) beyond openings in addition to continuous reinforcement.
- B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.
- C. Provide continuity at wall intersections by using prefabricated T-shaped units.
- D. Provide continuity at corners by using prefabricated L-shaped units.

### 3.7 LINTELS

- A. Provide concrete or masonry lintels where shown and where openings of more than 12 inches (305 mm) for brick-size units and 24 inches (610 mm) for block-size units are shown without structural steel or other supporting lintels.
- B. Provide minimum bearing of 8 inches (200 mm) at each jamb unless otherwise indicated.

### 3.8 REINFORCED UNIT MASONRY INSTALLATION

- A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
  - 1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
  - 2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/TMS 602.
- C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
  - 1. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
  - 2. Limit height of vertical grout pours to not more than 48 inches.

### 3.9 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to

perform tests and inspections. Retesting of materials that fail to meet specified requirementsshall be done at Contractor's expense.

- B. Inspections: Level 1 special inspections according to the "International Building Code."
  - 1. Begin masonry construction only after inspectors have verified proportions of siteprepared mortar.
  - 2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
  - 3. Place grout only after inspectors have verified proportions of site-prepared grout.
- C. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for compressive strength.
- D. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

### 3.10 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, 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 sealant application, where indicated.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortarfins and smears before 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 hoesor 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. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
  - 4. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable totype of stain on exposed surfaces.

#### 3.11 MASONRY WASTE DISPOSAL

- A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.
- B. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property.

# END OF SECTION
#### SECTION 07 21 00 - THERMAL INSULATION

#### PART 1 GENERAL

### 1.1 WORK INCLUDED

- A. Provide building insulation work as indicated on Drawings, and as specified, including but not limited to:
  - 1. Rigid extruded polystyrene foundation insulation.
  - 2. Spray-applied cellulosic insulation.
  - 3. Other building insulation work as may be called for on Drawings and not indicated orspecified to be included under other Sections.

### 1.2 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 09 29 00, GYPSUM BOARD ASSEMBLIES; Acoustical insulation.
  - 2. Division 23, HVAC; duct insulation.

### 1.3 REFERENCES

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
  - 1. American Society for Testing and Materials (ASTM):

C 578	Specifications for Preformed, Cellular PolystyreneThermal Insulation.
C 612	Specifications for Mineral Fiber Block and BoardThermal Insulation.
C 665	Specifications for Mineral Fiber Blanket ThermalInsulation for Light Frame Construction and Manufactured Housing.

#### 1.4 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. Refer to Section 01 30 00 SUBMITALS

### 1.5 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.

### 1.6 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

### 2.1 RIGID EXTRUDED POLYSTYRENE INSULATION

- A. Rigid Underslab Insulation: Provide extruded polystyrene insulation conforming to ASTM C 578, minimum 25 lbs. per sq. in. compressive strength at 0.1 in. deformation, 2.0 lbs. per cu. ft. density "K" factor of 0.185 at 40°F. and 0.20 at 75°F. per in. thickness, water vapor transmission of 1.0 perm, and water absorption by volume of 0.1%. Provide boards with manufacturer's standard tongue and groove edges. Provide one of the following products, or Architect approved equal:
  - 1. "CertiFoam" by DiversiFoam Products.
  - 2. "Styrofoam" by Dow Chemical Co.
  - 3. "Foamular" by Owens Corning.

## 2.2 SPRAY-APPLIED CELLULOSIC INSULATION

A. Self-Supported, Spray-Applied Cellulosic Insulation: ASTM C 1149, Type I (materials applied with liquid adhesive; suitable for either exposed or enclosed applications), chemically treated for flame-resistance, processing, and handling characteristics.

### PART 3 EXECUTION

- 3.1 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.

### 3.2 RIGID FOUNDATION AND UNDERSLAB INSULATION

A. Install indicated thickness of loosely laid rigid underslab insulation under concrete slabs- on-grade, as indicated. Lay horizontally directly over vapor barrier (vapor

barrier by Concrete trade), just prior to placement of concrete floor slab. Work shall be in close coordination and cooperation with work of other affected Section.

- B. Install uniformly wide, in continuous rows, with joints tightly butted at ends of adjoining panels and at edge(s) where abutting other insulation panels. Provide neat cut-outs at projections through insulation.
  - 1. Fill cracks and joints in insulation with crack sealer compatible with insulation and masonry.
  - 2. Fill open gaps in insulation with spray-foam insulation.
- 3.3 RIGID FOUNDATION-WALL INSULATION
  - A. Install board insulation in foundation -wall construction where indicated on Drawings.
- 3.4 SPRAY-APPLIED INSULATION
  - A. Spray-Applied Insulation: Apply spray-applied insulation according to manufacturer's written instructions. Do not apply insulation until installation of pipes, ducts, conduits, wiring, is completed.
- 3.5 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 07 81 10 - CEMENTITIOUS FIREPROOFING

#### PART 1 GENERAL

#### 1.1 WORK INCLUDED

- A. Provide spray applied cementitious fireproofing, as indicated on the Drawings and as specified herein. Work includes the following:
  - 1. Medium density cementitious fireproofing.

#### 1.2 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 notlimited to:
  - 1. Section 01 40 00, QUALITY CONTROL; Inspection and testing.

#### 1.3 REFERENCES

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirement shall govern.
  - 1. American Society for Testing and Materials (ASTM):

E 84	Test for Surface Burning Characteristics of Building Materials
E 119	Fire Tests of Building Construction and Materials
E 605	Thickness and Density of Sprayed Fire-Resistive Material Applied to Structural Members
E 736	Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members
E 759	Effect of Deflection of Sprayed Fire-Resistive Material Applied to Structural Members
E 760	Effect of Impact on Bonding of Sprayed Fire- Resistive Material Applied to Structural Members
E 761	Compressive Strength of Sprayed Fire- ResistiveMaterial Applied to Structural Members
E 859	Air Erosion of Sprayed Fire-Resistive MaterialsApplied to Structural Members
E 937	Corrosion of Steel by Sprayed Fire-

# ResistiveMaterials Applied to Structural Members

2. Underwriters Laboratories, Inc. (UL):

Ref. 1

Fire Resistance Directory

3. Test Methods for abrasion and impact resistance developed by the City of San Francisco, Bureau of Building Inspection (SFBBI).

#### 1.4 SUBMITTALS

- A. Submit representative sample panels of sprayed-on cementitious fireproofing on sheet steel, at least 12 in. by 12 in., with proposed surface finish.
- B. 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.
- C. Refer to Section 01 30 00 SUBMITTALS
- D. Shop Drawings: Structural framing plans indicating the following:
  - 1. Locations and types of surface preparations required before applying sprayed fire- resistive material.
  - 2. Extent of sprayed fire-resistive material for each construction and fire-resistance rating, including the following:
    - a. Applicable fire-resistance design designations of a qualified testing and inspecting agency acceptable to authorities having jurisdiction.
    - b. Minimum thickness needed to achieve required fire-resistance ratings of structural components and assemblies.
  - 3. Treatment of sprayed fire-resistive material after application.
  - E. Product Certificates: For each type of sprayed fire-resistive material, signed by product manufacturer.
  - F. Qualification Data: For Installer, manufacturer, professional engineer, and testing agency.
  - G. Compatibility and Adhesion Test Reports: From sprayed fire-resistive material manufacturer indicating the following:
    - 1. Materials have been tested for bond with substrates.
    - 2. Materials have been verified by sprayed fire-resistive material manufacturer to becompatible with substrate primers and coatings.
    - 3. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
  - H. Warranties: Special warranties specified in this Section.

### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A firm or individual certified, licensed, or otherwise qualified by sprayed fire-resistive material manufacturer as experienced and with sufficient trained staff to install manufacturer's products according to specified requirements. A manufacturer's willingness to sell its sprayed fire-resistive materials to Contractor or to an installer engaged by Contractor does not in itself confer qualification on the buyer.
- B. Source Limitations: Obtain sprayed fire-resistive materials through one source from a single manufacturer.
- C. Fire-Test-Response Characteristics: Provide sprayed fire-resistive materials with the fire- test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify bags containing sprayed fire-resistive materials with appropriate markings of applicable testing and inspecting agency.
  - 1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency acceptable to authorities having jurisdiction, for sprayed fire-resistive material serving as direct- applied protection tested per ASTM E 119.
  - 2. Surface-Burning Characteristics: ASTM E 84.
- D. Provide products containing no detectable asbestos as determined according to the method specified in 40 CFR 763, Subpart E, Appendix E, Section 1, "Polarized Light Microscopy."
- E. Mockup: Apply mockup to verify selections made under sample Submittals and to demonstrate aesthetic effects.
  - 1. Locations of Mockups: Any area of building with beams and metal deck.
  - 2. Extent of Mockups: Approximately 100 sq. ft. of surface for each product indicated.
  - 3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

### 1.6 DELIVERY, STORAGE AND HANDLING

- A. Manufactured materials shall be mill-mixed and shall be delivered in original, unopened packages bearing the name of the product, manufacturer's name, and the Underwriters' Laboratories, Inc. label.
- B. Materials shall be kept dry until ready for use, and shall be kept off the ground, under cover

and away from sweating walls and other damp surfaces. Materials that have been exposed to water before actual use shall be discarded.

### 1.7 TESTING AND INSPECTION

- A. Inspection and testing is to be carried out to ensure that applied thickness and density meets fire rating requirements, and to verify installation meets reviewed test reports. Initial inspection and testing is to be paid for by Owner in accordance with Section 014000, QUALITY REQUIREMENTS.
- B. Correct unacceptable work and pay for further testing required to prove acceptability of installation.
- C. Patch test areas as required to re-establish fireproofing integrity.

### 1.9 EXISTING CONDITIONS

A. Ensure structure and surfaces to which sprayed fireproofing is applied is not enclosed and is open to view until application is reviewed.

#### 1.10 PROJECT CONDITIONS

- A. Environmental Limitations: Do not apply sprayed fire-resistive material when ambient or substrate temperature is 40 deg F (4 deg C) or lower unless temporary protection and heatis provided to maintain temperature at or above this level for 24 hours before, during, and for 24 hours after product application.
- B. Ventilation: Ventilate building spaces during and after application of sprayed fireresistive material. Use natural means or, if they are inadequate, forced-air circulation until fire- resistive material dries thoroughly.

#### 1.11 COORDINATION

- A. Sequence and coordinate application of sprayed fire-resistive materials with other related work specified in other Sections to comply with the following requirements:
  - 1. Provide temporary enclosure as required to confine spraying operations and protect the environment.
  - 2. Provide temporary enclosures for applications to prevent deterioration of fireresistive material due to exposure to weather and to unfavorable ambient conditions for humidity, temperature, and ventilation.
  - 3. Avoid unnecessary exposure of fire-resistive material to abrasion and other damage likely to occur during construction operations subsequent to its application.
  - 4. Do not apply fire-resistive material to metal roof deck substrates until concrete topping, if any, has been completed. For metal roof decks without concrete topping, do not apply fire-resistive material to metal roof deck substrates until roofing has beencompleted; prohibit roof traffic during application and drying of fire-resistive material.
  - 5. Do not apply fire-resistive material to metal floor deck substrates until concrete topping has been completed.
  - 6. Do not begin applying fire-resistive material until clips, hangers, supports, sleeves, and other items penetrating fire protection are in place.
  - 7. Defer installing ducts, piping, and other items that would interfere with applying fire- resistive material until application of fire protection is completed.
  - 8. Do not install enclosing or concealing construction until after fire-resistive material has been applied, inspected, and tested and corrections have been made

to defective applications.

#### 1.12 WARRANTY

- A. Special Warranty: Manufacturer's standard form, signed by Contractor and by Installer, in which manufacturer agrees to repair or replace sprayed fire-resistive materials that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:
  - 1. Cracking, flaking, spalling, or eroding in excess of specified requirements; peeling; or delaminating of sprayed fire-resistive materials from substrates.
  - 2. Not covered under the warranty are failures due to damage by occupants and Owner's maintenance personnel, exposure to environmental conditions other than those investigated and approved during fire-response testing, and other causes not reasonably foreseeable under conditions of normal use.
- B. Warranty Period: Two years from date of Substantial Completion.

### PART 2 PRODUCTS

### 2.1 ACCEPTABLE PRODUCTS AND MANUFACTURERS

- A. Provide one of the following products:
  - 1. Medium Density Cementitious Fireproofing:
    - a. Basis-Of-Design: Monokote Z106; Grace Construction Products Division, W.R.Grace & Co.
    - b. Isolatek International equal.

#### 2.2 MEDIUM DENSITY CEMENTITIOUS FIREPROOFING

- A. Medium density Portland cement based cementitious fireproofing: The sprayed material shall be a factory blended cementitious fireproofing which when mixed at the jobsite with water and applied will provide compliance with all drawings, specifications and the performance test criteria specified herein.
  - 1. Material shall be a job mixed product prior to spraying. Products mixed with water at the spray nozzle will not be permitted.
- B. Dry Density: The field density shall be measured, in accordance with ASTM Standard E605. Minimum average density shall be 22 pcf as listed in the U.L. Fire Resistance Directory, ICBO Evaluation Report or as required by the authority having jurisdiction.
- C. Deflection: Material shall not crack or delaminate from the surface to which it is applied when tested in accordance with ASTM E759.
- D. Bond Impact: Material subject to impact tests in accordance with ASTM E760 shall not crack or delaminate from the surface to which it is applied.
- E. Bond Strength (Cohesion/Adhesion): Fireproofing, when tested in accordance with ASTM

E736, shall have a minimum average bond strength (cohesion/adhesion) of 1000 psf and aminimum individual bond strength of 750 psf.

- F. Air Erosion: Maximum allowable weight loss of the fireproofing material shall be  $0.025 \text{ gm./ft}^2$  when tested in accordance with ASTM E859.
- G. Compressive Strength: The fireproofing shall not deform more than 10 percent when subjected to compressive forces of 7,000 psf when tested in accordance with ASTM E761.
- H. Corrosion Resistance: Steel with applied fireproofing shall be tested in accordance with ASTM E937 and shall not promote corrosion of steel.
- I. Burning Characteristics: Material shall exhibit the following surface burning characteristics when tested in accordance with ASTM E84:

Flame spread0Smoke Development5

- K. The sprayed fireproofing material shall have been tested and reported by Underwriters' Laboratories, Inc. in accordance with the procedures of ASTM E119.
- L. Mixing water shall be clean, fresh and suitable for domestic consumption and free from such amounts of mineral or organic substances as would affect the set of the fireproofing material.
- M. The fireproofing product shall be tested in accordance with ASTM Standard G-21-75 and shall show resistance to mold growth when inoculated with aspergillus niger, and mixed spore cultures, (Tappi T487-M54 and ASTM G-21-80). Mold inhibitor shall be added by the manufacturer.

#### 2.3 AUXILIARY FIRE-RESISTIVE MATERIALS

- A. General: Provide auxiliary fire-resistive materials that are compatible with sprayed fire- resistive materials and substrates and are approved by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-resistance designs indicated.
- B. Adhesive for Bonding Fire-Resistive Material: Product approved by manufacturer of sprayed fire-resistive material.
- C. Metal Lath: Expanded metal lath fabricated from material of weight, configuration, and finish required to comply with fire-resistance designs indicated and fire-resistive material manufacturer's written recommendations. Include clips, lathing accessories, corner beads, and other anchorage devices required to attach lath to substrates and to receive sprayed fire-resistive material.
- D. Reinforcing Fabric: Glass-Fiber fabric of type, weight, and form required to comply with fire-resistance designs indicated, approved by manufacturer of fire-resistive material.
- E. Reinforcing Mesh: Metallic mesh reinforcement of type, weight, and form required to

comply with fire-resistance designs indicated, approved by manufacturer of fire-resistive material. Include pins and attachment.

#### PART 3 EXECUTION

#### 3.1 PRIOR WORK OF OTHER SECTIONS

- A. Clips, hangers, supports, sleeves, and other attachments to the fireproofing bases shall be placed under other Sections of the Specifications prior to application of the fireproofing material wherever practicable.
- B. Ducts, piping, conduit, and other suspended equipment which would interfere with the uniform application of the fireproofing material shall be positioned after application of sprayed-on fireproofing.
- C. Patching and repairing of sprayed-on fireproofing resulting from cutting or damage byother trades shall be performed under this Section.
- D. Schedule and coordinate work with other trades allowing them ample time to install all required clips, hangers, inserts, and other items which must be in place prior to application of fireproofing material.

### 3.2 SURFACE PREPARATION

- A. Examine all surfaces to which the sprayed-on fireproofing is to be applied, and notify Architect in writing of conditions detrimental to the proper and expeditious installation of fireproofing which cannot be corrected by normal cleaning of surfaces. Starting of work within an area shall be construed as acceptance of the conditions of that area.
- B. Thoroughly clean all surfaces to receive sprayed-on fireproofing, just prior to the application of the fireproofing, with hand tools, power tools, or solvent cleaning methods toeliminate mill scale, dirt, grim, oil, grease, dust, loose rust or paint, and all other foreign material which would prevent satisfactory bonding of fireproofing to steel.
- C. Application of fireproofing shall constitute acceptance of the suitability of the surface to receive this work by the fireproofing applicator.

#### 3.03 TEMPERATURE AND VENTILATION

- A. Exterior openings in areas to be sprayed shall be covered during application with tarpaulins or similar closures to confine the overspray and dusting to within the Contract-Limit Lines.
- B. The surfaces to which fire protection material is to be applied as well as the ambient temperature during application for at least one week following application shall be at least 55°F. Relative humidity shall be low enough to assure proper drying of the appliedmaterial.
- C. Provide natural ventilation to properly dry all sprayed-on fireproofing during and after its application. In enclosed areas lacking openings for natural ventilation,

circulate exterior air and exhaust it to the outside by use of temporary circulators and exhaust fans.

### 3.4 SAMPLE AREA

A. A sample area, not less than 100 sq. ft. of each type of fireproofing, comprising a typical

overhead fire protection installation, including steel deck, beams, columns, and other critical areas, shall be installed in location of the building selected by the Architect, for joint approval by the representative of the fireproofing material manufacturer and the Architect. Fireproofing in other areas shall not proceed until sample installation is approved. Approved sample installation shall remain in place and open to observation as a standard for all work under the Contract.

#### 3.5 MIXING AND APPLICATION

- A. Mixing shall conform to manufacturer's published instructions.
- B. Materials and equipment shall be as approved by the materials manufacturer. Application shall be by licensed manufacturer's applicators. Procedures shall be in strict accordance with said manufacturer's directions and specifications. Only experienced, skilled mechanics approved by the materials manufacturer shall be allowed to place the materials. A qualified manufacturer's representative shall be present for initial application to guideand assist applicator's personnel.
- C. Work shall comply with applicable UL standards in addition to the requirements imposed by the applicable laws and codes, for the indicated ratings, including local pollution controlregulations.
- D. Sprayed-on fireproofing shall be applied in the exact manner described in the certificates submitted to prove compliance with specified protection requirements. The fireproofing applicator shall be responsible for providing a controlled application of fireproofing material so that uniform quality and thickness is maintained.
- E. After completion of fireproofing work, equipment shall be removed and all surrounding wall and floor areas cleaned of deposits of sprayed-on fireproofing materials. Where hangers and other surfaces not requiring fireproofing have been sprayed unavoidably, the sprayed material shall be removed and the surfaces made clean.

#### 3.6 FIELD QUALITY CONTROL

- A. Tests for thickness, quality, and dry density of applied material may be performed by Testing Laboratory as described in Section 014500, QUALITY CONTROL. Such testing or lack of testing shall not diminish responsibilities under this Contract.
- B. Where sample fails to meet thickness, quality, or dry density requirements, further sampling and testing will be required in the area of the deficient sample. If such further testing indicates an area deficient in thickness, quality, or dry density, correction shall be made by application of additional material or removal of deficient material and replacementwith satisfactory material.

C. Patching: Areas from which samples have been removed shall be patched by applicator to provide the specified fire ratings.

### 3.7 CLEAN-UP

- A. Upon completion of each day's work, sweep clean the working area, placing waste materialin suitable bags or containers, and remove from site.
- B. Upon completion of fireproofing work, clean walls, floors, and surrounding surfaces of overspray, drippings, etc.

### END OF SECTION

#### SECTION 07 84 10 - FIRESTOPPING

#### PART 1 GENERAL

#### 1.2 DESCRIPTION OF WORK

- 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. Firestops shall be used in locations including, but not limited to, the following:
  - 1. Penetrations for the passage of duct, cable, cable trays, conduit, piping, electrical busways, and electrical raceways through fire-rated vertical barriers (walls and partitions), horizontal barriers (floor slabs and floor/ceiling assemblies), and vertical service shafts.
  - 2. Openings between structurally separate sections of walls or floors.
  - 3. Between stories unless within a fire-rated shaft.
  - 4. Above walls or partitions extending to underside of ceiling or roof assemblies above.
  - 5. Concealed furring spaces behind finishes.
  - 6. Where pipes, conduits, ducts, and other items pass through fire-rated assemblies.
  - 7. Openings for items mounted on or within fire-rated assemblies.

#### 1.3 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 092900, GYPSUM DRYWALL; Acoustical (sound attenuation) insulation.
  - 2. Division 21 FIRE SUPPRESSION.
  - 3. Division 23 HVAC; Pipe and duct insulation.
  - 4. Division 26 ELECTRICAL.

#### 1.4 **REFERENCES**

- A. Test Requirements: ASTM E-814, "Standard Method of Fire Tests of Through Penetration Fire Stops".
- B. Underwriters Laboratories (UL) of Northbrook, IL runs ASTM E-814 under their designation of UL 1479 and publishes the results in their "FIRE RESISTANCE DIRECTORY" that is updated annually with a midyear supplement.
  - 1. UL Fire Resistance Directory:
    - a. Through-Penetration Firestop Devices (XHCR)
    - b. Fire Resistance Ratings (BXUV)
    - c. Through-Penetration Firestop Systems (XHEZ)
    - d. Fill, Voids, or Cavity Material (XHHW)

- Forming Materials (XHKU) e.
- C. Test Requirements: UL 2079, "Tests for Resistance of Building Joint Systems" (November 1994).
- International Firestop Council Guidelines for Evaluating Firestop Systems D. **Engineering Judgments**
- E. ASTM E-84, Standard Test Method for Surface Burning Characteristics of Building Materials.
- F. Building codes: IBC.
- G. NFPA 101 - Life Safety Code
- NFPA 70 National Electric Code H.

#### 1.5 **SUBMITTALS**

- A. Submit Product Data: Manufacturer's specifications and technical data for each material including the composition and limitations, documentation of UL firestop systems to be used and manufacturer's installation instructions to comply with Section 1300.
- B. Manufacturer's engineering judgment identification number and drawing details when no UL system is available for an application. Engineer judgment must include both project name and contractor's name who will install firestop system as described in drawing.
- C. Submit material safety data sheets provided with product delivered to jobsite.
- Schedule of Firestopping: List each type of penetration and the proposed UL system D. number for firestopping each penetration, (see attached sample schedule).
- E. Refer to Section 01 30 00 SUBMITALS
- 1.6 QUALITY ASSURANCE:
  - A manufacturer's direct representative (not distributor or agent) to be on-site during A. initial installation of firestop systems to train appropriate contractor personnel in proper selection and installation procedures. This will be done per manufacturer's written recommendations published in their literature and drawing details.
  - Firestop System installation must meet requirements of ASTM E-814, UL 1479 B. or UL2079 tested assemblies that provide a fire rating equal to that of construction being penetrated.
  - Proposed firestop materials and methods shall conform to applicable governing C. codeshaving local jurisdiction.

Firestop Systems do not reestablish the structural integrity of load bearing D. Manchester-Boston Regional Airport FY24-805-45 Firestopping 07 84 10 - 2 May 24, 2024 partitions/assemblies or support live loads and traffic. Installer shall consult the structural engineer prior to penetrating any load bearing assembly.

- E. For those firestop applications that exist for which no UL tested system is available through a manufacturer, a manufacturer's engineering judgment derived from similar UL system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineer judgment drawings must follow requirements set forth by the International Firestop Council (September 7, 1994).
- F. Source: For each material 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.
- G. Installer: A firm with a minimum of three years' experience in type of work required by thisSection and which is acceptable to manufacturers of primary materials.
- H. UL Listed Designs: Firestopping materials and systems shall be installed in each location and type of installation conforming to listed UL designs.
  - 1. Firestopping materials shall be UL Classified as "Fill, Void, or Cavity Material" foruse in through-penetration firestop systems.
  - 2. Provide firestop systems that are UL listed with a fire-resistance rating equal to thehourly resistance rating of the fire-rated barrier being penetrated.

### 1.7 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in unopened factory-labeled packages.
- B. Store off floor in interior spaces, protected against damage.
- C. Schedule deliveries to minimize on-site storage.
- 1.8 TESTS
  - A. Fire-Resistance: Provide materials and construction identical to fire-rated assemblies tested in compliance with ASTM E 119, ASTM E 814, UL 263, or NFPA 251, by independent agencies acceptable to Designer and governing authorities.
  - B. Burning Characteristics: Provide products with maximum ASTM E 84 surface burning characteristics of flame spread 25 and smoke developed 25.
  - C. Firestop systems shall have been tested in accordance with ASTM E 814 or UL 1479 undera minimum positive pressure of 0.01 in. of water.
- 1.9 PROJECT CONDITIONS
  - A. Do not use materials that contain flammable solvents.

- B. Schedule installation of firestopping after completion of penetrating item installation but prior to covering or concealing of openings.
- C. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.
- D. Weather conditions: Do not proceed with installation of firestop materials when temperatures exceed the manufacturer's recommended limitations for installation printed onproduct label and product data sheet.
- E. During installation, provide masking and drop cloths to prevent firestopping materials from contaminating any adjacent surfaces.

### PART 2 PRODUCTS

- 2.1 FIRESTOPPING, GENERAL
  - A. 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 the firestopping manufacturer based on testing and field experience.
  - B. Provide components for each firestopping system that are needed to install fill material. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.

### 2.2 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with through penetration firestop systems (XHEZ) and joint systems (XHBN) listed in Volume II of the UL Fire Resistance Directory, provide products of the following manufacturers as identified below:
  - 1. Hilti, Inc., Tulsa, Oklahoma; 800-879-8000
  - 2. Tremco Sealants & Coatings, Beechwood, Ohio; (216) 292-5000
  - 3. 3M Fire Protection Products, St. Paul, Minnesota; (612) 736-0203
  - 4. Other manufacturers listed in the U.L. Fire Resistance Directory Volume 2

### 2.3 MATERIALS

- A. Use only firestop products that have been UL 1479, ASTM E-814, or UL 2079 tested for specific fire-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire-rating involved for each separate instance.
- B. Sealants or caulking materials for use with non-combustible items including steel pipe, copper pipe, rigid steel conduit and electrical metallic tubing (EMT), the following products are acceptable:
  - 1. Hilti FS-ONE Intumescent Firestop Sealant
  - 2. 3M Fire Stop Sealant 2000

- 3. 3M Fire Barrier CP25 WB
- 4. Tremco Tremstop Fyre-Sil Sealant
- 5. Equivalent products listed in the U.L. Fire Resistance Directory Volume 2
- C. Sealants or caulking materials for use with sheet metal ducts, the following products are acceptable:
  - 1. Hilti CP 601s Elastomeric Firestop Sealant
  - 2. Hilti CP 606 Flexible Firestop Sealant
  - 3. Hilti FS-ONE Intumescent Firestop Sealant
  - 4. Equivalent products listed in the U.L. Fire Resistance Directory Volume 2
- D. Sealants, caulking or spray materials for use with fire-rated construction joints and other gaps, the following products are acceptable:
  - 1. Hilti CP 672 Firestop Spray
  - 2. Hilti CP 601s Elastomeric Firestop Sealant
  - 3. Hilti CP 606 Flexible Firestop Sealant
  - 4. 3M Firestop Sealant 2000
  - 5. Tremco Tremstop Fyre-Sil Sealant
  - 6. Equivalent products listed in the U.L. Fire Resistance Directory Volume 2
- E. Intumescent sealants or caulking materials for use with combustible items (penetrants consumed by high heat and flame) including insulated metal pipe, PVC jacketed, flexible cable or cable bundles and plastic pipe, the following products are acceptable:
  - 1. Hilti FS-ONE Intumescent Firestop Sealant
  - 2. 3M Fire Barrier CP25 WB
  - 3. Tremco Tremstop MP Intumescent Firestop Sealant
  - 4. Equivalent products listed in the U.L. Fire Resistance Directory Volume 2
- F. Intumescent sealants, caulking or putty materials for use with flexible cable or cable bundles, the following products are acceptable:
  - 1. Hilti FS-ONE Intumescent Firestop Sealant
  - 2. Hilti CP 618 Firestop Putty Stick
  - 3. 3M Fire Barrier CP25 WB
  - 4. Tremco Tremstop MP Intumescent Firestop Sealant
  - 5. Equivalent products listed in the U.L. Fire Resistance Directory Volume 2
- G. Non curing, re-penetrable intumescent sealants, caulking or putty materials for use with flexible cable or cable bundles, the following products are acceptable:
  - 1. Hilti CP 618 Firestop Putty Stick
  - 2. Equivalent products listed in the U.L. Fire Resistance Directory Volume 2
- H. Wall opening protective materials for use with U.L. listed metallic and specified nonmetallic outlet boxes, the following products are acceptable:

- 1. Hilti CP 617 Firestop Putty Pad
- 2. Equivalent products listed in the U.L. Fire Resistance Directory Volume 1
- I. Firestop collar or wrap devices attached to assembly around combustible plastic pipe (closed and open piping systems), the following products are acceptable:
  - 1. Hilti CP 642 Firestop Collar
  - 2. Hilti CP 643 Firestop Collar
  - 3. 3M Fire Barrier PPD Plastic Pipe Device
  - 4. Equivalent products listed in the U.L. Fire Resistance Directory Volume 2
- J. Cast-in place firestop devices for use with non-combustible and combustible plastic pipe (closed and open piping systems) penetrating concrete floors, the following products are acceptable:
  - 1. Hilti CP 680 Cast-In Place Firestop Device
  - 2. Equivalent products listed in the U.L. Fire Resistance Directory Volume 2
- K. Materials used for large size/complex penetrations made to accommodate cable trays, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:
  - 1. Hilti CFS-BL Firestop Block
  - 2. 3M Firestop Foam 2001
  - 3. 3M Fire Barrier CS-195 Composite Sheet
  - 4. Equivalent products listed in the U.L. Fire Resistance Directory Volume 2
- L. Non curing, re-penetrable materials used for large size/complex penetrations made to accommodate cable trays, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:
  - 1. Hilti CFS-BL Firestop Block
  - 2. Equivalent products listed in the U.L. Fire Resistance Directory Volume 2
- M. Sealants or caulking materials used for openings between structurally separate sections of wall and floors, the following products are acceptable:
  - 1. Hilti CP 672 Firestop Spray
  - 2. Hilti CP 601s Elastomeric Firestop Sealant
  - 3. Hilti CP 606 Flexible Firestop Sealant
  - 4. 3M Fire Barrier CP 25 WB
  - 5. Equivalent products listed in the U.L. Fire Resistance Directory Volume 2
- N. Provide a firestop system with a "F" Rating as determined by UL 1479 or ASTM E814which is equal to the time rating of construction being penetrated.
- O. Provide a firestop system with an Assembly Rating as determined by UL 2079 which is equal to the time rating of construction being penetrated.
- 2.4 FASTENERS

A. Provide anchorage accessories complying with UL designs and other components and accessories as needed.

### PART 3 EXECUTION

### 3.1 INSPECTION

A. Examine substrates, supports, and conditions under which work shall be performed. Report of conditions detrimental to performance of work in writing to Designer. Do not proceed with work until unsatisfactory conditions are corrected. Beginning work shall establish acceptance of substrates and conditions.

### 3.2 PREPARATION

A. Review extent and types of required firestopping with governing authorities before beginning work. Obtain approval of thicknesses and installation methods, including non- typical locations.

### 3.3 INSTALLATION

- A. Comply with manufacturers' instructions and recommendations, except where more restrictive requirements are specified.
- B. Provide firestopping material and thickness as required to provide indicated ratings. Where not indicated otherwise, comply with UL standard designs. In multiple layer work, offset joints at least 6 in.
- C. Anchor with manufacturers' recommended system and in compliance with UL standard designs.
- D. Install without gaps and voids. Do not use damaged materials. Remove and replace non-fitting or disturbed work.
- 3.4 FIELD QUALITY CONTROL
  - A. Coordinate installation of firestopping work with other work to minimize cutting andremoval of installed fireproofing. As work of other Sections is completed, review firestopping work and repair or replace work which has been damaged or removed.

### 3.5 PROTECTION

A. Provide temporary protection to protect work from damage and deterioration until final acceptance. Remove protection and rework as necessary immediately before final acceptance.

### END OF SECTION

#### SECTION 07 92 00 - JOINT SEALANTS

#### PART 1 GENERAL

#### 1.1 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 in exterior construction.
  - 2. Sealing of joints between perimeter of exterior door frames, window and curtain wall frames, and other items occurring in openings in exterior walls, and the surrounding construction, including bed sealing of thresholds.
  - 3. Sealing of interior perimeter joints at door frames, window and curtain wall frames, and other wall openings.
  - 4. All other exterior and interior sealing called for, or reasonably inferred from the Drawings, and as required to provide weathertight conditions in exterior assemblies.

