

**A NEW K4 CLASSROOM ADDITION  
TO THE  
ELEMENTARY SCHOOL**  
on the  
Imboden Campus  
**SLOAN HENDRIX SCHOOL DISTRICT**  
PO BOX 1080  
Imboden, Arkansas 72434

**SPECIFICATIONS  
MARCH 10, 2017**

All information and documents herein in these specifications and along with separate bound drawings will be a part of the General Contract for Construction

**PREPARED BY**

**ANDREW HICKS ARCHITECT**  
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Little Rock AR 72205

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Not used

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NOTICE TO BIDDERS /INVITATION TO BID  
SLOAN HENDRIX SCHOOL DISTRICT  
A NEW K4 CLASSROOM ADDITION TO THE ELEMENTARY SCHOOL

Sealed proposals will be received by the Sloan Hendrix School District, Imboden, Arkansas, hereinafter referred to as "OWNER" in the Office of the Superintendent of Sloan Hendrix Schools at Imboden, Arkansas, on the 27th day of APRIL, 2017 until 2:00 pm local time for the construction of: A NEW K4 CLASSROOM ADDITION TO THE ELEMENTARY SCHOOL at Sloan Hendrix School Campus, Imboden, Arkansas. Bids will be opened in the Cafeteria Dining Room on the school campus.

The project is an ADDITION OF APPROXIMATELY 17,463 SF TO THE EXISTING ELEMENTARY SCHOOL. Construction involves primarily a pre-fab metal building with additional steel framing and masonry construction for a storm shelter corridor and light gauge metal and gypsum. board partitions for the balance of the interior walls with associated structural fill and other site work.

A MANDATORY PRE-BID CONFERENCE. A Pre Bid Conference will be held APRIL 13<sup>th</sup> , 2017 at 11:00 am in the Student Center building and at the project site on the school campus in Imboden, AR and will be mandatory for all GENERAL CONTRACTORS and major subcontractors. Major subcontractors include HVAC, Electrical, Plumbing and Site work Excavation. Failure to attend will be grounds for disqualification of bids.

Plans and Specifications, and Contract Documents may be obtained from SOUTHERN REPROGRAPHICS, 901 West 7<sup>th</sup> Street Little Rock, Arkansas 72201, Telephone (501) 372-4011 upon sending a deposit of \$200.00 per set to SOUTHERN REPROGRAPHICS. Deposit will be refunded to bona-fide bidders if Plans are returned in good condition to SOUTHERN REPROGRAPHICS within 10 days after Bidding Date. Deposit will not be returned to the successful contractor and subcontractors. Information regarding bidding procedures is covered in the Instructions to Bidders section of the Specifications. All Bidders must comply with the requirements of the Contractor's Licensing Law of the State of Arkansas.

To obtain Plans and Specifications, you must call SOUTHERN REPROGRAPHICS. To obtain refund of Deposit, Plans must be returned to SOUTHERN REPROGRAPHICS. The issuance of plans and specifications, addendums, list of bidders registered with SOUTHERN REPROGRAPHICS and the issuance final bid results will be done by SOUTHERN REPROGRAPHICS. The Architect will keep no list of bidders and will not issue plans specifications or addendums directly.

DO NOT CALL ARCHITECT FOR PLANS OR ADDENDUMS. DO NOT CALL ARCHITECT FOR BIDDERS LISTS. DO NOT RETURN PLANS TO ARCHITECT. DEPOSITS OF SUCCESSFUL CONTRACTOR AND SUB-CONTRACTORS WILL NOT BE REFUNDED.FOR PLANS CALL SOUTHERN REPROGRAPHICS: 501-372-4011

ANDREW HICKS, ARCHITECT / 209 North Pierce / Little Rock, AR 72205

NOTICE TO BIDDERS /INVITATION TO BID  
SLOAN HENDRIX SCHOOL DISTRICT  
A NEW K4 CLASSROOM ADDITION TO THE ELEMENTARY SCHOOL

Andrew Hicks: Project Manager  
Phone: (501) 219-1614  
[andrew@andrewhicksarchitect.com](mailto:andrew@andrewhicksarchitect.com)

SLOAN HENDRIX SCHOOL DISTRICT  
A NEW K4 CLASSROOM ADDITION TO THE ELEMENTARY SCHOOL

OWNER AND PROJECT INFORMATION

Any reference herein these documents to "OWNER", "SCHOOL DISTRICT", or "SCHOOL" is referring to the **SLOAN-HENDRIX SCHOOL DISTRICT**, Highway 115 / Greyhound Circle / PO Box 1080, Imboden, Arkansas 72434, as represented by the Superintendent of Schools, Mr. Clifford Rorex.

These bound specifications and drawings refer to the project to construct:

**A NEW K4 CLASSROOM ADDITION TO THE ELEMENTARY SCHOOL.**

for the SLOAN HENDRIX School District.

K4 CLASSROOM Addition to be located on:

Imboden School Campus, Highway 115 / Greyhound Circle, Imboden, AR 72434



ARCHITECT'S INSTRUCTIONS TO BIDDERS  
SLOAN HENDRIX SCHOOL DISTRICT  
A NEW K4 CLASSROOM ADDITION TO THE ELEMENTARY SCHOOL

1. BID FORM -Bidders are required to use A Proposal Form attached to and made a part of the Contract Documents. Proposal shall be addressed and delivered to:

Mr. Clifford Rorex, Superintendent of Sloan-Hendrix Schools, Sloan-Hendrix School District, PO Box 1080, Imboden, Arkansas 72434.

Bids shall be enclosed in an opaque sealed envelope addressed as stated above, marked "Proposal" and bearing the title and address of Bidder:

**A NEW K4 CLASSROOM ADDITION TO THE ELEMENTARY SCHOOL**

2. Proposals must be signed by an individual to bind the Bidder.

3. OPENING OF BIDS- Bids received prior to the time of opening shall be kept unopened. No bid received after the hour set for their opening will be considered. No responsibility will be assumed by any person for the premature opening of a bid not properly addressed and identified. The Owner may consider informal 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 schedule time for the opening of bids or authorized postponement thereof. Any bid received after the time shall not be considered. No bidder may withdraw a bid within 30 days after the actual date of the opening thereof.

4. TELEGRAPHIC MODIFICATION- Any bidder may modify his bid by telegraphic communication at any time prior to the schedule closing time for the receipt of bids, provided such telegraphic communication is received by the Owner prior to the closing time, and provided further, the Owner is satisfied that a written confirmation of the telegraphic modification over the signature of the bidder was mailed prior to the closing time. The telegraphic communication should not reveal the bid price but should provide the addition or subtraction or other modification so that the final prices of terms will not be known by the Owner until the sealed bid is opened. If written confirmation is not received within two days from the closing time, no consideration will be made to the telegraphic modification.

5. INTERPRETATION OF DOCUMENTS AND ADDENDA - If any person contemplating submitting a bid for the proposed Contract is in doubt as to the meaning of any part of Plans, Specifications or other proposed contract documents, then he may submit to the Architect a written request for an interpretation thereof prior to 48 hours of the hour of opening the bids. The person submitting the request will be responsible for its prompt delivery. Any interpretation of the proposed documents will be made only by Addendum duly issued and a copy of such addendum will be made available to each person receiving a set of such documents and in the same manner as the original bid documents. The architect will be solely responsible for any explanations or interpretations of the proposed documents. All addenda so issued shall become a part of

ARCHITECT'S INSTRUCTIONS TO BIDDERS  
SLOAN HENDRIX SCHOOL DISTRICT  
A NEW K4 CLASSROOM ADDITION TO THE ELEMENTARY SCHOOL

the Contract Documents. No interpretations of the meaning of the plans, specifications or other pre-bid documents will be made to any bidder orally. FAILURE OF ANY BIDDER TO RECEIVE ANY SUCH ADDENDUM OR INTERPRETATION SHALL NOT RELIEVE SUCH A BIDDER FROM THE OBLIGATION UNDER WHICH HIS BID IS SUBMITTED.

6. INTERPRETATION OF DOCUMENTS - In case of a difference in the written words and figures in a proposal, the amount stated in written words shall govern.

7. CONDITIONS OF WORK AND EXAMINATION OF SITE -Each bidder must inform himself fully of the conditions relating to the construction of the project and the employment of labor thereon. Failure to do so will not relieve a successful bidder of his obligation to furnish all material and labor necessary to carry out the provisions of his contract. Bidders are required to inform themselves fully of the conditions relating to construction and labor under which the work will be or is now being performed, and the Contractor must employ, so far as possible, such methods and means in the carrying out of his work as will not cause any interference or interruption with any other Contractor. Insofar as possible, the Contractor(s), in carrying out his work, must employ methods or means as will not cause damage to any existing portion of the site, including other buildings, which is to remain unchanged.

8. QUALIFICATION OF CONTRACTORS - Attention is called to the fact that the Bidders in signing the Proposal represents that he has the financial ability and experience to carry the work through its several stages, and unless he can show evidence of such ability, he will not be eligible to receive the award of the Contract. The Owner reserves the right to award the Contract to such person whose statements reveal that he is qualified by experience and finances to successfully carry out the work.

9. SUBCONTRACTORS - The Contractor shall name the sub-contractor whose bid he proposes to use on Plumbing, Mechanical, Electrical, and Roofing & Sheet Metal work as provided on the Bid Form.



**APPENDIX D-Section 1**  
**GENERAL INSTRUCTIONS, TERMS AND CONDITIONS**  
**SLOAN HENDRIX SCHOOL DISTRICT**  
**A NEW K4 CLASSROOM ADDITION TO THE ELEMENTARY SCHOOL**

These General Instructions, Terms and Conditions and any special terms and conditions become part of any contract entered into by the School District.

**DEFINITION OF TERMS**

IFB shall mean Invitation for Bids. The words vendor, bidder, offerer, company, proposer and contractor may be used synonymously in this document. The terms "District" or "Owner" are used interchangeably and refer to the School District as named on Owners Page as listed in Table of Contents

**ASSIGNMENTS**

Neither this contract nor any interest therein nor claim there under may or shall be assigned or transferred by the contractor except as expressly authorized in writing by the District. No contract, subcontract or agreement shall be made by the contractor with any other party for furnishing any of the product, work or services herein contracted without the written approval of the District.

**CONFLICT OF INTEREST**

By submitting a bid, the contractor represents and warrants that no director, board member or employee of the District is in any manner interested directly or indirectly in the bid or contract which may result from the bid or in any of the expected profits which might arise there from; further, that no attempt has been made to influence or gain favorable advantage by communicating directly or indirectly with any official of the School District. It is understood that any action taken which might tend to degrade the integrity of the competitive bidding process will be considered as grounds for disqualification or a breach of this contract.

**CONTRACT CHANGES**

In no event shall any understanding or agreement, contract modification, change order or other matter which would constitute a deviation from the terms of this contract be effective or binding upon the District unless expressly stated and agreed to in writing executed by the School District Official possessing contractual authority for said district.

**CONTRACT GUIDELINES**

Offerers agree that a contract does not become effective until It is awarded and a written agreement, purchase order, award letter, or other notice to proceed is executed or issued by the District and the contractor.