#### 1.2 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 notlimited to:
  - 1. Section 042200, CONCRETE UNIT MASONRY.
  - 2. Section 078410, FIRESTOPPING; Fire resistive sealants and caulks.
  - 3. Section 088000, GLAZING; Glazing sealants and gaskets.
  - 4. Section 092900, GYPSUM BOARD ASSEMBLIES; Concealed acoustical sealants.

#### 1.3 **REFERENCES**

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
  - 1. American Association of State Highway and Transportation Officials (AASHTO):

	M 220	Preformed Elastomeric Compression Joint Seals forConcrete
2.	American Society for Testing and I	Materials (ASTM):
	C 719	Adhesion and Cohesion of Elastomeric Joint Sealants under Cyclic Movement
	C 834	Latex Sealing Compounds
	C 920	Elastomeric Joint Sealants
	C 1193	Standard Guide for Use of Joint Sealants

	D 412	Test Methods for Rubber Properties in Tension
	D 624 Resistance	Test Method for Rubber Property - Tear
	D 2628	Preformed Polychloroprene Elastomeric Joint Sealsfor Concrete Pavements
3.	Federal Specifications (Fed. Spec.)	:
	TT-S-00227	Sealing Compound: Elastomeric Type, Multi-

	Glazing in Buildings and Other Structures)
TT-S-001543A	Sealing Compound: Silicone Rubber Base (For Calking, Sealing, and Glazing in
	Buildings and Other Structures)

Component (For Calking, Sealing, and

### 1.4 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.
- E. Refer to Section 01 30 00 SUBMITTALS
- 1.5 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.
- 1.6 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.

### 1.7 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.

### 1.8 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.

### 1.9 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

### 2.1 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.
- C. VOC Content of Interior Sealants: Provide interior sealants and sealant primers that comply with the following limits for VOC content when calculated according to40 CFR 59, Subpart D (EPA Method 24):
  - 1. Sealants: 250 g/L.
  - 2. Sealant Primers for Nonporous Substrates: 250 g/L.
  - 3. Sealant Primers for Porous Substrates: 775 g/L.

### 2.2 SELF-LEVELING POLYURETHANE SEALANT (Sealant Type 1)

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 tearresistance 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. Pecora Urexpan NR-200.
  - 2. Sika 2C, SL.
  - 3. Master Builders Solutions; MasterSeal SL 2.
  - 4. Tremco Vulkem 245 or 255.
  - 5. Tremco THC 901.
- D. Extent: Provide self-leveling polyurethane sealant for paving and floor joints not indicated to be sealed with another type of sealant.
- 2.3 NON-SAG POLYURETHANE SEALANT (Sealant Type 2)
  - A. Provide multi-part, non-sag, polyurethane based elastomeric sealant, complying with ASTM C 920 Type M, Grade NS, Class 25, Fed. Spec. TT-S-00227E Class A, having Shore A hardness of 20 to 30, cured modulus of elasticity at 100% elongation of not more than 75 psi, and tear resistance of not less than 50 lbs./inch when tested according to ASTMD 624.
  - B. Provide one of the following products that meet or exceed specified requirements:
    - 1. Sika Sikaflex 2c NS.
    - 2. Master Builders Solutions; MasterSeal NP 2.
    - 3. Tremco Vulkem 116.
    - 4. Tremco Dymeric
  - C. Where joint requires 50% movement capabilities, provide Tremco Dymeric Plus, or equal product approved by Architect.
  - D. Extent: Provide non-sag polyurethane sealant for all masonry to metal joints, masonry to masonry joints, masonry to concrete joints, concrete-to-concrete joints, concrete to metal window joints, and other joints not indicated to be sealed with another type of sealant.
- 2.4 SILICONE RUBBER SEALANT (Sealant Type 3)
  - 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. Tremco Proglaze.
  - D. Extent: Provide silicone rubber sealant for interior joints around plumbing fixtures and tile to tile joints in ceramic tile work.

### 2.5 ACRYLIC LATEX SEALANT (Sealant Type 4)

- 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. Sherwin-Williams (S-W); Powerhouse 1100A
- 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.

### 2.6 PREFORMED JOINT SEALER

- A. Preformed Resilient Joint Sealer: Preformed Resilient Joint Sealer for use at building expansion joints in exterior concrete and masonry walls where specifically called for on Drawings shall be preformed, resilient, extruded polychloroprene elastomeric joint sealer, conforming to ASTM D 2628 and AASHTO M 220 of indicated configuration(s), in continuous lengths, set in manufacturer's recommended primer-lubricating-adhesive consisting of moisture curing polyurethane and aromatic hydrocarbon solvent mixture(73% solid by weight) concrete gray color, equal to one of the following:
  - 1. D.S. Brown Co.
  - 2. Watson-Bowman & Acme Corp.

### 2.7 PREFORMED, PRECOMPRESSED, IMPREGNATED FOAM SEALANT

- A. Provide manufacturer's standard preformed, pre-compressed, impregnated open-cell foam sealant manufactured from high-density urethane foam impregnated with a nondrying, water-repellant agent; factory-produced in pre-compressed sizes in roll or stick form to fit joint widths indicated. Provide foam sealant permanently elastic, mildew-resistant, nonmigratory, nonstaining, compatible with substrates, and complying with the following requirements:
  - 1. Impregnating Agent: Manufacturer's standard.
  - 2. Density: 8 10 lb./cu. ft.
  - 3. Backing: Manufacturer's standard pressure sensitive adhesive, factory applied to oneside, with protective wrapping.
- B. Provide one of the following products, or Architect approved equal:

1. Emseal Greyflex; Emseal Corp.

2. Will-Seal 150; Tremco.

### 2.8 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. W. R. Meadows, Inc.
  - 4. Williams 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

#### 3.1 INSPECTION

A. The Installer shall examine substrates and conditions under which this work is to beperformed 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.

### 3.2 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 ASTM C 1193.

### D. Tape or mask adjoining surfaces to prevent spillage and migration problems.

E. Prime surfaces as recommended by sealant manufacturer.

### 3.3 INSTALLATION

- A. Schedule work as long as possible after completion of concrete work and finished brick paving and granite work.
- B. Provide backer rods for liquid 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.

### 3.4 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. Metal to metal joints.
  - 4. Wood to wood and wood to metal joints.
  - 5. Concrete to concrete joints.
  - 6. Joints and cracks in paving and walks.
  - 7. 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. Metal to gypsum drywall joints.
  - 3. Top of wall base along irregular walls.
  - 4. Splash to counter joints and splash to wall joints at countertops.
  - 5. Completely around plumbing fixtures, fittings, and trim to countertops, walls and

floors.

6. Exposed acoustical sealants, at tops and bottoms of stud partition walls around mechanical rooms, elevator machine rooms, toilet rooms, and at other acoustic

partitions as indicated.

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.

### 3.5 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.

### 3.6 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 timeof final acceptance. Remove protection immediately before final acceptance.

### END OF SECTION

#### SECTION 08 11 13 - HOLLOW METAL DOORS AND FRAMES

### PART 1 GENERAL

#### 1.1 WORK INCLUDED

- A. Provide steel doors and frames and related items as indicated on Drawings and as specified herein. Include, but do not limit to, the following:
  - 1. Steel doors.
  - 2. Steel door frames.

### 1.2 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 notlimited to:
  - 1. Section 042200, CONCRETE UNIT MASONRY; Grouting and building in steelframes.
  - 2. Section 087100, DOOR HARDWARE; Templates and hardware schedules.
  - 3. Section 099100, PAINTING; Field finishing of steel doors and frames.

### 1.3 REFERENCES

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
  - 1. American National Standards Institute (ANSI):

A250 Series Series on Steel Door and Frame Test Procedures, Acceptance Criteria, Reinforcement, Nomenclature, and Recommended Specifications (A250.3 thru 250.10)

2. American National Standards Institute/Steel Door Institute (ANSI/SDI):

A115 Series	Series on Door and Frame Preparation (A115.1 thruA115.18)
A123.1	Nomenclature for Steel Doors and Steel Door Frames
A151.1	Performance Test for Standard Steel Doors, Frames, Anchors, Hinge Reinforcings and Exit Device Reinforcings

3. American Society for Testing and Materials (ASTM):

	A 653	Steel Sheet, Zinc-Coated (Galvanized) or Zinc-IronAlloy-Coated (Galvannealed) by the Hot-Dip Process
	A 879	Steel Sheet, Zinc Coated by the Electrolytic Process for Applications Requiring Designation of the Coating Mass on Each Surface
	A 1008	Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable
	A 1011	Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High- Strength Low-Alloy with Improved Formability, and Ultra-High Strength
	C 1363	Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus
4.	National Fire Protection Association	on (NFPA):
	80	Standard for Fire Doors and Windows

80	Standard for the Doors and Windows
105	Smoke Door Control Assemblies
252	Fire Tests, Door Assemblies
257	Fire Test for Windows and Glass Block Assemblies
Steel Door Institute (SDI):	
100	Standard Steel Doors and Frames

 
 105
 Recommended Erection Instructions for SteelFrames

## Basic Fire Door Requirements

### 1.4 DEFINITIONS

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5.

- A. Steel Sheet Thicknesses: Thickness dimensions specified herein, are minimums as defined in referenced ASTM standards for both uncoated steel sheet and the uncoated base metal ofmetallic-coated steel sheets.
- 1.5 SUBMITTALS

- A. Product Data: For each type of door and frame indicated, include door designation, type, level and model, material description, core description, construction details, label compliance, sound and fire-resistance ratings, and finishes.
- B. Shop Drawings: Show the following:
  - 1. Elevations of each door design.
  - 2. Details of doors including vertical and horizontal edge details.
  - 3. Frame details for each frame type including dimensioned profiles.
  - 4. Details and locations of reinforcement and preparations for hardware.
  - 5. Details of each different wall opening condition.
  - 6. Details of anchorages, accessories, joints, and connections.
  - 7. Coordination of glazing frames and stops with glass and glazing requirements.
- C. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for factory-finished doors and frames.
- D. Samples for Verification: For each type of exposed finish required, prepare a sample not less than 3 by 5 inches and of same thickness and material indicated for final unit of Work.
- E. Door Schedule: Use same reference designations indicated on Drawings in preparing schedule for doors and frames.
- F. Oversize Construction Certificates: For door assemblies required to be fire-protection rated and exceeding size limitations of labeled assemblies.
- G. Refer to Section 01 30 00 SUBMITALS
- 1.6 QUALITY ASSURANCE
  - A. Steel Door and Frame Standard: Comply with ANSI A 250.8, unless more stringent requirements are indicated.
  - B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252.
    - 1. Test Pressure: Test at atmospheric pressure.
    - 2. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a testing agency acceptable to authorities having jurisdiction that doors comply with standard construction requirements for tested and labeled fire- rated door assemblies except for size.
    - 3. Temperature-Rise Rating: Labeled fire doors within an interior exitway stairway shall have a label indicating a maximum transmitted temperature end point of not more than 450°F. above ambient at the end of 30 minutes of standard fire test exposure.

C. Fire-Rated Window Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 257.

### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver doors and frames cardboard-wrapped or crated to provide protection during transit and job storage. Provide additional protection to prevent damage to finish of factory- finished doors and frames.
- B. Inspect doors and frames on delivery for damage and notify shipper and supplier if damage is found. Minor damages may be repaired provided refinished items match new work and are acceptable to Architect. Remove and replace damaged items that cannot be repaired as directed.
- C. Store doors and frames at building site under cover. Place units on minimum 4-inchhigh wood blocking. Avoid using nonvented plastic or canvas shelters that could create a humidity chamber. If door packaging becomes wet, remove cartons immediately. Provide minimum 1/4-inch spaces between stacked doors to permit air circulation.

### PART 2 PRODUCTS

### 2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with requirements, provide products of one of the following:
  - 1. Amweld Building Products, Inc.
  - 2. Benchmark Commercial Doors; a division of General Products Co., Inc.
  - 3. Ceco Door Products; an ASSA ABLOY Group Company.
  - 4. Curries Company; an ASSA ABLOY Group Company.
  - 5. Deansteel Manufacturing, Inc.
  - 6. Mesker Door, Inc.
  - 7. Pioneer Industries Inc.
  - 8. Republic Builders Products.
  - 9. Steelcraft; an Allegion (formerly Ingersoll-Rand) company.

### 2.2 MATERIALS

- A. Hot-Rolled Steel Sheets: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- B. Cold-Rolled Steel Sheets: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; stretcher-leveled standard of flatness.
- C. Metallic-Coated Steel Sheets: ASTM A 653/A 653M, Commercial Steel (CS), Type B, with an A40 zinc-iron-alloy (galvannealed) coating; stretcher-leveled standard of flatness.
- 2.3 DOORS

- A. General: Provide doors of sizes, thicknesses, and designs specified herein.
- B. Interior Doors: Provide doors complying with requirements indicated below by referencing ANSI 250.8 for level and model and ANSI A250.4 for physical-endurance level:
  - 1. Level 2 and Physical Performance Level B (Heavy Duty), Model 2 Seamless.
- C. Exterior Doors: Provide doors complying with requirements indicated below by referencing ANSI A250.8 for level and model and ANSI A250.4 for physical-endurance level:
  - 1. Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 2 Seamless.
- D. Door Louvers: Provide louvers for interior doors, where indicated, that comply with SDI 111C, with blades or baffles formed of 0.020-inch thick, cold-rolled steel sheet set into0.032-inch thick steel frame.
  - 1. Sightproof Louvers: Stationary louvers constructed with inverted V-shaped or Y-shaped blades.
  - 2. Lightproof Louvers: Stationary louvers constructed with baffles to prevent light from passing from one side to the other, any angle.
- E. Vision Lite Systems: Manufacturer's standard kits consisting of glass lite moldings to accommodate glass thickness and size of vision lite indicated.

### 2.4 FRAMES

- A. General: Provide steel frames for doors, and other openings that comply with ANSI A250.8 and with details indicated for type and profile. Conceal fastenings, unless otherwise indicated.
  - 1. Frames of 0.053-inch (16 Gage) thick steel sheet for:
    - a. Interior door and window openings less than 42 inches.
  - 2. Frames of 0.067-inch (14 Gage) thick steel sheet for:
    - a. Interior door and window openings of 42 inches or more.
    - b. All Exterior frames.
- B. Door Silencers: Except on weather-stripped frames, fabricate stops to receive three silencers on strike jambs of single-door frames and two silencers on heads of double-door frames.
- C. Plaster Guards: Provide 0.016-inch thick, steel sheet plaster guards or mortar boxes to close off interior of openings; place at back of hardware cutouts where mortar or other materials might obstruct hardware operation.
- D. Supports and Anchors: Fabricated from not less than 0.042-inch (18 Gage) thick, electrolytic zinc-coated or metallic-coated steel sheet.

- 1. Wall Anchors in Masonry Construction: 0.177-inch diameter, steel wire complying with ASTM A 510 may be used in place of steel sheet.
- E. Inserts, Bolts, and Fasteners: Manufacturer's standard units. Where zinc-coated items are to be built into exterior walls, comply with ASTM A 153/A 153M, Class C or D as applicable.

### 2.5 FABRICATION

- A. General: Fabricate steel door and frame units to comply with ANSI A250.8 and to be rigid, neat in appearance, and free from defects including warp and buckle. Where practical, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at Project site.
- B. Exterior Door Construction: For exterior locations and elsewhere as indicated, fabricate doors, panels, and frames from metallic-coated steel sheet. Close top and bottom edges of doors flush as an integral part of door construction or by addition of 0.053-inch thick, metallic-coated steel channels with channel webs placed even with top and bottom edges.
- C. Interior Door and Panel Faces: Fabricate exposed faces of doors and panels, including stiles and rails of nonflush units, from the following material:
  - 1. Cold-rolled steel sheet, unless otherwise indicated.
- D. Core Construction: One of the following manufacturer's standard core materials that produce a door complying with SDI standards:
  - 1. Vertical steel stiffeners.
- E. Clearances for Non-Fire-Rated Doors: Not more than 1/8 inch at jambs and heads, except not more than 1/4 inch between pairs of doors. Not more than 3/4 inch at bottom.
- F. Clearances for Fire-Rated Doors: As required by NFPA 80.
- G. Single-Acting, Door-Edge Profile: Square edge, unless beveled edge is indicated.
- H. Double-Acting, Door-Edge Profile: Round vertical edges with 2-1/8-inch radius.
- I. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."
- J. Fabricate concealed stiffeners, reinforcement, edge channels, louvers, and moldings from either cold- or hot-rolled steel sheet.
- K. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat or oval heads for exposed screws and bolts.
- L. Thermal-Rated (Insulating) Assemblies: At exterior locations and elsewhere as

shown or scheduled, provide doors fabricated as thermal-insulating door and frame assemblies and tested according to ASTM C 1363.

- 1. Unless otherwise indicated, provide thermal-rated assemblies with U-value of 0.37Btu/sq. ft. x h x deg F or better.
- M. Sound-Rated (Acoustical) Assemblies: Where shown or scheduled, provide door and frame assemblies fabricated as sound-reducing type, tested according to ASTM E 1408, and classified according to ASTM E 413.
  - Unless otherwise indicated, provide acoustical assemblies with STC sound ratings of 33 or better.
- N. Hardware Preparation: Prepare doors and frames to receive mortised and concealed hardware according to final door hardware schedule and templates provided by hardware supplier. Comply with applicable requirements in ANSI A250.6 and ANSI A115 Series specifications for door and frame preparation for hardware.
  - 1. For concealed overhead door closers (if any), provide space, cutouts, reinforcement, and provisions for fastening in top rail of doors or head of frames, as applicable.
- O. Frame Construction: Fabricate frames to shape shown.
  - 1. Fabricate frames with mitered or coped and continuously welded corners and seamlessface joints.
  - 2. Provide welded frames with temporary spreader bars.
  - 3. Provide terminated stops where indicated.
- P. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied hardware may be done at Project site.
- Q. Locate hardware as indicated on Shop Drawings or, if not indicated, according to ANSI A250.8.
- R. Glazing Stops: Manufacturer's standard, formed from 0.032-inch-thick steel sheet.
  - 1. Provide nonremovable stops on outside of exterior doors and on secure side of interior doors for glass, louvers, and other panels in doors. Provide screw-applied, removable, glazing stops on inside of glass, louvers, and other panels in doors.
- S. Astragals: As required by NFPA 80 to provide fire ratings indicated.

### 2.6 FINISHES

A. Prime Finish: Manufacturer's standard, factory-applied coat of rust-inhibiting primer complying with ANSI A250.10 for acceptance criteria, with VOC content of not more than 50 g/L.

#### PART 3 EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. Drill and tap doors and frames to receive nontemplated, mortised, and surfacemounted door hardware.

#### 3.3 INSTALLATION

- A. General: Install hollow-metal work plumb, rigid, properly aligned, and securely fastened inplace. Comply with Drawings and manufacturer's written instructions.
- B. Hollow-Metal Frames: Install hollow-metal frames of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.
  - 1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
    - a. At fire-rated openings, install frames according to NFPA 80.
    - b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
    - c. Install frames with removable stops located on secure side of opening.
    - d. Install door silencers in frames before grouting.
    - e. Remove temporary braces necessary for installation only after frames have beenproperly set and secured.
    - f. Check plumb, square, and twist of frames as walls are constructed. Shim asnecessary to comply with installation tolerances.
    - g. Field apply bituminous coating to backs of frames that will be filled with groutcontaining antifreezing agents.
  - 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post installed expansion anchors.
  - 3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
- 4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
- 5. Concrete Walls: Solidly fill space between frames and concrete with mineralfiber insulation.
- 6. In-Place Concrete or Masonry Construction: Secure frames in place with post installed expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
- 7. In-Place Metal or Wood-Stud Partitions: Secure slip-on drywall frames in place according to manufacturer's written instructions.
- 8. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
  - a. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line90 degrees from jamb perpendicular to frame head.
  - b. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontalline parallel to plane of wall.
  - c. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
  - d. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs at floor.
- C. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.
  - 1. Non-Fire-Rated Steel Doors:
    - a. Between Door and Frame Jambs and Head: 1/8 inch (3.2 mm) plus or minus 1/32inch (0.8 mm).
    - b. Between Edges of Pairs of Doors: 1/8 inch (3.2 mm) to 1/4 inch (6.3 mm) plus orminus 1/32 inch (0.8 mm).
    - c. At Bottom of Door: 3/4 inch (19.1 mm)] [5/8 inch (15.8 mm) plus or minus 1/32inch (0.8 mm).
    - d. Between Door Face and Stop: 1/16 inch (1.6 mm) to 1/8 inch (3.2 mm) plus orminus 1/32 inch (0.8 mm).
  - 2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
  - 3. Smoke-Control Doors: Install doors and gaskets according to NFPA 105.
- D. Glazing: Comply with installation requirements in Section 088000 "Glazing" and with hollow-metal manufacturer's written instructions.
  - 1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches (230 mm) o.c. and not more than 2 inches (51 mm) o.c. from each corner.

# 3.4 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.

- B. Remove grout and other bonding material from hollow-metal work immediately after
- C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
- D. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.
- E. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

### END OF SECTION

### SECTION 084413 - GLAZED ALUMINUM CURTAIN WALLS

PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

### 1.2 SUMMARY

A. Section includes glazed aluminum curtain walls.

### 1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

### 1.4 SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For glazed aluminum curtain walls. Include plans, elevations, sections, full-sizedetails, and attachments to other work.
  - 1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
  - 2. Include full-size isometric details of each vertical-to-horizontal intersection of glazed aluminum curtain walls, showing the following:
    - a. Joinery, including concealed welds.
    - b. Anchorage.
    - c. Expansion provisions.
    - d. Glazing.
    - e. Flashing and drainage.
  - 3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.
- C. Samples for Initial Selection: For units with factory-applied color finishes.
- D. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.
- E. Fabrication Sample: Of each vertical-to-horizontal intersection of assemblies, made from 12- inch (300-mm) lengths of full-size components and showing details of the following:
  - 1. Joinery, including concealed welds.
  - 2. Anchorage.

- 3. Expansion provisions.
- 4. Glazing.
- 5. Flashing and drainage.
- F. Delegated-Design Submittal: For glazed aluminum curtain walls indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- G. Qualification Data: For Installer and field-testing agency.
- H. Energy Performance Certificates: For glazed aluminum curtain walls, accessories, and components from manufacturer.
  - 1. Basis for Certification: NFRC-certified energy performance values for each glazed aluminum curtain wall.
- I. Product Test Reports: For glazed aluminum curtain walls, for tests performed by a qualified testing agency.
- J. Field quality-control reports.
- K. Sample Warranties: For special warranties.
- L. Maintenance Data: For glazed aluminum curtain walls to include in maintenance manuals.
- M. Refer to Section 01 30 00 SUBMITALS
- 1.5 QUALITY ASSURANCE
  - A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
  - B. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated and accredited by IAS or ILAC Mutual Recognition Arrangement as complying with ISO/IEC 17025.
  - C. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
    - 1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.

### 1.6 WARRANTY

- A. Special Assembly Warranty: Manufacturer agrees to repair or replace components of glazed aluminum curtain wall that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:

- a. Structural failures including, but not limited to, excessive deflection.
- b. Noise or vibration created by wind and thermal and structural movements.
- c. Deterioration of metals, metal finishes, and other materials beyond normalweathering.
- d. Water penetration through fixed glazing and framing areas.
- e. Failure of operating components.
- 2. Warranty Period: Five years from date of Substantial Completion.
- B. Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.
  - 1. Deterioration includes, but is not limited to, the following:
    - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
    - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
    - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
  - 2. Warranty Period: 10 years from date of Substantial Completion.

### PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design glazed aluminum curtain walls.
- B. General Performance: Comply with performance requirements specified, as determined by testing of glazed aluminum curtain walls representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
  - 1. Glazed aluminum curtain walls shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
  - 2. Failure also includes the following:
    - a. Thermal stresses transferring to building structure.
    - b. Glass breakage.
    - c. Noise or vibration created by wind and thermal and structural movements.
    - d. Loosening or weakening of fasteners, attachments, and other components.
    - e. Failure of operating units.
- C. Structural Loads:
  - 1. Wind Loads: As indicated on Drawings.
  - 2. Other Design Loads: As indicated on Drawings.

- D. Deflection of Framing Members: At design wind pressure, as follows:
  - 1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans up to 13 feet 6 inches (4.1 m) and to 1/240 of clear span plus 1/4 inch (6.35 mm) for spans greater than 13 feet 6 inches (4.1 m) or an amount that restricts edge deflection of individual glazing lites to 3/4 inch (19.1 mm), whichever is less.
  - 2. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch (3.2 mm), whichever is smaller] [amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components to less than 1/8 inch (3.2 mm)].
  - 3. Cantilever Deflection: Where framing members overhang an anchor point, as follows:
    - a. Perpendicular to Plane of Wall: No greater than 1/240 of clear span plus 1/4inch (6. 35-mm) for spans greater than 11 feet 8-1/4 inches (3.6 m) or 1/175 times span, for spans less than 11 feet 8-1/4 inches (3.6 m).
- E. Structural: Test according to ASTM E 330 as follows:
  - 1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
  - 2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
  - 3. Test Durations: As required by design wind velocity, but not less than 10 seconds.
- F. Air Infiltration: Test according to ASTM E 283 for infiltration as follows:
  - 1. Fixed Framing and Glass Area:
    - a. Maximum air leakage of 0.06 cfm/sq. ft. (0.30 L/s per sq. m) at a static-airpressure differential of 6.24 lbf/sq. ft. (300 Pa).
- G. Water Penetration under Static Pressure: Test according to ASTM E 331 as follows:
  - 1. No evidence of water penetration through fixed glazing and framing areas when tested according to a minimum static-air-pressure differential of 20 percent of positive wind- load design pressure, but not less than 6.24 lbf/sq. ft. (300 Pa).
- H. Seismic Performance: Glazed aluminum curtain walls shall withstand the effects of earthquakemotions determined according to ASCE/SEI 7.

1. Seismic Drift Causing Glass Fallout: Complying with criteria for passing based on building occupancy type when tested according to AAMA 501.6 at design displacement and 1.5 times the design displacement.

2. Vertical Interstory Movement: Complying with criteria for passing based on building occupancy type when tested according to AAMA 501.7 at design displacement and 1.5 times the design displacement]

- I. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:
  - 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
  - 2. Thermal Cycling: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.
    - a. High Exterior Ambient-Air Temperature: That which produces an exterior metalsurface temperature of 180 deg F (82 deg C).
    - b. Low Exterior Ambient-Air Temperature: 0 deg F (minus 18 deg C).

### 2.2 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. EFCO Corporation.
  - 2. Kawneer North America.
  - 3. Oldcastle, Inc.
  - 4. Shuco USA LP.
  - 5. Wausau Window and Wall Systems.
  - 6. YKK AP America Inc.
- B. Source Limitations: Obtain all components of curtain wall system, including framing spandrel panels, entrances and accessories, from single manufacturer.
- 2.3 FRAMING
  - A. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
    - 1. Construction: Thermally broken.
    - 2. Glazing System: Retained mechanically with gaskets on four sides.
    - 3. Finish: High-performance organic finish.
    - 4. Fabrication Method: Field-fabricated stick system.
  - B. Pressure Caps: Manufacturer's standard aluminum components that mechanically retain glazing.
    - 1. Include snap-on aluminum trim that conceals fasteners.
  - C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
  - D. Materials:
    - 1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
      - a. Sheet and Plate: ASTM B 209 (ASTM B 209M).

- b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221 (ASTM B 221M).
- c. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.
- d. Structural Profiles: ASTM B 308/B 308M.
- 2. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.
  - a. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
  - b. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
  - c. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

### 2.4 INSULATED SPANDREL PANELS

- A. Insulated Spandrel Panels: Laminated, metal-faced flat panels with no deviations in planeexceeding 0.8 percent of panel dimension in width or length.
  - 1. Overall Panel Thickness: 1 inch (25.4 mm).
  - 2. Exterior Skin: Aluminum.
    - a. Thickness: Manufacturer's standard for finish and texture indicated.
    - b. Finish: Match framing system.
    - c. Texture: Smooth.
  - 3. Interior Skin: Aluminum.
    - a. Thickness: Manufacturer's standard for finish and texture indicated.
    - b. Finish: Matching curtain-wall framing.
    - c. Texture: Smooth.
  - 4. Thermal Insulation Core: Manufacturer's standard rigid, closed-cell, polyisocyanurate board.
- B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Flame-Spread Index: 25.
  - 2. Smoke-Developed Index: 50s.

### 2.5 ENTRANCES

- A. Entrances: Comply with Section 084113 "Aluminum-Framed Entrances."
- 2.6 GLAZING
  - A. Glazing: Comply with Section 088000 "Glazing."
- 2.7 ACCESSORIES
  - A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining,

nonbleeding fasteners and accessories compatible with adjacent materials.

- 1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
- 2. Reinforce members as required to receive fastener threads.
- B. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch (25.4 mm) that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.
  - 1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steelinserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.
- C. Concealed Flashing: Dead-soft, 0.018-inch- (0.457-mm-) thick stainless steel, ASTM A 240/A 240M of type recommended by manufacturer.
- D. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil (0.762-mm) thickness per coat.

### 2.8 FABRICATION

- A. Form or extrude aluminum shapes before finishing.
- B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- C. Fabricate components that, when assembled, have the following characteristics:
  - 1. Profiles that are sharp, straight, and free of defects or deformations.
  - 2. Accurately fitted joints with ends coped or mitered.
  - 3. Physical and thermal isolation of glazing from framing members.
  - 4. Accommodations for thermal and mechanical movements of glazing and framing tomaintain required glazing edge clearances.
  - 5. Provisions for field replacement of glazing.
  - 6. Fasteners, anchors, and connection devices that are concealed from view to greatestextent possible.
- D. Fabricate components to resist water penetration as follows:
  - 1. Internal guttering system or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.
- E. Curtain-Wall Framing: Fabricate components for assembly using manufacturer's standard assembly method.
- F. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

## 2.9 ALUMINUM FINISHES

- A. High-Performance Organic Finish: Three-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply withcoating and resin manufacturers' written instructions.
  - 1. Color and Gloss: As selected by Architect from manufacturer's full range.

### PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

A. Prepare surfaces that will contact structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.

### 3.3 INSTALLATION

- A. General:
  - 1. Comply with manufacturer's written instructions.
  - 2. Do not install damaged components.
  - 3. Fit joints to produce hairline joints free of burrs and distortion.
  - 4. Rigidly secure nonmovement joints.
  - 5. Install anchors with separators and isolators to prevent metal corrosion and electrolyticdeterioration and to prevent impeding movement of moving joints.
  - 6. Where welding is required, weld components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.
  - 7. Seal joints watertight unless otherwise indicated.
- B. Metal Protection:
  - 1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with primer, applying sealant or tape, or installing nonconductive spacers as recommended by manufacturer for this purpose.
  - 2. Where aluminum is in contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.
- D. Install components plumb and true in alignment with established lines and grades.

- E. Install glazing as specified in Section 088000 "Glazing."
  - 1. Prepare surfaces that will contact structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.
- F. Install weatherseal sealant according to Section 079200 "Joint Sealants" and according to sealant manufacturer's written instructions to produce weatherproof joints. Install joint filler behind sealant as recommended by sealant manufacturer.

## 3.4 ERECTION TOLERANCES

- A. Erection Tolerances: Install glazed aluminum curtain walls to comply with the following maximum tolerances:
  - 1. Plumb: 1/8 inch in 10 feet (3.2 mm in 3 m); 1/4 inch in 40 feet (6.35 mm in 12.2 m).
  - 2. Level: 1/8 inch in 20 feet (3.2 mm in 6 m); 1/4 inch in 40 feet (6.35 mm in 12.2 m).
  - 3. Alignment:
    - a. Where surfaces abut in line or are separated by reveal or protruding element up to1/2 inch (12.7 mm) wide, limit offset from true alignment to 1/16 inch (1.6 mm).
    - b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch(12.7 to 25.4 mm) wide, limit offset from true alignment to 1/8 inch (3.2 mm).
    - c. Where surfaces are separated by reveal or protruding element of 1 inch (25.4 mm)wide or more, limit offset from true alignment to 1/4 inch (6 mm).
  - 4. Location: Limit variation from plane to 1/8 inch in 12 feet (3.2 mm in 3.6 m); 1/2 inch (12.7 mm) over total length.

## 3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Test Area: Perform tests on one bay at least 30 feet (9.1 m), by one story.
- C. Field Quality-Control Testing: Perform the following test on representative areas of glazed aluminum curtain walls.
  - 1. Water-Spray Test: Before installation of interior finishes has begun, areas designated by Architect shall be tested according to AAMA 501.2 and shall not evidence water penetration.
    - a. Perform a minimum of two tests in areas as directed by Architect.
    - b. Perform tests in each test area as directed by Architect. Perform at least three tests, prior to 10, 35, and 70 percent completion.
  - 2. Air Infiltration: ASTM E 783 at 1.5 times the rate specified for laboratory testing in "Performance Requirements" Article but not more than 0.09 cfm/sq. ft. (0.45 L/s

per sq. m) at a static-air-pressure differential of 1.57 lbf/sq. ft. (75 Pa).

- a. Perform a minimum of three tests in areas as directed by Architect.
- b. Perform tests in each test area as directed by Architect. Perform at least three tests, prior to 10, 35, and 70 percent completion.
- 3. Water Penetration: ASTM E 1105 at a minimum static-air-pressure differential of 0.67 times the static-air-pressure differential specified for laboratory testing in "Performance Requirements" Article, but not less than 6.24 lbf/sq. ft. (300 Pa) and shall not evidence water penetration.
- D. Glazed aluminum curtain walls will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports.

## END OF SECTION

## SECTION 08 71 00 - DOOR HARDWARE

# A.GENERAL

## A.1 GENERAL PROVISIONS

- A. Attention is directed to the GENERAL REQUIREMENTS AND COVENANTS DIVISION I, and Specification Section.
- **B**. Examine all Drawings and all Sections of the Specifications for requirements and provisions affecting the Work of this Section.

### A.2 DESCRIPTION OF WORK

- A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
  - 1. Provide mechanical and electrified door hardware for exterior and interior doors to provide correct functions for intended use.
  - 2. Provide related items and services as indicated on the drawings and as specified.
  - 3. Provide door hardware schedules and templates as required for fabrication of doors and frames under other sections.
  - 4. Provide hardware that complies with applicable codes and requirements of Authorities which have jurisdiction
- B. Where indicated as DOOR SECURITY BY OTHERS in hardware sets, door security components are to be installed by the Owner's Security Contractor.
- C. Items To Be Furnished Only:
  - 1. Furnish one Schlage Everest Primus high security system Level Four, interchangeable core, restricted keyway for each "CYLINDER" and "ACS CYLINDER" listed in Hardware Sets.
- D. Related Work: The following items are not included in this Section and will be performed under the designated Sections:
  - 1. Section 081110 HOLLOW METAL DOORS AND FRAMES for astragals provided as part of a fire-rated labeled assembly and for door silencers provided as part of the frame.
- E. Integration of Work: The installation of Access Control System hardware requires coordination between trades.

### A.3 REFERENCES

A. Comply with the applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall apply.

- 1. ICC/ANSI 117.1-09, International Building Code Accessibility and Usable Buildings and Facilities.
- 2. Door and Hardware Institute (DHI) Recommended Locations for Architectural Hardware for Standard Steel doors and Frames (2004).
- 3. National Fire Protection Association NFPA 80 Standard for Fire Doors and other Protective Openings (Latest Edition).
- 4. ANSI/BHMA A156.1, American National Standard for BUTTS AND HINGES (2021)

## A.4 SUBMITTALS

- A. Schedules: Prepare and submit to the Architect for approval a complete hardware schedule. The schedule shall be in DHI vertical format and shall include the manufacturers' numbers, types, sizes, and installation of all hardware required for the project. The hardware schedule shall list the Specification Hardware Set Number next to the Schedule Heading Number and shall include a numerical door index listing the schedule heading number.
  - 1. Note that correct hand of door hardware is the responsibility of the hardware supplier.
- B. Catalogue Cuts: Submit catalogue cuts along with product data sheets of all hardware items.
- C. Templates: Furnish templates to door and frame manufacturers sufficiently in advance so as not to impede the progress of the work. However, no templates shall be issued or materials ordered until the hardware schedule is approved.
- D. Samples: Submit samples as requested by the Engineer of any material specified herein. Samples shall be clearly marked with the manufacturer's name and number and with the schedule number. Samples shall be returned to the supplier after being approved.
- E. Substitutions:
  - 1. Or Equal: Submission of substitutions for products marked "Or Equal" is acceptable without conditions, provided quality matches specified item.
- F. Closeout:
  - 1. Submit RECORD COPY of hardware schedule and product cuts, as installed. Submission to contain contact information for supplier and Contractor.
  - 2. Submit manufacturers' standard warranties.

### A.5 QUALITY ASSURANCE

A. Supplier: Supplying firm must be a recognized Architectural Finish Hardware supplier with warehousing facilities who has been furnishing hardware in the project vicinity for not less than five years and who is, or employs on a full-time basis, a regular member of the Society of Architectural Consultants, or equal, acceptable by the Architect, to prepare detailed hardware and keying schedules, check drawings, and supervise installation, and who is available at reasonable times during the course of the work for consultation about the project's hardware requirements to the Owner and Architect.

- B. Contractor: Door Hardware is to be installed, at minimum, under the direct supervision of qualified and experienced personnel.
- C. Fire-rated openings: Provide hardware for fire-rated openings in compliance with NFPA 80 (2007) and local building code requirements. Provide only hardware which has been listed by UL or FM for types and sizes for doors required and complies with requirements for door and door frame labels.
  - 1. Where emergency panic devices are required on fire-rated doors (with supplementary marking on door UL and FM labels indicating "Fire Door To Be Equipped With Fire Panic Hardware") provide UL or FM label on panic devices indicating "Fire Panic Hardware".
- D. Field Measurement: The Contractor shall verify all dimensions in the field, including, but not limited to, door and frame opening dimensions and wall thickness dimensions.

## 1.6 KEYING AND KEY CONTROL

- A. At mortise lock sets, CYLINDER in Hardware Sets refers to lock cylinder and core.
- **B.** Provide a construction core for each locking hardware device indicated in the Hardware Sets. All construction cores are keyed alike UON.
- C. MHT Cylinders and cores: The MHT lock cores are Schlage Classic format with a 6-pin E Series keyway which is to be matched at the new work Lock cores shall be provided through the Owner's Locksmith, KAMCO Lock Solutions, Londonderry, NH.
- D. After the receipt of an approved hardware schedule, and prior to ordering any locking devices, hardware supplier shall arrange through the Contractor for a meeting with the Owner's Locksmith, to discuss keying for the job. A keying layout shall be submitted to the Owner for written approval before the keys are ordered. Keying System shall conform to Owner system.
- E. Furnish the Following Quantities of Keys:
  - 1. MHT Keys:
    - a. Two (2) blanks for each MHT restricted keyway lock.
    - b. Keys shall be stamped with a keying symbol and shall be stamped, "DO NOT DUPLICATE"
  - 2. Construction Keys. Provide construction keys to match the core type specified in the following quantities:
    - a. Three (3) Construction Master Keys for each lock.
    - b. Three (3) Construction Change Keys.

### 1.7 SPECIAL REQUIREMENTS

A. Hardware Supplier shall determine conditions and materials for all the doors and frames for proper application of hardware.

- **B**. Hardware Supplier shall be responsible for the accuracy of the quantities, sizes, finish and proper hardware to be furnished, whether specifically mentioned or not, and shall be responsible for determining all details such as hand of doors, bevel of locks, etc.
- C. All lever trim for door locks to hazardous areas such as mechanical rooms, incinerator rooms, etc., shall have a tactile surface to comply with requirements of the Authority Having Jurisdiction.
  - 1. Tactile surfaces shall be applied to trim on both sides of door.
- D. Tools for maintenance: All special tools packed with hardware items shall be saved and turned over to the Owner upon completion of the work.
- E. Lock fronts, flush bolt faces, and strikes shall be beveled in accordance with manufacturers' standards.
- F. Provide fire rated hardware and accessories including back boxes for items mounted inside exterior walls labeled as a NFPA 285 assembly.

### 1.8 MARKING AND PACKING

Finish Hardware shall arrive at the site in its original packaging. All packages shall be legibly labeled indicating manufacturer's numbers, types, sizes and hardware schedule reference number. All hardware shall be wrapped in paper and shall be packed in the same package as all screws, bolts and fastenings necessary for proper installation.

### 1.9 DELIVERY, STORAGE AND HANDLING

- A. The Contractor shall receive, check against invoices, and store all hardware at the job.
- **B**. Delivery of hardware for the job shall be in accordance with the Contractor's instructions.
- C. The Contractor shall furnish the supplier of the hardware with receipts for all hardware received.
- D. The Contractor shall provide adequate locked storage space with shelving for all items of hardware and shall be responsible for such hardware after receipt from the supplier. Contractor shall replace all lost or damaged hardware at the Contractor's own expense.

### 1.10 WARRANTY / GUARANTEE

- A. Manufacturers shall provide their standard warranties/guarantees for work under this Section. However, such warranties/guarantees shall be in addition to, and not in lieu of, all other liabilities which the manufacturers may have by law or by other provisions of the Contract Documents.
- **B.** Warranties shall begin as of the date of final acceptance of the Finish Hardware installation, or the date of Substantial Completion, whichever occurs first

### PART 2 - PRODUCTS

### 2.1 QUALITY OF MATERIALS

A. Hardware shall be entirely free from imperfection in manufacture and finish. Furnish hardware as specified below and listed in the Hardware Sets. Note that all products listed may not be used in every Package of this Contract.

### 2.2 HINGES

- A. Unless otherwise noted (UON), provide full mortise butt hinges at exterior and interior doors.
  - 1. Where indicated SET OF BUTTS provide Stanley CB 1961 4-1/2 x 4-1/2" NRP Series (heavy weight) UON.
  - 2. Provide 3 hinges for doors up to 7'-6" tall. Add one additional hinge for every additional 30" height.
- B. Where indicated CONTINUOUS HINGE, provide concealed type geared continuous hinges Roton 780-112 UON.
  - 1. Where indicated CONTINUOUS HINGE (HD), provide heavy duty aluminum Roton 780-112.
  - 2. Where indicated as (PREP FOR EPT) provide hinge leaf cutouts to accommodate Von Duprin electric power transfers.

### 2.3 LOCKSETS AND LATCHSETS

- A. Unless otherwise noted, provide mortise locksets.
  - 1. Mortise locksets shall be heavy duty type, Schlage L9000 Series x 06a Lever and Rose trim in functions as noted in the Hardware Sets below UON.
- **B.** Strike plates shall have curved lips. Strike lips shall be detailed to provide clearance for latch bolt at door frames with projecting trim. At pairs of doors, strike lips shall be 7/8 in. to center.
- F. Where new locksets are provided for existing doors, provide new strike plate.

### 2. 6 ELECTROMAGNETIC LOCKS

- A. Unless otherwise indicated, provide surface mounted electromagnetic locks. Electromagnetic locks shall contain magnetic bond sensors (MBS), door position switches (DPS) and relock time delays (RTD)
- B. Electromagnetic locks shall be surface mounted Schlage M490+ DPS/MBS/RTD (at single doors) and M492+ DPS2/MBS2/RTD2 (option at double doors) UON.
  - 1. Voltage shall be 24VDC.
  - 2. Finish shall be standard 628.

3. Provide appropriate "Z" bracket kits and accessories.

# 2.7 PANIC DEVICES

- A. Unless otherwise noted, all panic devices shall be surface mounted. All panic devices shall be less dogging.
- B. Where indicated RIM PANIC DEVICE, provide Von Duprin 98 Series rim devices with 06 style lever. Provide lock function indicated in hardware sets. Provide surface strike 299F UON.
- C. Where indicated V/R PANIC DEVICE provide Von Duprin 9827 Surface mounted vertical rod device with 06 style lever. Provide device less bottom rod. Provide lock functions indicated in hardware sets
- D. Provide panic devices in appropriate lengths for door leaf. Standard lengths apply except as noted in the hardware sets.
- E. Where new panic devices are provided for existing doors, provide new strike plate.

## 2.8 CLOSERS

- A. Overhead Surface Closers shall be LCN Closers 4040XP; heavy-duty; non-sized; metal cover; ADA approved, as follows:
- B. HOLD OPEN CLOSER shall be LCN 4040XP with HEDA hold-open arm UON.
- C. INT CLOSER (PUSH SIDE MTD) shall be parallel arm LCN 4040XP with EDA arm UON.
- D. INT CLOSER (PULL SIDE MTD) shall be LCN 4040XP with an EDA arm UON
- E. Where indicated as X 180 in hardware sets install closer utilizing 180-degree template.
- F. Unless otherwise noted, closers shall be mounted on that side of the opening least objectionable to the public view.
- G. Provide all required mounting accessories.

### 2.9 **PROTECTION PLATES**

- A. Manufacturers: Burns Manufacturing, Ives, Rockwood Manufacturing, Or Equal.
- B. Door protection shall be 16 ga (.050) metal, eased or beveled edges on four sides with countersunk holes for fasteners. Door protection shall be screw attached and be UL listed for use on 90-minute steel doors minimum. Provide machine screws or wood screws to match door protection finish.
- C. KICK PLATES shall be 12-in. height, stile permitting; otherwise, plates shall be 4-in high.

D. ARMOR PLATES shall be 34-in. height. Provide cutouts for door operating hardware.

## 2.10 STOPS AND STAYS

- A. Manufacturers: Wall and floor stops: Burns Manufacturing, Ives, Rockwood Manufacturing, Or Equal.
- B. Where indicated in Hardware Sets below, provide stops and stays.
- C. It shall be the responsibility of the hardware supplier to provide door stops for all doors with the following requirements:
  - 1. Wall stops shall be used wherever possible.
  - 2. Where wall stops cannot be used, provide dome type floor stops where conditions allow.
  - 3. At any opening where a wall or floor stop cannot be used, a heavy-duty overhead stop must be used.
  - 4. Wall stops at mortise locksets, cipher locks and panic devices shall be provided at openings. Wall stops shall be round bases with convex rubber bumpers. Burns 560, Or Equal.
  - 5. Wall stops at cylindrical locksets shall be round bases with concave rubber bumpers. Burns 565, Or Equal.
  - 6. Floor stops shall be dome heavy duty dome type. Burns 527 Series, Or Equal.

## 2.11 FLUSH BOLTS

- A. All flush bolts shall be manual UON.
- B. Where indicated in the Hardware Sets below, provide manual flush bolts. Door Controls International – 780F. Or Equal. MANUAL FLUSH BOLTS shall have a plated satin chrome (US26D) finish.
- C. Manual flush bolts shall be provided at top and bottom at inactive leaf. Frame and floor strikes shall be included in the hardware.
- D. Where indicated in the Hardware Sets below, automatic flush bolts shall be Door Controls International 942, Or Equal.

## 2.12 THRESHOLDS

- A. "Or Equal": Products equal to the quality and configuration of threshold items are acceptable.
- B. Where indicated in Hardware Sets EXTERIOR THRESHOLDS shall be by Pemko 2005\_T aluminum with an AK (non-slip coating).
- C. Where indicated in Hardware Sets INTERIOR THRESHOLDS shall be Pemko 272\_aluminum with an AK (non-slip coating).
- D. Where indicated in Hardware Sets, TRANSITION THRESHOLDS shall be Pemko 273 aluminum with an AK (non-slip coating).

- E. Where indicated in the Hardware Sets, THERMAL BARRIER THRESHOLDS shall be Pemko  $273 \times$  width indicated.
- F. Where indicated in Hardware Sets, CURB THRESHOLDS shall be Pemko 1855\_T-aluminum with AK (non-slip coating) UON.
- G. Size thresholds and metal plates to fit door openings. Scribe thresholds and metal plates to fit profile of door frame. Provide 1/8" clearance between thresholds, plates and frame.
- 2.13 GASKETING, WEATHERSTRIPPING, ASTRAGALS, DOOR BOTTOMS
  - H. Or Equal": Products equal to the quality and configuration of threshold items are acceptable.
  - I. Where indicated as "smoke tested", provide products which have been tested to UL 1784-01 and which meet NFPA 105-99.
  - J. GASKETING: Perimeter gasketing (smoke tested) shall be Pemko 297APK aluminum with a satin nickel finish UON.
  - K. AUTOMATIC DOOR BOTTOM (smoke tested): Pemko 4301CPKL aluminum with a clear finish. Automatic door bottom shall be surface mounted OUN.
  - L. MEETING STILE GASKETING (smoke tested) shall be overlapping Pemko 297AS aluminum with a clear finish UON.
  - M. DOOR SWEEP shall be brush type. Brush door sweeps shall be Pemko 18100CNB.
  - N. WEATHERSTRIPPING shall be brush type. Brush perimeter weatherstripping shall be Pemko 18100 CNB UON.

### 2.14 MISCELLANEOUS

- A. Coordinators shall be aluminum bar coordinators with US26D finish. COORDINATOR shall be Ives COR 52, Or Equal.
- B. SILENCERS: Unless otherwise noted, all interior metal frames shall be provided with door silencers, three for each single door and two for each pair of doors. Delete silencers at frames with weather-stripping or gasketing.
- C. DEAD BOLT shall be Schlage 800 series UON. Model numbers are listed in Hardware Sets below.
- D. LATCH PROTECTORS shall be IVES LG10 Lock Guard x security pin fasteners x 630 (Or Equal)

### 2.15 ELECTRIC STRIKES

A. Electric strikes shall be Von Duprin 6200 series UON

- B. At door locks without dead bolts, ELECTRIC STRIKE shall be Von Duprin model 6214 (FSE)
- C. Electric strikes shall be:
  - 1. Tamper resistant per UL 1034
  - 2. Fire-rated where required UL 10C
  - 3. Construction shall be heavy duty stainless steel
  - 4. Finish shall be 630 (US32D)
  - 5. Power shall be 24VDC from a central source UON

## 2.16 FINISHES

- D. Unless noted otherwise, finish of hardware shall be as follows:
  - 1. All butt hinges shall be satin stainless steel, 630 (US32D).
  - 2. Continuous hinges shall be anodized aluminum, 628 (US28).
  - 3. Locksets, latch sets, cylinders, panic devices, floor closers, flush bolts, floor stops, overhead stops, flush pulls, etc., shall be satin chrome, 626 (US26D) finish.
  - 4. Closers shall be plated satin chrome, 626 (US26D).
  - 5. Push plates, kick plates, surface pulls, and wall stops shall be dull stainless steel 630 (US32D). Plates shall be BS .062 GA., 18-8 Alloy.
  - 6. Thresholds shall be anodized aluminum, 628 (US28).
  - 7. Any item not listed shall be satin chrome or anodized aluminum finish.

## PART 3 - EXECUTION

## 3.1 MOUNTING POSITIONS

- A. Locksets and latch sets: unless shown otherwise, locate center of levers 40 inches above finished floor.
- B. Overhead Closers:
  - 1. Verify each head condition prior to furnishing door closers.
  - 2. Surface-mounted on door: surface shoe application for standard operation and soffit plate application for parallel arms. Provide special shoe plates and brackets where specified or where required by job conditions.
  - **3**. Set hardware plumb, level and in exact alignment and location. Conceal and countersink fasteners wherever possible

### 3.2 INSTALLATION

- A. Follow guidelines of DHI 'Recommended Locations for Builder's Hardware" and hardware manufacturers instructions.
- B. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Coordinate with work of other sections.
- C. Set hardware plumb, level and in exact alignment and location. Conceal and countersink fasteners wherever possible.

### D. <u>SELF-TAPPING SCREWS SHALL NOT BE USED TO INSTALL ANY DOOR HARDWARE</u> <u>EXCEPT CONTINUOUS HINGES.</u>

## 3.3 SPECIAL INSTRUCTIONS

- A. General
  - 1. The Contractor shall coordinate all work, including pre-installation coordination with the Owner's Security Contractor.
  - 2. Install construction cores in all locking hardware at time of installation. Replace construction cores with permanent cores when directed by the Owner.

3. Contractor shall retain responsibility for hardware installation until final acceptance. This includes control of hardware during and through the wiring of electrified devices. Coordinate installation of electrified door hardware with electrical trades.

## 3.4 ADJUSTING, CLEANING AND PROTECTION

- A, Adjust hardware items to work smoothly, easily and correctly.
- B. Clean exposed surfaces using non-abrasive materials and methods recommended by the manufacturer of the hardware being cleaned. Remove and replace work which cannot be successfully cleaned, as judged solely by the architect.
- C, Provide temporary protection to ensure work being done without damage or deterioration at time of final acceptance. Levers shall be kept covered with heavy cloth, and other hardware shall be protected against damage until substantial completion of the project. Remove protections and re-clean as necessary immediately prior to final acceptance.

### 3.5 COMPLETION AND CONTINUED MAINTENANCE

1. Before completion of work of this section, inspect work with architect and correct work to

leave operating parts in perfect operating condition, jointing to adjacent material tight, surfaces without blemishes or stains, work properly executed and complete, and defects and damaged work replaced or corrected.

### 3.6 DOOR HARDWARE SETS

A. Abbreviations used in hardware sets:

ACS – access control system	HDWE - hardware	X - by or with, in hardware listing
ELEC – electrically controlled	INT - interior	(2) - 2 items at pairs of doors
EMER – emergency	MTD - mounted	
EXIST – existing	OH- overhead	
EXT – exterior	PR - pair	
FR – fire-rated	SGL - single	

### B. HARDWARE SET DETAILS

1225-1 HW-00

ALL EXISTING HARDWARE TO REMAIN

1202-4

HW-01

(EXT OUTSWINGING SGL)

PROVIDE:

CONTINUOUS HINGE (HD) HOLD OPEN CLOSER (PUSH SIDE MTD) RIM PANIC DEVICE X CLASSROOM CYLINDER KICK PLATE OH STOP EXT THRESHOLD GASKETING AUTOMATIC DOOR BOTTOM

1224-1 (FR INSWINGING SGL) HW-02

PROVIDE:

SET OF BUTTS HOLD OPEN CLOSER (PULL SIDE MTD) MORTISE LOCKSET X STOREROOM CYLINDER STOP SILENCERS 1170-1, 1139-1HW-03(FR ACS OUTSWINGING EGRESS SGL)

SET OF BUTTS INT CLOSER (PUSH SIDE MTD) RIM PANIC DEVICE X PASSAGE ELECTRIC STRIKE KICK PLATE DOOR SWEEP STOP SILENCERS DOOR SECURITY BY OTHERS

1172, 1173	HW-04
(ED OUTOWINGING COL)	

(FR OUTSWINGING SGL)

PROVIDE:

**PROVIDE:** 

CONTINUOUS HINGE (HD) X 180 HOLD OPEN CLOSER ( PULL SIDE MTD) MORTISE LOCKSET X STOREROOM CYLINDER STOP SILENCERS

(FR INSWINGING SGL)

PROVIDE:

1179

SET OF BUTTS INT CLOSER (PULL SIDE MTD) MORTISE LOCKSET X CLASSROOM CYLINDER KICK PLATE STOP SILENCERS

1139-3 (OUTSWINGING SGL)

HW-06

HW-05

PROVIDE:

SET OF BUTTS ELECTRIFIED HOLD OPEN SURFCE CLOSER – LCN 4040SE X 120VAC (PUSH SIDE MTD) RIM PANIC DEVICE X CLASSROOM CYLINDER KICK PLATE STOP SILENCERS <u>1200-1, 1202-1, 1202-2</u> <u>1202-3,</u> (FR INSWINGING SGL)

PROVIDE:

SET OF BUTTS INT CLOSER (PUSH SIDE MTD) MORTISE LOCKSET X CLASSROOM CYLINDER KICK PLATE OH STOP SILENCERS

HW-07

NOT USED HW-08

<u>1160-1, 1160-2</u> HW-09 (FR INSWINGING SGL)

PROVIDE:

SET OF BUTTS INT CLOSER (PULL SIDE MTD) MORTISE LOCKSET X OFFICE CYLINDER KICK PLATE STOP SILENCERS

<u>1025-1,1026-1</u> (INSWINGNG SGL)

ALL HARDWARE BY ALUMINUM STOREFRONT MANUFACTURER, EXCEPT:

PROVIDE:

MORTISE LOCKSET X OFFICE CYLINDER

1025-2	<u>HW-11</u>
(OUTSWINGING SGL)	
PROVIDE:	SET OF BUTTS MORTISE LOCKSET X OFFICE CYLINDER KICK PLATE STOP SILENCERS
<u>2095-1</u>	<u>HW-12</u>
(FR ACS OUTSWINGING P PROVIDE:	<ul> <li>(2) SET OF BUTTS</li> <li>(2) HOLD-OPEN CLOSERS</li> <li>(2) V/R PANIC DEVICES 9827 X 996L-DT X LBR X LD</li> <li>(2) ELECTROMAGETIC LOCKS</li> <li>(2) DOOR SWEEPS</li> <li>SILENCERS</li> <li>DOOR SECURITY BY OTHERS</li> </ul>
2005 2	
2095-2 (WIRE-MESH SLIDING SG	<u>HW-13</u> L)
ALL HARDWARE MANUF	ACTURER STANDARD, EXCEPT
PROVIDE:	CYLINDER AND CORE TO MATCH SYSTEM
1170-2 (FR ACS OUTSWINGING E	HW-14 EGRESS SGL)
PROVIDE:	SET OF BUTTS INT CLOSER (PUSH SIDE MTD) RIM PANIC DEVICE X PASSAGE FUNCTION CYLINDER ELECTROMAGNETIC LOCK DOOR CONTACT KICK PLATE STOP SILENCERS SECURITY BY OTHERS

<u>1910-1</u>

HW-15

(EXT OUTSWINGING SGL)

PROVIDE:

SET OF BUTTS INT CLOSER (PULL SIDE MTD) MORTISE LOCKSET X CLASSROOM CYLINDER KICK PLATE STOP SILENCERS

END OF SECTION

### PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- 1. Glass for doors, interior borrowed lites, and glazed curtain walls.
- 2. Glazing sealants and accessories.

### 1.3 DEFINITIONS

- A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined inreferenced glazing publications.
- B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.
- C. IBC: International Building Code.
- D. Interspace: Space between lites of an insulating-glass unit.

### 1.4 COORDINATION

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge andface clearances, and adequate sealant thicknesses, with reasonable tolerances.
- 1.5 PREINSTALLATION MEETINGS
  - A. Preinstallation Conference: Conduct conference at Project site.
    - 1. Review and finalize construction schedule and verify availability of materials, Installer'spersonnel, equipment, and facilities needed to make progress and avoid delays.
    - 2. Review temporary protection requirements for glazing during and after installation.

### 1.6 SUBMITTALS

- A. Product Data: For each type of product.
- B. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches (300 mm) square.
- C. Glazing Accessory Samples: For sealants, in 12-inch (300-mm) lengths. Install sealant Samples between two strips of material representative in color of the adjoining framing system.

- D. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.
- E. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- 1.7 INFORMATIONAL SUBMITTALS
  - A. Refer to Section 01 30 00 SUBMITTALS.
  - B. Product Certificates: For glass.
  - C. Product Test Reports: For insulating glass and glazing sealants, for tests performed by a qualified testing agency.
    - 1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.
  - D. Preconstruction adhesion and compatibility test report.
  - E. Sample Warranties: For special warranties.

### 1.8 QUALITY ASSURANCE

- A. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved and certified by coatedglass manufacturer.
- B. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.
- C. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
- 1.9 PRECONSTRUCTION TESTING
  - A. Preconstruction Adhesion and Compatibility Testing: Test each glass product, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.
    - 1. Testing is not required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.
    - 1. Use ASTM C 1087 to determine whether priming and other specific jointpreparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.
    - 2. Test no fewer than eight Samples of each type of material, including joint substrates, shims, sealant backings, secondary seals, and miscellaneous materials.

- 3. Schedule enough time for testing and analyzing results to prevent delaying the Work.
- 4. For materials failing tests, submit sealant manufacturer's written instructions for corrective measures including the use of specially formulated primers.

# 1.10 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. Comply with insulating-glass manufacturer's written instructions for venting and sealing units toavoid hermetic seal ruptures due to altitude change.

# 1.11 FIELD CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and whenglazing channel substrates are wet from rain, frost, condensation, or other causes.
  - 1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below 40 deg F (4.4 deg C).

# 1.12 WARRANTY

- A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.
  - 1. Warranty Period: 10 years from date of Substantial Completion.
- B. Manufacturer's Special Warranty for Laminated Glass: Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated glass standard.
  - 1. Warranty Period: Five years from date of Substantial Completion.
- C. Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interiorsurfaces of glass.

1. Warranty Period: 10 years from date of Substantial Completion.

# PART 2 - PRODUCTS

# 2.1 MANUFACTURERS

- A. Subject to compliance with requirements, provide products by one of the following:
  - 1. Cardinal Glass Industries.
  - 2. Oldcastle Building Envelope.
  - 3. Pilkington North America Inc.
  - 4. Vitro Architectural Glass.
  - 5. Saint-Gobain Corporation.
  - 6. Viracon, Inc.
- B. Source Limitations for Glass: Obtain from single source from single manufacturer for eachglass type.
  - 1. Obtain tinted glass from single source from single manufacturer.
  - 2. Obtain reflective-coated glass from single source from single manufacturer.
- C. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

## 2.2 PERFORMANCE REQUIREMENTS

- A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets toremain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the IBC and ASTM E 1300.
  - 1. Design Wind Pressures: As indicated on Drawings.
  - 2. Design Wind Pressures: Determine design wind pressures applicable to Project according to ASCE/SEI 7, based on heights above grade indicated on Drawings.
    - a. Wind Design Data: As indicated on Drawings.
    - b. Basic Wind Speed: 110 mph (49 m/s).
  - 3. Maximum Lateral Deflection: For glass supported on all four edges, limit centerof-glass deflection at design wind pressure to not more than 1/50 times the shortside length or 1 inch (25 mm), whichever is less.
- C. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.
- D. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures

indicated below:

- 1. For monolithic-glass lites, properties are based on units with lites 6 mm thick].
- 2. For laminated-glass lites, properties are based on products of construction indicated.
- 3. For insulating-glass units, properties are based on units of thickness indicated for overallunit and for each lite.
- 4. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL'sWINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F (W/sq. m x K).
- 5. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
- 6. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

# 2.3 GLASS PRODUCTS, GENERAL

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.
  - 1. GANA Publications: "Laminated Glazing Reference Manual" and "Glazing Manual."
  - 2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," andAAMA TIR A7, "Sloped Glazing Guidelines."
  - 3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for SlopedGlazing."
  - 4. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American GlazingGuidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
- B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safetyglazing standard with which glass complies.
- C. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least onecomponent lite of units with appropriate certification label of IGCC.
- D. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies withperformance requirements and is not less than the thickness indicated.
  - 1. Minimum Glass Thickness for Exterior Lites: 6 mm.
- E. Strength: Where annealed float glass is indicated, provide annealed float glass, heatstrengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened float glass is indicated, provide heat- strengthened float glass or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where fully tempered float glass is indicated, provide fully tempered float glass.
- 2.4 GLASS PRODUCTS

- A. Clear Annealed Float Glass: ASTM C 1036, Type I, Class 1 (clear), Quality-Q3.
- B. Fully Tempered Float Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
  - 1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortionparallel to bottom edge of glass as installed unless otherwise indicated.
- C. Heat-Strengthened Float Glass: ASTM C 1048, Kind HS (heat strengthened), Type I, Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
  - 1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortionparallel to bottom edge of glass as installed unless otherwise indicated.

# 2.5 LAMINATED GLASS

- A. Laminated Glass: ASTM C 1172. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.
  - 1. Construction: Laminate glass with polyvinyl butyral interlayer to comply with interlayermanufacturer's written instructions.
  - 2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
  - 3. Interlayer Color: Clear unless otherwise indicated.

## 2.6 INSULATING GLASS

- A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by adehydrated interspace, qualified according to ASTM E 2190.
  - 1. Sealing System: Dual seal, with polyisobutylene and silicon primary and secondary sealants.
  - 2. Spacer: Thermally broken aluminum.
  - 3. Desiccant: Molecular sieve or silica gel, or a blend of both.

# 2.7 GLAZING SEALANTS

- A. General:
  - 1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
  - 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing attime of installation.

- 3. Field-applied sealants shall have a VOC content of not more than 250 g/L.
- 4. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
- B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Dow Corning Corporation; 790.
    - b. GE Advanced Materials Silicones; SilPruf LM SCS2700.
    - c. Sika Corporation U.S.; Sikasil WS-290.
    - d. Tremco Incorporated; Spectrem 1.
- C. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 50, Use NT.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Dow Corning Corporation; 791.
    - b. GE Advanced Materials Silicones; Contractors N SCS1800.
    - c. Sika Corporation U.S.; Sikasil WS-295.
    - d. Tremco Incorporated; Spectrem 2.

### 2.8 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
  - 1. AAMA 804.3 tape, where indicated.
  - 2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
  - 3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuouspressure.
- B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
  - 1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
  - 2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

### 2.9 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, with requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in

installation.

- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

# 2.10 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
  - 1. Allow for thermal movements from ambient and surface temperature changes acting onglass framing members and glazing components.
    - a. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.
- C. Grind smooth and polish exposed glass edges and corners.

## PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
  - 1. Manufacturing and installation tolerances, including those for size, squareness, andoffsets at corners.
  - 2. Presence and functioning of weep systems.
  - 3. Minimum required face and edge clearances.
  - 4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing.Remove coatings not firmly bonded to substrates.
- B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visiblemarks in the completed Work.

# 3.3 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, orimpair appearance.
- C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- F. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).
  - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearancesand to comply with system performance requirements.
  - 2. Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.
- J. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints withsealant recommended by gasket manufacturer.
### 3.4 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until right before each glazing unit is installed.
- F. Apply heel bead of elastomeric sealant.
- G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops.Start gasket applications at corners and work toward centers of openings.
- H. Apply cap bead of elastomeric sealant over exposed edge of tape.