**INDEMNIFICATION AND LEGAL COMPLIANCE**

The contractor shall at all times observe and fully comply with any and all Federal, State and local laws, statutes, orders, ordinances and regulations. The contractor agrees to save, hold harmless and to indemnify. the District, its agents, employees, officers and board members against any and all liability, losses, claims or costs of whatsoever kind or nature relative to the performance of the contract or any occurrence or accident in

**APPENDIX D-Section 1**  
**GENERAL INSTRUCTIONS, TERMS AND CONDITIONS**  
**SLOAN HENDRIX SCHOOL DISTRICT**  
**A NEW K4 CLASSROOM ADDITION TO THE ELEMENTARY SCHOOL**

connection with inadequate design, breach of contract, material failure, default or the performance of any work, services or products supplied, pursuant to the award, whether to property or persons. Further, contractor shall indemnify, hold harmless and defend the District, its agents, employees, officers and board members from any lawsuits, causes of action, claims, liabilities and damages, of any kind and nature, including but not limited to, attorney's fees and costs, arising out of the performance of this contract whether attributable in whole or in part to any act, omission or negligence of the District, its agents or employees, including, but not limited to, any and all lawsuits, causes of action, claims, liabilities, and damages which the District, its agents or employees may sustain by reason of any failure by contractor to indemnify as provided herein, or any failure by contractor to otherwise perform its obligations pursuant to this contract, or by reason of the injury to or death of any person or persons or the damage to, loss of use of or destruction of any property resulting from work undertaken herein.

**MINORITY BUSINESS POLICY**

It is the policy of the (Name) School District that minority business enterprises shall have the maximum opportunity to participate in the District's purchasing process. Therefore, the District encourages all minority businesses to compete for goods, services, and construction contracts.

**NON-COLLUSIVE AFFIDAVIT**

By submitting a bid, the company and the individual personally signing the bid represent and warrant that such bid is genuine and is neither collusive nor made for or on behalf of any person not named, and that he has neither induced nor solicited any other company to place a sham bid nor directly or indirectly caused another company to refrain from or be unable to present a bid.

**NON-DISCRIMINATION**

The company shall not discriminate against or segregate, a person or a group of persons on account of race, color, creed, religion, sex, sexual orientation, marital status, familial status, national origin, ancestry, disability or condition of acquired immune deficiency syndrome (AIDS) or AIDS-related complex in carrying out its duties and obligations pursuant to this agreement nor shall the company or any person claiming under or through the company establish or permit any such practice or practices of discrimination or segregation. The company must include in any and all subcontracts a provision similar to the proceeding.

**PENALTY FOR COLLUSION**

If at any time it shall be found that the person, firm or corporation to whom a contract has been awarded has, in presenting any bid, colluded with any other party or parties, then, in the sole discretion of the District, the contract so awarded shall be null and void or considered breached and the contractor shall be liable to the District for any and all loss and damage of whatsoever nature, which the District may suffer and the District may seek a new contractor.

**APPENDIX D-Section 1**  
**GENERAL INSTRUCTIONS, TERMS AND CONDITIONS**  
**SLOAN HENDRIX SCHOOL DISTRICT**  
**A NEW K4 CLASSROOM ADDITION TO THE ELEMENTARY SCHOOL**

**PROPRIETARY INFORMATION**

All information submitted in response to this bid is public after the bid opening. The bidder should not include as a part of the response to the invitation to bid any information which the bidder believes to be a trade secret or otherwise privileged or confidential. If the bidder wishes to include such material with a bid, then the material should be supplied under separate cover and Identified as confidential. The District does not warrant or agree to, but will endeavor to, keep that information confidential. Contractor acknowledges that information in the possession of the District may be subject to the provisions of the Arkansas Freedom of Information Act.

**REJECTION OF BIDS**

The District may reject any and all bids and may reject a bid of any party who has failed to perform, been unfaithful and/or delinquent in any former relationship with the District. The District reserves the right to waive any irregularities or formalities in any solicitation or bid response. The District shall be the sole judge as to which bid is best and, in determining that fact, may consider the contractor's business integrity, financial resources, experience, facilities and/or capacity for performing the work.

**RESERVATIONS**

This IFB does not commit the District to award a contract, to pay any costs incurred in the preparation of a bid in response to this invitation, or to procure or contract for services or supplies. The District reserves the right to accept or reject, in part or its entirety, any bid received as a result of this IFB, If it is in the best interest of the District to do so.

**SEVERABILITY**

The finding or determination of any part or parts of the General Instruction, Terms and Conditions is void unenforceable, invalid or voidable shall result in only that part being stricken with the remainder to continue in full force and effect.

**STATEMENT OF EXPERIENCE AND QUALIFICATIONS**

The company may be required, upon request, to prove to the satisfaction of the District that they have the skill, experience and the necessary facilities and financial resources to perform the contract in a satisfactory manner and within the required time. If the evidence of competency is not satisfactory, the bid of such company may be rejected.

End of IFB Section1



**APPENDIX D-Section 2**  
INSTRUCTIONS FOR  
PERFORMANCE AND PAYMENT BONDS, INSURANCE  
SMOKING, COMPLETION DATE, LIQUIDATED DAMAGES AND OTHER  
TERMS AND CONDITIONS  
SLOAN HENDRIX SCHOOL DISTRICT  
A NEW K4 CLASSROOM ADDITION TO THE ELEMENTARY SCHOOL

These General Instructions, Terms and Conditions and any special terms and conditions become part of any contract entered into in the event any part or all of the bid is accepted by the School District.

Any special terms and conditions included in the Invitation for Bids override these general instructions, terms and conditions.

**SECTION 2: SPECIAL INSTRUCTIONS, TERMS AND CONDITIONS**

Contractor PERFORMANCE BONDS and Subcontractor PERFORMANCE BONDS

**CONTRACTOR PERFORMANCE AND PAYMENT BONDS**

If bid is over \$20,000, each Bidder must be prepared to furnish a Performance and Payment Bond in accordance with the Arkansas statutory requirements written by a surety company authorized to do business in the State of Arkansas. The Performance and Payment bond will be furnished by the successful bidder within ten (10) days after receipt of the School District intent to award notice. Failure to furnish the required bonds may cause forfeiture of bid guarantee to the owner as liquidated damages. The "Performance and Payment Bond" will be in the amount equal to 100% of the contract price as security for the faithful performance of this contract price and for payment of all indebtedness for labor and materials furnished or performed in connection with this contract

The bonds will be written by a surety company which is qualified and is authorized to do business in the State of Arkansas, according to A.C.A. 22-9-402(a)(b) and filing with said bond, his power of attorney as his authority. The bonds will be written in favor of the Owner and executed per Arkansas state law. An original and two (2) copies of the bonds must be furnished, with power of attorney attached to each. The Contractor will file and record the original with the Clerk in the Circuit Court of the County of the School District.

The Contractor is to pay all expense incidentals to file the bonds. The remaining two copies should be certified by the Clerk to evidence the filing of the original and these two copies submitted to the School District.

**NO SMOKING POLICY**

The School District has a No Smoking Policy on all school properties. It is the policy of the Board of Education that all uses of tobacco and tobacco products, including smokeless tobacco, will be prohibited on all District facilities. At no time will the use of tobacco products be permitted in classrooms, corridors, restrooms, locker rooms, work

**APPENDIX D-Section 2**  
INSTRUCTIONS FOR  
PERFORMANCE AND PAYMENT BONDS, INSURANCE  
SMOKING, COMPLETION DATE, LIQUIDATED DAMAGES AND OTHER  
TERMS AND CONDITIONS  
SLOAN HENDRIX SCHOOL DISTRICT  
A NEW K4 CLASSROOM ADDITION TO THE ELEMENTARY SCHOOL

areas, cafeterias, offices, faculty lounges, gymnasiums, all other rooms and school grounds. This policy applies to all Staff Members, Students, Visitors, General Contractors, Sub- Contractors, and Vendors. This policy is strictly enforced without exception.

**INSURANCE REQUIREMENT**

After bids are opened, the apparent low bidder must provide proof of insurance within five (5) business days from date of request by the District. Insurance must provide sufficient liability protection for all claims, whether direct or indirect, resulting from contractual operations. Failure to submit an insurance certificate by the time provided may be cause for bid disqualification. The following are recommended amounts for insurance coverage: (The District reserves the right to lower/raise these coverages if It is in the best interest of the District). The (Name) School District must be named as additional insured, and the certificate must contain a clause that the insurer will not cancel or change the insurance without first giving the (Name) School District a minimum of 30 days, prior written notice.

1. Workmen's Compensation - Statutory Limits.
2. General Liability-
  - General Aggregate - \$3,000,000
  - Each Occurrence -\$1,500,000

**BUILDER'S RISK**

Fire Extended Coverage and Vandalism and Malicious Mischief Insurance: The Contractor shall procure and maintain during the term of this contract and until work has been completed and accepted, Builder's Risk, Fire Extended Coverage, Vandalism and Malicious Mischief Insurance for an amount equal to 100% of the insurable property value of the project less the cost of any excavation, brick, stone or concrete foundation, piers or other supports which are below the under surface of the lowest basement floor or where there is no basement, piers which are below the surface of the ground or underground flues, pipes or wiring. Said insurance coverage is to be written in the name of the Contractor and Owner. The required insurance must be written by a company licensed to do business in the State of Arkansas in accordance with A.CA 23-63 at the time the policy is issued. In addition, the companies must be acceptable to the Owner and Owner's agent.

**CANCELLATION PROVISIONS**

Cancellation for Cause: The District may cancel the contract at any time for breach of contractual obligations by providing the contractor with a written notice of such cancellation. Should the District exercise its right to cancel the contract for such reasons, the cancellation shall become effective on the date as specified in the notice of cancellation sent to the contractor.

**APPENDIX D-Section 2**  
INSTRUCTIONS FOR  
PERFORMANCE AND PAYMENT BONDS, INSURANCE  
SMOKING, COMPLETION DATE, LIQUIDATED DAMAGES AND OTHER  
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SLOAN HENDRIX SCHOOL DISTRICT  
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**TIME OF COMPLETION** The Contractor shall show in the proposal the number of calendar days required to complete the project.

A. If a required completion date is established herein, the contractor shall affirm the required completion date.

B. If NO completion date is established herein the Contractor shall specify his time of completion and if awarded the contract will be obligated to perform to this self specified completion date.

**COMPLETION DATE**

All work must be fully complete no later than:

**Contractor to supply completion date by 320 calendar working days**

If work is not completed by this date, liquidated damages will be assessed.

**LIQUIDATED DAMAGES**

Liquidated damages imposed against the contractor for failure to meet the final agreed upon completion date will be an amount per calendar day for each workday beyond the final agreed upon completion date. This amount will be specified in a separate section of this specification. The contractor shall be relieved of delays due to causes beyond his control such as Acts of God, national emergency, strikes, or fire. The contractor must notify the District Contracting Official In writing, on a timely basis of such developments stating reason, justification and extent of delay. Weather days will be allowed to be used and not counted as working days at the discretion of the contractor and the architect and the use of each weather day must be documented and filed with the School District Contract Official within 10 days of such use. Weather days will be in accordance with the average inclement weather days as recorded by the National Weather Bureau for the geographical area of the contract.

**PRICING**

Bid hereinafter is understood to include all expenses, taxes, incidentals and overhead; including, but not limited to wages, fringe benefits, supervision, material and equipment costs and it is further understood that the bidder shall bear the sum of all supplies (except as otherwise specified) necessary or desirable in order to perform the work.

End of IFB Section 2





CONTRACT  
AND  
GENERAL CONDITIONS OF THE CONTRACT  
SLOAN HENDRIX SCHOOL DISTRICT  
A NEW K4 CLASSROOM ADDITION TO THE ELEMENTARY SCHOOL

The Contract will be standard AIA contract between Owner and General Contractor for a stipulated sum - latest edition.

General Conditions of the contract shall consist of the Standard AIA General Conditions by the American Institute of Architects (A.I.A) Documents, latest edition and shall apply to every contractor and sub-contractor.