# 3.5 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure- glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints withsealant recommended by gasket manufacturer.
- E. Install gaskets so they protrude past face of glazing stops.
- 3.6 SEALANT GLAZING (WET)
  - A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from

extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

# 3.7 MIRROR INSTALLATION

- A. General: Install mirrors to comply with mirror manufacturer's written instructions and with referenced GANA publications. Mount mirrors accurately in place in a manner that avoids distorting reflected images.
  - 1. GANA Publications: "Glazing Manual" and "Mirrors, Handle with Extreme Care: Tips for the Professional on the Care and Handling of Mirrors."
- B. Provide a minimum airspace of 1/8 inch (3 mm) between back of mirrors and mounting surface for air circulation between back of mirrors and face of mounting surface.
- C. Install mirrors with mastic and mirror hardware. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed with anchors or inserts as applicable. Install fasteners so heads do not impose point loads on backs of mirrors.
  - 1. Aluminum J-Channels: Provide setting blocks 1/8 inch (3 mm) thick by 4 inches (100 mm) long at quarter points. To prevent trapping water, provide, between setting blocks, two slotted weeps not less than 1/4 inch (6.4 mm) wide by 3/8 inch (9.5 mm) long at bottom channel.
  - 2. Install mastic as follows:
    - a. Apply barrier coat to mirror backing where approved in writing by manufacturers of mirrors and backing material.
    - b. Apply mastic to comply with mastic manufacturer's written instructions for coverage and to allow air circulation between back of mirrors and face of mounting surface.
    - c. After mastic is applied, align mirrors and press into place while maintaining a minimum airspace of 1/8 inch (3 mm) between back of mirrors and mounting surface.

# 3.8 CLEANING AND PROTECTION

- A. Immediately after installation remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry

surfaces at frequent intervals during construction, but not less than once a month, for buildup ofdirt, scum, alkaline deposits, or stains.

- 1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.
- C. Remove and replace glass that is damaged during construction period.
- D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended inwriting by glass manufacturer.

# 3.9 LAMINATED GLASS SCHEDULE

- A. Clear laminated glass with two plies of annealed float glass.
  - 1. Minimum Thickness of Each Glass Ply: As indicated.
  - 2. Interlayer Thickness: 0.030 inch (0.76 mm).
  - 3. Safety glazing required.

# 3.10 GLASS SCHEDULE

- A. Glass Type GL-1: Low-E-coated, Tinted insulating glass.
  - 1. Overall Unit Thickness: 1 inch (25 mm).
  - 2. Minimum Thickness of Each Glass Lite: 6 mm.
  - 3. Outdoor Lite: Annealed or Fully tempered glass as indicated.
  - 4. Interspace Content: Air.
  - 5. Indoor Lite: Annealed or Fully tempered glass as indicated.
  - 6. Low-E Coating: Pyrolytic on second surface.
  - 7. Winter Nighttime U-Factor: .45 maximum.
  - 8. Summer Daytime U-Factor: .45 maximum.
  - 9. Solar Heat Gain Coefficient: .40 maximum.
  - 10. Tint: Grey
  - 11. Shading Coefficient: 0.45 minimum.
- B. Glass Type GL-2: Same as GL-1, except with Bird Glass.
- C. Glass Type GL-3: <sup>1</sup>/<sub>2</sub> in. tempered.
- D. Glass Type GL-4: <sup>1</sup>/<sub>4</sub> in. laminated.
- E. Glass Type 5: <sup>1</sup>/<sub>2</sub> in. mirrors.

# END OF SECTION

### SECTION 09 29 00 - GYPSUM BOARD ASSEMBLIES

#### PART 1 GENERAL

### 1.1 WORK INCLUDED

- A. Furnish and install gypsum drywall work, as indicated on the Drawings and as specified. Include, but do not limit to:
  - 1. Steel suspension systems for ceilings and soffits.
  - 2. Screwable steel stud interior partition framing.
  - 3. Screwable steel stud framed and furred enclosures at columns and beams.
  - 4. Blockings and attachments for fixture supports.
  - 5. Gypsum wallboard finishes.
  - 6. Cementitious backer board.
  - 7. Acoustical sealing and acoustical insulation of gypsum wallboard finishes at steel studframed partitions and furrings where indicated.
  - 8. Adhered acoustic panels.
  - 9. Other gypsum drywall work called for on the Drawings or reasonably required tocomplete the Project intent.

#### 1.2 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 notlimited to:
  - 1. Section 081113, HOLLOW METAL DOORS AND FRAMES; Access doors.
  - 2. Section 099100, PAINTING; Painting.

### 1.3 REFERENCES

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
  - 1. American Society for Testing and Materials (ASTM):

A 653	Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
C 475	Joint Treatment Materials for Gypsum WallboardConstruction
C 645	Non-Load (Axial) Bearing Steel Studs, Runners(Track), and Rigid Furring Channels for Screw

C 754	Installation of Steel Framing Members to Receive Screw-Attached Gypsum Wallboard, Backing Board, or Water-Resistant Backing Board
C 840	Application and Finishing of Gypsum Board
C 919	Sealants in Acoustical Applications
C 1002	Steel Drill Screws for the Application of Gypsum Board
C 1396	Gypsum Board
E 90	Measurement of Airborne-Sound Transmission Loss of Building Partitions

# 1.4 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. Confirm on shop drawings that deflection will not exceed limitations specified.
- B. Product Data: Submit manufacturer's product data and installation instructions.
- C. Refer to Section 01 30 00 SUBMITALS

# 1.6 QUALITY ASSURANCE

- A. Reference Standards: Conform to governing laws, building code and manufacturer'sprinted standards.
- B. Structural Performance: Limit deflection to L/270 for all work except as follows:
  - 1. Limit deflection on walls to receive ceramic tile to L/360.
- C. Sound Transmission Performance: Provide shaft wall assemblies with minimum STC ratings as indicated on Drawings. Provide drywall partitions with minimum STC ratings indicated on Drawings tested in conformance with ASTM E 90.
- D. Fire Resistance Ratings: Where indicated provide materials and assemblies identical to those tested and rated by testing and inspecting organization acceptable to authorities that have jurisdiction

# 1.7 COORDINATION

A. Work of this Section shall be coordinated with the work of other Sections to assure the steady progress of all the work of the Contract. Obtain complete information regarding wall and ceiling mounted fixtures, grilles, registers, equipment, accessories, etc. to be used on the work from other trades. In no case shall work of other Sections be concealed until ithas been inspected.

### 1.8 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.
- C. Handle gypsum boards to prevent damage to edges, ends, or surfaces. Protect metal corner beads, casing beads, and trim from being bent or damaged.

# PART 2 PRODUCTS

- 2.1 MATERIALS, GENERAL
  - A. Compatibility: Provide acoustical joint sealants, adhesives, and other related materials that are compatible with one another and with substrates under conditions of service and application, as demonstrated by manufacturer, based on testing and field experience.
  - B. VOC Content of Interior Sealants: Provide interior acoustical sealants and sealant primers that comply with the following limits for VOC content when calculated according to40 CFR 59, Subpart D (EPA Method 24):
    - 1. Sealants: 250 g/L.
    - 2. Sealant Primers for Nonporous Substrates: 250 g/L.
    - 3. Sealant Primers for Porous Substrates: 775 g/L.
  - C. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
  - D. Recycled Content of Gypsum Panel Products: Postconsumer recycled content plus one-halfof preconsumer recycled content not less than 30 percent.

# 2.2 MANUFACTURERS

- A. Metal Framing and Suspension Systems: Provide materials, products, and systems from one of the following manufacturers that meet or exceed specified requirements:
  - 1. ClarkDietrich.
  - 2. MarinoWare; Division of Ware Ind.
  - 3. National Gypsum Company.
  - 4. Scafco Corporation.
- B. Gypsum Boards and Related Products: Provide materials, products, and systems from one of the following manufacturers that meet or exceed specified requirements:
  - 1. American Gypsum Co.
  - 2. G-P Gypsum Corp.
  - 3. Lafarge North America Inc.

- 4. National Gypsum Company.
- 5. United States Gypsum Co.

# 2.3 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 653, 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 minimum3/16 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.
- 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.

# 2.4 METAL FRAMING SYSTEMS FOR WALLS AND PARTITIONS

Unless otherwise indicated, steel stud system for walls and partitions shall be a complete proprietary framing system consisting of prefabricated, non-load bearing, screwable 20 ga. steel studs, steel track, anchors, and related items, conforming to ASTM C 645. Provide all metal runners, hangers, studs, and channels hot-dip

galvanized conforming to ASTM A 653, G60, unless noted otherwise.

- 1. Special system at gypsum shaft-wall construction shall be as above, except with "C-H" Type galvanized steel studs, or equivalent.
- 2. Provide minimum 20 gage steel studs at jambs of door and fixed glass frames, at open partition ends, and where the partition is to receive wall-mounted shelves, heavyfixtures, etc.; except as follows:
  - a. Locations to Receive Sheet Metal Blocking: At locations indicated to receive sheetmetal blocking, provide 18-gauge galvanized steel studs.
- 3. Sheet Metal Blocking: At locations indicated to receive sheet metal blocking, provide 18-gauge sheet steel, conforming with ASTM A 653/A 653M, G90 (Z275) coating, either commercial steel or forming steel.
- B. Screwable Steel Wall Furring Channels: 20 ga. hot-dip galvanized, screwable, pressed steel furring channels, 7/8 in. thick, hat section.
- C. Slip-Type Head Joints: Where indicated, provide one of the following:
  - 1. Single Long-Leg Runner System: ASTM C 645 top runner with 2-inch- (50.8-mm-) deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top runner and with continuous bridging located within 12 inches (305 mm) of the top of studs to provide lateral bracing.
  - 2. Double-Runner System: ASTM C 645 top runners, inside runner with 2-inch-(50.8- mm-) deep flanges in thickness not less than indicated for studs and fastened to studs, and outer runner sized to friction fit inside runner.
  - 3. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
    - a. Available Products: Subject to compliance with requirements, products that maybe incorporated into the Work include, but are not limited to, the following:
      - 1) Steel Network Inc. (The); VertiClip SLD or VertiTrack VTD Series.
      - 2) Clark Dietrich Building Systems; MaxTrak Slotted Deflection Track.
- D. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Fire Trak Corp.; Fire Trak attached to studs with Fire Trak Slip Clip.
    - b. Metal-Lite, Inc.; The System.

indicated.

1. Minimum Base-Metal Thickness: 0.027 inch (0.7 mm).

# 2.5 GYPSUM BOARDS

- A. Gypsum Wallboard: Indicated thickness(es) by 48 in. width by lengths as required, tapered edge, paper finish, conforming to ASTM C 1396. Where used in all assemblies, provide Type X fire resistant type.
- B. Moisture and Mold-Resistant Type X: With moisture and mold-resistant core and surfaces. 1. Complying with ASTM C 1396/C1396M as applicable to type of gypsum board indicated. a. Core: 5/8 inch (15.9 mm). b. Long Edges: Tapered. c. Performance: Rating of 10 per ASTM D3273. d. Acceptable Product: M-Bloc Type X with Mold and Moisture Resistance.
- C. Abuse-Resistant Gypsum Wallboard: ASTM C 1396, manufactured to produce greater resistance to surface indentation and through-penetration than standard gypsum panels.
  - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
    - a. National Gypsum Company; Gold Bond Hi-Abuse Wallboard.
    - b. United States Gypsum Co.; Fiberock Brand Abuse-Resistant Gypsum Panels.
  - 2. Core: 5/8 inch (15.9 mm), Type X.
  - 3. Long Edges: Tapered.
- D. High Strength Sag-Resistant Gypsum Ceiling Board: ASTM C 1396, manufactured to have more sag resistance than regular-type gypsum board.
  - 1. Thickness: 1/2 inch (12.7 mm).
  - 2. Long Edges: Tapered.
- E. Cementitious Backerboard for ceramic tile and for direct-applied finish system shall be "Durock" tile backerboard manufactured by United States Gypsum, Chicago, IL 60606; or approved equal.
  - 1. Backer board shall be constructed of a concrete core with fiber glass mesh reinforcement and high-density Portland cement surface.
  - 2. Thickness of board shall be as indicated on the Drawings.
- F. Joint Treatment Materials: Joint treatment materials shall conform to ASTM C 475.
  - 1. Laminating Adhesive and Joint Finishing Compound: As recommended by gypsum wallboard manufacturer, interior type for interior general use, exterior type for use at water resistant gypsum backer board.
  - 2. Joint Tape: 2 in. to 2-1/2 in. wide paper tape, as recommended by gypsum wallboardmanufacturer.

#### 2.6 FASTENERS

- A. Screws for Attachment of Gypsum Wallboard to Steel Framing and Furring Members: Self-drilling, Type S, bugle head screws, conforming to ASTM C 1002, with bugle-type Phillips-head, appropriate size and length in each case as recommended by manufacturer.
- B. Screws for Attachment of Gypsum Wallboard to Wood Blocking: Self-drilling Type W screws conforming to ASTM C 1002, with bugle-type Phillips-head. Screw length and size in each case shall be as recommended by gypsum wallboard manufacturer.
- C. Screws for Attachment of Steel Framing and Furring Members to Other Steel Members: Self-drilling, Type S, pan head screws, conforming to ASTM C 1002, appropriate size and length in each case as recommended by manufacturer.

### 2.7 METAL TRIM AND ACCESSORIES

- A. General: Provide metal trim and accessories conforming to ASTM C 840.
- B. Control Joint: Galvanized steel, "Vee" type, with perforated flanges, for compound finishing.
- C. Corner Bead: 1 in. by 1 in. perforated flange, standard type, Galvanized steel, for compound finishing.
- D. Metal Trim: Galvanized steel, with perforated flanges, for compound finishing.
- E. Preformed reveals and corners for gypsum wallboard partitions shall be equal to Softforms Commercial Grade Standard Extrusions, manufactured by Softforms Division, Pittcon Industries, Inc., or approved equal. Shapes shall be extruded 6063-T5 aluminum alloy 1/8 in. thick, minimum (profile areas). Shapes shall be primed; plaster and paints shall be capable of bonding to primed surface. Fire rating shall be Class A. Provide all required shapes and radii indicated or required to complete the work.
- F. Acoustical Blanket/Batt Insulation: Indicated thicknesses by 16-1/8 in. and 24-1/8 in. wide, as appropriate, equal to "Sound Attenuation Batt Insulation", manufactured by Owens- Corning Fiberglas Corp., or approved equal.
- G. Packing Wool Insulation: Fiberglas or mineral wool packing insulation, equal to products manufactured by U.S. Gypsum Co. or Owens- Corning Fiberglas Corp.
- H. Fire Safing Insulation: Mineral fiber fire-rated fire safing insulation in conformance with the governing laws and building code, manufactured by U.S. Gypsum Co. or approved equal.
- I. Acoustical Sealant for Concealed Applications: Provide "BA-98 Acoustical Sealant", manufactured by Pecora Chemical Corp., equivalent product manufactured by U.S. Gypsum Co., National Gypsum Co., or approved equal.

Latex Caulk", manufactured by Pecora Chemical Corp., equivalent product manufactured by DAPor Gibson Homans Co., or approved equal.

- K. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
  - 1. Use adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

# PART 3 EXECUTION

### 3.1 INSPECTION AND COORDINATION

- A. Inspect job conditions and related work and report to Architect 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 receivework of this Section.
- B. Change and adjust work of this Section to accommodate work of other Sections, providing cutting and patching until it has been inspected.

### 3.2 GENERAL REQUIREMENTS

- A. Provide work conforming to published specifications and installation instructions of each manufacturer, the approved shop drawings, above-referenced quality assurance standards, the governing laws and code. 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). Also refer to the Drawings to determine the number of layers of gypsum board, thickness of board, etc., for each of the installations.
- B. Erect gypsum drywall work, rigidly supported, and securely fastened in place, in such a manner that plumb, level, and true finished lines and surfaces will result in the finished work in accordance with the requirements of ASTM C 754 and ASTM C 840.
- C. Construct gypsum drywall work only after all windows and door openings are enclosed and a temperature of not less than 55°F. is maintained during and up to completion of the drywall work.

### 3.3 STEEL CEILING FRAMING AND FURRING

- A. Suspended Ceilings: Install complete suspended steel ceiling framing system in accordancewith 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.

### 3.4 STEEL WALL FRAMING AND FURRING

- A. Screwable Steel Stud Partitions: Install complete stud partition system in conformance to ASTM C 754.
- B. Installation of Partition Track: Align standard steel track at floors and ceiling construction according to partition layouts and secure with suitable fasteners to the floor and ceiling construction at a spacing not to exceed 24 in. o.c. Carry all walls and partitions full height above suspended ceilings to underside of floor and roof decks above except where otherwise specifically called for on Drawings.
  - 1. Fill voids above track, such as steel deck flutes, solidly with packing wool or fiberglassinsulation at non-fire rated partitions. Fill voids in flutes of steel deck with mineral wool fire-safing insulation at fire rated partitions for smoke and firestopping purposes to assure the rated performance at fire-rated assemblies.
  - 2. Where partitions run parallel to flutes either install the top track directly to the bottom flange of the deck or install a continuous inverted steel stud, the same depth as the flutes, in the flute and install the top track directly under, and in contact with, the stud, all as required to provide a positive means of attachment.
  - 3. Where acoustical partitions (those to receive acoustical insulation) and fire-rated partitions run parallel to flutes of deck, install top track in continuous bed of acoustical or thermal sealant formed by applying a 1/4 in. minimum bead of sealant to the rear of the track and pressing into place. At fire-rated partitions also install tightly packed fire- safing insulation in the flutes for smoke and firestopping purposes to achieve effective closure and to assure the rated performance of the fire-rated assemblies.
- C. Installation of Steel Studs: Provide one-piece steel studs without splices installed at spacing not to exceed 16 in. o.c. (or other spacing indicated) and located at abutting construction and at the internal apex of corners. Provide additional studs at corner conditions, frame jambs, etc., as called for on the Drawings and specified herein.
- D. Position steel studs vertically engaging both floor and top runners. Anchor studs located adjacent to door and fixed glass frames, partition intersections, corners, and open partition ends, to the floor and ceiling runner flanges by positive screw engagement with 3/8 in.Type S pan head screws or by locking the studs with metal lock fasteners and to the ceiling runner flanges by screw engagement. Allow for relief of 1/2 in. roof or ceiling deflection attops of all partitions by screwing through slotted holes.
- E. Install double stud at door and fixed glass frame jambs and securely attach to the frame anchors with at least two screws per anchor. Over steel door and fixed glass

frames, install steel track header and install studs above, with back-to-back pair, centered over the door to secure control joints. Run continuous length of cold-rolled steel channel through the stud cores, overlapping at least one stud beyond jamb studs at each end. Frame out for recessed cabinets, accessories, grilles, etc., as recommended by the manufacturer for each of the project conditions.

- F. Steel Stud Chase Walls: Construct partitions on both sides of non-fire rated chase walls in same manner as other partitions, with studs in direct alignment across the chase. Bracewith three gypsum wallboard gussets, per pair of studs, across the chase, located at quarter points, and screwed to the studs. Comply with manufacturer's published details.
- G. Steel Furring: Install screwable steel furring channels over faces of concrete or masonry walls to receive gypsum wallboard finishes, continuously along tops and bottoms of walls and in continuous vertical rows spaced 16 in. o.c. Securely anchor at maximum spacing of 16 in. o.c. along full length of each furring member, through alternate flanges.
- H. Metal Access Panels: Install all metal access panels at partitions, furrings, and suspended ceilings. Access panels will be furnished to this trade loose under other Section(s).
- I. Fixture Attachments: Before any wallboard is installed, a complete survey of all fixtures, accessories, cabinet work, shelves, rail brackets, door stops, or other items to be attached tothe finished work of this Section shall be made and wood or steel sheet blocking or other attachments shall be installed within the steel framing and furring work to receive the loads. Blockings or other attachments for the various loads shall be as recommended by the manufacturer and shall be described on the shop drawings. All such fixture attachments shall be observed by the Architect before commencing installation of wallboard. All such blockings and attachments shall be provided as work of this Section.
  - 1. At locations indicated, install sheet metal blocking to face of studs using sheet metal screws.
- J. Miscellaneous Framing and Furring: Construct all special miscellaneous screwable steel stud framing and furring, such as at ceiling edgings, soffits, column and beam enclosures, skylight wells, etc., as detailed and as required to achieve the shapes and profiles indicated and other miscellaneous framing indicated and/or reasonably required for the thorough completion of the Project.
  - 1. Thoroughly fasten together, anchor, and brace to provide absolutely rigid structural conditions fully capable of supporting the loads to be applied with factor of safety not less than 2-1/2 to 1. Carry out the work generally as detailed, strictly following instructions of the manufacturer for steel and stud structural framing use. Screw all connections with self-tapping metal screws or other appropriate fasteners and provide all additional reinforcement required to assure the required performance.

### 3.5 GYPSUM WALLBOARD APPLICATION

C 840.

- B. Apply thicknesses and layers of gypsum wallboard at ceilings, walls, partitions, column andbeam enclosures as indicated. Stagger joints in each layer. Locate joints in first layer on opposite sides of partitions to occur on different studs. Apply wallboard at ceilings with long dimension perpendicular to furring channels, with each end occurring over a framing member. Install wallboard at walls and partitions with long dimension vertical, and with each end and edge lying over a framing member.
  - 1. At double layer installations apply second layer by combination of laminating adhesive and mechanical fastenings (through first layer into the steel framing and/or furring member behind), in strict accordance with manufacturer's printed recommendations for

each project condition.

- C. Carry gypsum wallboard, each side, continuously from floor to underside of deck construction above, including above suspended ceilings, for acoustical and fire-resistive performances. Where installing perpendicular to steel joists, fit carefully to, and around, steel joist chords to provide positive, fire-safe barrier.
- D. To minimize end joints, use maximum practical lengths. Bring gypsum wallboard panels into contact, but do not force into place. Fit abutting ends and edges neatly. Provide slots for sealant at top, bottom, ends, and corners of wallboard at all walls and partitions indicated to receive acoustical insulation, as indicated. Also provide slots for sealant where wallboard abuts other finish materials, as specified hereinbelow.
- E. Spacing and installation of drywall screws for the various applications and fire-rating requirements shall conform to the printed standards of the manufacturer.
- F. Set heads of fasteners flush with surface of the paper, but not breaking the paper. Where attached loosely to a framing or furring member, a second fastener shall be installed within 1-1/2 in.
- G. Cut gypsum wallboard neatly at corners, edges, etc., and for pipes, electrical outlets, electrical conduit and raceway, recessed cabinets, and other projections.
- H. Install wallboard cants over tops of beam enclosures in elevator hoistway as indicated, securely anchored into place.

# 3.6 CEMENTITIOUS BACKER BOARD INSTALLATION

- A. Installation of cementitious backerboard shall conform to ASTM C 840 and as recommended by cementitious backerboard manufacturer.
- 3.7 ACOUSTICAL INSULATION
  - A. Walls and partitions indicated on the Drawings with STC Rating or indicated to receive acoustical insulation shall have a single, continuous layer of insulation

installed as indicated and specified, filling the entire open space between the framing members. Carry insulation behind backs of all electric boxes and similar appurtenances. Provide mechanical attachment to prevent future settlement.

B. Refer to descriptions of shaft wall and furred wall construction, above, for further description of insulation work.

### 3.8 INSTALLATION OF WALLBOARD ACCESSORIES

- A. Install accessories at gypsum wallboard installations, as follows, in strict accordance with manufacturer's instructions.
  - 1. Install joint reinforcement tape at all joints, and at all internal corners where abuttingsurfaces are both gypsum wallboard construction.
  - 2. Install corner beads at all external wallboard corners.
  - 3. Install casing bead wherever finish wallboard abuts dissimilar materials and otherplaces where specifically called for on the Drawings.
  - 4. Install control joints generally over (and under) centers of all major wall openings (those greater than 40% of wall height, measured floor to ceiling), 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. Specific locations of control joints shall be as indicated or as directed by Architect; submit proposed locations of control joints to Architect for approval before beginning work.
  - 5. Install preformed reveals corners where indicated in accordance with the manufacturer's recommendations.

# 3.9 JOINT FINISHING

- A. Finish all corners, joints, and edges of gypsum wallboard and gypsum soffit board work, and all corner beads, casing beads, control joints and other trim to provide complete finishing of all exposed wallboard surfaces, in strict accordance with manufacturer's printed instructions and ASTM C 840. Finish to absolutely flush, true surface showing no irregularity when tested by light source parallel to the plane of the nominal wallboard face.
  - 1. Finish wallboard to receive ceramic tile and other adhesive-applied finishes in similar manner.
- B. Finish all concealed joints in wallboard above ceiling finishes flush with tape and a minimum of two coats of compound to provide a continuous, uninterrupted plane for acoustical and fire-resistive performance. Concealed joints may be left in rough condition without finish sanding.
- C. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

- D. Prefill open joints, rounded or beveled edges, and damaged surface areas.
- E. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.
- F. Gypsum Board Finish Levels: Finish panels to levels indicated below, according to ASTM C 840, for locations indicated:
  - 1. Level 1 in Ceiling Plenums and Concealed Areas and At Acoustical Plaster: Embed tape at joints in ceiling plenum areas, concealed areas, and where indicated, unless a higher level of finish is required for fire-resistance-rated assemblies and sound-rated assemblies.
  - 2. Level 2 where Panels are Substrate for Tiles: Embed tape and apply separate first coat of joint compound to tape, fasteners, and trim flanges where panels are substrate for tileand where indicated panels are substrate for acoustical panels.
  - 3. Level 4 for Panels to Receive Flat Paints: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges at surfaces receiving flat paints.
  - 4. Level 5 for Panels Scheduled to Satin, Eggshell and Semigloss Paints and Surfaces subject to Severe Lighting, where scheduled: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges, and apply skim coat of joint compound over entire surface scheduled to receive gloss and semigloss enamels and surfaces subject to severe lighting.

# 3.10 ACOUSTICAL SEALING

- A. Walls and partitions designated on the Drawings with an STC Rating and/or indicated to receive acoustical or thermal insulation, including interior faces of exterior steel framed curtain walls, do all sealing work required, as indicated on the Drawing and generally as listed below.
  - 1. Seal all joints between the gypsum wallboard and surrounding construction.
  - 2. Seal full perimeters of all frames, sleeves, ducts, and other items set into, or passingthrough, gypsum wallboard construction.
  - 3. Seal full perimeters of all projections through the gypsum wallboard construction, such as pipes, conduits, etc.
  - 4. Seal all control joints in the gypsum wallboard work.
  - 5. Seal all joints between gypsum wallboard and adjoining gypsum wallboard panels atcorners and intersections.
  - 6. Seal all joints between gypsum wallboard and adjoining door and window frames inexterior walls.
  - 7. Do all other sealing called for on the Drawings or reasonably required to produce maximum thermal and sound transmission reduction through the walls and partitions.
- B. Seal joints in partitions continuing above suspended ceilings, in similar manner, for acoustical purposes.
- C. Sealing shall be done using sealant of type specified hereinbefore, in strict accordance with manufacturer's printed instructions and applicable requirements of

ASTM C 919. Sealant shall thoroughly fill void for a complete sound and thermal seal, and shall be tooled to dense, smooth, concave finish.

- 1. Except as may be otherwise specifically called for on the Drawings, in two-layer wallboard work seal only the outer layer.
- 2. Penetrations of Partitions: Duct and pipe penetrations of partitions are similar to one another. The gypsum board shall be held back around the penetrating element by the width of a nominal caulk joint. The gap shall be packed with acoustical batt insulation and then sealed with acoustical sealant to form an airtight seal.
- 3. Heads of partitions shall have a bead of sealant if the underside of the structure is uniform and straight like for a flat slab. If the underside of the structure is complex, like a fluted steel deck, run the main gypsum board sheet to the underside of the deck and then apply a narrow strip of gypsum board (perhaps 8 in. to 10 in. wide) that has been precut to the form of the deck (castle cut). Then the joint between the gypsum board and the deck shall be caulked airtight.

### 3.11 PROTECTION AND CLEANING

- A. Protect the work of other Sections and work of this Section already installed against soiling and damage by the exercise of reasonable care and precautions. Repair or replace any workso damaged or soiled.
  - 1. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
  - 2. Provide summary documentation for stored materials indicating the following:
    - a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
    - b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
    - c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.

# END OF SECTION

### SECTION 09 51 13 - ACOUSTICAL PANEL CEILINGS

### PART 1 GENERAL

### 1.1 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.

### 1.2 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 notlimited to:
  - 1. Section 092900, GYPSUM BOARD ASSEMBLIES; Gypsum drywall ceilings.
  - 2. Division 21 FIRE SUPPRESSION; 23, HVAC and Division 26, ELECTRICAL; Mechanical and electrical fixtures and appurtenances at acoustical ceilings, including independent suspension.

### 1.3 REFERENCES

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
  - 1. American Society for Testing and Materials (ASTM):

A 641	Zinc-Coated (Galvanized) Carbon Steel Wire
C 423	Sound Absorption and Sound AbsorptionCoefficients by the Reverberation Ram Method
C 635	Metal Suspension Systems for Acoustical Tile andLay-In Panel Ceilings
C 636	Installation of Metal Ceiling Suspension Systemsfor Acoustical Tile and Lay-In Panels
E 84	Surface Burning Characteristics of BuildingMaterials
E 119	Fire Tests of Building Construction and Materials
E 580	Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Seismic Restraint

E 1264 Standard Classification for Acoustical Ceiling Products

2. Ceilings and Interior Systems Contractors Association (CISCA): Ceiling Systems Handbook.

# 1.4 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, andfinishes 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 and tiles. Provide minimum 12 in. long samples of exposed suspension systems.
- D. Test Reports: Submit certified reports for tests required.
- E. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
  - 1. Suspended ceiling components.
  - 2. Structural members to which suspension systems will be attached.
  - 3. Size and location of initial access modules for acoustical panels.
  - 4. Items penetrating finished ceiling including the following:
    - a. Lighting fixtures.
    - b. Air outlets and inlets.
    - c. Speakers.
    - d. Sprinklers.
    - e. Access panels.
  - 5. Perimeter moldings.
- F. Refer to Section 01 30 00 SUBMITALS

# 1.5 QUALITY ASSURANCE

- A. Comply with governing laws and building codes as well as to CISCA Handbook and 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.

# 1.6 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 and authorities having jurisdiction.
- B. Burning Characteristics: Provide materials whose surface burning characteristics, when tested in compliance with ASTM E 84 are Class A.

# 1.7 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.

### 1.8 PROJECT CONDITIONS, SEQUENCING AND SCHEDULING

- A. Environment: Perform work only when temperature and humidity conditions are within thelimits 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 tiles or 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 tile or panel.

# 1.9 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 tile and panel.
  - 2. Each type of suspension system component.

# 2.1 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Flame-Spread Index: Comply with ASTM E 1264 for Class A materials.
  - 2. Smoke-Developed Index: 50 or less.

# 2.2 ACOUSTICAL PANELS, GENERAL

- A. Source Limitations:
  - 1. Acoustical Ceiling Panel: Obtain each type from single source from single manufacturer.
  - 2. Suspension System: Obtain each type from single source from single manufacturer.
- B. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- C. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances unless otherwise indicated.
  - 1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches (400 mm) away from test surface according toASTM E 795.
- D. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.
  - 1. Where appearance characteristics of acoustical panels are indicated by referencing pattern designations in ASTM E 1264 and not manufacturers' proprietary product designations, provide products selected by Architect from each manufacturer's full range that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.

# 2.3 ACOUSTICAL PANELS

- A. Basis-of-Design Manufacturer: Subject to compliance with requirements, provide products by Armstrong World Industries, or approved equal from one of the following:
  - 1. Armstrong World Industries, Inc.
  - 2. CertainTeed Corp.
  - 3. USG Interiors, Inc.; Subsidiary of USG Corporation.
- B. Product: Subject to compliance with requirements, provide products specified below, or approved equal product by one of other manufacturers listed above:

1. <u>Type ACT-1</u>: Refer to the Finish Schedule for acoustical ceiling material and sizes.

# 2.4 METAL SUSPENSION SYSTEMS, GENERAL

- A. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Metal Suspension-System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635/C 635M.
  - 1. High-Humidity Finish: Comply with ASTM C 635/C 635M requirements for "Coating Classification for Severe Environment Performance" where high-humidity finishes are indicated.
- C. Attachment Devices: Size for five times the design load indicated in ASTM C 635/C 635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
- D. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
  - 1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
  - Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635/C 635M, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.135-inch- (3.5-mm-) diameter wire.
- E. Hanger Rods or Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.
- F. Angle Hangers: Angles with legs not less than 7/8 inch (22 mm) wide; formed with 0.04- inch- (1-mm-) thick, galvanized-steel sheet complying with ASTM A 653/A 653M, G90 (Z275) coating designation; with bolted connections and 5/16-inch- (8-mm-) diameterbolts.
- G. Seismic Stabilizer Bars: Manufacturer's standard perimeter stabilizers designed to accommodate seismic forces.
- H. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces.
- I. Hold-Down Clips: Where indicated, provide manufacturer's standard hold-down clips spaced 24 inches (610 mm) o.c. on all cross tees.

# 2.5 METAL SUSPENSION SYSTEM

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product specified, or comparable product by one of the following:
  - 1. Armstrong World Industries, Inc.
  - 2. CertainTeed Corp.
  - 3. Chicago Metallic Corporation.

- 4. USG Interiors, Inc.; Subsidiary of USG Corporation.
- 5. Ceilings Plus.
- B. Product: Provide suspension system as scheduled on the Finish Schedule. Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, not less than G30 (Z90) coating designation; with prefinished 9/16-inch- (15-mm-) wide metal caps on flanges.
  - 1. Structural Classification: Intermediate-duty system.
  - 2. End Condition of Cross Runners: Override (stepped) or butt-edge type.
  - 3. Face Design: 9/16 in. wide.
  - 4. Face Finish: Painted white.
  - 5. Reveal Finish: Painted white.

### 2.6 ACOUSTICAL SEALANT

- A. Acoustical Sealant: Manufacturer's standard sealant complying with ASTM C 834 and effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
  - 1. Exposed and Concealed Joints: Nonsag, paintable, nonstaining latex sealant.
  - 2. Concealed Joints: Nondrying, nonhardening, nonskinning, nonstaining, gunnable,synthetic-rubber sealant.
  - 3. Acoustical sealant shall [have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

# PART 3 EXECUTION

### 3.1 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.
- 3.2 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<sup>o</sup>F. shall be maintained before, during, and after the installation f 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.

# 3.3 INSTALLATION OF SUSPENDED EXPOSED "TEE" LAY-IN PANEL SYSTEM

- A. Install exposed "Tee" suspension system where indicated, in accordance with ASTM C636.
- 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. x 2 ft. grid as indicated. Install wall mouldings 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 mouldings 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.

# 3.4 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 workso damaged or soiled.

# END OF SECTION

#### SECTION 09 65 00 - RESILIENT FLOOR TILE

### PART 1 GENERAL

#### 1.1 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. Vinyl composition tile.
  - 2. Mastics and leveling compounds.

#### 1.2 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 033000, CAST-IN-PLACE CONCRETE; Cement concrete floor slabs andfills, ready to receive resilient flooring.

#### 1.3 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, andfinishes 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.
- 1.4 QUALITY ASSURANCE
  - A. Single-Source Responsibility for Floor Tile: Obtain each type, color, and pattern of tile from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.
  - B. Fire Performance Characteristics: Provide resilient floor tile with the following fire performance characteristics as determined by testing products per ASTM test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
    - 1. Critical Radiant Flux: 0.45 watts per sq. cm or more per ASTM E 648.
    - 2. Smoke Density: Less than 450 per ASTM E 662.

### 1.5 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

### 2.1 VINYL COMPOSITION TILE FLOORING

- A. Provide vinyl composition tile of type and color as scheduled in the Finish Schedule; or approved equal.
- 2.2 ADHESIVES, MASTIC UNDERLAYMENTS, CRACK FILLERS, AND PRIMERS
  - A. Trowelable Leveling and Patching Compounds: Latex-modified, Portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
  - B. Adhesives: Water-resistant type recommended by manufacturer to suit floor tile and substrate conditions indicated.
    - 1. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
      - a. Floor Adhesives: Not more than 60 g/L.
  - C. Crack filler shall be as recommended by flooring manufacturer.

### 2.3 CLEANER

A. As recommended by manufacturer.

### PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F 710.
  - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
  - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended bymanufacturer. Do not use solvents.

- 3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
- 4. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.
  - a. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75% relative humidity level measurement.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install floor tiles until they are same temperature as space where they are to be installed.
  - 1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.
- 3.3 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 manufacturers 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<sup>o</sup>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  $60^{\circ}$ 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. Where different colors of resilient tile flooring occur in adjoining rooms or areas, and no threshold is called for, install feature strip under door or across center of doorless opening, of color selected by the Architect.
- E. Fit flooring neatly into breaks and recesses, against bases and thresholds, and around pipes, columns, and other projections. Cut, fit, and scribe borders after application of field tile.
- F. Install edge strips where resilient flooring materials terminate at points higher than contiguous finished flooring.
- G. Clean off surplus adhesive from resilient materials and adjacent surfaces.

# 3.4 FLOORING INSTALLATION

- A. Lay flooring square with room axis, with joints aligned in strict conformance with manufacturer's printed instructions.
- B. Once the material has been conditioned, install flooring in strict recommendations of manufacturer.

# 3.5 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 material used on the Project.
- B. Deliver the additional materials to site and place in storage area(s) within the building designated by the Architect.
  - a. Application for Payment and on or before date of current Application for Payment.
  - b. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.

# END OF SECTION

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### SECTION 09 68 13 - TILE CARPETING

# PART 1 GENERAL

### 1.1 WORK INCLUDED

- A. Furnish and install modular carpet tile and entrance mats and related items to complete work as shown on Drawings and/or as specified herein and includes, but is not limited to, the following:
  - 1. Preparation of concrete floor slabs and fills, except leveling and repair of faulty surfaces and those not constructed to stated tolerance.
  - 2. Furnishing and installation of modular carpet tile at floors, where scheduled.

# 1.2 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 notlimited to:
  - 1. Section 033000, CAST-IN-PLACE CONCRETE; Concrete floor slabs and fills, clean, level, and true to specified tolerance.
  - 2. Section 096513, RESILIENT WALL BASE AND ACCESSORIES; Resilient base.

### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include manufacturer's written data on physical characteristics, durability, and fade resistance. Include installation methods.
- B. Shop Drawings: Show the following:
  - 1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
  - 2. Carpet tile type, color, and dye lot.
  - 3. Type of subfloor.
  - 4. Type of installation.
  - 5. Pattern of installation.
  - 6. Pattern type, location, and direction.
  - 7. Pile direction.
  - 8. Type, color, and location of insets and borders.
  - 9. Type, color, and location of edge, transition, and other accessory strips.
  - 10. Transition details to other flooring materials.
- C. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.
  - 1. Carpet Tile: Full-size Sample.

- 2. Exposed Edge Stripping and Accessory: 12-inch- (300-mm-) long Samples.
- D. Product Schedule: Use same room and product designations indicated on Drawings and in schedules.
- E. Maintenance Data: For carpet tile to include in maintenance manuals specified in Division 1. Include the following:
  - 1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
  - Precautions for cleaning materials and methods that could be detrimental to carpet tile.
- F. Referto Section 01 30 00 SUBMITTALS
- 1.4 QUALITY ASSURANCE
  - A. Installer Qualifications: An experienced installer who is certified by the Floor Covering Installation Board or who can demonstrate compliance with its certification program requirements.
  - B. Fire-Test-Response Characteristics: Provide products with the critical radiant flux classification indicated in Part 2, as determined by testing identical products per ASTM E 648 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
  - C. Product Options: Products and manufacturers named in Part 2 establish requirements for product quality in terms of appearance, construction, and performance. Other manufacturers' products comparable in quality to named products and complying with requirements may be considered. Refer to Section 016000, PRODUCT REQUIREMENTS for further requirements concerning substitutions.
  - D. Mockups: Before installing carpet tile, install mockups for each type of carpet tile installation required to demonstrate aesthetic effects and qualities of materials and execution. Install mockups to comply with the following requirements, using materials indicated for the completed Work:
    - 1. Install mockups in the location and of the size indicated or, if not indicated, as directedby Architect.
    - 2. Notify Architect seven days in advance of dates and times when mockups will beinstalled.
    - 3. Demonstrate the proposed range of aesthetic effects and workmanship.
    - 4. Obtain Architect's approval of mockups before starting work.
    - 5. Maintain mockups during construction in an undisturbed condition as a standard forjudging the completed Work.
    - 6. Remove mockups when directed.
    - 7. Approved mockups may become part of the completed Work if undamaged at time of Substantial Completion.
- 1.5 DELIVERY, STORAGE, AND HANDLING
- A. General: Comply with CRI 104, Section 5, "Storage and Handling."

# 1.6 PROJECT CONDITIONS

- A. General: Comply with CRI 104, Section 6.1, "Site Conditions; Temperature and Humidity."
- B. Environmental Limitations: Do not install carpet tile until wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- C. Do not install carpet tile over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.
- D. Where demountable partitions or other items are indicated for installation on top of carpet tile, install carpet tile before installing these items.

# 1.7 WARRANTY

- A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Special Carpet Tile Warranty: Written warranty, signed by carpet tile manufacturer agreeing to replace carpet tile that does not comply with requirements or that fails within specified warranty period. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, and delamination.
  - 1. Warranty Period: **10** years from date of Substantial Completion.

# 1.8 EXTRA MATERIALS

- A. Furnish extra materials described below, before installation begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each typeindicated, but not less than 10 sq. yd. (8.3 sq. m).

# PART 2 PRODUCTS

# 2.1 CARPET TILE

- A. Carpet Tile: Provide carpet tiles of type and colors as scheduled in the Finish Schedule; or approved equal.
- 2.2 INSTALLATION MATERIALS
  - A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-

based formulation provided by or recommended by carpet tile manufacturer, with a VOC content of 65 g/L or less when calculated according to 40 CFR 59, Subpart D.

- B. Transition Strips: Provide as follows:
  - 1. TR-1: Carpet to Concrete: Provide Schluter Reno-U (AEU 80), anodized aluminum.
  - 2. TR-6: VCT to Carpet: Provide Schluter Reno-U (AEU 80), anodized aluminum.
- C. Adhesives for Carpets: Water-resistant, mildew-resistant, nonstaining type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet and is recommended or provided by carpet manufacturer.
  - 1. VOC Limits: Provide adhesives that comply with the following limits for VOC contentwhen tested according to ASTM D 5116:
    - a. Total VOCs: 10.00 mg/sq. m x h.
    - b. Formaldehyde: 0.05 mg/sq. m x h.
    - c. 2-Ethyl-1-Hexanol: 3.00 mg/sq. m x h.

#### PART 3 EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance. Verify that substrates and conditions are satisfactory for carpet tile installation and comply with requirements specified.
- B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:
  - 1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by carpet tile manufacturer.
  - 2. Subfloor finishes comply with requirements specified in Division 3 Section "Cast-in- Place Concrete" for slabs receiving carpet tile.
  - 3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. General: Comply with CRI 104, Section 6.2, "Site Conditions; Floor Preparation," and carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile installation.
- B. Use trowelable leveling and patching compounds, according to manufacturer's writteninstructions, to fill cracks, holes, and depressions in substrates.

- C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet tile manufacturer.
- D. Broom and vacuum clean substrates to be covered immediately before installing carpet tile. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Proceed with installation only after unsatisfactory conditions have been corrected.

# 3.3 INSTALLATION

- A. General: Comply with CRI 104, Section 13, "Carpet Modules (Tiles)."
- B. Glue-down installations are appropriate for wheel traffic; partial glue-down, for carpet tiles of moderate dimensional stability and moderate weight and mass; and free-lay, for dimensionally stable carpet tiles with heavy backings.
- C. Installation Method: Quarter turn pattern.
- D. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and builtin furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- E. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.
- G. Install pattern parallel to walls and borders.

# 3.4 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet tile:
  - 1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet tile manufacturer.
  - 2. Remove yarns that protrude from carpet tile surface.
  - 3. Vacuum carpet tile using commercial machine with face-beater element.
- B. Protect installed carpet tile to comply with CRI 104, Section 15, "Protection of Indoor Installations."
- C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.
  - 1. Provide summary documentation for stored materials indicating the following:
    - a. Value of materials previously stored and remaining stored as of date of

previous Applications for Payment.

- b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
- c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.

# END OF SECTION

#### SECTION 099100 - PAINTING

### PART 1 GENERAL

### 1.1 WORK INCLUDED

- A. Provide painting and finishing work throughout exterior and interior of Project as indicated and scheduled 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 tobe left unfinished.
- C. Preparatory work of materials and surfaces to receive paint beyond that specified to bedone as work of other Sections, shall be included as work of this Section.
- D. Hoisting Equipment: The painting subcontractor shall furnish, install and maintain in safe and adequate condition all mechanical hoisting equipment, operating personnel and rigging that is necessary for the proper execution of the Work of this Section.
- E. Staging, Planking and Scaffolding: The Painting subcontractor shall furnish, install and maintain in safe and adequate condition, all staging, planking and scaffolding that isnecessary for the proper execution of the Work in this Section.

#### 1.2 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 notlimited to:
  - 1. Section 081113, HOLLOW METAL DOORS AND FRAMES; Prime coat on hollowsteel doors and frames.

### 1.3 REFERENCES

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
  - 1. Steel Structures Painting Council (SSPC):
    - SP 2 Hand Tool Cleaning
    - SP 3 Power Tool Cleaning

### 1.4 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 colorranges 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 gypsumdrywall or Masonite board having minimum size of 144 sq. in.
  - 2. Paint Samples for Concrete Masonry Units: Provide samples of painted finishes onactual concrete masonry units having minimum size of 4 in. x 8 in.
  - 3. Stained or Natural Finished Wood: Provide samples of stained or natural finishedwood on actual samples of wood to be used in the completed work.
- D. Refer to Section 01 30 00 SUBMITALS

# 1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - Paint and High-Performance Coatings: 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

# 1.6 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 100 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.

# 1.7 TESTS

A. 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.

# 1.8 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 anddrying of paints.
  - 2. Outdoor Temperature and Conditions: Air and surface temperature shall be between50°F. and 90°F. Surfaces shall be dry within limits of finish system manufacturer.
  - 3. Do not paint 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.
- 1.9 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

## 2.1 ACCEPTABLE MANUFACTURERS

- A. Latex and Alkyd Based Paints: Provide products of one of the following manufacturers:
  - 1. Benjamin Moore and Co. (Moore).
  - 2. Pratt & Lambert. (P & L).
  - 3. The Sherwin Williams Company (S-W)
- B. High Performance Paint Coatings: Provide products of one of the following manufacturers:
  - 1. Tnemec Corporation.
  - 2. Valspar.
  - 3. DuPont.
- 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. 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 appropriatefor each of the substrates and finishes encountered.
- E. Provide miscellaneous painting materials such as linseed oil, shellac, turpentine, and thinner of the highest quality.
- F. Material Compatibility:
  - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
  - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

# 2.2 COLORS

A. Colors: Refer to Finish Schedule.

## 2.3 FILLERS, SOLVENTS, AND MISCELLANEOUS MATERIALS

- A. Turpentine: Pure gum spirits of turpentine.
- B. Drier: As recommended by coating manufacturer.
- C. Tinting Materials: Best quality, ground in pure boiled linseed oil, limeproof, and non-fading.

## PART 3 EXECUTION

- 3.1 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 toreceive 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.

# 3.2 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. Wire-brush clean previously painted concrete and masonry surfaces.
  - 2. Thoroughly clean of dirt, grit, loose materials, mortar drippings, and other deleterious substances.
  - 3. Concrete floor which is to receive sealer shall be thoroughly washed with a cleaning and degreasing solution, in accordance with the recommendations of the sealer manufacturer.
  - 4. 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. Wood to be Painted: Sand surfaces smooth and free of marks prior to applying first coat. Wash sap spots and knots with mineral spirits. When dry, touch-up spots and knots with an approved sealer for exterior work, and with two coats of shellac for interior work.
  - 1. Fill nail holes, cracks, open joints, and other defects, with putty or plastic wood filler. Sand smooth when dry.
  - 2. Prime tops, edges, and bottoms, of unprimed wood doors immediately upon delivery. Prime hardware cut-outs in similar manner prior to installation of butts, locks, and closers.
  - 3. Prime wood edges, ends, faces, undersides, backsides, including cabinets,

casework, paneling, and mouldings and trim.

- 4. Prime wood glazing rabbets and sealant slots before glazing or sealant work is begun.
- E. Wood to be Transparent Finished: Sand smooth and free of marks before applying the first coat. Wash sap spots and knots with mineral spirits. When dry, touch-up spots and knots with two coats of shellac.
  - 1. Backprime work with an approved spar varnish.
  - 2. Fill nail holes, cracks, open joints, and other defects after first coat is dry, using an exterior filler compatible with the finishing specified and tinted to camouflage repairs.
  - 3. Seal tops, edges, and bottoms, of unfinished wood doors immediately upon delivery. Seal cut-outs in similar manner prior to installation of butts, locks, and closers. If stained finish is required obtain alternate instructions from Architect. After being fitted by the carpenter, seal cut edges again, in similar manner, and then top and bottom edges shall be given an additional seal coat.
  - 4. Seal wood glazing rabbets and sealant slots before glazing or sealant work begins.
- F. Field-Welded 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.
- G. Other Ferrous Metal: Remove rust, mill scale, and foreign materials. Wire brush or sand damaged or rusted area to bright metal. Remove grease or dirt with solvents recommended by paint manufacturer just prior to applying paint.
  - 1. Spot prime all areas where shop coat has been damaged or abraded, using same type paint as used for shop coat.
- H. Field-Welded Galvanized Metal: After installation, field-welding, and grinding, and immediately before painting, remove rust, loose mill scale, dirt, weld flux, weld spatter, weld smoke stains, and other foreign material with wire brushes and/or steel scrapers. Power tool clean in accordance with SSPC SP 3. Remove grease and oil with solvents recommended by paint manufacturer. Sand exposed surfaces, and between coats, as required to produce smooth, even finishes.
  - 1. Sand smooth welded areas, and areas where galvanized coating has been damaged or abraded. Spot prime using zinc primer scheduled in this Section.
- I. Other Galvanized Metal: Prior to installation, remove corrosion and foreign materials by sanding or other appropriate method. Remove grease or dirt with solvent recommended by paint manufacturer just prior to applying primer.
- J. 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.
- K. Other Materials: Prepare other materials in strict accordance with recommendations of manufacturers of materials to be finished, and primers and finishes to be applied.
- L. 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.

# 3.3 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 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 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. Field-Finished Casework: Finish interior of wall and base cabinets and other field finished casework to match exterior.
- N. 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.
- O. Concrete Floor to Receive Sealer: Apply sealer at a rate not to exceed 200 sq. ft./gal.
  - 1. Allow first coat to cure not less than 24 hours, but not more than 72 hours. Applysecond coat at a rate not to exceed 400 sq. ft./gal.
- P. Mechanical and Electrical Work: Painting of mechanical and electrical items is limited 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.
- Q. Block Fillers: Apply block fillers to concrete masonry units at rates to ensure complete coverage with pores completely filled.
- R. 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.

# 3.4 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 Owner.

# 3.5 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 Exteriorand Interior Schedules.
  - 1. Chrome or nickel plating, stainless steel, bronze, brass, and aluminum other than millfinished, unless otherwise specified.
  - 2. Factory finished mechanical and electrical equipment, pumps, and machinery, whichoccur 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.
  - 7. Exterior masonry.
  - 8. Architectural woodwork specified as shop finished.

#### 3.6 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 and Plaster for Latex Eggshell, or Satin Finish:

One Coat	1.	Benjamin Moore; Eco-Spec Interior Latex Primer: Applied at a dry film thickness of not less than 1.2 mils (0.030 mm).
	2.	Pratt & Lambert Equal
	3.	S-W Equal
Two Coats	1.	Benjamin Moore; Eco-Spec Latex Eggshell Enamel: Applied at a dry film thickness of not less than 1.3 mils (0.033 mm).
	2.	Pratt & Lambert Equal
	3.	S-W Equal
Interior Gypsum Wallb	oard	and Plaster Ceilings for Latex Flat Finish:

- One Coat 1. Benjamin Moore; Eco-Spec Interior Latex Primer: Applied at a dry film thickness of not less than 1.2 mils (0.030 mm).
  - 2. Pratt & Lambert Equal

2.

3. S-W Equal

Two Coats

One Coat

- 1. Benjamin Moore; Eco-Spec Latex Flat: Applied at a dry film thickness of not less than 1.3 mils (0.033 mm).
  - 2. Pratt & Lambert Equal
  - 3. S-W Equal

# 3. Interior Gypsum Wallboard and Plaster for Semi-Gloss Finish:

- Benjamin Moore; Eco-Spec Interior Latex Primer: Applied at a dry film thickness of not less than 1.2 mils (0.030 mm).
  - 2. Pratt & Lambert Equal
  - 3. S-W Equal

# Two Coats1.Benjamin Moore; Eco-Spec Latex Semi-Gloss Enamel:<br/>Applied at a dry film thickness of not less than 1.3 mils<br/>(0.033 mm).2Breatt & Lambert Equal

- 2. Pratt & Lambert Equal
- 3. S-W Equal
- 4. Interior Finish Carpentry for Latex Semi-Gloss Paint Finish (softwoods, paint gradehardwoods, MDO, and hardwood veneers):

One Coat	1.	Benjamin Moore; Eco-Spec Interior Latex Primer: Applied at a dry film thickness of not less than 1.2 mils (0.030 mm).
	2.	Pratt & Lambert Equal
	3.	S-W Equal
Two Coats	1.	Benjamin Moore; Eco-Spec Latex Semi-Gloss Enamel: Applied at a dry film thickness of not less than 1.3 mils (0.033 mm).
	2.	Pratt & Lambert Equal
	3.	S-W Equal
Interior Wood Finish hardwood veneers, e	a Carper xcept pa	ntry for Satin Transparent Finish (all hardwoods and aint grade and factory-finished items):

Sand	120 grit sandpaper.	
Sand	220 grit sandpaper.	
Stain F241	1.	Moore Interior Wood Finishes Penetrating Stain
Two Coats	1.	Moore Benwood Polyurethane Finish 435 Sand Between 220 grit sandpaper.Urethane Coats
Interior Metals not Specified to Receive other Coating Systems:		

One Coat 1. Approved primer, in shop under other Sections(where specified)

6.

5.

One Coat Field Primer (only where shop primer is not specified):

- 1. Benjamin Moore; Moore's Ultra Spec HP Acrylic Metal Primer No. HP04: Applied at a dry film thickness of not less than 2.0 mils (0.051 mm).
- 2. Pratt & Lambert Equal
- 3. S-W

Note: One prime coat only is required at interior metal work, except touch-up of areas which have become rusted or damagedprior to finish painting.

Two Coats	1.	Benjamin Moore; Ultra Spec HP D.T.M. Semi- Gloss Enamel No. FP29: Applied at a dry film thickness of notless than 1.4 mils (0.036 mm).
	2.	Pratt & Lambert Equal
	3.	S-W Equal

- 7. 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.
- 8. Interior Concrete Masonry Units for Semi-Gloss Finish in Dry Areas:

One Coat Block	1.	Benjamin Moore; Moorcraft Super Craft Latex
		Filler: Applied at a dry film thickness of not less than 8.1 mils (0.206 mm).
	2.	Pratt & Lambert Equal
	3.	S-W Equal
One Primer Coat	1.	Benjamin Moore; Ultra Spec 500 Primer: Applied at a dry film thickness of not less than 1.2 mils (0.030 mm).
	2.	Pratt & Lambert Equal
	3.	S-W Equal
Two Coats	1.	Benjamin Moore; Ultra Spec 500 Semi-Gloss: Applied at a dry film thickness of not less than 1.2 mils (0.031 mm).
	2.	Pratt & Lambert Equal
	3.	S-W Equal

## 3.7 HIGH PERFORMANCE COATING SCHEDULE

A. High Performance Coating of Exterior Surfaces:

1. Exterior Galvanized Steel for Acrylic Polyurethane Finish (exterior steel doors and frames):

One Coat	1.	Primer in shop, under Section 081113 and 083323.
After Installation:		
Barrier Coat:	1.	As recommended by manufacturer for compatibility between shop coats and field coats.
First Field Coat	1. 2. 3.	Tnemec "No. N69 Hi-Build Epoxoline" Epoxy DuPont Equal Valspar Equal
Second Field Coat (dry film 1.5 to 2.0 mils)	1. 2. 3.	Tnemec "No. 750 UVX" IPC Equal Valspar Equal

- B. High Performance Coating of Interior Surfaces:
  - 1. Interior CMU Walls:

Primer Spray-	1.	Tnemec Series 130 Envirofill Acrylic Block
Filler Applied and	2.	DuPont Equal
Rolled Out	3.	Valspar Equal
First Top Coat	1.	Tnemec
Series 280(dry_film 1-5	mile	) 2 Dupont

Equal	5 1111	<i>J2.</i> Dupont
1	3.	Valspar Equal
Second Top Coat	1.	Tnemec series 1081
(dry-film 2-2.5 mils)	2.	DuPont Equal
	3.	Valspar Equal

2. Interior Steel Doors and Frames:

One Coat Primer in shop, under Section 081113. 1. After Installation: Barrier Coat: 1. As recommended by field coat manufacturer for compatibility between shop and field coats. Tnemec "No. L69 Hi-Build Epoxoline" Epoxy First Field Coat 1. Second Field Coat 1. Tnemec "No. 1081 Endura-Shield" Acrylic (dry film 1.5 to Polyurethane 2.0 mils)

3. Epoxy Coating for Interior Drywall Surfaces:

One Coat	1.	Tnemec Series 151-1051 Elastogrip
Two Coats (dry film 2.0 mils coat)	1.	Tnemec Series 1081

#### SECTION 21 05 00 - COMMON WORK RESULTS FOR FIRE SUPPRESSION

#### PART 1 GENERAL

#### 1.1 SUMMARY

- A. Section includes pipe, fittings, valves, and connections for sprinkler systems.
- B. Related Sections:
  - 1. Section 07 84 10 Firestopping: Product requirements for firestopping for placement by this section.
  - 2. Section 09 91 00 Painting and Coating: Execution requirements for piping painting specified by this section.
  - 3. Section 23 01 00 Basic Mechanical Methods: Methods and procedures for mechanical work.

#### 1.2 REFERENCES

- A. American Society of Mechanical Engineers:
  - 1. ASME B16.1 Cast Iron Pipe Flanges and Flanged Fittings.
  - 2. ASME B16.11 Forged Steel Fittings Socket-Welding and Threaded.
  - 3. ASME B 16.25 Buttwelding Ends.
  - 4. ASME B16.3 Malleable Iron Threaded Fittings.
  - 5. ASME B16.4 Gray Iron Threaded Fittings.
  - 6. ASME B16.5 Pipe Flanges and Flanged Fittings.
  - 7. ASME B16.9 Factory-Made Wrought Steel Buttwelding Fittings.
  - 8. ASME B36.10M- Welded and Seamless Wrought Steel Pipe.
- B. ASTM International:
  - 1. ASTMA53/A53M Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
  - 2. ASTM A135 Standard Specification for Electric-Resistance-Welded Steel Pipe.
  - 3. ASTM A234/A234M Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.
  - 4. ASTM A795/A795M Standard Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use.

- C. American Welding Society:
  - 1. AWS A5.8 Specification for Filler Metals for Brazing and Braze Welding.
  - 2. AWS D1.1 Structural Welding Code Steel.
- D. National Fire Protection Association:
  - 1. NFPA 13 Installation of Sprinkler Systems.
- E. Underwriter Laboratories, Inc.:
  - 1. UL 1887 Fire Tests of Plastic Sprinkler Pipe for Visible Flame and Smoke Characteristics.

#### 1.3 SYSTEM DESCRIPTION

A. Firestopping Materials: Comply with requirements of Section 07 84 10.

#### 1.4 PERFORMANCE REQUIREMENTS

A. Firestopping Materials: Comply with requirements of Section 07 84 10.

#### 1.5 SUBMITTALS

- A. Section 01 33 00 Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.

#### 1.6 CLOSEOUT SUBMITTALS

- A. Section 01 78 00 Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents: Record actual locations of components and tag numbering.
- C. Operation and Maintenance Data: Submit spare parts lists.

#### 1.7 QUALITY ASSURANCE

A. Perform Work in accordance with NFPA 13.

#### 1.8 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

#### 1.9 PRE-INSTALLATION MEETINGS

- A. Section 01 30 05 Project Coordination Pre--installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

#### 1.10 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 02 Delivery Storage and Handling: Product storage and handling requirements.
- B. Deliver and store valves in shipping containers, with labeling in place.
- C. Furnish cast iron and steel valves with temporary protective coating.
- D. Furnish temporary end caps and closures on piping and fittings. Maintain in place until installation.

#### 1.11 ENVIRONMENTAL REQUIREMENTS

- A. Section: Environmental conditions affecting products on site.
- B. Provide ventilation in areas to receive solvent cured materials.

#### 1.12 WARRANTY

- A. Section 01 78 10 -Product warranties and product bonds.
- B. Furnish five year manufacturer warranty for basic fire suppression materials and methods.

#### PART 2 PRODUCTS

A. Drain Valves:

- 1. Compression Stop: Bronze with hose thread nipple and cap.
- 2. Ball Valve: Brass with cap and chain, 3/4 inch hose thread.

#### 2.2 ABOVE GROUND PIPING

- A. Steel Pipe: ASTM A53/A53M, Grade B; or ASME B36.10; Schedule 40 black.
  - 1. Steel Fittings: ASME B16.9, wrought steel, butt welded.
  - 2. Cast Iron Fittings: ASME B16.1, flanges and flanged fittings .
  - 3. Malleable Iron Fittings: ASME B16.3, threaded fittings.
  - 4. Mechanical Grooved Couplings: Malleable iron housing clamps to engage and lock, "C" shaped elastomeric sealing gasket, steel bolts, nuts, and washers; galvanized for galvanized pipe.
  - 5. Mechanical Formed Fittings: Carbon-steel housing with integral pipe stop and O-ring pocked and O-ring uniformly compressed into permanent mechanical engagement onto pipe.

#### 2.3 PIPE HANGERS AND SUPPORTS

- A. Conform toNFPA 13.
- B. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron, adjustable swivel, split ring.
- C. Hangers for Pipe Sizes 2 inch and Over: Carbon steel, adjustable, clevis.
- D. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
- E. Wall Support for Pipe Sizes to 3 inches: Cast iron hook.
- F. Wall Support for Pipe Sizes 4 inches and Over: Welded steel bracket and wrought steel clamp.
- G. Vertical Support: Steel riser clamp.
- H. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
- I. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

#### 2.4 FIRESTOPPING

A. Firestopping Materials: Comply with requirements of Section 07 84 10.

## 2.5 FIRESTOPPING ACCESSORIES

A. Installation Accessories: Comply with requirements of Section 07 84 10.

#### PART 3 EXECUTION

#### 3.1 EXAMINATION

A. Section 00 72 20 - Site Conditions: Verification of existing conditions before starting work.

B. Verify openings are ready to receive sleeves.

#### 3.2 PREPARATION

- A. Ream pipe and tube ends. Remove burrs.
- B. Remove scale and foreign material, from inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.
- D. Do not drill or cut structural members.

#### 3.3 INSTALLATION

- A. Install piping in accordance with NFPA 13 for sprinkler systems,
- B. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.
- C. Install piping to conserve building space, to not interfere with use of space and other work.
- D. Group piping whenever practical at common elevations.
- E. Install pipe sleeve at piping penetrations through walls, and floors. Seal pipe and sleeve penetrations to maintain fire resistance equivalent to fire separation.
- F. Install piping to allow for expansion and contraction without stressing pipejoints, or connected equipment.
- G. Pipe Hangers and Supports:
  - 1. Install in accordance with NFPA 13.
  - 2. Pitch pipe in accordance with NFPA 13 for dry-pipe sprinkler systems.
  - 2. Install hangers to with minimum 1/2 inch space between finished covering and adjacent work.
  - 3. Place hangers within 12 inches of each horizontal elbow.
  - 4. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.5. Support vertical piping at every floor. Support riser piping independently of connected horizontal piping.
  - 6. Where installing several pipes in parallel and at same elevation, provide multiple or trapeze hangers.
  - 7. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
- H. Slope piping and arrange systems to drain at low points. Install eccentric reducers to maintain top of pipe level.
- I. Prepare pipe, fittings, supports, and accessories for finish painting. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding. Refer to Section 09 90 00.
- J. Do not penetrate building structural members unless indicated.

- K. Where more than one piping system material is specified, install compatible system components and joints. Install flanges, union, and couplings at locations requiring servicing.
- L. Die cut threaded joints with full cut standard taper pipe threads with red lead and linseed oil or other non-toxic joint compound applied to male threads only.
- M. Install valves with stems upright or horizontal, not inverted. Remove protective coatings after installation.
- N. Install butterfly valves for shut-off or isolating service.
- O. Install drain valves at main shut-off valves, low points of piping and apparatus.

#### 3.4 INSTALLATION -FIRESTOPPING

A. Firestopping Materials: Comply with requirements of Section 07 84 10.

#### 3.5 FIELD QUALITY CONTROL

A. Section 01 40 10 - Quality Requirements: Requirements for inspecting, testing.

#### 3.6 CLEANING

- A. Section 01 71 00 Execution and Closeout Requirements: Final cleaning.
- B. Clean entire system after other construction is complete.

# SECTION 23 01 00 - BASIC MECHANICAL REQUIREMENTS

# PART 1 GENERAL

# 1.1 WORK SEQUENCE

- A. Construct Work in sequence so as to conform to the project construction schedule.
- B. Order the progress of mechanical work to conform to the progress of other trades.

# 1.2 JOB CONDITIONS

# A. Connections to Existing Work:

- 1. Install new work and connect to existing work with minimum interference to existing facilities.
- 2. Temporary Shutdowns of Existing Services:
  - a. At no additional cost to the Owner.
  - b. At times not to interfere with the normal operation of existing facilities.
  - c. Only with written consent of the Owner.
- 3. Maintain continuous operation of existing facilities as required with necessary temporary connections between new and existing work.
- 4. Connect new work to existing work in neat and acceptable manner. Restore existing disturbed work to original condition.

# 1.3 COORDINATION

A. Drawings and specifications are complementary to each other. Include any work, materials or equipment indicated on the drawings but not described by the specifications, or described by the specifications but not shown on the drawings, which is necessary for the completion of mechanical systems.

# 1.4 REGULATORY REQUIREMENTS

- A. Conform to Regional Building and Fire Codes.
- B. Obtain required permits, plan review, and inspections from authority having jurisdiction.

## 1.5 LOCAL CONDITIONS

A. Examine the site and become familiar with existing local conditions affecting work, such as obstructions, levels, necessary cutting, excavating or filling, before submitting proposal. No allowance will subsequently be made by reason of any misunderstanding with respect to existing site conditions.