Where Supplementary General Conditions conflict or are at variance with the General Conditions, the provisions of the all the Supplementary Conditions shall govern. Supplementary Conditions are provided herein as:

Appendix "D" Section 1, GENERAL INSTRUCTIONS, TERMS AND CONDITIONS

Appendix "D" Section 2, INSTRUCTIONS FOR BID GUARANTEE, PERFORMANCE  
AND PAYMENT BONDS, INSURANCE, SMOKING,  
COMPLETION DATE, LIQUIDATED DAMAGES AND OTHER  
TERMS AND CONDITIONS.

Supplementary Conditions

CONTRACT  
AND  
GENERAL CONDITIONS OF THE CONTRACT



SUPPLEMENTARY GENERAL CONDITIONS  
SLOAN HENDRIX SCHOOL DISTRICT  
A NEW K4 CLASSROOM ADDITION TO THE ELEMENTARY SCHOOL

1. CONTRACTOR'S LICENSE,

A. Any contractor employed on the work shall be a licensed contractor as provided by the Arkansas State Contractors' Licensing Board.

2. PAYMENT

A. Not later than the tenth (10th) day of each calendar Month The owner will make partial payment to the Contractor on the basis of an estimate approved by the Architect of the work performed during the preceding calendar month by the Contractor, but the Owner will retain 5% of the amount of each such estimate until final completion and acceptance of all work covered by this Contract. The Contractor shall present his request for payment on the twenty-fifth day of each calendar month.

B. In preparing estimates, the material, delivered and suitably stored on the site and preparatory work done may be taken into consideration.

C. These periodical estimates for partial payment shall be submitted to the Architect by the Contractor on standard AIA Pay Request forms available from the AIA. The Contractor shall furnish five (5) copies of each estimate or as requested by the Architect.

4. EXTRA AND/OR ADDITIONAL WORK AND CHANGES

A. Without invalidating the Contract, the Owner may order extra work or make changes by altering, adding to or deducting from the work, the Contract sum being adjusted accordingly, and the consent of the surety being first obtained .where necessary or desirable.

B. No claims for any extra work or materials shall be allowed unless the work is ordered in writing by the Architect.

C. Any changes in the work will be on a basis of actual cost to the Contractor plus 15% of the cost for Contractor's supervision, overhead and profit.

D. Work omitted that was included in the original contract shall be computed on the same basis.

E. The Contractor shall be required, if called upon, to furnish the original bills and payrolls and support the statement with proper affidavits. The burden of proof of the costs rests on the Contractor.

F. Bills for extras will be allowed only when work is ordered in writing. No bills based on verbal orders will be allowed by the Architect unless accompanied by a written order from the Architect.

G. The contractor waives all claims for extension of time of completion on account of extra work, unless application for such extension is made by the Contractor within 24

SUPPLEMENTARY GENERAL CONDITIONS  
SLOAN HENDRIX SCHOOL DISTRICT  
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hours of the time such work is ordered.

5. EXAMINATION OF SITE - All Contractors submitting proposals for this work shall first examine the site and all conditions therein. All Proposals shall take into consideration all such conditions as may affect the work as ordered.

6. VARIATIONS FROM MATERIALS SPECIFIED BY NAME

A. Where a definite material or product is specified by name of manufacturer, brand, trade name, or catalogue reference, it is not the intent to discriminate against any equal material or product of another manufacturer, but to set a definite standard, of quality. Open competition is expected and bidding may be based upon materials and products equal to those specified, subject to the provisions below.

B. As soon as practicable, within thirty days (30) after award of the Contract, the Contractor shall make written request to the Architect for, and shall obtain his approval of the use of materials or products other than those shown on the drawings mentioned as standards or called for in the Specifications. No substitutions will be considered after thirty (30) days, and no substitutions shall be made without approval of the Architect.

7. SHOP DRAWINGS - The Contractor shall submit with such promptness, as to cause no delay in his work, all shop or setting drawings and schedules required for the work of the various trades, and the Architect will pass upon them with reasonable promptness, making desired corrections, including all necessary corrections relating to artistic affect. The Contractor shall, make any corrections required by the Architect, file with him corrected copies, and furnish such other copies as may be needed. The Architect's approval of such drawings or schedules shall not relieve the Contractor from responsibility for deviations from drawings or specifications, unless he has in writing called the Architect's attention to such deviations at the time of submission, not shall it relieve him from responsibility for errors of any sort in shop drawings or schedules.

In checking shop drawings, the Architect will pass upon the design, size, adequacy, etc. of the items shown, but will not assume any responsibility for quantities. The Architect is under no obligation to check any shop drawings until the completed (completed not only in number, but also in adequacy of information supplied) drawings for that trade are in his hands. The Contractor is to submit the number of copies of drawings required by the parts of the specifications relative to that trade. The Architect may, at his option, require the digital CAD copies or tracings of shop drawings to be submitted and after correcting the drawings tracings may have the necessary number of prints made and distributed at the expense of the party submitting the shop drawing for approval. After shop drawings have been approved by the Architect, it shall be the duty of the Contractor to see that all Sub-Contractors or material-men requiring information regarding work to be done, or materials to be supplied, that may be affected by said shop drawings, shall be supplied with copies of such drawings and given such information that they may require.

SUPPLEMENTARY GENERAL CONDITIONS  
SLOAN HENDRIX SCHOOL DISTRICT  
A NEW K4 CLASSROOM ADDITION TO THE ELEMENTARY SCHOOL

8. MEASUREMENTS - Discrepancies shall be called to the attention of the Architect before work is installed. No work, which is to be installed in the building shall be laid out according to figured dimensions when work already installed may govern these dimensions; verify all dimensions at job before laying out shop drawings or shop work. The Contractor will be responsible for any mistakes which may be attributed to failure to follow these instructions. The Architect is not responsible for any discrepancies in figured dimensions.

9. JOB OFFICE – The Contractor shall provide a suitable job office with necessary provisions for the proper care of the drawings, and maintain telephone service, lights, and heat.

10. TEMPORARY TOILETS -The Contractor shall install temporary toilets, if necessary connected to sewer line, and housed in properly constructed enclosures. Toilets shall be sufficient in number to take care of all workmen.

11. WATER -The Contractor shall supply water for use by all trades. All charges incident to the installation operation, maintenance and removal of such facilities shall be borne by the Contractor.

12. POWER - The Contractor shall supply necessary electric power for operation of the various types of equipment used on the job, and pay all charges incident to the installation, maintenance, operations, and removal of these facilities.

13. LIGHTS - Wherever lights / illumination are found necessary for the proper execution of the work the Contractor must supply and maintain them. No open torches will be permitted.

14. HEATING -The Contractor shall have the entire building closed in, as soon as possible. The Contractor shall furnish all natural gas or fuel necessary to maintain a temperature of not less than 50 degrees F both day and night.

15. GAS -The Contractor shall be responsible for the cost of all gas or fuel required for heating during the construction of the project.

16. CONTRADICTIONS -Should any contradictions in the Specifications and Drawings occur, or any other questions arise regarding interpretation or intent, of any point in the Specifications or Drawings, the Architect shall decide the points at issue and the Architect's decision shall be final and binding on both the Owner and the Contractor. In the absence of a decision by the architect the most stringent requirement shall apply.

17. GUARANTEE -All Contractors shall guarantee all work under the Contract for a period of one (1) year from the date of contract acceptance by the Architect and shall

SUPPLEMENTARY GENERAL CONDITIONS  
SLOAN HENDRIX SCHOOL DISTRICT  
A NEW K4 CLASSROOM ADDITION TO THE ELEMENTARY SCHOOL

leave the work in perfect order at completion and neither final certificate nor any provisions in the Contract Documents shall relieve the Contractor of the responsibility for negligence or faulty materials or workmanship within the extent of the period named and upon written notice he shall remedy any defects due thereto and pay all expenses for any damage to other work resulting therefrom. This guarantee shall be of a longer period on certain items where so designated in the body of the Specifications. If the Contractor, after due notice, fails to comply promptly with the terms of the guarantee, the Owner may have the defects corrected and the Contractor and his surety shall be liable for all expenses incurred.

18. ARKANSAS HEALTH DEPARTMENT FEE - The School shall pay the Arkansas State Health Department a fee of 1% (one percent) of the cost of the Mechanical Sub-Contract not to exceed \$500.00 (five hundred dollars) maximum. This fee is charged for review of plans and job inspections by the Health Department. The fee is to be paid prior to the issuance of documents for bidding and any mechanical work being commenced.

29. MATERIALS TESTING - Concrete and soil testing will be paid for by the Owner. However, any work that does not meet the Contract Documents Requirements will be removed by the Contractor/Sub-Contractor performing the unacceptable work and replaced at no additional charge to the Owner. Any subsequent tests required will be paid for by the Contractor/Sub-Contractor until the work is determined to be in compliance.

20. BUILDING PERMITS - The Contractor will provide any local building permits required, if any.

21 OSHA-STANDARD - 29 CFR 1926, Sub-Part P shall be included in this Contract as though bound in this Document.

22. SAFETY STANDARDS AND ACCIDENT PREVENTION

With respect to all work performed under this contract, the Contractor shall:

A. Comply with the safety standards provision of applicable laws, building and construction codes and the "Manual of Accident Prevention in Construction" Published by the Associated General Contractors of America, the requirements of the Occupational Safety and Health Act of 1970 and including any revisions to date

B. Exercise every precaution at all times for the prevention of accidents and the protection of person and property.

C. Maintain at his office or other well-known place at the job site all articles necessary for giving first aid to the injured, and shall make standing arrangements for the immediate removal to a hospital or a doctor's care of persons who may be injured at the job site.

SUPPLEMENTARY GENERAL CONDITIONS  
SLOAN HENDRIX SCHOOL DISTRICT  
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19. LABOR

All Contractors employed upon the work shall and will be required to conform to the Labor Laws of the State of Arkansas and the various acts amendatory and supplementary thereto; and to all other laws, ordinances and legal requirements applicable thereto.





ARCHITECT'S CONTINGENCY ALLOWANCE  
TO BE INCLUDED IN BID AMOUNT  
AND LIQUIDATED DAMAGES  
SLOAN HENDRIX SCHOOL DISTRICT  
A NEW K4 CLASSROOM ADDITION TO THE ELEMENTARY SCHOOL

1. ARCHITECTS CONTINGENCY ALLOWANCE

The Contractor to include in the bid an Architect's Contingency allowance of:

**\$80,000.00, (eighty thousand dollars)**

To be used during the construction of the project at the Architect's sole discretion. A construction project is very complicated and involves the coordination of a large number of trades and details. It is impossible to address all aspects of the job in the final construction documents due to nonexistent details on the drawings, changing conditions and/or unexpected circumstances on the job site, etc. The contingency allowance is used in order to clarify, resolve or correct situations that may arise during construction. At the conclusion of the project the unused portion of the contingency is returned to the Owner.

2. LIQUIDATED DAMAGES

Liquidated damages imposed against the contractor for failure to meet the final agreed upon completion date will be an amount:

**\$400 (four hundred dollars)** per day–Liquidated Damages

for each calendar day beyond the final agreed upon completion date. Liquidated damages are further specified in Appendix "D" Section 2



ALLOWANCES AND UNIT PRICES  
TO BE INCLUDED IN BID AMOUNT  
SLOAN HENDRIX SCHOOL DISTRICT  
A NEW K4 CLASSROOM ADDITION TO THE ELEMENTARY SCHOOL

**1. ALLOWANCES**

A.The Contractor to include in the bid an allowance of

**FORTY DOLLARS (\$40.00) PER DOOR**

to provide and install room identification signs. All interior doors are to have one sign on one side of each door. Double doors count as one door. Architect or Owner is to select door sign locations.

**2. UNIT PRICES**

A. For rock excavation and removal the contractor will be paid an additional sum to the bid price for the removal of rock, if encountered during the excavation of the site for footings, utilities etc.