# 1.6 PERMITS, LICENSES, FEES, AND INSPECTIONS

A. Obtain, pay for, and maintain all required permits, licenses, and certificates of inspection.

# 1.7 OBSERVATION OF THE WORK

A. The Contractor shall provide an opportunity for the Architect/Engineer, Code Enforcement Authorities and/or the Owner's representative to examine all work prior to concealment. This includes exterior piping and services prior to backfill of trenching, all interior roughing-in of piping, ductwork or equipment prior to insulating or other concealment. The Contractor shall notify the Architect/Engineer and/or the Owner's representative at least 72 hours in advance of such work so that the appropriate representative(s) may perform such observations prior to concealment. Notification of Code Enforcement authorities sufficiently in advance of concealing work is the Contractor's responsibility.

# 1.8 FINAL OBSERVATION

- A. At the completion of the work, the Contractor shall notify the Architect and request the final observation.
- B. Prior to such request, all work under the contract shall be completed and all systems shall be in proper working order and placed in operation.
- C. All air systems shall be properly balanced with quantities shown on the drawings.
- D. All debris and construction materials shall be removed from the premises,
- E. At the request of the Architect, a representative of the Contractor who is thoroughly familiar with the project and operation of the various systems shall be present during the final observation to demonstrate proper operation of the equipment and controls, If requested, the Contractor shall have representatives from his subcontractors present to assist during final observation.

## 1.9 SUBMITTALS

A. Refer to Section 01 30 00 – SUBMITTALS

# PART 2 PRODUCTS

# 2.1 MATERIALS AND EQUIPMENT

A. All equipment and materials installed shall be new, unless otherwise specified. Except as otherwise shown on the drawings and/or specified, manufactured products shall be standard cataloged items which have been in production for a period not less than two (2) years prior to date for receipt of bids or proposals.

## PART 3 EXECUTION

## 3.1 WORKMANSHIP

A. Workmanship shall conform to highest industry standards for each trade involved in the erection of the Work.

B. Contractor's personnel and subcontractors selected to perform the work shall be well versed and skilled in the trades involved.

# 3.2 ADHERENCE TO BASIS OF DESIGN AND 2D AND 3D CONSTRUCTION DOCUMENTS

A. The Basis of Design was done on Record Drawings provided to the Engineer by the Owner. Contractor is responsible for a pre-bid walk-through with the Bid Documents to review actual on-site conditions.

# 3.3 SYSTEMS TESTING AND START-UP

A. Provide all completion services, including final systems and/or subsystems performance verification, to ensure that all systems function as specified before authorizing Owner or tenant occupancy and before accepting Certificates of partial or total Substantial Completion.

# SECTION 23 01 20 - MECHANICAL REMOVALS AND DEMOLITION

# PART 1 GENERAL

## 1.1 SUMMARY

A. Section Includes:

- 1. Removal of designated building equipment and fixtures.
- 2. Removal of designated construction.

#### 1.2 REFERENCES

A. Refer to Division 1 GENERAL REQUIREMENTS

#### 1.3 PROJECT CONDITIONS

A. Conduct demolition to minimize interference with adjacent building areas.

# PART 2 PRODUCTS

Not Used

#### PART 3 EXECUTION

.

## 3.1 DEMOLITION

- A. Disconnect and identify designated utilities within demolition areas.
- B. Remove materials as Work progresses. Upon completion of Work, leave areas in clean condition.

# SECTION 23 05 29 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

## PART 1 GENERAL

## 1.1 SUMMARY

A. Section Includes:

- 1. Hanger rods.
- 2. Formed steel channel.

## 1.2 REFERENCES

- A. American Society of Mechanical Engineers:
  - 1. ASME B31.1 -Power Piping.
  - 2. ASME B31.5 Refrigeration Piping.
  - 3. ASME B31.9 Building Services Piping.
- B. ASTM International:
  - 1. ASTM El 19 Standard Test Methods for Fire Tests of Building Construction and Materials.
  - 2. ASTM E814 Standard Test Method for Fire Tests of Through Penetration Fire Stops.
  - 3. ASTM F708 Standard Practice for Design and Installation of Rigid Pipe Hangers.
  - 4. ASTM El 966 Standard Test Method for Fire-Resistive Joint Systems.
- C. American Welding Society: 1. AWS DI.I - Structural Welding Code - steel.
- D. FM Global:
  - 1. FM Approval Guide, A Guide to Equipment, Materials & Services Approved By Factory Mutual Research For Property Conservation.
- E. Manufacturers Standardization Society of the Valve and Fittings Industry:
  - 1. MSS SP 58 Pipe Hangers and Supports Materials, Design and Manufacturer.
  - 2. MSS SP 69 Pipe Hangers and Supports Selection and Application.
  - 3. MSS SP 89 Pipe Hangers and Supports Fabrication and Installation Practices.
- F. Underwriters Laboratories Inc.:

1. UL 263 - Fire Tests of Building Construction and Materials.

- 2. UL 723 Tests for Surface Burning Characteristics of Building Materials.
- 3. UL 1479 Fire Tests of Through-Penetration Firestops.
- 4. UL 2079 Tests for Fire Resistance of Building Joint Systems.
- 5. UL Fire Resistance Directory.
- G. Intertek Testing Services (Warnock Hersey Listed):1. WH Certification Listings.

## 1.3 SUBMITTALS

## A. Refer to Section 01 30 00 – SUBMITTALS

# 1.4 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years' experience.
- B. Installer: Company specializing in performing Work of this section.

# 1.5 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

## 1.6 WARRANTY

A. Furnish five year manufacturer warranty for pipe hangers and supports.

## PART 2 PRODUCTS

## 2.1 ACCESSORIES

A. Hanger Rods: Mild steel threaded both ends, threaded on one end, or continuous threaded.

# 2.2 FORMED STEEL CHANNEL

- A. Manufacturers:
  - 1. <u>Cooper B-Line. Inc</u>.
  - 2. <u>Unistrut• Atkore International</u>.
- B. Product Description: Galvanized 12 gage) thick steel. With holes 1-1/2 inches on center.

## PART 3 EXECUTION

Not Used

#### SECTION 23 05 93 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

#### PART 1 GENERAL

## 1.1 SUMMARY

A. Section Includes:

- 1. Testing, adjusting, and balancing of air systems.
- 2. Measurement of final operating condition of HVAC systems.

#### 1.2 REFERENCES

A. Natural Environmental Balancing Bureau:

1. NEBB - Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems.

#### 1.3 SUBMITTALS

- A. Prior to commencing Work, submit proof of latest calibration date of each instrument.
- B. Test Reports: Indicate data on NEBB Report forms.
- C. Field Reports: Indicate deficiencies preventing proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
- D. Refer to Section 01 30 00 SUBMITTALS

#### 1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with NEBB Procedural Standards for Testing, Balancing and Adjusting of Environmental Systems.
- B. Prior to commencing Work, calibrate each instrument to be used.

## 1.5 QUALIFICATIONS

A. Agency: Company specializing in testing, adjusting, and balancing of systems specified in this section with minimum three years documented experience Celtified by NEBB.

## PART 2 PRODUCTS

Not Used.

## PART 3 EXECUTION

## 3.1 EXAMINATION

A. Verify systems are complete and operable before commencing work. Verify the following:

- 1. Systems are started and operating in safe and normal condition.
- 2. HVAC control systems are installed complete and operable.
- 3. Final filters are clean and in place. If required, install temporary media in addition to final filters.
- 4. Duct systems are clean of debris.
- 5. Fans are rotating correctly.
- 6. Fire and volume dampers are in place and open.
- 7. Air coil fins are cleaned and combed.
- 8. Access doors are closed and duct end caps are in place.
- 9. Air outlets are installed and connected.
- 10. Duct system leakage is minimized.
- 11. Pumps are rotating correctly.
- 12. Service and balancing valves are open.

# 3.2 INSTALLATION TOLERANCES

A. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.

## 3.3 ADJUSTING

- A. Verify recorded data represents actual measured or observed conditions.
- B. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
- C. After adjustment, take measurements to verify balance has not been disrupted. If disrupted, verify correcting adjustments have been made.
- D. Report defects and deficiencies noted during performance of services, preventing system balance.
- E. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

## 3.4 AIR SYSTEM PROCEDURE

- A. Adjust air handling and distribution systems to obtain required or design supply, return, and exhaust air quantities.
- B. Make air flow rate measurements in main ducts by Pitot tube traverse of entire cross sectional area of duct.
- C. Adjust distribution system to obtain:1. Space temperatures within 2 degrees F.
- D. Vary branch air quantities by damper regulation.
- E. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.

- F. At modulating damper locations, take measurements and balance at extreme conditions. Balance variable volume systems at maximum airflow rate, full cooling, and at minimum airflow rate, full heating.
- G. For variable air volume system powered units set volume controller to airflow setting indicated. Confirm connections properly made and confirm proper operation for automatic variable-air-volume temperature control.
- H. On fan powered VAV boxes, adjust airflow switches for proper operation.

# 3.5 SCHEDULES

# A. Report Forms

- 1. Title Page:
  - a. Name of Testing, Adjusting, and Balancing Agency
  - b. Address of Testing, Adjusting, and Balancing Agency
  - c. Telephone and facsimile numbers of Testing, Adjusting, and Balancing Agency
  - d. Project name
  - e. Project location
  - f. Project Architect
  - g. Project Engineer
  - h. Project Contractor
  - i. Project altitude
  - j. Repon date
- 2. Summary Comments:
  - a. Design versus final performance
  - b. Notable characteristics of system
  - c. Description of systems operation sequence
  - d. Summary of outdoor and exhaust flows to indicate building pressurization
  - e. Nomenclature used throughout report
  - f. Test conditions
- 3. Instrument List:
  - a. Instrument
  - b. Manufacturer
  - c. Model number
  - d. Serial number
  - e. Range
  - f. Calibration date
- 4. Duct Traverse:
  - a. System zone/branch
  - b. Duct size
  - c. Area
  - d. Design velocity
  - e. Design air flow
  - f. Test velocity
  - g. Test air flow

- h. Duct static pressure
- i. Air temperature
- j. Air correction factor
- 5. Duct Leak Test:
  - a. Description of ductwork under test
  - b. Duct design operating pressure
  - c. Duct design test static pressure
  - d. Duct capacity, air flow
  - e. Maximum allowable leakage duct capacity times leak factor
  - f. Test apparatus
    - 1) Blower
    - 2) Orifice, tube size
    - 3) Orifice size
    - 4) Calibrated
  - g. Test static pressure
  - h. Test orifice differential pressure
  - i. Leakage
- 6. Air Distribution Test Sheet:
  - a. Air terminal number
  - b. Room number/location
  - c. Terminal type
  - d. Teminal size
  - e. Area factor
  - f. Design velocity
  - g. Design air flow
  - h. Test (final) velocity
  - i. Test (final) air flow
  - j. Percent of design air flow

#### SECTION 23 07 00 - HVAC INSULATION

## PART 1 GENERAL

#### 1.1 SUMMARY

A. Section Includes:1. HVAC ductwork insulation, jackets, and accessories.

#### 1.2 REFERENCES

A. Sheet Metal and Air Conditioning Contractors':1. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.

## 1.3 SUBMITTALS

- A. Manufacturer's Certificate: Certify products meet or exceed specified requirements.
- B. Refer to Section 01 30 00 SUBMITTALS

#### 1.4 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years' experience.
- B. Applicator: Company specializing in performing Work of this section with minimum three years' experience.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.
- B. Protect insulation from weather and construction traffic, dirt, water, chemical, and damage, by storing in original wrapping.

#### PART 2 PRODUCTS

#### 2.1 MANUFACTURER

- A. Manufacturers; Glass Fiber and Mineral Fiber Insulation:
  - 1. CertainTeed Corporation.
  - 2. Johns Manville.
  - 3. Knauf Insulati on.
  - 4. Manson Insulation Inc.

- 5. Owens Corning.
- B. Manufacturers; Closed Cell Elastomeric Insulation:
  - 1. Aeroflex USA, Inc.
  - 2. Armacell LLC.
  - 3. K-Flex USA.
- C. TYPE D-1 : ASTM C1290, Type Ill, flexible glass fiber, commercial grade with factory applied reinforced aluminum foil jacket meeting ASTM Cl 136, Type Il.
  - 1. Thermal Conductivity: 0.27 at 75 degrees F.
  - 2. Maximum Operating Temperature: 250 degrees F.
  - 3. Density: 1.0 pound per cubic foot.
- D. TYPE D-4: ASTM C1071, Type I, flexible, glass fiber duct liner with coated air side.
  - 1. Thermal Conductivity: 0.25 at 75 degrees F.
  - 2. Density: 2.0 pound per cubic foot.
  - 3. Maximum Operating Temperature: 250 degrees F.
  - 4. Maximum Air Velocity: 6,000 feet per minute.

# 2.2 DUCTWORK INSULATION JACKETS

- A. Aluminum Duct Jacket:
  - 1. Thickness: 0.020 inch thick sheet.
  - 2. Finish: Smooth.
  - 3. Joining: Longitudinal slip joints and 2 inch laps.
  - 4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
  - 5. Metal Jacket Bands: 3/8 inch wide; [0.015] inch thick aluminum.
- B. Canvas Duct Jacket: UL listed, 6 oz. /sq. yd., plain weave cotton fabric with fire retardant lagging adhesive compatible with insulation.

# 2.3 DUCTWORK INSULATION ACCESSORIES

- A. Vapor Retarder Tape:
  - 1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.
- B. Vapor Retarder Lap Adhesive: Compatible with insulation.
- C. Lagging Adhesive: Fire retardant type with maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.
- D. Impale Anchors: Galvanized steel, 12 gage self-adhesive pad.
- E. Adhesives: Compatible with insulation.

#### PART 3 EXECUTION

## 3.1 INSTALLATION - DUCTWORK SYSTEMS

- A. Duct dimensions indicated on Drawings are finished inside dimensions.
- B. Insulated ductwork conveying air below ambient temperature:
  - 1. Provide insulation with vapor retarder jackets.
  - 2. Finish with tape and vapor retarder jacket.
  - 3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
  - 4. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.
- C. Insulated ductwork conveying air above ambient temperature:
  - 1. Provide with or without standard vapor retardel' jacket.
  - 2. Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.
- D. Ductwork Exposed in Mechanical Equipment Rooms or Finished Spaces (below 10 feet above finished floor): Finish with aluminum jacket.
- E. External Glass Fiber Duct Insulation: 1. Secure insulation with vapor retarder with wires and seal jacket joints with vapor retarder adhesive or tape to match jacket.
  - 2. Secure insulation without vapor retarder with staples, tape, or wires.
  - 3. Install without sag on underside of ductwork. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift ductwork off trapeze hangers and insert spacers.
  - 4. Seal vapor retarder penetrations by mechanical fasteners with vapor retarder adhesive.
  - 5. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.
- F. Extemal Elastomeric Duct Insulation:
  - 1. Adhere to clean oil-free surfaces with full coverage of adhesive.
  - 2. Seal seams and butt joints with manufacturer's recommended adhesive.
  - 3. When application requires multiple layers, apply with joints staggered.
  - 4. Insulate standing metal duct seams with insulation of like material and thickness as adjacent duct surface. Apply adhesive at joints with flat duct surfaces.
  - 5. Lift ductwork off trapeze hangers and insert spacers.
- G. Duct Liner:
  - 1. Adhere insulation with adhesive for 100 percent coverage.
  - 2. Secure insulation with mechanical liner fasteners. Comply with SMACNA Standards for spacing.
  - 3. Seal and smooth joints. Seal and coat transverse joints.
  - 4. Seal liner surface penetrations with adhesive.
  - 5. Cut insulation for tight overlapped corner joints. Support top pieces of liner at edges with side pieces.

# 3.2 SCHEDULES

A. Ductwork Insulation Schedule:

DUCTWORK SYSTEM	INSULATION TYPE	INSULATION THICKNESS inches
Supply Ducts (internally insulated)	D-4	1.5
Return Ducts (internally insulated)	D-4	0.5
Supply Ducts (externally insulated)	D-1	1.5
Return Ducts (externally insulated)	D-1	1.0
Rectangular Supply Ducts Downstream of Variable Air Volume Boxes (internally insulated)	D-4	1.0
Rectangular Supply Ducts Downstream of Variable Air Volume Boxes (externally insulated)	D-1	1.5
Round Supply Ducts Downstream of Variable Air Volume Boxes (externally insulated)	D-1	1.5

## SECTION 23 31 00 - HVAC DUCTS AND CASINGS

#### PART 1 GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Duct Materials.
  - 2. Insulated flexible ducts.
  - 3. Single wall spiral round ducts.
  - 4. Ductwork fabrication.
- B. Sheet Metal and Air Conditioning Contractors:
  - 1. SMACNA Fibrous Glass Duct Construction Standards.
  - 2. SMACNA HVAC Air Duct Leakage Test Manual.
  - 3. SMACNA HVAC Duct Construction Standard Metal and Flexible.

#### 1.2 PERFORMANCE REQUIREMENTS

A. Variation of duct configuration or sizes other than those of equivalent or lower loss coefficient is not permitted except by written permission. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts.

#### 1.3 SUBMITTALS

A. Refer to Section 01 30 00 SUBMITTALS

#### 1.4 QUALITY ASSURANCE

A. Perform Work in accordance with SMACNA - HVAC Duct Construction Standards - Metal and flexible.

#### 1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years' experience.
- B. Installer: Company specializing in performing Work of this section with minimum three years' experience.

#### PART 2 PRODUCTS

#### 2.1 DUCT MATERIALS

A. Galvanized Steel Ducts: ASTM A653/A653M galvanized steel sheet, lock-forming quality, having G60 (zinc coating of in conformance with ASTM A90/A90M.

- B. Aluminum Ducts: ASTM B209; aluminum sheet, alloy 3003-H14. Aluminum Connectors and Bar Stock: Alloy 6061-T6 or of equivalent strength.
- C. Fasteners: Rivets, bolts, or sheet metal screws.
- D. Hanger Rod: ASTM A36/A36M; steel; threaded both ends, threaded one end, or continuously threaded.

# 2.2 GLASS FIBER DUCTS

A. Shall not be used on this project.

## 2.3 INSULATED FLEXIBLE DUCTS

- A. Product Description: Two ply vinyl film supported by helical wound spring steel wire; fiberglass insulation; aluminized vapor barrier film.
  - 1. Pressure Rating: 10 inches wg positive and 1.0 inches wg negative.
  - 2. Maximum Velocity: 4000 fpm.
  - 3. Temperature Range: -10 degrees F to 160 degrees F.
  - 4. Thermal Resistance: 4.2 square feet-hour-degree F per BTU.

## 2.4 SINGLE WALL SPIRAL ROUND DUCTS

- A. Product Description: UL 181, Class I, round spiral lockseam duct constructed of galvanized steel.
- B. Construct duct with the following minimum gages:

[	
Diameter	Gauge
3 inches to 14 inches	26
15 inches to 26 inches	24
28 inches to 36 inches	22
38 inches to 50 inches	20
52 inches to 84 inches	18

C. Construct fittings with the following minimum gages:

Diameter	Gauge
3 inches to 14 inches	24
15 inches to 26 inches	22
28 inches to 36 inches	20
38 inches to 50 inches	20
52 inches to 60 inches	18
62 inches to 84 inches	16

## 2.5 DUCTWORK FABRICATION

A. In accordance with SMACNA HVAC Duct Construction Standards Metal and Flexible. Provide duct material, gages, reinforcing, and sealing for the following pressure classifications:

Service	Duct Pressure Class
Supply Ducts Upstream of Terminal Units	+4 in. wg
Supply Ducts Downstream of Terminal Units	+1 in. wg
Return Ducts	-1 in. wg

B. Fabricate and support round ducts with longitudinal seams in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible (Round Duct Construction Standards). Provide duct material, gages, reinforcing, and sealing for the following pressure classifications:

Service	Duct Pressure Class
Supply Ducts Up stream of Terminal Units	+4 in. wg
Supply Duct Downstream of Terminal Units	+2 in. wg
Return Ducts	-2 in. wg

- C. Construct T's, bends, and elbows with minimum radius 1-1/2 times centerline duct width. Where not possible and where rectangular elbows are used, provide airfoil turning vanes. Where acoustical lining is indicated, furnish turning vanes of perforated metal with glass fiber insulation.
- D. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
- E. Fabricate continuously welded round and oval duct fittings two gages heavier than duct gages indicated in SMACNA Standard. Minimum 4 inch cemented slip joint, brazed or electric welded. Prime coat welded joints.
- F. Provide standard 45-degree lateral wye takeoffs. When space does not allow 45-degree lateral wye takeoff, use 90-degree conical tee connections.
- G. Seal joints between duct sections and duct seams with welds, gaskets, mastic adhesives, mastic plus embedded fabric systems, or tape.
  - 1. Sealants, Mastics and Tapes: Conform to UL 18 IA. Provide products bearing appropriate UL 181 A markings.
  - 2. Do not provide sealing products not bearing UL approval markings.

## PART 3 EXECUTION

## 3.1 EXAMINATION

A. Verify sizes of equipment connections before fabricating transitions.

# 3.2 INSTALLATION

A. Install and seal ducts in accordance with SMACNA HVAC Duct Construction Standards Metal and Flexible.

- B. During construction, install temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- C. Use crimp joints with or without bead or beaded sleeve couplings for joining round duct sizes 8 inch and smaller.
- D. Install duct hangers and supports in accordance with Section 23 05 29.
- E. Use double nuts and lock washers on threaded rod supports.
- F. Connect flexible ducts to metal ducts with draw bands.

#### 3.3 INTERFACE WITH OTHER PRODUCTS

- A. Install openings in ductwork where required to accommodate thermometers and controllers. Install pitot tube openings for testing of systems. Install pitot tube complete with metal can with spring device or screw to prevent air leakage. Where openings are provided in insulated ductwork, install insulation material inside metal ring.
- B. Connect diffusers or light troffer boots to low pressure ducts directly or with 5 feet maximum length of flexible duct held in place with strap or clamp.
- C. Connect air outlets and inlets to supply ducts directly or with five-foot maximum length of flexible duct. Do not use flexible duct to change direction.

## 3.4 TESTING

- A. For ductwork designed for 3 inches w.c. above ambient, pressure test minimum 25 percent of ductwork after duct cleaning, but before duct insulation is applied or ductwork is concealed.
  - 1. Test in accordance with SMACNA HVAC Air Duct Leakage Test Manual.
  - 2. Maximum Allowable Leakage: In accordance with ICC IECC.

#### 3.5 SCHEDULES

A. Ductwork Material Schedule:

MATERIAL
Steel, Aluminum
Steel, Aluminum
Steel, Aluminum

B. Ductwork Pressure Class Schedule:

AIR SYSTEM	PRESSURE CLASS
Constant Volume Supply	1 inch wg regardless of velocity
Variable Volume-Variable Temperature Supply	1 inch wg regardless of velocity.
Variable Air Volume Supply (downstream of VAV boxes)	1 inch wg regardless of velocity.

Supply (Heating Systems)	I inch wg
Supply (System with Cooling Coils)	1 inch wg
# SECTION 23 33 00 - AIR DUCT ACCESSORIES

## PART 1 GENERAL

## 1.1 SUMMARY

- A. Section Includes:
  - 1. Volume control dampers.
  - 2. Flexible duct connections.

#### 1.2 REFERENCES

A. Sheet Metal and Air Conditioning Contractors:1. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.

## 1.3 SUBMITTALS

A. Refer to Section 01 30 00 - SUBMITTALS

## 1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years' experience.

## 1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect dampers from damage to operating linkages and blades.

## 1.6 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

## PART 2 PRODUCTS

#### 2.1 VOLUME CONTROL DAMPERS

- A. Manufacturers:
  - 1. Carnes Company.
  - 2. Greenheck Fan Corporation.
  - 3. Louvers and Dampers, Inc.
  - 4. Nailor Industries Inc.
  - 5. Pottorff.
  - 6. Ruskin Company.
- B. Fabricate in accordance with SMACNA HVAC Duct Construction Standards Metal and Flexible.
- C. Quadrants:
  - 1. Furnish locking, indicating quadrant regulators on single and multi-blade dampers.
  - 2. On insulated ducts mount quadrant regulators on standoff mounting brackets, bases, or adapters.
  - 3. Where rod lengths exceed 30 inches furnish regulator at both ends.

# 2.2 FLEXIBLE DUCT CONNECTIONS

- A. Manufacturers:
  - 1. Duro Dyne Inc.
  - 2. Flexmaster U.S.A., Inc.
  - 3. Hart & Cooley Inc.
- B. Fabricate in accordance with SMACNA HVAC Duct Construction Standards Metal and Flexible, and as indicated on Drawings,
- C. Connector: Fabric crimped into metal edging strip.
  - 1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric conforming to NFPA 90A, minimum density 30 oz. per sq.yd.
  - 2. Net Fabric Width: Approximately 3 inches wide.
  - 3. Metal: 3 inch wide, 24 gage galvanized steel.
- D. Leaded Vinyl Sheet: Minimum 0.55 inch thick, 0.87 lbs. per sq. ft, 10 dB attenuation in 10 to 10,000 Hz range.

# PART 3 EXECUTION

## 3.1 EXAMINATION

A. Check location of air outlets and inlets and make necessary adj ustments in position to conform to architectural features, symmetry, and lighting arrangement.

# 3.2 INSTALLATION.

- A. Install in accordance with NFPA 90A, and follow SMACNA HVAC Duct Construction Standards -Metal and Flexible. Refer to Section 23 31 00 for duct construction and pressure class.
- B. Access Doors: Install access doors at the following locations .1. Downstream of each VAV box.
- C. Access Door Sizes: Install minimum 8 x 8 inch size for hand access, 18 x 18 inch size for shoulder access, and . Review locations prior to fabrication.
- D. Install temporary duct test holes and required for testing and balancing purposes. Cut or drill in ducts. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.

# END OF SECTION

## SECTION 23 37 00 - AIR OUTLETS AND INLETS

## PART 1 GENERAL

## 1.1 SUMMARY

A. Section Includes:

- 1. Diffusers.
- 2. Registers
- 3. Grilles.
- 4. Section 09 90 00 Painting and Coating: Execution and product requirements for Painting of ductwork visible behind outlets and inlets specified by this section.
- 5. Section 23 01 00 Basic Mechanical Methods: Methods and procedures for mechanical work.

# 1.2 REFERENCES

A. Sheet Metal and Air Conditioning Contractors:I. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.

# 1.3 SUBMITTALS

- A. Test Reports: Rating of air outlet and inlet performance.
- B. Refer to Section 01 30 00 SUBMITTALS

## PART 2 PRODUCTS

## 2.1 RECTANGULAR CEILING DIFFUSERS

## A. Manufacturers:

- 1. Carnes Company.
- 2. Krueger.
- 3. METALAIRE, Inc.
- 4. Nailor Industries Inc.
- 5. Price Industries.
- 6. Titus.

- B. Type: Square and rectangular, multi-louvered diffuser to discharge air in four-way pattern.
- C. Frame: Inverted T-bar type. In plaster ceilings, furnish plaster frame and ceiling frame.
- D. Fabrication: Steel with baked enamel off-white finish.

# 2.2 CEILING SUPPLY REGISTERS/GRILLES

- A. Manufacturers:
  - 1. Carnes Company.
  - 2. Krueger.
  - 3. METALAIRE, Inc.
  - 4. Nailor Industries Inc.
  - 5. Price Industries.
  - 6. Titus.
- B. Type: Streamlined and individually adjustable curved blades to discharge air along face of grille, two-way deflection.
- C. Frame: 1 inchmargin with countersunk screw mounting and gasket.
- D. Fabrication: Aluminum extrusions with factory off-white enamel finish.
- E. Damper: Integral, gang-operated, opposed-blade type with removable key operator, operable from face.

## 2.3 CEILING RETURN REGISTERS/GRILLES

- A. Manufacturers:
  - 1. Carnes Company.
  - 2. Krueger.
  - 3. METALAIRE, Inc.
  - 4. Nailor Industries Inc.
  - 5. Price Industries.
  - 6. Titus.
- B. Type: Streamlined blades, 3/4 inch minimum depth, 3/4 inch maximum spacing, with blades set at 45 degrees, vertical face.
- C. Frame: 1 inch margin with countersunk screw mounting.
- D. Fabrication: Steel with 20 gage minimum frames and 22 gage minimum blades, steel and aluminum with 20 gage minimum frame, or aluminum extrusions, with factory off-white enamel finish.
- E. Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face where not individually connected to exhaust fans.

## PART 3 EXECUTION

#### 3.1 EXAMINATION

- A. Verify inlet and outlet locations.
- B. Verify ceiling systems are ready for installation.

## 3.2 INSTALLATION

- A. Install diffusers to ductwork with airtight connection.
- B. Install balancing dampers on duct take-off to diffusers, grilles, and registers, whether or not dampers are furnished as part of diffuser, grille, and register assembly. Refer to Section 23 33 00.

# 3.3 INTERFACE WITH OTHER PRODUCTS

A. Check location of outlets and inlets and make necessary adjustments in position to conform to architectural features, symmetry, and lighting arrangement.

# END OF SECTION

# SECTION 26 05 00

# COMMON WORK RESULTS FOR ELECTRICAL WORK

# PART 1 - GENERAL

## 1.1 DESCRIPTION OF WORK

A. <u>Work Included</u>: This Section specifies basic materials and methods for electrical work.

The following items are not included in this Section and will be performed under the designated Sections:

- 1. Determine interfaces and coordinate with work completed, progressing, or to be performed under other sections of these Specifications or by other contractors. Make indicated connections to previously completed work. Where future connections to or extensions of the work are indicated, make safe and convenient provisions for such future connections and extensions.
- 2. Where indicated, take possession of, maintain, and operate as required any electrical plant and equipment left in place by others. Where indicated, leave temporary and interim electrical work, plant and equipment in place for maintenance and operation by others.

## 1.2 REFERENCES

- A. Comply with applicable requirements of the following:
  - 1. National Electrical Code
  - 2. Client Standards
  - 3. All applicable federal, local and State Codes
  - 4. National Electrical Safety Code

# 1.3 SUBMITTALS

- A. Submit shop drawings for review showing fabricated work being furnished and installed under these Specifications. Submit such drawings prior to fabrication and within ample time to prevent delays in the work.
- B. Submit verified test results to the Engineer promptly upon completion of test.
- C. Before installation of the wire and cable, submit the following information for each type and size of wire and cable for review:

- 1. Manufacturer of the wire and cable.
- 2. Number and size of strands composing each conductor.
- 3. Conductor insulation composition and thickness in mils.
- 4. Average overall diameter of finished wire and cable.
- 5. Minimum insulation resistance in megohms per 1,000 feet at 20°C ambient temperature.
- 6. Jacket composition (if any) and thickness in mils.
- 7. Total number of conductors per cable.
- 8. Shield material (if any) and thickness.
- 9. Conductor resistance and reactance in ohms per 1,000 feet at 20°C ambient temperature.
- 10. Conductor ampacity at 20°C ambient temperature.

# PART 2 - PRODUCTS

## 2.1 GENERAL REQUIREMENTS

- A. Furnish all items of the materials, design, sizes, and ratings shown on the Contract Drawings and herein specified.
- B. Furnish materials and equipment bearing evidence of UL listing where UL standards exist and such product listing is available.
- C. Methods of fabrication, assembly and installation are optional unless otherwise specifically indicated.
- D. Provide products that are free from defects impairing performance, durability, or appearance, and of the commercial quality best suited for the purpose shown on the Contract Drawings or specified herein.
- E. Steel conduit and accessories specified to be zinc coated: Hot-dipped galvanized after fabrication in accordance with ASTM A286.
- F. Conform to applicable requirements of Insulation Cable Engineers' Association (ICEA).

## 2.2 RIGID GALVANIZED STEEL CONDUIT AND ACCESSORIES

- A. Conduit, couplings, elbows, bends, and nipples: ANSI C80.1 and UL 6, with each length bearing manufacturer's stamp and UL label.
- B. Method used to determine the thickness of zinc coating: The Referenced Test included in the appendix to ANSI C80.1.

- C. Fittings and Accessories:
  - 1. Galvanized steel or malleable iron, ANSI C80.4.
  - 2. Provide separable watertight hub fittings with a gasket, separate nylon insulated throat and a case-hardened locknut.
  - 3. Bushings: Nylon insulated metallic and grounding type.
  - 4. Furnish conduit straps, clamps, and clamp backs made of galvanized malleable iron.
- D. All conduits penetrating floors and ceilings must have brass labels for ease of tracing circuits.
- E. All galvanized conduits passing through concrete shall have an anti-corrosion material added to the galvanized conduits.

# 2.3 TYPE EMT-S DUCT RACEWAYS AND ELBOWS

- A. Performance Criteria:
  - 1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction and marked for intended location and application.
  - 2. Listing Criteria: UL CCN FJMX; including UL 797.
- B. Source Quality Control:
  - 1. Product Data: Prepare and submit catalog cuts, brochures, and performance data illustrating size, physical appearance, and other characteristics of product.
  - 2. Manufacturer's Published Instructions: Prepare and submit installation, testing, and operating instructions for product.
- C. UL FJMX Steel Electrical Metal Tubing (EMT-S) and Elbows:
  - 1. Material: Steel.
  - 2. Options:
    - a. Exterior Coating: Zinc.
    - b. Interior Coating: Zinc with organic top coating.
    - c. Minimum Trade Size: trade size 3/4.
    - d. Colors: As indicated on Drawings.

# 2.4 LIQUID-TIGHT FLEXIBLE METALLIC CONDUIT AND FITTINGS

- A. Furnish conduit consisting of a core of flexible galvanized steel with an extruded liquid-tight plastic or neoprene jacket overall. Jacket shall be moisture and oil-proof, capable of conforming to the minimum radius bends of flexible conduit without cracking.
- B. Furnish conduits with a continuous copper bonding conductor spiral wound between the convolutions, as required by NEC, and as indicated.