**ONE HUNDRED FIFTY DOLLARS (\$150.00) PER CUBIC YARD**



CERTIFICATE OF NON-COLLUSION

ACT 2161 of 2005 concerning ethics in the Public School Procurement Process requires each General Contractor submitting a bid to comply with this Act by furnishing a Notary Public Certification of the following statement with the bid:

NAME OF SCHOOL DISTRICT \_\_\_\_\_

NAME OF COUNTY \_\_\_\_\_

I, \_\_\_\_\_ hereby state

(1) I am the duly authorized agent of \_\_\_\_\_, the bidder submitting the competitive bid which is attached to this statement, for the purpose of certifying the facts pertaining to the existence of collusion among and between bidders and state officials, as well as facts pertaining to the giving or offering of things of value to government personnel in return for special consideration in the award of any contract pursuant to the bid to which this statement is attached.

(2) I am fully aware of the facts and circumstances surrounding the making of the bid to which this statement is attached and have been personally and directly involved in the proceedings leading to the submission of the bid.

(3) Neither the bidder nor anyone subject to the bidder's direction or control has been a party:

(A) To any collusion among bidders in restraint of freedom of competition by agreement to bid at a fixed price or to refrain from bidding; or

(B) To any collusion with any state official or employee as to quantity, quality or price in the prospective contract, or as to any other terms of the prospective contract; or

(C) In any discussions between bidders and any state official concerning exchange of money or other thing of value for special consideration in the awarding of a contract.

(4) I hereby guarantee that the specifications outlined in the bid shall be followed as specified and that deviations from the specifications shall occur only as part of a formal change process approved by the Board of Directors of the school district.

\_\_\_\_\_  
Signature

Subscribed and sworn to before me this \_\_\_\_\_ (date) of \_\_\_\_\_ (month)  
\_\_\_\_\_ (year)

\_\_\_\_\_  
Notary Public



SLOAN HENDRIX SCHOOL DISTRICT  
A NEW K4 CLASSROOM ADDITION TO THE ELEMENTARY SCHOOL  
PROPOSAL FOR CONTRACT FOR GENERAL CONSTRUCTION

Proposal of \_\_\_\_\_

"a corporation organized and existing under the laws of the \_\_\_\_\_

\_\_\_\_\_

"an individual trading as \_\_\_\_\_

\_\_\_\_\_

TO: The Board of Education  
Sloan Hendrix  
PO Box 1080  
Imboden, Arkansas 72434

Gentlemen:

The undersigned in compliance with your invitation for bids for general construction of

**A NEW K4 CLASSROOM ADDITION TO THE ELEMENTARY SCHOOL**

located in Imboden, Arkansas, having examined the Plans and Specifications with related documents and the site of proposed work and being familiar with all of the conditions surrounding the construction of the proposed project, including the availability of labor, hereby propose to furnish all labor, materials, supplies and equipment and to construct the project in accordance with the contract documents and at the prices stated hereinafter. These prices are to cover all expenses incurred in performing the work of which this proposal is a part.

I (or we) acknowledge receipt of the following addenda:

No. \_\_\_\_\_ Dated \_\_\_\_\_

No. \_\_\_\_\_ Dated \_\_\_\_\_

No. \_\_\_\_\_ Dated \_\_\_\_\_

No. \_\_\_\_\_ Dated \_\_\_\_\_

SLOAN HENDRIX SCHOOL DISTRICT  
A NEW K4 CLASSROOM ADDITION TO THE ELEMENTARY SCHOOL

PROPOSAL FOR CONTRACT FOR GENERAL CONSTRUCTION

No. \_\_\_\_\_ Dated \_\_\_\_\_

No. \_\_\_\_\_ Dated \_\_\_\_\_

No. \_\_\_\_\_ Dated \_\_\_\_\_

No. \_\_\_\_\_ Dated \_\_\_\_\_

No. \_\_\_\_\_ Dated \_\_\_\_\_

**BASE PROPOSAL:**

(THE BASE PROPOSAL IS TO INCLUDE AN EIGHTY THOUSAND DOLLAR  
(\$80,000) CONTINGENCY ALLOWANCE)

For all work described in the Specifications and shown on the Plans, for general  
construction work for:

**A NEW K4 CLASSROOM ADDITION TO THE ELEMENTARY SCHOOL**

at Imboden, Arkansas, I (or we) agree to perform all work for the sum of:

\_\_\_\_\_

\$ \_\_\_\_\_

Amount shall be shown in both written form and figures. In case of discrepancy between  
the written amount and figures, the written amount will govern.

**NO DEDUCTIVE ALTERNATES**

The contractor hereby agrees to commence work under this contract on the date to be  
specified in the written "Work Order" of the Architect.

**TRENCHING AND EXCAVATIONS**

Lump sum price for Trenching and Excavations to meet OSHA Standards for  
TRENCHING AND EXCAVATION SAFETY, CFR 201926, Sub-part P.

\$ \_\_\_\_\_

(This amount to be included in the Base Bid)

Bid Form /Proposal **2 of 4**



SLOAN HENDRIX SCHOOL DISTRICT  
A NEW K4 CLASSROOM ADDITION TO THE ELEMENTARY SCHOOL

PROPOSAL FOR CONTRACT FOR GENERAL CONSTRUCTION

The contractor hereby agrees to commence work under this contract on the date to be specified in the written "Work Order" of the Architect.

ELECTRICAL CONTRACTOR'S NAME AND LICENSE NO:

---

PLUMBING CONTRACTOR'S NAME AND LICENSE NO:

---

HEATING, VENTILATING AND AIR CONDITIONS (HVAC) CONTRACTOR'S  
NAME AND LICENSE NO:

---

ROOFING & SHEET METAL CONTRACTOR'S NAME AND LICENSE NO:

---

In submitting this proposal it is understood that the right is reserved by the Owner to reject any and all proposals for any reason whether or not the reason is related to the proposals themselves or to waive informalities in the process, or to negotiate with any of the qualified bidders

No bid shall be withdrawn for a period of thirty (30) days subsequent to the opening of the proposals (bids) without consent of the owner.

Upon receipt of notice of the acceptance of the above base proposal with or without alternates at your option, we will execute the formal contract attached within five days and deliver SURETY BOND for the faithful performance of this Contract. The bid security attached without endorsement in the sum of:

\_\_\_\_\_ Dollars

(\$\_\_\_\_\_)

is to become the property of the OWNER in the event the Contract and Bond are not executed within the time above set forth, as liquidated damages for the delay and

SLOAN HENDRIX SCHOOL DISTRICT  
A NEW K4 CLASSROOM ADDITION TO THE ELEMENTARY SCHOOL

PROPOSAL FOR CONTRACT FOR GENERAL CONSTRUCTION  
additional work caused thereby.

If awarded this Contract, I (or we) agree-to complete the all work within \_\_\_\_\_, calendar days.

Respectfully submitted,

\_\_\_\_\_

By \_\_\_\_\_  
Title

\_\_\_\_\_

Address

(Seal if Bid is  
by Corporation)

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**A NEW K4 CLASSROOM ADDITION TO THE ELEMENTARY SCHOOL**

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**SPECIAL CONDITIONS**

**PART 1 - GENERAL**

**RELATED DOCUMENTS**

Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section

All Subcontractors, as well as the General Contractor, shall be governed by all applicable Sections of these Documents with reference to their respective areas of work. It shall be the responsibility of the General Contractor to apprise their Subcontractors and suppliers of these requirements.

**RELATIONS WITH ADJOINING PROPERTY OWNERS**

To facilitate his work, the Contractor may choose to make necessary arrangements for use and subsequent rehabilitation of the adjoining Owner's property. Such arrangements are solely the Contractor's responsibility.

**GENERAL**

The Contractor shall provide sufficient and adequate labor, materials and equipment necessary to properly correlate all phases of the work to the end that the approved Progress Schedule can be adhered to and the Contract completion date met.

**SUPERINTENDENT**

The General Contractor's Superintendent shall be at the job full-time, during normal working days and hours, continuously from the start of the job. The Contractor's Superintendent shall maintain up-to-date records, including as-built Drawings.

**PERMITS, FEES, DEPOSITS, AND NOTICES**

The General Contractor shall secure and pay for all permits and certificates of inspection incidental to this work required by City, County, State, or any other governing authority having jurisdiction over premises.

The General Contractor shall ensure that all Subcontractors and Sub-subcontractors have obtained all permits, paid all fees, made any required deposits, and posted all notices required by law before any of their work is started.

Should it be required that any permits or notices be posted at the job site, the General Contractor shall make proper provision for such posting with adequate protection for their preservation throughout the course of the work.

Copies of all permits shall be sent to the Owner's representative and the Architect by the General Contractor.

The General Contractor will coordinate all required inspections by governing authorities.

**MEETINGS**

Before any work is started, responsible representatives for the Contractor, including his designated job superintendent for the project, shall meet at the site with the Owner's representative to review the requirements and conditions under which the project will be performed.

Progress meetings shall be held at the site under the direction of the Owner's representative. The Contractor shall attend or be represented by someone fully empowered to speak for and commit them to any agreement reached.

**EXAMINATION OF THE SITE**

All Contractors submitting proposals for this work shall first examine the site and all conditions thereon. All proposals shall take into consideration all such conditions as may affect the work under this Contract.

**GRADES, LINES, LEVELS, AND SURVEYS**

All grades, lines, levels, and bench marks for the building shall be established and maintained by the General Contractor who shall be responsible for same.

Verify all grades, lines, levels, and dimensions as shown on the Drawings, and report any errors or inconsistencies discovered in the above to the Architect before commencing work. Provide and maintain established bench marks in not less than two widely separated places.

#### FIELD MEASUREMENTS

The General Contractor shall take measurements in the field to verify or supplement dimensions indicated on Drawings and shall be responsible for accurate fit of specified work. Any discrepancy between the Drawings and the actual conditions shall be reported immediately to the Architect.

Tolerances: The General Contractor shall be responsible to maintain dimensions for spaces requiring close tolerances for such items as equipment or fixtures by "grounding" such locations. Uneven surfaces and joints will not be accepted which prevent the installation of units whose dimensions are shown in the documents.

#### PROTECTION

It shall be the responsibility of each Contractor to see that all personnel comply with Specific Safety Requirements of the agencies of jurisdiction relating to construction and the latest Federal Regulations of the Department of Labor, Bureau of Labor Standards, and the Occupational Safety and Health Act (O.S.H.A.).

Each Contractor shall provide and maintain guard lights for his work at all barricades, railings, obstructions in the streets, roads, or sidewalks, and at all trenches or pits. Remove such work when directed after necessity for same ceases.

Each Contractor will be held responsible for all of his work and materials provided for by the plans and Specifications until the work is completed and accepted.

#### FIRE PROTECTION

Free access shall be maintained at all times from the street to fire hydrants and to outside connections for standpipes. Fire doors shall be installed and in operation at the earliest possible time.

During the construction period, the General Contractor shall furnish 20 pound ABC all-purpose dry chemical type extinguishers to be located strategically throughout the building. In lieu of the above, the Contractor may substitute 2-1/2 gallon anti-freeze type water extinguishers and 10 pound carbon dioxide extinguishers.

The General Contractor shall appoint one of his personnel who is continually employed on the job site (such as the Superintendent) whose additional duty it will be to act as fire warden for the project. The fire warden shall institute and vigorously enforce a program of fire safety for the project.

The General Contractor shall maintain fire protection equipment, institute fire prevention measures, and direct the prompt removal of all unnecessary combustible material and waste. He shall be responsible for the correct and safe use of soldering coppers, extension lights, flammable liquids, welding and metal cutting apparatus, wax pots, or other open flame tools. This type of work shall be done only when properly supervised and with adequate fire extinguishing equipment available.

Combustible materials shall not be stored in the building.

The use of wood scaffolding shall be kept to a minimum and entirely eliminated when possible, in order to eliminate fire hazards from this source. No part of the building where forms are in place shall be used for the storage of flammable materials of any kind. Temporary structures of combustible material shall be located not less than 30 feet from the building.

No smoking or use of tobacco in any form shall be permitted within the building or on the roof surfaces.

Paints, varnishes, volatile oils, etc., shall be stored in a room having good ventilation and containing no other material, or in metal lockers or metal boxes with self-closing covers. Gasoline and other volatile and flammable liquids shall be stored in metal barrels well away from other structures or other combustible materials.

Special precautions shall be taken to reduce fire hazards where electric or gas welding or cutting work is done and suitable fire extinguishing equipment shall be maintained near such operations.

The General Contractor shall install and maintain portable fire extinguishers in tool houses and other temporary buildings.

#### USE OF SITE

The General Contractor shall designate areas for location of parking, storage, and construction trailers.

##### Material Delivery and Storage

It shall be the responsibility of each Contractor to direct all deliveries to the construction site and not the Owner.

Temporary storage facilities shall be provided to protect equipment and/or materials delivered to the job site which may be damaged by exposure to weather. It shall be the General Contractor's responsibility to provide all labor and materials necessary to provide such protection. The Owner shall be consulted as to the "adequacy" of such temporary protection.

All Contractors shall exercise control over all trucks and equipment using public roads and the Owner's property to preclude spillage, tracking of dirt or debris thereon. Should spillage occur, that Contractor is held to promptly clean and remove same.

Mud from the construction site shall be removed from public and the Owner's roads daily. Failure to remove mud promptly could result in roads being cleaned by the Owner at the responsible Contractor's expense.

#### WEATHER PROTECTION

All Contractors shall at all times provide protection against weather --- rain, wind, storms, frost, or heat --- so as to maintain his work, materials, apparatus, and fixtures free from injury or damage. At the end of the day's work, all work likely to be damaged shall be covered.

During cold weather, the General Contractor shall protect the work from damage. If low temperatures make it impossible to continue operations safely in spite of cold weather precautions, the Contractor shall cease work.

Any work damaged by failure to provide above protection shall be removed and replaced with new work at the Contractor's expense.

#### RESTORATION

Where existing properties, streets, paving, curbs, etc., are removed or damaged as a result of work operations, the responsible Contractor shall restore the foregoing items to match the original or as required by local authorities.

#### PROTECTION OF INSTALLED WORK

All Contractors shall:

Provide temporary protection for installed products. Control traffic in immediate area to minimize damage.

Prohibit traffic and storage on waterproofed and roofed surfaces, and on lawn and landscaped areas.

Provide protective coverings at walls, projections, jambs, sills, and soffits or openings. Protect finished floors and stairs from traffic, movement of heavy objects, and storage.

#### WATER CONTROL

All Contractors shall provide, operate, and maintain pumps or other equipment necessary to drain his work. Keep excavation pits, trenches, and ditches including the entire subgrade free of any water under any circumstances that may arise.

#### REMOVAL

Remove temporary materials, equipment, services, and construction prior to Substantial Completion inspection.

Clean and repair damage caused by installation or use of temporary facilities.

#### SURPLUS FINISH MATERIALS

Unless specified otherwise, a minimum of one percent (1%) of all finish materials shall be turned over to the Owner at the completion of the Project for maintenance and repair work, including, but not limited to touch-up paint, etc.

Refer to respective Specification Sections for further requirements.

**PART 2 - PRODUCTS**

Not Used

**PART 3 - EXECUTION**

Not Used

**END OF SECTION**



## SECTION 01010

### SUMMARY OF WORK AND HAZARDOUS MATERIALS

#### **PART 1 - GENERAL**

##### REQUIREMENTS INCLUDED

Description of Work

##### DESCRIPTION OF WORK

Project Description: WORK IS AS SHOWN ON DRAWINGS AS LISTED IN THE INDEX OF DRAWINGS AND AS SPECIFIED HEREIN and associated work.

Extent: Contractor shall furnish all labor, tools, equipment and materials to complete all work under this heading as indicated on the Drawings and described in the Specifications.

Items Included: The work to be performed under this Section shall include, but is not limited to, the following:

Items to be furnished by the Owner and installed by the Contractor (F.B.O. - I.B.C.).

Items to be furnished and installed by the Owner (F.B.O. - I.B.O.).

The Drawings and Specifications are complementary and what is required by any one shall be as binding as if required by all.

Drawings and General Provisions of Contract, including General Conditions, Supplementary Conditions, and Division 1 Specification Sections, apply to work specified in this Section.

##### QUALITY ASSURANCE

Qualifications of Contractors: In order to assure that Bidders are qualified to perform the work bid upon, the Owner, at his sole discretion, may require bidder to submit a list of three (3) similar projects which have been completed by the Bidder. Such list shall include descriptions of the work performed and a specific person (reference) whom the Owner may contact. If Owner requires such list, submit promptly within five (5) days. Non-compliance may cause rejection of bid. It is the intent of the Owner and the Project Manual to conform with the AMERICANS WITH DISABILITIES ACT OF 1991 and any later revisions or updated requirements .

##### CONTRACTOR USE OF PREMISES

General: Contractors shall limit their use of the premises to construction activities in areas indicated.

Confine operations to areas within Contract limits indicated. Portions of the site beyond areas in which construction operations are indicated are not to be disturbed.

Keep driveways and entrances serving the premises clear and available to the Owner and the Owner's employees at all times. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on site.

Contractor shall assume full responsibility for protection and safe keeping of products under this Specification.

##### PROGRESS SCHEDULE

A Progress Schedule listing the major items of work and dates of completion shall be submitted in bar-graph form for the Architect's approval no more than 14 days after the date of the Owner's award of Contract. This Schedule shall be updated before every construction meeting.

##### HAZARDOUS MATERIALS

In the event the Contractor encounters material reasonably believed to contain asbestos or other hazardous materials which have not been identified or rendered harmless, the Contractor shall immediately stop work in the area affected and report the condition to the Owner in writing. The work in the affected area shall be resumed in the absence of asbestos, as verified by the Owner.

To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Engineer, Architect, Engineer's and Architect's consultants and agents and employees of any of them from and against claims, damages, losses, and expenses, including, but not limited to, attorney's fees arising out of or resulting from performance of the work in the affected area if, in fact, the material is asbestos and has not been rendered harmless, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the work itself), including loss of use resulting there from, but only to the extent caused in whole or in part by negligent acts or omissions of the Owner, anyone directly or indirectly employed by the Owner or anyone for whose acts the Owner may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to a part or person described in this Subparagraph.

## **PART 2 - PRODUCTS**

Not Used

## **PART 3 - EXECUTION**

Not Used

**END OF SECTION**

## **SECTION 01020 ALLOWANCES**

### **PART 1 - GENERAL**

#### **1.01 REQUIREMENTS INCLUDED**

- A. Include the Contract Sum allowances stated in the Contract for Construction.
- B. Designate in the construction progress schedule the delivery dates for Products specified under each allowance.

#### **1.02 RELATED REQUIREMENTS**

- A. Conditions of the Contract.
- B. Section 01300 - Submittals.

#### **1.03 ALLOWANCES FOR PRODUCTS**

- A. The amount of each allowance for services to be provided by the Owner but to be paid for out of the Contract Sum includes:
  - 1. The cost of service to the Owner.
- B. The amount of each allowance includes:
  - 1. The cost of the Product to the Contractor, or Sub-Contractor, less any applicable trade discounts.
  - 2. Delivery to the site or F.O.B. plant, as applicable.
  - 3. Applicable taxes.
  - 4. Labor required under the allowance, only when labor is specified to be included in the allowance.
- C. In addition to the amount of each allowance, include in the Contract Sum the Contractor's or Sub-Contractor's costs for:
  - 1. Handling of the site, including unloading, uncrating and storage.
  - 2. Hauling from the plant to the site, if applicable.
  - 3. Protection from the elements and from damage.
  - 4. Labor for installation and finishing, except where labor is specified to be a part of the allowance.
  - 5. Other expenses required to complete the installation.
  - 6. Contractor's and Sub-Contractor's overhead and profit.

#### **1.04 SELECTION OF PRODUCTS AND SUB-CONTRACTOR UNDER ALLOWANCES**

- A. Architect/Engineer's duties
  - 1. Consult with the Contractor in consideration of Products, Suppliers and Sub-Contractors.
  - 2. Make product selection in consultation with the Owner. Obtain Owner's written decision, designating:
    - a. Product, type or model, color and finish.
    - b. Supplier.
    - c. Cost to Contractor, delivered to job site.
  - 3. Prepare Change Orders.
- B. Contractor's Duties

1. Assist Architect/Engineer and Owner in determining qualified Suppliers.
2. Obtain proposals from Suppliers when requested by Architect/Engineer and the Owner.
3. Make appropriate recommendations for consideration of the Architect/Engineer and the Owner.
4. Notify Architect/Engineer promptly of:
  - a. Any reasonable objections Contractor may have against any Supplier.
  - b. Any effect on the construction Schedule anticipated by selections under consideration.

#### 1.05 CONTRACTOR RESPONSIBILITY FOR PURCHASE, DELIVERY AND INSTALLATION

- A. On notification of selection, execute purchase agreement with designated Supplier, or contract with Sub-Contractor
- B. Arrange for and process Shop Drawings, Product Data and Samples, as required.
- C. Make all arrangements for delivery.
- D. Upon delivery, promptly inspect products for damage or defects.
- E. Submit claims for transportation damage.
- F. Install and finish products in compliance with requirements of referenced Specification sections.

#### 1.06 ADJUSTMENT OF COSTS

- A. Should the net cost be more or less than the specified amount of the allowance, the Contract Sum will be adjusted accordingly by Change Order.
  1. For products specified under a unit cost allowance, the unit cost shall apply to the quantity listed in the Schedule of Values.

#### PART 2 - PRODUCTS

See Bid Form.

#### PART 3 - EXECUTION

(NOT USED)

END OF SECTION

ALLOWANCES  
01020-2

**SECTION 01040**  
**PROJECT COORDINATION**

**PART 1 - GENERAL**

**RELATED DOCUMENTS**

Drawings and General Provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

This Section specifies requirements for project coordination including, but not necessarily limited to:

Coordination

Administrative and Supervisory Personnel

General Installation Provisions

Cleaning and Protection

**Coordination:** Coordinate activities included in various Sections to assure efficient and orderly installation of each component. Coordinate operations included under different Sections that are dependent on each other for proper installation and operation.

Where installation of one component depends on installation of other components before or after its own installation, schedule activities in the sequence required to obtain the best results.

Coordinate installation of different components to assure maximum accessibility for maintenance, service and repair.

Make provisions to accommodate items scheduled for later installation.

Prepare memoranda for distribution to each party involved outlining required coordination procedures. Include required notices, reports, and attendance at meetings.

Prepare similar memoranda for the Owner and separate Contractors where coordination of their Work is required.

**Administrative Procedures:** Coordinate scheduling and timing of administrative procedures with other activities to avoid conflicts and ensure orderly progress. Such activities include:

Preparation of Schedules

Installation and Removal of Temporary Facilities

Delivery and Processing of Submittals

Progress Meetings

Project Closeout Activities

**Coordination Drawings:** Prepare Coordination Drawings where close coordination is required for installation of products and materials fabricated off-site by separate entities, and where limited space necessitates maximum utilization of space for efficient installation of different components.

Show relationship of components shown on separate Shop Drawings.

Indicate required installation sequences.