C. Fittings: UL Standard 514, cadmium or zinc coated.

# 2.5 CONDUIT EXPANSION FITTINGS

- A. Fabricate from material similar to the type of conduit with which they are to be used.
- B. Include a factory installed packing ring, designed to prevent the entrance of moisture, and a pressure ring.
- C. Also include a grounding ring or a grounding conductor for metallic expansion couplings.

# 2.6 INSERTS

- A. Channel Inserts. Fabricate from not less than 12-gauge steel channel having an overall size of 1-1/2 by 1-1/2 or 1-5/8 by 1-5/8 inches with continuous 7/8-inch-wide slot, in lengths as indicated. Galvanize after fabrication.
- B. Channel Inserts for Embedding in Concrete
  - 1. Fabricate from channels having a solid base.
  - 2. Weld concrete anchors to the channel during fabrication and before coating.
  - 3. Galvanize after fabrication.
  - 4. Provide assemblies with a minimum pull-out load rating of 4,500 pounds per linear foot uniformly distributed.
  - 5. Furnish all channel inserts for installation embedded in concrete with the channel interior completely filled with Styrofoam to prevent seepage of concrete into the channel during installation.
- C. Channel Inserts for Surface Mounting
  - 1. Fabricate from channel having 3/8 inch by 3-inch slots on 4-inch centers in the base.
  - 2. Galvanize inserts for surface mounting on concrete surfaces or for installation in damp or wet areas.
- D. Spot Inserts for Embedding in Concrete
  - 1. Steel, galvanized after fabrication.
  - 2. Designed for a maximum loading of 800 pounds with safety factor of three.
  - 3. Knockout openings to accommodate either square or rectangular nuts.

# 2.7 SURFACE METAL RACEWAYS AND FITTINGS

# A. ANSI/UL 5 and the NEC.

# 2.8 OUTLET, JUNCTION AND PULL BOXES

- A. Conform to NEC Article 370. Electrical boxes shall conform to UL-50, "Standard for Electrical Cabinets and Boxes", and UL-514, "Standard for Electrical Outlet Boxes and Fittings".
- B. Provide electrical boxes of the material, finish, type and size indicated and required for the location, kind of service, number of wires, and function. Boxes shall have mounting holes retapped for 10-24 machine screws.
- C. Provide boxes complete with accessible covers designed for quick removal and suitable for the purpose for which they will be used, except that boxes in which or on which no devices or fixtures are to be installed, shall be equipped with flat or raised blank covers as required. All ceiling fixture outlet boxes shall be equipped with 3/8-inch boltless fixture studs.
- D. All outdoor enclosures shall be NEMA 4X stainless steel with piano hinge and pad lockable latch.
- E. Covers: Same thickness as boxes and secured in position by means of No. 10-24 stainless steel machine screws. Arrange covers to be readily and conveniently removed.
- F. Coat junction boxes inside and outside to prevent oxidation. Where outlet boxes are used as junction boxes, they shall be cast aluminum and not be smaller than 4 inches square by 1-1/2 inches deep. Provide such boxes with flat blank covers.
- G. Outlet Boxes: Cast aluminum, not be smaller than 4 inches square by 2-1/8 inches deep.
- H. Concealed Switch Boxes: Stainless steel, not less than 4 inches square by 1-1/2 inches deep for two devices unless otherwise indicated. Provide covers with rectangular openings of proper size and shape. Furnish and install special boxes required to suit the kind of service and location requirements, as indicated, and as may be directed by the Engineer.
- I. Furnish brackets, supports, hangers, fittings, bonding jumpers and all other accessories required.
- J. Provide neoprene gaskets 1/8 inch thick with boxes subjected to weather, and as directed by the Engineer.
- K. Grounding. Provide each box to which a lighting fixture or receptacle is to be attached with a grounding terminal.
  - 1. Grounding Terminal: Either a green-colored washer-in-head machine screw not smaller than No. 10-32 in a drilled and tapped hole in the back of the box, or a grounding bushing with green-colored machine screw terminal attached to one of the conduits.
  - 2. Provide suitable grounding terminals in motor connection boxes.
- L. Junction and pull boxes must be surface mounted and not buried.

# 2.9 WIRING DEVICES

A. General. Wiring devices include switches, receptacles and special outlets installed in raceway or conduit boxes, complete with cover plates.

# B. Switches

- 1. AC tumbler-toggle switches: Meeting minimum requirements of UL 20 and further requirements herein specified and of specification grade, heavy duty, of the type indicated.
- 2. Provide switches that operate in any position and are fully enclosed with entire body and cover of molded phenolic, urea or melamine. Do not use fiber, paper or similar insulating material for body or cover.
- 3. Equip switches with metal mounting yoke with plaster ears, insulated from the mechanism and fastened to the switch body by bolts, screws, rivets or other substantial means that meet test requirements.
- 4. Provide a green-colored equipment grounding screw on the yoke.
- 5. Provide the section of the yoke normally intended to bear on the surface outside the box with a minimum over-all dimension of 3/4 inch, measured at right angles to the longitudinal axis of the yoke.
- 6. Make switch contacts between silver or silver alloys.
- 7. Switches shall be back, and side wired with terminals of screw or combination screw-clamp type.
- 8. Terminal Screws: No. 8 or larger, captive, or terminal type.
- 9. Provide access holes for back wiring.
- 10. Wiring terminals capable of receiving and holding proper wire sizes as shown below:

Switch Rating	Wire Size, AWG No.
20 amperes	12
30 amperes	10

- C. Wall switches: Tumbler type, totally enclosed, heavy duty, in accordance with NEMA WD 1.
- D. Switches for use on incandescent or fluorescent lighting circuits: Fully rated 20 amperes at 120 or 277 volts, as indicated. Actual connected lamp wattage not to exceed the following:

Switch Rating at 120-	Maximum Wattage Allowed
277 Volts	120 Volts 277 Volts
20 amperes	1,400 3,000

- E. Switches controlling outlets other than lighting, such as motors less than 1/4 horsepower may be specification grade, flush type, AC DC, T-rated 20 ampere, 125 volts. Switches controlling straight resistance loads may be snap switches as specified herein, of the proper rating up to 30 amperes at 120-277 volts.
- F. Provide ac 120–277-volt snap switches capable of withstanding tests as outlined in NEMA WD 1, Paragraphs WD 1-2.04, WD 1-2.05A, WD 1-2.05C, WD 1-2.05E2, WD 1-2.05F2, and WD 1-2.05G. If requested by the Engineer, submit satisfactory evidence that the types of switches proposed have satisfactorily withstood these tests.

# 2.10 RECEPTACLES AND PLUGS

- A. Configuration and requirements for connector and outlet receptacles; UL 498 and NEMA WD 1 for heavy duty general use type.
- B. Receptacles: Fire-resistant nonabsorptive, hot molded phenolic composition or equal bodies and bases with metal plaster ears integral with supporting member.
- C. Type: Flush type, except where otherwise indicated.
  - 1. Wall receptacles: Single or duplex as shown on the Contract Drawings.
  - 2. Provide receptacles and plugs (caps) with light-colored terminal facilities for neutral connections, amber or brass colored for phase conductor connections, and green-colored hexagonal machine screws for the equipment grounding conductor or connections.
  - 3. All contracts of the receptacles, including the grounding contract: Double grip bronze type with spring steel backup clips so that both sides of each male prong of the plug will be in firm contact.
  - 4. Provide all receptacles with self-grounding clip or mounting strap screws.
  - 5. Ground fault circuit interrupter duplex receptacles shall be 120-volt, 60 Hz, 15 ampere with built-in test, reset buttons, and ground fault tripped indication. They shall interrupt the circuit within 1/30th of a second on a 5 milliampere earth leakage current. They shall be designed for end of run installation or with provisions for feeding through to protect other outlets on the circuit. Maximum circuit capacity for the latter shall be 20 amperes. The receptacles shall be furnished with necessary wire connectors, clips, mounting scores and instruction.

## 2.11 COVER PLATES

- A. Provide cover plates for each switch, receptacle, and special purpose outlet.
- B. Use multi-gang plates for multi-gang boxes.

- C. Unless otherwise indicated, use cover plates conforming to FS W-P-455.
- D. Provide and install cover plates of brushed stainless steel in ancillary spaces, mechanical rooms, fan rooms, wire closets, AC switchboard rooms, traction substations, and all unfinished areas.
- E. In public areas provide cover plates fabricated of corrosion-resistant steel, 18% chromium, 8% nickel with baked porcelain enamel bronze finish.
- F. For special purpose outlets commercially produced using special material, configuration, and size, use plate of brushed stainless steel and of a design for the particular application.
- G. Where plates of material and finish herein specified are not available commercially for these special purpose outlets, plates commercially available and suitable for enameling to match adjacent surface will be acceptable.
- H. Use stainless steel cover plates of 0.040 thickness for flush devices.

# PART 3 - EXECUTION

# 3.1 GENERAL

- A. Install all items in their proper locations as shown on the Contract Drawings, rigid and secure, plumb and level, and in true alignment with related and adjoining work. Do not weld electrical materials for attachment or support.
- B. Furnish anchor bolts and anchorage items as required, and field check to ensure proper alignment and location. Provide templates, layout drawings, and supervision at the job site to ensure correct placing of anchorage items in concrete. Check embedded items for correctness of location and detail before concrete is placed.
- C. Install supporting members, fastenings, framing, hangers, bracing, brackets, straps, bolts and angles as required to set and connect rigidly the work.
- D. Control erection tolerance requirements to not impair the strength, safety, serviceability, or appearance of the installations, as approved by the Engineer. Determine exact location of conduit. Route all conduit parallel to building lines.
- E. The trade size, type and general routing and location of conduits, raceways, and boxes shall be as indicated.
- F. Install exposed conduit so as to avoid conflicts with other work. Install horizontal raceway close to the ceiling or ceiling beams, and above water or other piping whenever possible.
- G. Install individual conductors in conduits, raceways, cable trays, ducts, and trenches and multiple-conductor sheathed cables as shown on the Contract Drawings to complete the wiring systems.
- H. Install switches, receptacles, special purpose outlets, and cover plates complete in a neat manner in accordance with the NEC and local electrical codes.

I.All entry into outdoor enclosures shall utilize weather tight connectors to prevent the entry of water. Wherever possible do not enter the top of enclosures.

# 3.2 CONDUIT AND FITTINGS

- A. Metallic Electrical Conduit
  - 1. Install metallic conduit in accordance with the NEC and as indicated. Prevent concrete and other materials from obstructing the conduit. Pack all outlet, pull and junction boxes with paper prior to pouring concrete ends of embedded conduit. Do not use conduit smaller than 3/4-inch diameter.
  - 2. Make all conduit bends in accordance with the NEC, with not more than 3 bends per run (a total of 270 degrees). Where more than 3 bends are required in a particular run, install pull boxes as required to facilitate pulling conductors.
  - 3. Unless otherwise indicated, terminate metallic conduit installed for future extension with flush couplings set to finished floor level.
  - 4. Provide metallic numbering tags indicating the conduit number on the end of conduit. Identify train control and communication conduit as indicated.
  - 5. Install conduit so that any moisture collecting in the conduit will be drained to the nearest outlet or pull box.
  - 6. Whenever exposed or buried conduit passes through an expansion or contraction joint in the structure, install the conduit at right angles to the joint, and provide an approved conduit expansion joint at the joint. Paint the conduit with an approved bituminous compound for one foot on each side of the expansion couplings.
  - 7. Provide expansion joints in conduit runs where required to compensate for thermal expansion or other movement.
  - 8. Rod and swab conduit after installation to remove foreign matter, which may have worked in at the joints. If obstructions are encountered which cannot be removed, or if any conditions exist which may result in damage to wires and cables pulled through the conduit, install new conduit at no additional expense to the owner.
  - 9. After the conduit has been rodded and swabbed, repack boxes and protect conduit ends to prevent any foreign material from entering the conduit.
  - 10. Where metallic conduit is exposed to different temperatures, seal the conduit to prevent condensation and passage of air from one area to the other.
  - 11. Use only conduits that are electrically and mechanically continuous and connect to the structure ground system. Secure continuous ground by bonding where required.
  - 12. Apply conductive anti-seize compound to the threads of threaded rigid conduit joints. Do not use compounds containing lead. Terminate the conduit in appropriate boxes at all motors, switches, outlets, and junction points.

- 13. When field cutting of conduit is required, thread and ream the conduit to remove any rough edges. Where a conduit enters a box or other fitting, provide a bushing to protect the wire from abrasion. Provide insulation type bushings and double locknuts on ends of rigid conduits terminating at steel boxes, panelboards, cabinets, motor starting equipment, and similar enclosures.
- 14. Support individual horizontal conduits not larger than 1-1/2 inches diameter by means of one-hole pipe straps with back spacers or individual pipe hangers.
- 15. Space conduits installed against concrete surfaces away from the surface by clamp backs or other approved means.
- 16. Support parallel conduits at the same elevation on multiple conduit hangers or channel inserts. Secure each conduit to the pipe hanger or channel insert member by a U-bolt, one-hole strap, or other specially designed and approved fastener suitable for use with the pipe hangers or channel inserts.
- 17. Space supports not over 10 feet on centers for vertical conduits spanning open areas. Securely anchor conduit at each end and run so as not to interfere with the installation and operation of equipment at the location.
- 18. Support conduits and raceways above suspended ceilings from either the floor construction above or from the main ceiling support members, using the applicable method specified herein.
- 19. Install liquid-tight flexible metal conduit so that liquids tend to run off the surface and not drain toward fittings. Provide sufficient slack to reduce the effects of vibration. Running threads are not acceptable. Where necessary for connecting conduits, use right- and left-hand couplings.
- B. Non-Metallic Electrical Conduit
  - 1. Properly support conduits to maintain the correct location and spacing during concreting operations and, if necessary, provide suitable plastic supports and spacers for this purpose.
- C. Pull Wires
  - 1. Use nylon pull wires of tensile strength not less than 240 pounds in each conduit and duct, leave pull wires in ducts and conduit after cleaning.
  - 2. No splices in pull wire will be allowed.
  - 3. Leave ample slack length at each end of pull wire.
- D. Filling of Openings. Wherever slots, sleeves, or other openings are provided in floors or walls for the passage of raceways, including bus ducts, fill such openings as follows:
  - 1. Use fire-resistive filling material for openings similar to the material of the floor, wall or ceiling being penetrated, and finish to prevent passage of water, smoke, and fumes.
  - 2. Where conduits passing through openings are exposed in finished rooms, use filling material that matches, and is flush with, the adjoining finished floor, ceiling or wall.

# 3.3 INSERTS

- A. Channel Inserts. Install embedded channel inserts with the slotted face flush with the finished concrete surface.
- B. Spot Inserts
  - 1. Install with the insert face flush with the finished building surface, firmly embedded, with no evidence of movement.
  - 2. All floor and wall penetrations shall utilize fire retardant materials in order to maintain the fire rating of the surface being penetrated.
  - 3. Test selected inserts, as required by the Engineer, by suspension of 800 pounds of weight from the insert. If there is evidence of failure, replace the inserts in a manner satisfactory to the Engineer.

# 3.4 SURFACE METAL RACEWAYS

- A. Securely ground surface metal raceways to outlet boxes or to backplates and fixtures by means of bolts, screws, or other approved means.
- B. Install surface metal raceways where indicated, in accordance with the NEC. Use fittings and accessories designed for the raceway.

# 3.5 OUTLET, JUNCTION AND PULL BOXES

- A. Outlet Boxes
  - 1. Unless otherwise indicated, flush mount outlet boxes with the front edges of the boxes or plaster covers attached thereto flush with the finished wall or ceiling.
  - 2. Mount boxes so that the long axis of the devices will be vertical, unless otherwise indicated.
  - 3. Locate conduit boxes and conduit box knockouts so as not to interfere with the reinforcing steel.
  - 4. Unless otherwise specified, provide boxes in plastered walls and ceilings with plaster covers. Do not install these covers until the finish plaster line is determined for the particular location.
  - 5. The mounting height indicated for a wall-mounted outlet box shall be construed to mean the height from the finished floor to the horizontal centerline of the cover plate.
  - 6. Mount outlet boxes for switches and receptacles located on columns and pilasters so as not to interfere with installation of partitions.
  - 7. Install boxes located near doors on the lock sides, even where the symbols appear on the hinge sides on the Contract Drawings, unless other locations are approved by the Engineer.

## B. Junction and Pull Boxes

- 1. Install so that covers are readily accessible after completion of the installation.
- 2. Do not install boxes above suspended ceilings, except where the ceiling is of the removable type or where definite provisions are made for access to each box.

# 3.6 WIRING

- A. General
  - 1. Furnish wires and cables to the site in unbroken standard coils or reels, to which shall be attached a tag bearing the manufacturer's name, trade name of the wire, and the UL label for 600-volt wire and cable.
  - 2. Provide all wiring complete as indicated. Provide ample slack wire for motor loops, service connections and extensions. In outlet or junction boxes provided for installation of equipment by others, tape ends of wires and install blank covers.
  - 3. Do not bend cables during installation, either permanently or temporarily, to radii less than 12 times the outer diameters, except where conditions make the specified radius impracticable, and shorter radii are permitted by the NEC and NEMA Standard WC 7, Appendix N.
  - 4. Neatly and securely bundle cable conductors located in branch circuit panelboards, cabinets, control boards, switchboards and motor control centers and pull boxes. Use nylon bundling straps.
- B. Wire Pulling
  - 1. Install wire and cable in conduit as indicated. Do not pull wiring into any conduit until conduits and outlets have been thoroughly cleaned and swabbed to remove water and debris. Do not use block or tackle or other mechanical means in pulling conductors smaller than No. 2 AWG in raceways.
  - 2. Provide suitable installation equipment to prevent cutting and abrasion of conduits and wire during the pulling of feeders. Use lubricant and installation procedure as recommended by the cable manufacturer, and as approved by the Engineer.
  - 3. Use masking or other means to prevent obliteration of cable identifications when solid color coating or colored tracers are used.
  - 4. Pull together all cables to be installed in a single conduit.
- C. Cable Supports. Install cable supports for vertical feeders in accordance with the NEC.
- D. Splices and Terminations
  - 1. Make wire and cable splices only in outlet, junction or pull boxes, or in equipment cabinets. Splices in conduit or raceway will not be permitted. Make splices by means of compression type connectors, and cover with tape to an insulation level equal to that of the cable.

- 2. Use positive type connector installation tools as recommended by the manufacturer.
- 3. Mechanical hand tools, with dies for each conductor size, recommended by the manufacturer, may be used on conductor sizes through No. 4/0.
- 4. For conductor sizes larger than No. 4/0, use hydraulic tools with hexagonal or circumferential installing dies for each conductor size, as recommended by the manufacturer.
- 5. For inspection purposes, clearly mark die numbers on the installed connectors.
- 6. Before installation, apply anti-corrosion electrical joint compound to conductors and terminal bolting pads.

# 3.7 WIRING DEVICES

- A. Locate switches four feet above finished floor, except as otherwise indicated.
- B. Attach receptacles rigidly to outlet box by means of two screws.
- C. Wire duplex receptacles, where so indicated, so that one unit of the duplex may be controlled by a wall switch and the other unit remain continuously energized.
- D. For exterior locations, mount receptacles in watertight cast type outlet boxes with threaded hubs or bosses and equipped with gasketed cover and captive cap of the screw or twist type.
- E. Provide equipment permanently connected to exterior receptacles, or in areas subject to spray or hose cleaning, with watertight male plugs to suit. Such receptacles shall be of the ground fault circuit interrupter type, as specified herein.
- F. Furnish one matching plug with each receptacle, as indicated, installed in the work.

END OF SECTION 26 05 00

# SECTION 26 05 19

# CONDUCTORS AND CABLES

# PART 1 - GENERAL

# 1.1 SUMMARY

- A. Section Includes:
  - 1. Copper building wire rated 600 V or less.
  - 2. Connectors, splices, and terminations rated 600 V and less.

# 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Product Schedule: Indicate type, use, location, and termination locations.

## 1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

# PART 2 - PRODUCTS

## 2.1 COPPER BUILDING WIRE

- A. Description: Flexible, insulated, and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.
- B. Standards:
  - 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
  - 2. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."
- C. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 or ASTM B496 for stranded conductors.
- D. Conductor Insulation:
  - 1. Type NM: Comply with UL 83 and UL 719.
  - 2. Type RHH and Type RHW-2: Comply with UL 44.

- 3. Type THHN and Type THWN-2: Comply with UL 83.
- 4. Type THW and Type THW-2: Comply with NEMA WC-70/ICEA S-95-658 and UL 83.
- 5. Type XHHW-2: Comply with UL 44.

# 2.2 CONNECTORS AND SPLICES

- A. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
- B. Lugs: One piece, seamless, designed to terminate conductors specified in this Section.
  - 1. Material: Copper.
  - 2. Type: One or Two hole with standard barrels.
  - 3. Termination: Compression.

# 2.3 CATEGORY 6 BALANCED TWISTED PAIR CABLE

- A. Description: Four-pair, balanced-twisted pair cable, certified to meet transmission characteristics of Category 6 cable at frequencies up to 250 MHz.
- B. Standard: Comply with ICEA S-90-661, NEMA WC 63.1, and TIA-568-C.2 for Category 6 cables.
- C. Conductors: 100-ohm, No. 24 AWG solid copper.
- D. Shielding/Screening: Unshielded twisted pairs (UTP), Shielded twisted pairs (FTP)] Screened twisted pairs (F/UTP), Screened and shielded twisted pairs (F/FTP).
- E. Cable Rating: Plenum.
- F. Jacket: Gray thermoplastic.

# PART 3 - EXECUTION

# 3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders:
  - 1. Copper; solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
  - 2. Copper for feeders smaller than No. 4 AWG; copper for feeders No. 4 AWG and larger. Conductors must be solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- B. Branch Circuits:

## 1. Copper, Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

2. Copper, Solid for No. 12 AWG and smaller; stranded for No. 10 AWG and larger.

# 3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Exposed Feeders: Type THHN/THWN-2, single conductors in raceway
- B. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspaces: Type THHN/THWN-2, single conductors in raceway.
- C. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN-2, single conductors in raceway.

# 3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.
- B. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes" prior to pulling conductors and cables.
- C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members and follow surface contours where possible.
- F. Support cables according to Section 260529 "Hangers and Supports."

# 3.4 IDENTIFICATION

A. Identify each spare conductor at each end with identity number and location of other end of conductor and identify as spare conductor.

# 3.5 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

# END OF SECTION 26 05 19

SECTION 26 05 26

# GROUNDING AND BONDING

# PART 1 - GENERAL

# 1.1 SUMMARY

A. This Section includes methods and materials for grounding systems and equipment.

# 1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Field quality-control test reports.

# 1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

# PART 2 - PRODUCTS

# 2.1 CONDUCTORS

- A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
  - 1. Solid Conductors: ASTM B 3.
  - 2. Stranded Conductors: ASTM B 8.
  - 3. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
  - 4. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
  - 5. Bonding Jumper: Copper tape, braided conductors, terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

# 2.2 CONNECTORS

- A. Listed and labeled by a nationally recognized testing laboratory acceptable to authorities having jurisdiction for applications in which used, and for specific types, sizes, and combinations of conductors and other items connected.
- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, bolted pressure-type, with at least two bolts.
  - 1. Pipe Connectors: Clamp type, sized for pipe.
- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

# PART 3 - EXECUTION

# 3.1 APPLICATIONS

- A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger, unless otherwise indicated.
- B. Conductor Terminations and Connections:
  - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
  - 2. Connections to Structural Steel: Welded connectors.

# 3.2 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:
  - 1. Feeders and branch circuits.
  - 2. Lighting circuits.
  - 3. Receptacle circuits.
  - 4. Single-phase motor and appliance branch circuits.
  - 5. Three-phase motor and appliance branch circuits.
  - 6. Flexible raceway runs.
  - 7. Metal-clad cable runs.

# 3.3 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance, except where routed through short lengths of conduit.
  - 1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
  - 2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install so vibration is not transmitted to rigidly mounted equipment.
  - 3. Use exothermic-welded connectors for outdoor locations, but if a disconnect-type connection is required, use a bolted clamp.

# 3.4 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections and prepare test reports:
  - 1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
  - 2. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal.
    - a. Measure ground resistance not less than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
    - b. Perform tests by fall-of-potential method according to IEEE 81.
- B. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

# END OF SECTION 26 05 26

# SECTION 26 05 29

# HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

# PART 1 - GENERAL

## 1.1 SUMMARY

- A. Section includes:
  - 1. Hangers and supports for electrical equipment and systems.
  - 2. Construction requirements for concrete bases.

## 1.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design supports for multiple raceways, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
- C. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
- D. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.

## 1.3 SUBMITTALS

- A. Product Data: For steel slotted support systems.
- B. Shop Drawings: Show fabrication and installation details and include calculations for the following:
  - 1. Trapeze hangers. Include Product Data for components.
  - 2. Steel slotted channel systems. Include Product Data for components.
  - 3. Equipment supports.
- C. Welding certificates.

# 1.4 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code Steel."
- B. Comply with NFPA 70.

# PART 2 - PRODUCTS

# 2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Allied Tube & Conduit.
    - b. Cooper B-Line, Inc.; a division of Cooper Industries.
    - c. ERICO International Corporation.
    - d. GS Metals Corp.
    - e. Thomas & Betts Corporation.
    - f. Unistrut; Tyco International, Ltd.
    - g. Wesanco, Inc.
  - 2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
  - 3. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
  - 4. Channel Dimensions: Selected for applicable load criteria.
- B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- C. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- D. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- E. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

- 1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened Portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
  - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - 1) Hilti Inc.
    - 2) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
    - 3) MKT Fastening, LLC.
    - 4) Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit.
- 2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened Portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
  - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - 1) Cooper B-Line, Inc.; a division of Cooper Industries.
    - 2) Empire Tool and Manufacturing Co., Inc.
    - 3) Hilti Inc.
    - 4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
    - 5) MKT Fastening, LLC.
- 3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
- 4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
- 5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
- 6. Toggle Bolts: All-steel springhead type.
- 7. Hanger Rods: Threaded steel.

# 2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

## PART 3 - EXECUTION

# 3.1 APPLICATION

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.
- B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 3/8" inch in diameter.
- C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted or other support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
  - 1. Secure raceways and cables to these supports with single-bolt conduit clamps.
- D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

# 3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.
- B. Raceway Support Methods: In addition to methods described in NECA 1, EMT, IMC, and RMC may be supported by openings through structure members, as permitted in NFPA 70.
- C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.
- D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
  - 1. To Wood: Fasten with lag screws or through bolts.
  - 2. To New Concrete: Bolt to concrete inserts.
  - 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
  - 4. To Existing Concrete: Expansion anchor fasteners.
  - 5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches thick or

greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.

- 6. To Steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69.
- 7. To Light Steel: Sheet metal screws.
- 8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that meet seismic-restraint strength and anchorage requirements.
- E. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

# 3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- B. Field Welding: Comply with AWS D1.1/D1.1M.

# 3.4 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
  - 1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.
- B. Touchup: Comply with requirements in Division 9 painting Sections for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.
- C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

# END OF SECTION 26 05 29

SECTION 26 05 33

# RACEWAYS AND BOXES

# PART 1 - GENERAL

## 1.1 SUMMARY

A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

# 1.2 SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
- B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, details, and attachments to other work.

# 1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

# PART 2 - PRODUCTS

## 2.1 METAL CONDUIT AND TUBING

- A. Rigid Steel Conduit: ANSI C80.1.
- B. IMC: ANSI C80.6.
- C. EMT: ANSI C80.3.
- D. FMC: Zinc-coated steel.
- E. LFMC: Flexible steel conduit with PVC jacket.
- F. Fittings for Conduit (Including all Types and Flexible and Liquidtight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.
  - 1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886.

2. Fittings for EMT: Steel, compression type.

# 2.2 METAL WIREWAYS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Cooper B-Line, Inc.
  - 2. Hoffman.
  - 3. Square D; Schneider Electric.
- B. Description: Sheet metal sized and shaped as indicated, NEMA 250, Type 1, unless otherwise indicated.
- C. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
- D. Wireway Covers: Screw-cover type.
- E. Finish: Manufacturer's standard enamel finish.

# 2.3 SURFACE RACEWAYS

- A. Surface Metal Raceways: Galvanized steel with Snap-On covers. Manufacturer's standard enamel finish.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Thomas & Betts Corporation.
    - b. Walker Systems, Inc.; Wiremold Company (The).
    - c. Wiremold Company (The); Electrical Sales Division.

# 2.4 BOXES, ENCLOSURES, AND CABINETS

- A. Cast-Metal Outlet and Device Boxes: NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.
- B. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- C. Hinged-Cover Enclosures: NEMA 250, Type 1, and NEMA 4X Stainless Steel, with continuous-hinge cover with flush latch, unless otherwise indicated. All NEMA 4X enclosures shall be lockable.

# D. Cabinets:

- 1. NEMA 4X, stainless steel box with removable interior panel and removable front.
- 2. Hinged door in front cover with flush latch and concealed hinge.
- 3. Key latch to match panelboards.
- 4. Metal barriers to separate wiring of different systems and voltage.
- 5. Accessory feet where required for freestanding equipment.

# PART 3 - EXECUTION

# 3.1 RACEWAY APPLICATION

- A. Comply with the following indoor applications, unless otherwise indicated:
  - 1. Exposed: Rigid steel conduit.
  - 2. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
  - 3. Damp or Wet Locations: Rigid steel conduit.
  - 4. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4X, stainless steel in damp or wet locations.
- B. Minimum Raceway Size: 3/4-inch trade size.
- C. Raceway Fittings: Compatible with raceways and suitable for use and location.
  - 1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.

# 3.2 INSTALLATION

- A. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter.
- B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- C. Complete raceway installation before starting conductor installation.
- D. Arrange stub-ups so curved portions of bends are not visible above the finished slab.

- E. Install no more than the equivalent of three 90-degree bends in any conduit run except for communications conduits, for which fewer bends are allowed.
- F. Conceal conduit within finished walls, ceilings, and floors, unless otherwise indicated.
- G. Raceways Embedded in Slabs:
  - 1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
  - 2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
  - 3. Change from ENT to RNC, Type EPC-40-PVC, rigid steel conduit, or IMC before rising above the floor.
- H. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors, including conductors smaller than No. 4 AWG.
- I. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire.
- J. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:
  - 1. Where conduits pass from warm to cold locations., such as boundaries of refrigerated spaces.
  - 2. Where otherwise required by NFPA 70.
- K. Flexible Conduit Connections: Use maximum of 72 inches of flexible conduit for equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
  - 1. Use LFMC in damp or wet locations subject to severe physical damage.
- L. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block and install box flush with surface of wall.

# 3.3 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly.

END OF SECTION 26 05 33

# SECTION 26 05 44 SLEEVES AND SLEEVE SEALS FOR ELECTRICAL WORK

# PART 1 - GENERAL

## 1.1 SUMMARY

- A. Section Includes:
  - 1. Sleeves.
  - 2. Stack-sleeve fittings.
  - 3. Sleeve-seal systems.
  - 4. Sleeve-seal fittings.
  - 5. Grout.
  - 6. Silicone sealants.

## 1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

# PART 2 - PRODUCTS

## 2.1 SLEEVES

- A. Cast-Iron Pipe Sleeves: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral water stop collar.
- B. Steel Pipe Sleeves: ASTM A53/A53M, Type E, Grade B, Schedule 40, anti-corrosion coated or zinc coated, with plain ends and integral welded water stop collar.
- C. Galvanized-Steel Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

## 2.2 SLEEVE-SEAL SYSTEMS

- A. Description:
  - 1. Modular sealing-element unit, designed for field assembly, for filling annular space between conduit and sleeve.
  - 2. Designed to form a hydrostatic seal of 20-psig.
  - 3. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of conduit. Include type and number required for pipe material and size.
  - 4. Pressure Plates: Carbon steel.

5. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating, ASTM B633 of length required to secure pressure plates to sealing elements.

# 2.3 GROUT

- A. Description: Non-shrink, recommended for interior and exterior sealing openings in non-firerated walls or floors.
- B. Standard: ASTM C1107/C1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- C. Design Mix: 5000-psi, 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

# PART 3 - EXECUTION

# 3.1 SLEEVE INSTALLATION

- A. Install sleeves for conduits passing through penetrations in floors, partitions, roofs, and walls.
- B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch annular clear space between piping and concrete slabs and walls.
- C. Install sleeves for conduits passing through interior partitions.
  - 1. Cut sleeves to length for mounting flush with both surfaces.
  - 2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and conduit insulation.
  - 3. Seal annular space between sleeve and conduit insulation; use sealants appropriate for size, depth, and location of joint.
- D. Fire-Resistance-Rated Penetrations, Horizontal Assembly Penetrations, and Smoke-Barrier Penetrations: Maintain indicated fire or smoke rating of walls, partitions, ceilings, and floors at conduit penetrations. Seal conduit penetrations with fire- and smoke-stop materials.

# 3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

- A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at conduit entries into building.
- B. Select type, size, and number of sealing elements required for material and size and for sleeve ID or hole size. Position conduit in center of sleeve. Center conduit in penetration, assemble sleeve-seal-system components, and install in annular space between conduit and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

# END OF SECTION 26 05 44
## SECTION 26 28 16

# ENCLOSED SWITCHES AND CIRCUIT BREAKERS

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. Section Includes:
  - 1. Fusible switches.
  - 2. Non-fusible switches.
  - 3. Receptacle switches.
  - 4. Shunt trip switches.
  - 5. Molded-case circuit breakers (MCCBs).
  - 6. Molded-case switches.
  - 7. Enclosures.

## 1.3 DEFINITIONS

- A. NC: Normally closed.
- B. NO: Normally open.
- C. SPDT: Single pole, double throw.

### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include nameplate ratings, dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.
  - 1. Enclosure types and details for types other than NEMA 250, Type 1.

- 2. Current and voltage ratings.
- 3. Short-circuit current ratings (interrupting and withstand, as appropriate).
- 4. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.
- B. Shop Drawings: For enclosed switches and circuit breakers.
  - 1. Include plans, elevations, sections, details, and attachments to other work.
  - 2. Include wiring diagrams for power, signal, and control wiring.

# 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Seismic Qualification Data: Certificates, for enclosed switches and circuit breakers, accessories, and components, from manufacturer.
  - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
  - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
  - 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

# 1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Circuit breakers and fuses: Equal to 25 percent of quantity installed for each size and type, but no fewer than one of each size and type.

# 1.7 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Accredited by NETA.
  - 1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.

# 1.8 FIELD CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:

- 1. Ambient Temperature: Not less than minus -20 deg F and not exceeding 104 deg F
- 2. Altitude: Not exceeding 6600 feet.

## 1.9 WARRANTY

- A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace components that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: One year(s) from date of Substantial Completion.

# PART 2 - PRODUCTS

## 2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Enclosed switches and circuit breakers shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
  - 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

## 2.2 GENERAL REQUIREMENTS

- A. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single manufacturer.
- B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
- D. Comply with NFPA 70.

# 2.3 FUSIBLE SWITCHES

- A. Type HD, Heavy Duty:
  - 1. Single throw.
  - 2. Three pole.
  - 3. 600-V ac.

- 4. 200 A and smaller.
- 5. UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate indicated fuses.
- 6. Lockable handle with capability to accept padlocks and interlocked with cover in closed position.
- B. Accessories:
  - 1. Equipment Ground Kit: Internally mounted and labeled for copper ground conductors.
  - 2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper neutral conductors.
  - 3. Isolated Ground Kit: Internally mounted; insulated, labeled for copper neutral conductors.
  - 4. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
  - 5. Auxiliary Contact Kit: As required to meet all contract requirements and intents.
  - 6. Service-Rated Switches: Labeled for use as service equipment.

### 2.4 NON-FUSIBLE SWITCHES

- A. Type HD, Heavy Duty, Three Pole, Single Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- B. Accessories:
  - 1. Equipment Ground Kit: Internally mounted and labeled for copper ground conductors.
  - 2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper neutral conductors.
  - 3. Isolated Ground Kit: Internally mounted; insulated, labeled for copper neutral conductors.
  - 4. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
  - 5. Service-Rated Switches: Labeled for use as service equipment.

# 2.5 MOLDED-CASE CIRCUIT BREAKERS

- A. Circuit breakers shall be constructed using glass-reinforced insulating material. Current carrying components shall be completely isolated from the handle and the accessory mounting area.
- B. Circuit breakers shall have a toggle operating mechanism with common tripping of all poles, which provides quick-make, quick-break contact action. The circuit-breaker handle shall be

over center, be trip free, and reside in a tripped position between on and off to provide local trip indication. Circuit-breaker escutcheon shall be clearly marked on and off in addition to providing international I/O markings. Equip circuit breaker with a push-to-trip button, located on the face of the circuit breaker to mechanically operate the circuit-breaker tripping mechanism for maintenance and testing purposes.

- C. The maximum ampere rating and UL, IEC, or other certification standards with applicable voltage systems and corresponding interrupting ratings shall be clearly marked on face of circuit breaker. Circuit breakers shall be 100 percent rated combinations for series connected interrupting ratings shall be listed by UL as recognized component combinations. Any series rated combination used shall be marked on the end-use equipment along with the statement "Caution Series Rated System. \_\_\_\_\_ Amps Available. Identical Replacement Component Required."
- D. MCCBs shall be equipped with a device for locking in the isolated position.
- E. Lugs shall be suitable for 140 deg F rated wire on 125-A circuit breakers and below.
- F. Standard: Comply with UL 489 with interrupting capacity to comply with available fault currents.
- G. Thermal-Magnetic Circuit Breakers: Inverse time-current thermal element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
- H. Adjustable, Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
- I. Electronic Trip Circuit Breakers: Field-replaceable rating plug, rms sensing, with the following field-adjustable settings:
  - 1. Instantaneous trip.
  - 2. Long- and short-time pickup levels.
  - 3. Long- and short-time time adjustments.
  - 4. Ground-fault pickup level, time delay, and I-squared t response.
- J.Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller, and let-through ratings less than NEMA FU 1, RK-5.
- K. Integrally Fused Circuit Breakers: Thermal-magnetic trip element with integral limiter-style fuse listed for use with circuit breaker and trip activation on fuse opening or on opening of fuse compartment door.
- L. Ground-Fault Circuit-Interrupter (GFCI) Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).
- M. Ground-Fault Equipment-Protection (GFEP) Circuit Breakers: With Class B ground-fault protection (30-mA trip).

- N. Features and Accessories:
  - 1. Standard frame sizes, trip ratings, and number of poles.
  - 2. Lugs: Compression type, suitable for number, size, trip ratings, and conductor material.
  - 3. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge lighting circuits.
  - 4. Ground-Fault Protection: Comply with UL 1053; integrally mounted, self-powered or remote-mounted and powered type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero-sequence current transformer/sensor.
  - 5. Communication Capability: Circuit-breaker-mounted or Universal-mounted integral Dinrail-mounted communication module with functions and features compatible with power monitoring and control system.
  - 6. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.
  - 7. Accessory Control Power Voltage: Integrally mounted, self-powered; Voltage as required for equipment supplied.

## 2.6 MOLDED-CASE SWITCHES

- A. Description: MCCB with fixed, high-set instantaneous trip only, and short-circuit withstand rating equal to equivalent breaker frame size interrupting rating.
- B. Standard: Comply with UL 489 with interrupting capacity to comply with available fault currents.
- C. Features and Accessories:
  - 1. Standard frame sizes and number of poles.
  - 2. Lugs:
    - a. Mechanical or Compression type, suitable for number, size, trip ratings, and conductor material.
    - b. Lugs shall be suitable for 140 deg F rated wire on 125-A circuit breakers and below.
  - 3. Ground-Fault Protection: Comply with UL 1053; remote-mounted and powered type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero-sequence current transformer/sensor.
  - 4. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.

- 5. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage without intentional time delay.
- 6. Auxiliary Contacts: Number and rating as required with "a" and "b" contacts; "a" contacts mimic switch contacts, "b" contacts operate in reverse of switch contacts.
- 7. Alarm Switch: As required to meet contract requirements and design intent.
- 8. Key Interlock Kit: Externally mounted to prohibit switch operation; key shall be removable only when switch is in off position.
- 9. Zone-Selective Interlocking: Integral with ground-fault shunt trip unit; for interlocking ground-fault protection function.
- 10. Electrical Operator: Provide remote control for on, off, and reset operations.
- 11. Accessory Control Power Voltage: Integrally mounted, self-powered or Remote mounted and powered; Voltage rating as required.

# 2.7 ENCLOSURES

- A. Enclosed Switches and Circuit Breakers: UL 489, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.
- B. Conduit Entry: NEMA 250 Types 4, 4X, and 12 enclosures shall contain no knockouts. NEMA 250 Types 7 and 9 enclosures shall be provided with threaded conduit openings in both endwalls.
- C. Enclosures designated as NEMA 250 Type 4, 4X stainless steel, 12, or 12K shall have a dual cover interlock mechanism to prevent unintentional opening of the enclosure cover when the circuit breaker is ON and to prevent turning the circuit breaker ON when the enclosure cover is open.
- D. NEMA 250 Type 7/9 enclosures shall be furnished with a breather and drain kit to allow their use in outdoor and wet location applications.

# PART 3 - EXECUTION

# 3.1 EXAMINATION

- A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
  - 1. Commencement of work shall indicate Installer's acceptance of the areas and conditions as satisfactory.

## 3.2 PREPARATION

- A. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:
  - 1. Notify Owner no fewer than 14 days in advance of proposed interruption of electric service.
  - 2. Indicate method of providing temporary electric service.
  - 3. Do not proceed with interruption of electric service without owner's written permission.
  - 4. Comply with NFPA 70E.

# 3.3 ENCLOSURE ENVIRONMENTAL RATING APPLICATIONS

- A. Enclosed Switches and Circuit Breakers: Provide enclosures at installed locations with the following environmental ratings.
  - 1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
  - 2. Outdoor Locations: NEMA 250, Type 4X stainless steel.

## 3.4 INSTALLATION

- A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- B. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.
- C. Install fuses in fusible devices.
- D. Comply with NFPA 70 and NECA 1.

# 3.5 IDENTIFICATION

- 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
- 2. Label each enclosure with engraved metal or laminated-plastic nameplate.

# 3.6 FIELD QUALITY CONTROL

A. Tests and Inspections for Switches:

- 1. Visual and Mechanical Inspection:
  - a. Inspect physical and mechanical condition.
  - b. Inspect anchorage, alignment, grounding, and clearances.
  - c. Verify that the unit is clean.
  - d. Verify blade alignment, blade penetration, travel stops, and mechanical operation.
  - e. Verify that fuse sizes and types match the Specifications and Drawings.
  - f. Verify that each fuse has adequate mechanical support and contact integrity.
  - g. Inspect bolted electrical connections for high resistance using one of the two following methods:
    - 1) Use a low-resistance ohmmeter.
      - a) Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.
    - 2) Verify tightness of accessible bolted electrical connections by calibrated torquewrench method in accordance with manufacturer's published data or NETA ATS Table 100.12.
      - a) Bolt-torque levels shall be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS Table 100.12.
  - h. Verify that operation and sequencing of interlocking systems is as described in the Specifications and shown on the Drawings.
  - i. Verify correct phase barrier installation.
  - j. Verify lubrication of moving current-carrying parts and moving and sliding surfaces.
- 2. Electrical Tests:
  - a. Perform resistance measurements through bolted connections with a low-resistance ohmmeter. Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
  - b. Measure contact resistance across each switchblade fuseholder. Drop values shall not exceed the high level of the manufacturer's published data. If manufacturer's published data are not available, investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
  - c. Perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to-ground with switch closed, and across each open pole. Apply voltage in accordance with manufacturer's published data. In the absence of manufacturer's published data, use Table 100.1 from the NETA ATS. Investigate values of insulation resistance less than those published in Table 100.1 or as recommended in manufacturer's published data.
  - d. Measure fuse resistance. Investigate fuse-resistance values that deviate from each other by more than 15 percent.
  - e. Perform ground fault test according to NETA ATS 7.14 "Ground Fault Protection Systems, Low-Voltage."

- B. Tests and Inspections for Molded Case Circuit Breakers:
  - 1. Visual and Mechanical Inspection:
    - a. Verify that equipment nameplate data are as described in the Specifications and shown on the Drawings.
    - b. Inspect physical and mechanical condition.
    - c. Inspect anchorage, alignment, grounding, and clearances.
    - d. Verify that the unit is clean.
    - e. Operate the circuit breaker to ensure smooth operation.
    - f. Inspect bolted electrical connections for high resistance using one of the two following methods:
      - 1) Use a low-resistance ohmmeter.
        - a) Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.
      - 2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS Table 100.12.
        - a) Bolt-torque levels shall be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS Table 100.12.
    - g. Inspect operating mechanism, contacts, and chutes in unsealed units.
  - 2. Electrical Tests:
    - a. Perform resistance measurements through bolted connections with a low-resistance ohmmeter. Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
    - b. Perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to-ground with circuit breaker closed, and across each open pole. Apply voltage in accordance with manufacturer's published data. In the absence of manufacturer's published data, use Table 100.1 from the NETA ATS. Investigate values of insulation resistance less than those published in Table 100.1 or as recommended in manufacturer's published data.
    - c. Perform a contact/pole resistance test. Drop values shall not exceed the high level of the manufacturer's published data. If manufacturer's published data are not available, investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
    - d. Perform insulation resistance tests on all control wiring with respect to ground. Applied potential shall be 500-V dc for 300-V rated cable and 1000-V dc for 600-V rated cable. Test duration shall be one minute. For units with solid state components, follow manufacturer's recommendation. Insulation resistance values shall be no less than two megohms.
    - e. Determine the following by primary current injection:

- 1) Long-time pickup and delay. Pickup values shall be as specified. Trip characteristics shall not exceed manufacturer's published time-current characteristic tolerance band, including adjustment factors.
- 2) Short-time pickup and delay. Short-time pickup values shall be as specified. Trip characteristics shall not exceed manufacturer's published time-current characteristic tolerance band, including adjustment factors.
- 3) Ground-fault pickup and time delay. Ground-fault pickup values shall be as specified. Trip characteristics shall not exceed manufacturer's published time-current characteristic tolerance band, including adjustment factors.
- 4) Instantaneous pickup. Instantaneous pickup values shall be as specified and within manufacturer's published tolerances.
- 3. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
- 4. Perform the following infrared scan tests and inspections and prepare reports:
  - a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each enclosed switch and circuit breaker. Remove front panels so joints and connections are accessible to portable scanner.
  - b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each enclosed switch and circuit breaker 11 months after date of Substantial Completion.
  - c. Instruments and Equipment: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
- 5. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.
- C. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.

# 3.7 ADJUSTING

A. Adjust moving parts and operable components to function smoothly and lubricate as recommended by manufacturer.

# END OF SECTION 26 28 16

### SECTION 28 3 1 00 - FIRE DETECTION AND ALARM

#### PART 1 GENERAL

#### 1.1 SUMMARY

- A. Section includes adding to an existing building fire alarm control panel, manual fire alarm stations, automatic smoke and detectors, fire alarm signaling appliances, and auxiliary fire alarm equipment and power and signal wire and cable.
- B. Related Sections:
  - 1. Section 08 71 00 Door Hardware: Door closers, electric locks, electric releases.
  - 2. Section 26 05 19 Low-Voltage Electrical Power Conductors and Cables.
  - 3. Section 26 05 26 Grounding and Bonding for Electrical Systems.

### 1.2 REFERENCES

- A. National Fire Protection Association:
  - 1. NFPA 70 National Electrical Code.
  - 2. NFPA 72 National Fire Alarm Code.
  - 3. NFPA 90A Standard for the installation of air conditioning and ventilating systems.
  - 4. NFPA- 92 Recommended Practice for Smoke Control.
- B. New Hampshire State Fire Code (amended IFC International Fire Code)
- C. New Hampshire State Building Code (amended IBC International Building Code)
- D. New Hampshire State Mechanical Code (amended IMC International Mechanical Code)
- E. ANSI 117.1 Elevator Requirements (1997)
- F. Americans With Disabilities Act (ADA)
- G. AHJ: New Hampshire Londonderry Fire Department

#### 1.3 SYSTEM DESCRIPTION

A. Adding to an existing EST 4 building Fire Alarm System. The scope of work for this project is to add to an existing EST building Fire Alarm control panel: New smoke detectors, fire alarm notification devices and notification power supply as necessary shall be added to the existing fire alarmsystem. All new fire alarm notification devices shall sync with the existing fire alarm notification devices. All new fire alarm conduits shall be red marked EMT. All new fire alarm wire type and size shall match existing unless otherwise noted. The new fire alarm devices shall follow the existing fire alarm sequence of operations. Provide new revised fire alarm graphic maps for all graphic map locations. The work covered by this Section of the Specification shall include all labor, equipment, materials,

and services to furnish and install modifications to the existing fire alarm and detection system of the zoned, non-coded general alarm type. The work shall be complete with all necessary hardware, software, and memory specifically tailored for this installation. The system shall consist of, but not belimited to, the following:

- 1. Existing Fire alarm control panels.
- 2. Fire alarm graphic maps. All of the map shall reflect all the new changes to the fire alarm system.
- 3. Addressable manual fire alarm stations.
- 4. Analog/Addressable automatic initiating devices.
- 5. Fire alarm notification appliances.
- 6. Auxiliary fire alarm equipment and connections.

D. The Terminal building floorplan backgrounds (AutoCADD-based) will be provided for upload for the Fire Alarm Contractors use in updating the existing FIREWORKS graphic annunciator.

#### 1.4 SUBMITTALS

- A. General Requirements Section(s).
- B. Shop Drawings: Provide shop drawings of all revised fire alarm graphic maps referencing the new fire alarm devices that were added to the existing fire alarm system. Fire alarm shop drawings shall reference the existing fire alarm devices with the new. All fire alarm control panel battery calculations shall be revised and referencing all new devices. Wiring diagrams showing all equipment, device placement, and wiring connection required.
- C. Product Data: Provide manufacturer's data sheets showing product appearance, electrical characteristics, and connection requirements. All fire alarm product numbers must highlighted and have an arrow pointing to alarm and supervisory currents.
- D. Load Calculations: Provide load calculations for all visual notification appliance circuits, audio notification appliance circuits, system power supplies, and battery standby systems. All notification voltage drops must have a minimum 20% spare capacity per circuit.
- E. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use, as stipulated by the product-testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and start-up of products.
- F. Exceptions: Provide a detailed listing of any and all exceptions, variances, and nonconformances to the specifications and contract design drawings. Failure to disclose any such items shall be grounds for immediate disapproval of submittals without comment.
- G. Samples: Provide samples of all cable supporting device equipment. Provide samples of various items, when requested.

### 1.5 CLOSEOUT SUBMITTALS

- A. General Requirements and/or Special Provisions Section(s).
- B. Record "as-built" locations of all system components, initiating devices, notification appliances, and end-of-line devices. Include "as-built" conduit routing, cable routing, and wire counts. Fire alarm contractor "as-built" drawings shall be giving to SRI at the end of the job,

so SRI can produce final construction documents. The contractor "as-built" will need to begiven to SRI in an AutoCAD format.

C. Operation and Maintenance Data: Submit manufacturer's standard operating and maintenance instructions. All final AHJ, and NFPA-72 required sign off sheets shall be inside the 3 ring binder with the O&M manuals.

### 1.6 QUALITY ASSURANCE

- A. Provide wiring materials located in plenums with peak optical density not greater than 0.5, average optical density not greater than 0.15, and flame spread not greater than 5 feet (1.5 m) when tested in accordance with NFPA 262.
- B. Perform Work in accordance with local AHJ standard.
- C. Maintain two copies of each document on site.

### 1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the products specified in this section with a minimum five (5) years documented experience, and with service facilities within fifty (50) miles of the project. Manufacture shall be EST. no exceptions.
- B. Installer: Company specializing in installing the products specified in this section with a minimum five (5) years documented experience, and licensed by the local Fire department as a fire alarm installer. The installer shall employ NICET Level 3 technicians or engineers to install or supervise the installation of the products specified in this Section

### 1.8 MAINTENANCE SERVICE

- A. General Requirements and/or Special Provisions Section(s).
- B. Operational Data: Provide operating instructions, detailed for the specific project.
- C. Maintenance Data: Provide maintenance and repair procedures for each type of equipment provided, as applicable. Include any specific requirements particular to the project.
- D. Equipment Data: Provide manufacturer data sheets or catalog sheets for each type of equipment provided.
- E. Spare Parts Data: Provide manufacturer's recommended spare parts list, including quantity, and any equipment replacement schedules, as applicable.
- F. Supplier Data: Provide system manufacturer and local service organization information. Include contact, phone numbers, and addresses, as applicable.
- G. Warranty Data: Provide system warranty information, including all material and/or labor terms.

### 1.9 MAINTENANCE MATERIALS

A. General Requirements and/or Special Provisions Section(s).

### 1.11 EXISTING CONTROL PANEL

- A. The Existing EST 4 Fire alarm control panel shall incorporate all new control electronics, relays, necessary modules, and components in a surface mounted cabinet. The operating controls and zone/supervisory indicators shall be located behind a locked door with viewing windows; with keys made available for the Fire Department and other authorized operating personnel. The fire alarm control panel shall consist of a base panel, system power supply, and battery charger, with optional modules suitable to meet the requirements of these specifications.
  - B. The fire alarm control panel utilizes full digital communications to supervise all addressable loop detectors and modules for proper operation.
  - C. The existing fire alarm control panel supervises all system modules for placement, and shall have a digital display for reporting system status and abnormal conditions.

6.

### PART 2 PRODUCTS

### 2.1. Power supply:

- A. Provide booster power supply panels as required, to meet project requirements. The booster power supply shall activate via dry contact from the fire alarm control panel. The booster power supply shall generate a fault condition at the main fire alarm control panel, when any fault condition occurs on circuits connected to the booster power supply, or a trouble condition occurs at the booster power supply panel. The booster power supplyshall contain an integral battery charger capable of recharging the standby batteries perNFPA 72 requirements, and shall provide battery supervision for placement and low voltage.
- B. Provide audio amplifier racks as required, to meet project requirements. The audio amplifier rack shall automatically switch to batteries upon power failure or brown out conditions, and shall be adequate to service all audio signaling appliances connected to it. The audio amplifier rack shall generate a fault condition at the main fire alarm control panel, when any fault condition occurs at the audio amplifier panel. The audio amplifier rack shall contain an integral battery charger capable of recharging the standby batteriesper NFPA 72 requirements, and shall provide battery supervision for placement and lowvoltage
- C. Initiating Device Circuits: All initiating devices shall be UL Listed for Fire Protective Use
- D. Intelligent Detectors General:
  - 1. The system detectors shall be capable of full digital communications using polling protocol, and shall be individually addressable. The detectors shall have aseparate means of displaying communication and alarm status. As a minimum, each detector shall have flashing LED to indicate communications status, and a red LED to indicate alarm status of the detector.

- 2. Each detector shall be capable of providing pre-alarm and alarm signals, in addition to normal, trouble and need for cleaning information. Each detector shall be individually programmed to operate at any one (1) of five (5) sensitivity levels, and shall be capable of being programmed for different sensitivities during day/night periods: which allows the detector to be more sensitive during unoccupied periods, when lower ambient background conditions are expected. Each detector shall be provided with an environmental compensation feature, which will adjust the detector's compensation value to counteract the impacts of temperature, humidity, other contaminates, as well as detector aging. The individual detector's environmental compensation feature shall update itself, as a minimum, once every twenty-four (24) period. The detector shall monitor the environmental compensation value and alert the system operator when the detector approaches 80% and 100% of the allowable environmental compensation value.
- E. Heat Detector, Fixed Temperature: Provide intelligent analog/addressable fixed temperature heat detector with a nominal alarm point rating of 135 or 200 degrees F, as indicated on the Contract Documents. The heat detector shall incorporate a low mass thermistor heat sensor and operate at a fixed temperature. The heat detector shall continually monitor the temperature of the air in its surroundings to minimize thermal lag to the time required to report an alarm condition, and shall be rated for ceiling or wall mount installation. The heat detector shall mount to any of the mounting bases as specified below, and shall be suitable for operation in the following environment:
  - 1. Temperature: 32 degrees F to 100 degrees F
  - 2. Humidity: 0-93% RH, non-condensing
  - 3. Elevation: No limit
- F. Indicating Appliance Circuits: Supervised march time signal module, sufficient for signal devices connected to system; occurrence of single ground or open condition places circuit in trouble mode but does not disable circuit from signaling alarm.
- G. Municipal Trip Circuit: Output connections for connection to local energy municipal master fire alarm box remote station transmitter. Include municipal trip DISCONNECT switch.
- H. Remote Station Signal Transmitter: Electrically supervised digital alarm communicator transmitter, capable of transmitting alarm and trouble signals over telephone lines to central station receiver.
- I. Auxiliary Relays: Sufficient SPDT auxiliary relay contacts for each detection zone to provide accessory functions specified.

## 2.2 MANUAL FIRE ALARM STATIONS

- A. Manufacturers: Intelligent Manual Station: Provide intelligent addressable manual station. The manual station shall be semi-flush mounted non-coded double action type, shall be red in color, and shall be individually addressable. The manual station shall require a key to reset the station, and shall mount to a standard electrical box or trim ring. Provide manufacturer's standard back box for surface mount applications. Provide weatherproof wall box for outdoor mounting, where applicable.
  - 1. Manufacturer:
    - a. EST. No Exceptions

### 2.3 CEILING SMOKE DETECTOR

- A. Photoelectric Smoke Detector: Provide intelligent analog/addressable photoelectric smoke detector. The photoelectric smoke detector shall utilize a light scattering type photoelectric smoke sensor to sense changes in air samples from its surroundings, and shall continually monitor any changes in sensitivity due to the environmental affects of dirt, smoke, temperature, aging and humidity. The photoelectric smoke detector shall be rated for ceiling or wall mount installation, and shall be rated for operation in constant air velocities from 0-5,000 ft/min. The percent smoke obscuration per foot alarm set point shall be field selectable to any of five (5) sensitivity settings, ranging from 1.0% to 3.5%, and shall be suitable for operation in the following environment:
  - 1. Temperature: 32 degrees F to 120 degrees F
  - 2. Humidity: 0-93% RH, non-condensing
  - 3. Elevation: No limit
  - 4. EST. No Exceptions

### 2.4 ALARM NOTIFICATION APPLIANCES

- A. All indicating appliances shall be UL Listed for Fire Protective Service.
- B. All visual notification appliances (strobes) or combination appliances with strobes shall be capable of providing the "Equivalent Facilitation" allowed under the Americans with Disabilities Act Accessibilities Guidelines (ADAAG), and shall be UL1971 listed.
- C. Strobes: Provide standard, synchronized, 24vDC, white strobe unit with 15cd, 30cd, 60cd, 75cd, 95cd, and 11Ocd flash outputs, as shown on the Contract Documents. The strobes shall have their lens markings oriented for wall mounting or ceiling mounting, shall be provided with screw terminals for wiring interconnect, and shall mount to a standard electrical box or trim ring. Provide weatherproof wall box for outdoor mounting, where applicable. Locate strobes per NFPA 72 and ADA guidelines.
- D. Wall Mounted Speaker/Speaker/Strobes: Provide 4' round, white, 25vRMS speaker, capable of producing a sound rating from 81dBA to 90dBA. The speaker and speaker/strobe shall have multiple wattage tap settings of %, 'A,1 and 2 watts, selectable from the exterior of the device, and shall be provided with screw terminals for wiring interconnect. The speaker and speaker/strobe shall be UL Listed for fire signaling applications, and shall mount to a standard electrical box with extension ring. Provide integral, synchronized, UL 1971 strobe unit with 15cd, 30cd, or 11Ocd flash output, as shown on the Contract Documents. The speaker/strobe shall have their lens marking oriented for wall mounting. Provide re-entrant type speaker or speaker/strobe and weatherproof box for exterior mounting. Locate speakers and speaker/strobes per NFPA 72 and ADA guidelines.
- E. Ceiling Mounted Speaker/Speaker/Strobes: Provide 4' round, white, 25vRMS speaker, capable of producing a sound rating from 81dBA to 90dBA. The speaker and speaker/strobe shall have multiple wattage tap settings of 'A, 'A, 1 and 2 watts, and shall be provided with screw terminals for wiring interconnect. The speaker and speaker/strobe shall be UL Listed for fire signaling applications, and shall mount to a standard electrical box with extension ring. Provide integral, synchronized, UL 1971 strobe unit with 15cd, 30cd, 95cd, or 115cd flash output, as shown on the drawings. The speaker/strobe shall have their lens marking oriented for ceiling mounting, as applicable. Locate speakers and speaker/strobes per NFPA 72 and ADA guidelines.
  - 1. EST. No Exceptions

### 2.5 DOOR RELEASE

- A. Wall Mount: Provide semi-flush wall mounted electromagnetic door holder/release rated at 120vAC input, with a minimum holding force of 25Lbf.Door holder/release shall mount to a standard electrical box or trim ring.
  - 1. EST. No Exceptions

### 2.6 WIRE AND CABLE

- A. Fire Alarm Power Branch Circuits: Single conductor, copper, 12 AWG, 600 volts, THHN, rated at 90 degrees C.
- B. Initiating Device and Indicating Appliance Circuits: Power limited fire-protective signaling cable classified for fire and smoke characteristics, copper conductor, 300 volts insulation rated 105 degrees C, suitable for use in air handling ducts, hollow spaces used as ducts, and plenums.
- C. Product Description: Non-power limited fire-protective signaling cable, copper conductor, 150 volt insulation rated 60 degrees C. Power limited fire-protective signaling cable, copper conductor, 300 volts insulation rated 105 degrees C.
- D. Cable Located Exposed in Plenums: Power limited fire-protective signaling cable classified for fire and smoke characteristics, copper conductor, 300 volts insulation rated 105 degrees C, suitable for use in air handling ducts, hollow spaces used as ducts, and plenums.
- E. Fire alarm circuit conductors have insulation color or code as follows:
  - 1. Power Branch Circuit Conductors: Black, red, white.
  - 2. Initiating Device Circuit: Black, red.
  - 3. Detector Power Supply: Violet, brown.
  - 4. Signal Device Circuit: Blue (positive), white (negative).
  - 5. Door Release: Gray, gray.
  - 6. Municipal Trip Circuit: Orange, orange.
  - 7. Municipal Fire Alarm Loop: Black, white.

#### PART 3 EXECUTION

#### 3.1 TRAINING

- A. Provide the services of a factory-authorized service representative to demonstrate the system and train Owner's maintenance personnel as specified below.
  - 1. Train Owner's maintenance personnel in the procedures and schedules involved in operating, troubleshooting, servicing, and preventive maintenance of the system. Provide a minimum of one four (4) hour training session on system modifications to accommodate Owner's personnel schedules.
- B. Schedule training with the Owner at least seven days in advance.

#### 3.2 EXAMINATION

- A. General Requirements and/or Special Provisions Section(s).
- B. Verify products and systems receiving devices are ready for installation.

#### 3.3 INSTALLATION

A. Install 16 and 14 AWG minimum size conductors for fire alarm detection and signal circuit conductors in conduit and cable.

- B. Mount end-of-line device in control panel and box with last device or separate box adjacent to last device in circuit.
- C. Mount outlet box for electric door holder to withstand 80 pounds pulling force.
- D. Connect conduit and wire to door release devices, and sprinkler flow switches, sprinkler valve tamper switches, duct smoke detectors.
- E. Automatic Detector Installation: Conform to NFPA 72.
- F. Ground and bond fire alarm equipment and circuits in accordance with Section 26 05 26.
- G. Install products in accordance with manufacturer's instructions.
- H. Install manual station with operating handle 48 inches feet above finished floor.
- I. Install audio and visual notification appliances per NFPA Guidelines. Wall mount devices at 80 inches to the bottom of the visual notification lens, unless otherwise shown on the Contract Documents. Ceiling mount devices center the device in the middle of the ceiling tile.
- J. Use 16 AWG minimum size conductors for fire alarm signaling device loop circuits and initiating device circuits.
- K. Use 14 AWG minimum size conductors for fire alarm notification appliance circuits and miscellaneous power device circuits.
- L. Install wiring in plenum cable, unless shown on the drawings, or in areas required by Code. Plenum cabling shall be installed to the open cabling requirements delineated in Section 3.5 below.
- M. Install cable in raceway in electrical rooms, mechanical rooms, boiler rooms, chiller rooms, elevator hoistways, elevator machine rooms, wall cavities, and other Code required areas.
- N. Mount end-of-line device in box with last device.
- O. Make conduit and wiring connections to door release devices, sprinkler flow switches, sprinkler valve tamper switches, fire suppression system control panels, duct smoke detectors, smoke/fire dampers, HVAC units, and other applicable devices, furnished under other Sections.
- P. Open cabling shall be installed in a neat and workmanlike manner, and shall be runperpendicular or parallel to building structural members. Diagonal routing of cable shall not be considered acceptable and shall cause the cable to be removed and reinstalled.
- R. Open cabling shall be routed away from other building cabling and equipment, and shall be routed to and from the device in a vertical or horizontal manner. Maintain cabling at the same level where possible. Cabling that is not dropped vertically to the device or routed

horizontally straight to the device shall not be considered acceptable. Cabling that is routed through, over, under or around other equipment, when a straight horizontal or vertical path is available shall not be considered acceptable and shall cause the cable to be removed and be reinstalled.

- S. Open cabling shall be supported at a minimum of every 4 feet to building structural members utilizing bridle rings or other approved supporting devices. Cabling that is secured to sprinkler piping, HVAC ductwork, electrical conduit or other non-structural building member shall not be acceptable and shall cause the cable to be re-supported in a proper manner.
- T. Conduits shall have appropriate bushings where open cable routing occurs.
- U. Appropriate fire caulking or sealant shall be utilized where open cabling penetrations through fire separation barriers or building separation walls occur.
- V. Automatic Detector Installation: Conform to NFPA 72.
- W. Automatic Duct Detector Installation: Conform to NFPA 90A.

#### 3.4 FIELD QUALITY CONTROL

- A. General Requirements and/or Special Provisions Section(s) Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Test in accordance with NFPA 72 and City and County requirements.

#### 3.5 MANUFACTURER'S FIELD SERVICES

- A. General Requirements and/or Special Provisions Section(s).
- B. Prepare and start systems.
- C. Include services of certified technician to supervise installation, adjustments, final connections, and system testing.

#### END OF SECTION