Refer to Division 15 Section "Basic Mechanical Requirements", and Division 16 Section "Basic Electrical Requirements", for requirements for mechanical and electrical installations.

**Staff Names:** Within 15 days of Notice to Proceed, submit a list of Contractor's staff assignments, including Superintendent and personnel at the site; identify individuals, their duties and responsibilities, addresses and telephone numbers.

Post copies in the Project meeting room, the field office, and at each temporary telephone.

**PART 2 - PRODUCTS**

**Not Used**

**PART 3 - EXECUTION**

**INSPECTION OF CONDITIONS:** The installer of each component shall inspect the substrate and conditions under which work is performed. Do not proceed until unsatisfactory conditions have been corrected.

**MANUFACTURER'S INSTRUCTIONS:** Comply with the manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents.

Inspect materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items.

Provide attachment and connection devices and methods necessary for securing work. Secure work true to line and level. Allow for expansion and building movement.

**VISUAL EFFECTS:** Provide uniform joint widths in exposed work. Arrange joints in exposed work to obtain the best visual effect. Refer questionable choices to the Architect for final decision.

Recheck measurements and dimensions before starting each installation.

Install each component during weather conditions and project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible material as necessary to prevent deterioration.

**ENCLOSURE OF THE WORK:** Coordinate temporary enclosures with required inspections and tests, to minimize the necessity of uncovering completed construction for that purpose.

**MOUNTING HEIGHTS:** Where mounting heights are not indicated, install individual components at standard mounting heights recognized within the industry for the particular application indicated. Refer questionable mounting height decisions to the Architect for final decision.

**CLEANING AND PROTECTION:** During handling and installation, clean and protect construction in progress and adjoining materials in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

Clean and maintain completed construction as often as necessary through the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

**Limiting Exposures:** Supervise operations to ensure that no part of construction, completed or in progress, is subject to harmful or deleterious exposure. Such exposures include, but are not necessarily limited to, the following:

- Excessive Weathering
- Excessively High or Low Temperatures or Humidity
- Water or Ice
- Chemicals or Solvents
- Heavy Traffic, Soiling, Staining and Corrosion
- Contact Between Incompatible Materials
- Theft or Vandalism
- Excessive Static or Dynamic Loading
- Thermal Shock
- Combustion

**END OF SECTION**

**SECTION 01045**  
**CUTTING AND PATCHING**

**PART 1 - GENERAL**

**RELATED DOCUMENTS**

Drawings and General Provisions of Contract, including General and Supplementary Condition and other Division 1 Specification Sections, apply to this Section.

Refer to other Sections of these Specifications, including Divisions 15 and 16, for specific requirements and limitations applicable to cutting and patching individual parts of the work.

**CUTTING AND PATCHING PROPOSAL:** Where approval of procedures is required before proceeding, submit a proposal describing procedures in advance of the time cutting and patching will be performed. Include the following information, as applicable:

Describe the extent of cutting and patching required and how it is to be performed. Indicate why it cannot be avoided.

Describe anticipated results, include changes to structural elements and operating components and changes in the building's appearance and other visual elements.

List products to be used and entities that will perform work.

Indicate dates when cutting and patching is to be performed.

List utilities that will be disturbed, including those that will be relocated and those that will be temporarily out-of service. Indicate how long service will be disrupted.

Approval by the Architect and Owner's Representative to proceed does not waive the Architect's right to later require complete removal and replacement of work found to be unsatisfactory.

**STRUCTURAL WORK:** Do not cut and patch structural elements in a manner that would reduce the load-carrying capacity or load deflection ratio. Obtain approval of the cutting and patching proposal before cutting and patching structural elements.

**OPERATIONAL AND SAFETY LIMITATIONS:** Do not cut and patch operating elements or safety components in a manner that would reduce their capacity to perform as intended, or would increase maintenance, or decrease operational life or safety. Obtain approval of the cutting and patching proposal before cutting and patching operating elements or safety related systems.

**VISUAL REQUIREMENTS:** Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would reduce the building's aesthetic qualities or result in visual evidence of cutting and patching. Remove and replace Work cut and patched in a visually unsatisfactory manner.

**PART 2 - PRODUCTS**

**MATERIALS:** Use materials identical to existing materials. If identical materials are not available or cannot be used where exposed surfaces are involved, use materials that match existing adjacent surfaces to the fullest extent possible. Use materials whose performance will equal or surpass that of existing materials.

**PART 3 - EXECUTION**

**INSPECTION:** Before cutting, examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed. Take corrective action before proceeding if unsafe or unsatisfactory conditions are encountered.

**TEMPORARY SUPPORT:** Provide temporary support of work to be cut.

**PROTECTION:** Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions that might be exposed during cutting and patching operations.

Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

Take all precautions to avoid cutting existing pipe, conduit, or ductwork serving the building, but scheduled to be removed, or relocated until provisions have been made to bypass them.

**PERFORMANCE:** Employ skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.

Cut existing construction to provide for the installation of other components or the performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition.

**CUTTING:** Cut existing construction using methods least likely to damage elements to be retained or adjoining construction. Where possible, review procedures with the original installer. Comply with the original installer's recommendations.

All cutting of areas shall be by Contractor requiring cutting, except where noted otherwise in the Specifications and/or Drawings.

Where cutting is required, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots to size required with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.

Cut through concrete and masonry using a cutting machine such as a carborundum saw or diamond core drill. Overcuts are **NOT** allowed

Comply with requirements of applicable sections of Division 2 where cutting and patching requires excavating and backfilling.

**PATCHING:** Patch with durable seams that are as invisible as possible. Comply with specified tolerances.

All patching shall be by Contractor doing cutting work and shall be performed by trade who would customarily be performing that type of work.

Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.

Where patching occurs in a smooth painted surface, extend final paint coat over entire unbroken surface containing the patch, after the patched area has received primer and second coat.

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

**END OF SECTION**



**SECTION 01300**  
**SUBMITTALS AND SUBSTITUTIONS**

**PART 1 - GENERAL**

**RELATED DOCUMENTS**

Drawings and General Provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

**DESCRIPTION OF WORK**

Wherever possible throughout the Contract Documents, the minimum acceptable quality of workmanship and materials has been defined either by manufacturer's name and catalog number or reference to recognized industry standards.

To ensure that the specified products are furnished and installed in accordance with the design intent, procedures have been established for advance submittal of design data for its review and approval or rejection by the Architect.

This Section specifies administrative and procedural requirements for submittals required for performance of the work, including:

- Contractor's Construction Schedule
- Shop Drawings
- Product Data
- Samples

**RELATED WORK**

Contractual Requirements for Submittals: General Conditions

Five (5) copies of all Submittals by Contractors of Documents, plus number of copies to be returned to Contractor, shall be submitted unless otherwise specified.

Individual Submittals Required: Pertinent Sections of these Specifications.

**PRODUCT HANDLING:** Make all submittals of Shop Drawings, samples, requests for substitutions, and other similar items, in strict accordance with the provisions of this Section of these Specifications.

**SUBMITTAL PROCEDURES**

**Coordination:** Coordinate preparation and processing of Submittals with performance of construction activities. Transmit each Submittal sufficiently in advance of performance of related construction activities to avoid delay.

Coordinate each Submittal with fabrication, purchasing, testing, delivery, other Submittals and related activities that require sequential activity.

Coordinate transmittal of different types of Submittals for related elements of the work so processing will not be delayed by the need to review Submittals concurrently for coordination.

The Architect reserves the right to withhold action on a Submittal requiring coordination with other Submittals until related Submittals are received.

No extension of Contract Time will be authorized because of failure to transmit Submittals to the Architect sufficiently in advance of the work to permit processing.

Deliver Submittals to the Architect.

**Submittal Preparation:** Place a permanent label or title block on each Submittal for identification. Indicate the name of the entity that prepared each Submittal on the label or title block.

Provide a space approximately 10" x 10" on the label or beside the title block on Shop Drawings to record the Contractor's review and approval markings and the action taken.

Include the following information on the label for processing and recording action taken:

- Project Name
- Name of the Owner
- Date
- Name and Address of Architect
- Name and Address of Contractor
- Name and Address of Subcontractor or Vendor
- Location Where Item is to be Used
- Name of Manufacturer
- Drawing Number and Detail References, as Appropriate
- Certification by the Contractor

Submittal Transmittal: Package each Submittal appropriately for transmittal and handling. Transmit each Submittal from Contractor to Architect using a transmittal form. Submittals received from sources other than the Contractor will be returned without action.

On the transmittal, record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including minor variations and limitations. Include Contractor's certification that information complies with Contract Document requirements.

When Resubmittal is required for any reason, transmit under new letter of transmittal, indicating by reference to a previous Submittal that this is a Resubmittal.

After Architect's review of Submittal, revise and resubmit as required, identifying changes made since previous Submittal.

Distribute copies of reviewed Submittals to concerned persons. Instruct recipients to promptly report any inability to comply with provisions.

**All Submittals shall bear the stamp of approval of the General Contractor submitting same as evidence that they have been checked by him, or they will be rejected.**

#### SHOP DRAWINGS

Submit newly prepared information drawn to accurate scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not considered Shop Drawings.

Shop Drawings shall be drawn at a scale to clearly indicate all of the above conditions and allow for corrections or modifications which the Architect may wish to make. The Architect shall be the sole judge as to the acceptability of manufacturer's literature and catalog sheets as Shop Drawings.

Shop Drawings shall clearly indicate all dimensional data for all parts of the item; types and materials for all connections; finishes; the exact relation of the item to adjacent materials and equipment in the completed structure including clearance, any necessary isolation, and fastening methods and devices; and mechanical and electrical connections.

Shop Drawings include fabrication and installation Drawings, setting diagrams, schedules, patterns, templates, and similar Drawings. Include the following information:

- Dimensions
- Identification of Products and Materials Included
- Compliance With Specified Standards
- Notation of Coordination Requirements
- Notation of Dimensions Established by Field Measurement

Sheet Size: Except for templates, patterns, and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2" x 11", but no larger than 36" x 48".

Submit in the form of one reproducible transparency and one opaque reproduction, or three opaque reproductions plus required amount to be returned to Contractor. After review, reproduce and distribute in accordance with requirements in Article on Procedures, above.

Do not permit Shop Drawing copies, without an appropriate final "Action" marking by the Architect, to be used in connection with the work.

The Contractors shall be responsible for distribution of additional prints to vendors, etc.

Refer to General Conditions for additional requirements.

## PRODUCT DATA

Collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams and performance curves. Where Product Data must be specially prepared because standard printed data is not suitable for use, submit as "Shop Drawings."

Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products, some of which are not required, mark copies to indicate the applicable information. Include the following information:

- Manufacturer's Printed Recommendations
- Compliance with Recognized Trade Association Standards
- Compliance with Recognized Testing Agency Standards
- Application of Testing Agency Labels and Seals
- Notation of Dimensions Verified by Field Measurement
- Notation of Coordination Requirements
- Type and Model Numbers

Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.

Submittals: Submit six (6) copies of each required Submittal. Submit nine (9) copies where required for maintenance manuals. The Architect will retain three (3) and will return the others marked with action taken and corrections or modifications required.

Distribution: Furnish copies of final Submittal to installers, subcontractors, suppliers, manufacturers, fabricators, and others required for performance of construction activities. Show distribution on transmittal forms.

Do not proceed with installation until a copy of Product Data applicable is in the installer's possession.

Do not permit use of unmarked copies of Product Data in connection with construction.

## SAMPLES

Submit full-size, fully fabricated Samples cured and finished as specified and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, full color-range sets, and swatches showing color, texture, and pattern.

Mount, display, or package Samples in the manner specified to facilitate review of qualities indicated. Include the following:

- Generic Description of the Sample
- Sample Source
- Product Name or Name of Manufacturer
- Compliance with Recognized Standards
- Availability and Delivery Time

Colors

General: Unless the precise color and pattern is specifically described in the Contract Documents, whenever a choice of color or pattern is available in a specified product, submit accurate color charts and pattern charts to the Architect for his review. Owner will make final selection of color.

Submit Samples for review of kind, color, pattern, and texture for a final check of these characteristics with other elements and for a comparison of these characteristics between the final Submittal and the actual component as delivered and installed.

Where variation in color, pattern, texture, or other characteristics are inherent in the material or product represented, submit multiple units (not less than 3) that show approximate limits of the variations.

Refer to other Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.

Refer to other Sections for Samples to be returned to the Contractor for incorporation in the work. Such Samples must be undamaged at time of use. On the transmittal, indicate special requests regarding disposition of Sample Submittals.

Preliminary Submittals: Where Samples are for selection of color, pattern, texture, or similar characteristics from a range of standard choices, submit a full set of choices for the material or product.

Preliminary Submittals will be reviewed and returned with the Architect's mark indicating selection and other action.

Maintain sets of Samples, as returned, at the Project site for quality comparisons throughout the course of construction.

Unless noncompliance with Contract Document provisions is observed, the Submittal may serve as the final Submittal.

Sample sets may be used to obtain final acceptance of the construction associated with each set.

Distribution of Samples: Prepare and distribute additional sets to Subcontractors, manufacturers, fabricators, suppliers, installers, and others as required for performance of the work.

Field Samples specified in individual Sections are special types of Samples. Field Samples are full-size examples erected on site to illustrate finishes, coatings, or finish materials and to establish the standard by which the work will be judged.

Comply with submittal requirements to the fullest extent possible. Process transmittal forms to provide a record of activity

#### ARCHITECT'S ACTION

Except for Submittals for record, information or similar purposes, where action and return is required or requested, the Architect will review each Submittal, mark to indicate action taken, and return within a reasonable time.

Compliance with specified characteristics is the Contractor's responsibility.

Action Stamp: The Architect will stamp each Submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, as follows, to indicate the action taken:

##### Final Unrestricted Release:

Where Submittals are marked "APPROVED" OR "APPROVED AS SUBMITTED", that part of the work covered by the Submittal may proceed, provided it complies with requirements of the Contract Documents. Final payment will depend upon that compliance.

##### Final-But-Restricted Release:

When Submittals are marked "APPROVED AS NOTED", that part of the work covered by the Submittal may proceed, provided it complies with notations or corrections on the Submittal and requirements of the Contract Documents. Final payment will depend on that compliance.

Returned for Re-submittal:

When Submittal is marked "REVISE AND RESUBMIT", do not proceed with that part of the work covered by the Submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new Submittal in accordance with the notations. Resubmit without delay. Repeat, if necessary, to obtain a different action mark.

Do not permit submittals marked "REVISE AND RESUBMIT" to be used at the Project site or elsewhere where work is in progress.

Other Action: Where a Submittal is primarily for information or record purposes, special processing or other activity, the Submittal will be returned marked "ACTION NOT REQUIRED".

## **PART 2 - PRODUCTS**

### **SUBSTITUTIONS**

Source Limitations: To the greatest extent possible for each unit of work, provide products, materials, or equipment of a singular generic kind from a single source.

Compatibility of Options: Where more than one choice is available as options for Contractor's selection of a product or materials, select an option which is compatible with other products and materials already selected (which may have been from among options for those other products and materials). Total compatibility among options, if not assured by limitations within contract documents, must be provided by Contractor. Compatibility is a basic general requirement of product/material selections.

#### **Architect's Approval Required**

The Contract is based on the materials, equipment, and methods described in the Contract Documents.

The Contract Drawings and Specifications establish the "minimum standard of quality" each product and/or system must meet to be considered acceptable. Products of other manufacturers will be considered if the product and/or system meets or exceeds the "minimum standard of quality" established by the Contract Documents.

The Architect will consider proposals for substitutions under the "or approved equal" provision of materials, equipment, and methods by Addendum, prior to Bid due date, only when such proposals are accompanied by full and complete technical data and all other information required by the Architect to evaluate the proposed substitutions.

It will be the responsibility of the submitting Contractor to prove equality.

The Submittal shall include a line-by-line, item-by-item description of the specified and proposed product.

Requests for substitutions must be submitted to the Architect NO later than ten (10) days prior to Bid due date.

If the proposed product and/or system is acceptable as an equal, as herein described, an Addendum will be issued noting the specific items accepted.

**DO NOT SUBSTITUTE MATERIALS, EQUIPMENT, OR METHODS UNLESS SUCH SUBSTITUTIONS HAVE BEEN SPECIFICALLY APPROVED FOR THIS WORK BY THE ARCHITECT, BY ADDENDUM.**

"Or Approved Equal"

Where the phrase "or approved equal" occurs in the Contract Documents, do not assume that material, equipment, or methods will be approved as equal by the Architect unless the item has been specifically approved for this work by the Architect.

Color choices will be one of the determining factors for approval.

The decision of the Architect will be final.

#### Availability of Specified Items

Verify prior to bidding that all specified items will be available in time for installation during orderly and timely progress of the work.

In the event specified item or items will not be so available, so notify the Architect prior to the receipt of Bids.

Costs of delay caused on non-availability of specified items, when such delays could have been avoided by the Contractor, will be back-charged as necessary and shall not be borne by the Owner.

Whenever the Contractor secures approval for changing any items and such change involves a corresponding change or adjustment in any adjacent or related item, the responsibility for making the required change, or seeing that it is made, rests with the Contractor. The cost of these changes and/or adjustments shall be paid for by the Contractor unless it is otherwise agreed, in writing, at the time the change is approved. The acceptance of any change will not, in any way, relieve the Prime Contractor from full compliance with the Contract Documents.

#### MANUALS

General: Where Manuals are required to be submitted covering items included in this work, prepare all such Manuals in durable plastic binders approximately 8-1/2 x 11 inches in size with at least the following:

- Identification on or readable through the front cover stating the general nature of the Manual.

- Neatly typewritten index near the front of the Manual furnishing immediate information as to location of all emergency data regarding the installation.

- Complete instructions regarding operating and maintenance of all equipment involved.

- Complete nomenclature of all replaceable parts, their part numbers, current cost, and name and address of nearest vendor of parts.

- Copy of all guarantees and warranties issued.

- Copy of approved Shop Drawing(s) with all data concerning all changes made during construction

#### MISCELLANEOUS SUBMITTALS

Inspection and Test Reports Not Performed by Owner: Classify each inspection and test report as being either "Shop Drawings" or "product data" depending on whether the report is specially prepared for the project or a standard publication of workmanship control testing at the point of production. Process inspection and test reports accordingly.

#### Warranties (Guarantees)

Categories of Specific Warranties: Warranties on the work are in several categories, including those of General Conditions, and including (but not necessarily limited to) the following specific categories related to individual units of work specified in sections of Divisions 2 through 16 of these Specifications.

- Special Project Warranty (Guarantee): A warranty specifically written and signed by Contractor for a defined portion of the work and, where required, countersigned by Subcontractor, installer, manufacturer, or other entity engaged by Contractor.

- Specified Product Warranty: A warranty which is required by Contract Documents, to be provided for a manufactured product incorporated into the work, regardless of whether manufacturer has published a similar warranty without regard for specific

incorporation of product into the work, or has written and executed a special project warranty as a direct result of Contract Documents requirements.

**Coincidental Product Warranty:** A warranty which is not specifically required by Contract Documents (other than as specified in this Section), but which is available on a product incorporated into the work by virtue of the fact that manufacturer of product has published warranty in connection with purchases and uses of product without regard for specific applications, except as otherwise limited by terms of warranty.

Refer to individual Sections of Divisions 2 through 16 for the determination of units of work which are required to be specifically or individually warranted, and for the specific requirements and terms of those warranties (or guarantees).

**Specific Warranty Forms:** Where a special project warranty (guarantee) or specified product warranty is required, prepare a written document to contain terms and appropriate identification, ready for execution by required parties. Submit draft to the Owner (through Architect) for approval prior to final execution.

### **PART 3 - EXECUTION**

#### **COORDINATION OF SUBMITTALS**

**General:** Prior to submittal for Architect's review, use all means necessary to fully coordinate all material, including the following:

- Determine and verify all field dimensions and conditions, catalog numbers, and similar data.

- Coordinate, as required, with all trades and public agencies involved.

- Secure all necessary approvals from public agencies and others. Signify by stamp or other means that all required approvals have been obtained.

- Clearly indicate all deviations from the Contract Documents.

The General Contractor shall submit a prioritized tabulation by date of Submittals required during the first 90 days of construction. List those Submittals required to maintain orderly progress of the work, and those required early because of long lead time for manufacture or fabrication.

These dates may be shown on construction schedule at Contractor's option.

#### **TIMING OF SUBMITTALS**

##### **General**

Make all Submittals enough in advance of scheduled dates for installation to provide all required time for reviews for securing necessary approvals, for possible revision and Resubmittals, and for placing orders and securing delivery.

In scheduling, allow a minimum of fourteen (14) full working days for the Architect's initial review following receipt of the Submittals. Allow additional time if the Architect requires coordination with subsequent Submittals.

The Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until all related Submittals are received.

If an Intermediate Submittal is necessary, process the same as the initial Submittal. Allow fourteen (14) working days for reprocessing each Submittal.

No extension of Contract time will be authorized because of failure to transmit Submittals to the Architect sufficiently in advance of the work to permit processing.

### **END OF SECTION**





## **SECTION 01500**

### **CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS**

#### **PART 1 - GENERAL**

##### **RELATED DOCUMENTS**

Drawings and General Provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

**SUMMARY:** This Section specifies temporary services and facilities, including utilities, construction and support facilities, security and protection. Provide facilities ready for use. Maintain, expand and modify as needed. Remove when no longer needed, or replaced by permanent facilities.

**DESCRIPTION OF WORK:** Work of this Section shall include, but not necessarily be limited to, the following:

- Electricity, Lighting
- Heat, Ventilation
- Telephone Service
- Water
- Storm and Sanitary Sewer
- Sanitary Facilities
- Barriers, Barricades, Warning Signs, and Lights
- Enclosures
- Hoisting
- Water Control
- Field Office and Storage Sheds
- Dust Control
- Snow Removal
- Environmental Protection

##### **RELATED SECTIONS**

General Conditions

Refer to General Conditions for additional requirements.

Section 01000 - Special Conditions

Section 01010 - Summary of Work

Section 01710 - Cleaning

##### **QUALITY ASSURANCE**

**Regulations:** Each Contractor shall comply with industry standards and with applicable laws and regulations of authorities having jurisdiction, including but not limited to:

- Owner's Requirements
- Building Code Requirements
- Health and Safety Regulations
- Utility Company Regulations
- Police, Fire Department, and Rescue Squad Rules
- Environmental Protection Regulations

**Standards:** Comply with NFPA Code 241, "Standard for Safeguarding Construction, Alterations 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.

Trade Jurisdictions: Assigned responsibilities for installation and operation of temporary utilities are not intended to interfere with the normal application of trade regulations and union jurisdictions.

Electrical Service: Comply with NEMA, NECA, and UL standards and regulations for temporary electric service. Install service in compliance with National Electric Code (NFPA 70).

Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

#### PROJECT CONDITIONS

Temporary Utilities: Prepare a schedule indicating dates of the implementation and termination of each temporary utility. At the earliest feasible time, when acceptable to the Owner, change over from use of the temporary service to use of the permanent service.

Temporary Use of Permanent Facilities: The installer of each permanent service or facility shall assume responsibility for its operation, maintenance and protection during its use as a construction service or facility prior to the Owner's acceptance, regardless of previously assigned responsibilities.

Conditions of Use: 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.

#### GENERAL

Any Contractor requiring one of the temporary services before it can be provided as specified, or whose requirements with respect to a particular service differ from the service specified, shall provide such service as suits his needs, at his own expense, and in a manner satisfactory to the Architect and Owner.

#### USE CHARGES

General: Cost or use charges for temporary facilities are not chargeable to the Owner or the Architect. Contractor's cost or use charges for temporary services or facilities will not be accepted as a basis of claim for an adjustment in the Contract Sum or Contract Time.

Utility Company Charges: Power, sewer and water easements, permanent property assessments, charges required for construction, connection charges, tap fees and the like will be paid for by the Owner.

Water Service: Water is to be extended from the nearest water distribution system to a location to be determined by the General Contractor. The Plumbing Contractor shall provide a water meter to be used during construction and it shall be removed at the completion of the project.

The General Contractor will pay for all metered water used by all Contractors during the entire construction period, in accordance with meter readings.

Sewer Service Use Charges: The General Contractor will shall pay sewer service use charges, if required, for sewer usage by all parties engaged in construction at the project site.

Electric Power Service: The General Contractor will pay electric power use charges, whether metered or otherwise, for electricity used by all entities engaged in construction activities at the project site.

Heating Fuel Charges:

Prior to building enclosure: each Contractor shall provide any necessary temporary heating and associated fuel charges.

After building enclosure: HVAC Contractor shall pay for all fuel required for temporary heating and ventilation, other than electric power use.

The term "Enclosure" shall mean when all permanent walls and roofs are in place, insulated and weather tight, windows are covered and all entrances are permanently in place or are provided with suitable temporary enclosure.

Meters required for metering use charges will be furnished and installed by the Contractor responsible for installing distribution equipment.

Other entities using temporary services and facilities include, but are not limited to:

- Other Non-prime Contractors

- The Owner's Work Forces

- Occupants of the Project

- The Architect

- Testing Agencies

- Personnel of Government Agencies.

## **PART 2 - PRODUCTS**

### **MATERIALS**

General: 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.

Lumber and Plywood: Comply with requirements in Section 06100 -Rough Carpentry.

Tarpaulins: 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.

Water: Provide potable water approved by local health authorities.

### **EQUIPMENT**

Water Hoses: 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.

Electrical Outlets: 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.

Electrical Power Cords: Provide maximum 100 foot long 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.

Lamps and Light Fixtures: Provide general service incandescent lamps of wattage required for adequate illumination. Provide guard cages or tempered glass enclosures, where exposed to breakage. Provide exterior fixtures where exposed to moisture.

Heating Units: 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.

Sanitary Facilities: Toilet rooms within the new building shall not be used by construction personnel. Provide sanitary facilities that include temporary toilets, wash facilities and drinking water fixtures. Comply with OSHA and other regulations and health codes for the type, number, location, operation, and maintenance of fixtures. Install where facilities will best serve the Project. Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Provide covered waste containers for used materials.

Toilets: The General Contractor shall install 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. Use of pit-type privies will not be permitted.

Wash Facilities: The Plumbing Contractor shall install wash facilities supplied with potable water at convenient locations for personnel involved in handling materials that require wash-up. Dispose of drainage properly. Supply cleaning compounds.

Drinking Water Facilities: Each Contractor shall provide containerized tap-dispenser bottled-water type drinking water units for their employees and subcontractors.

First Aid Supplies: Comply with governing regulations.

Fire Extinguishers: 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.

#### TEMPORARY FIELD OFFICE

The General Contractor shall provide and maintain clean, temporary weather-tight offices at the site, in location as approved by the Owner, for the use of the General Contractor, his Subcontractors' agents, Owner's Representative, and the Architect, and at which location he or his authorized agent shall be present, or to which either may be readily called at all times. While the work is in progress, copies of permits, approved Shop Drawings, and a complete set of Contract Drawings and Specifications marked up to date with any revisions, shall be kept at said office ready for use at all times.

All expenses in connection with the field office, including the installation cost, and use of heat, light, water, and janitor service shall be borne by the General Contractor.

Field office shall be maintained until final acceptance and then be removed by the respective using contractors, no later than 15 days after acceptance of building unless the Architect orders earlier removal by them.

Other Contractors shall provide, maintain, and remove upon completion any necessary temporary field office, shanties, and sheds required to coordinate and control his field operations. Location and construction shall be approved by the General Contractor. If necessary, this location may be off-site. All costs of maintaining, including heat, power, water, telephone/fax, fire protection and clean-up, is the General Contractor's responsibility.

If the job conditions require relocation of any temporary office, shanty or shed, the Contractor shall relocate as directed by the General Contractor or Architect, at no increase in the Contract Amount.

#### HOISTING

Each Contractor is responsible for hoisting his materials, tools, equipment, etc.

Any temporary openings required by any Contractor for access of material and equipment must be coordinated with the General Contractor. Any costs involved are the Contractor's responsibility.

### **PART 3 - EXECUTION**

#### INSTALLATION

Use qualified personnel for installation of temporary facilities. Locate facilities where they serve the project adequately and result in minimum interference with performance of the work. Relocate and modify facilities as required.

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.

## TEMPORARY UTILITY INSTALLATION

Each Contractor shall provide all temporary and/or permanent requirements necessary to maintain utilities and services for existing facilities and new facilities made necessary by this Construction

Temporary long-term shutdowns required to complete the work require the Contractor to provide temporary requirements necessary to maintain services for new facilities, at no increase in the Contract Amount.

General: 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.

Obtain easements to bring temporary utilities to the site, where the Owner's easements cannot be used for that purpose.

Water Service: Install water service connected to nearest system, and distribution piping of sizes and pressures adequate for construction until permanent water service is in use.

Sterilization: Sterilize temporary water piping prior to use.

The Plumbing Contractor shall furnish and install the temporary water service for construction work and be responsible for protecting temporary water lines from freezing and shall remove same upon completion of the project.

The Plumbing Contractor shall remove temporary water service at the completion of the Project.

Temporary Electric Power Service: The Electrical Contractor shall 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.

Any Contractor requiring more than included herein above shall provide same including energy consumption cost at no increase in the Contract Amount.

Power Distribution System: 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.

Temporary wiring is to be laid out, balanced, and sized so as to produce a voltage drop of no more than five percent at the extreme end of the line when operating at full load.

Temporary work shall be installed in such a manner as not to interfere with the permanent construction. If such interference does occur, it shall be the responsibility of the Contractor to make such changes as may be required to overcome the interference. The cost of these changes will be included as part of the contract price.

The electrical work for construction purposes shall conform to all Federal, State (Ohio Safety Code IC-3) Specific Safety Requirements as well as the requirements of the National Electric Code and National Electrical Safety Code. The Electrical Contractor shall obtain and pay for required applications, permits, and inspection pertaining to this work. This cost shall also be included in the Contractor's price.

All temporary facilities are to be maintained and kept in good operating condition. Maintenance personnel necessary to perform this work shall be provided in accordance with the requirements. Maintenance time will include normal working hours for all trades and start up and shut down overtime as required.

Protect installation against weather damage, the normal operations of other trades, Owner's personnel, and visitors to the site.

The Electrical Contractor shall remove temporary power equipment at the completion of the project.

**Temporary Lighting:** Whenever overhead floor or roof deck has been installed, the Electrical Contractor shall provide temporary lighting including lamps, 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 all as necessary and as required by state and federal safety codes and ordinances.

The Electrical Contractor shall remove temporary lighting equipment at the completion of the Project.

**Temporary Telephones:** Provide temporary telephone service for all personnel engaged in construction activities, throughout the construction period.

All local calls shall be paid for by the General Contractor.

All long distance and toll calls shall be paid for by the party making the call.

At each telephone, post a list of important telephones numbers.

**Sewers and Drainage:** If sewers are available, the Plumbing Contractor shall provide temporary connections to remove effluent that can be discharged lawfully. If sewers are not available or cannot be used, provide drainage ditches, dry wells, stabilization ponds and similar facilities. If neither sewers nor drainage facilities can be lawfully used for discharge of effluent, provide containers to remove and dispose of effluent off the site in a lawful manner.

Filter out excessive amounts of soil, construction debris, chemicals, oils and similar contaminants that might clog sewers or pollute waterways before discharge.

Provide earthen embankments and similar barriers in and around excavations and subgrade construction, sufficient to prevent flooding by runoff of storm water from heavy rains.

**Dewatering Facilities and Drains:** For temporary drainage and dewatering operations not associated with construction, comply with requirements of applicable Division 2 Sections. Where feasible, utilize the same facilities. Maintain excavations and construction free of water.

The Plumbing Contractor shall remove temporary sewer and drainage work at the completion of the Project.

## TEMPORARY CONSTRUCTION AND SUPPORT FACILITIES INSTALLATION

Locate field offices, storage sheds, sanitary facilities and other temporary construction and support facilities for easy access, in locations approved by General Contractor.

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.

**Temporary Heat:** Provide temporary heat required by construction activities, for curing or drying of completed installations or protection of installed construction from adverse effects of low temperatures or high humidity. Select safe equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.

After building enclosure, either permanent or temporary, as approved by the Architect, the Heating Contractor shall provide heat, supplied with air, as follows:

At all times during normal working hours, provide sufficient heat to maintain a temperature of not less than 50 degrees F., and from 40 degrees to 50 degrees F. during periods other than specified herein below.

At all times during the placing, setting, and curing of concrete, provide sufficient heat to ensure heating of the spaces involved to not less than 50 degrees F.

Well before gypsum board work begins and continuous throughout the setting and drying periods, a temperature range between 55 and 70 degrees F. shall be maintained day and night. During this period, no finish woodwork, wood finish flooring, resilient flooring or flexible wall coverings shall be installed or stored in the buildings, and no finish painting or applying of finish wall coatings shall be undertaken.

For a period of ten (10) days previous to the placing of interior wood finish and throughout the placing of this and other interior finishing, varnishing, painting, etc., and until final acceptance of the work or until full occupancy by the Owner, provide sufficient heat to produce a temperature of not less than 70 degrees F.

Heat and air shall be supplied in a manner which shall avoid the rapid drying of material but thoroughly dry to such an extent that no remaining moisture will affect finish material.

Ventilation requirements may be supplemented by the building's permanent heating system if approved, but primary responsibility rests with the Heating Contractor.

The Heating Contractor shall operate the heating and ventilating systems each day, including Saturdays, Sundays, and holidays; operating shall include necessary labor and approved operating personnel in attendance as required by agencies having jurisdiction.

It shall be each Contractor's responsibility to inform the Heating Contractor of the range of temperatures required for temporary heating, during this period, that temperature as recommended by the manufacturer of the materials as mentioned are stored in the building or being installed, and for the length of time recommended, following installation.

The Heating Contractor shall remove all temporary heating, cooling and ventilation equipment at the completion of the Project.

Temporary heating and ventilating equipment, piping, etc., shall be installed in such a manner as not to interfere with work of other trades or the permanent construction. If such interference does occur, it shall be the responsibility of the Heating Contractor to make any changes required to overcome the interference.

Except as hereinafter specified, the permanent heating and ventilating systems may be used for temporary heat. The HVAC Contractor shall provide, operate, and maintain approved adequate heating and ventilating units for the purposes specified before the permanent system is operable and as required to supplement the systems. (The use of salamanders or similar, open-type smoke producing devices, will not be approved.) Only gas (natural or LP) direct-fired forced air heaters or units employing steam-heated coils will be approved for use. (Electrical resistance heaters, electrical boilers, or electric furnaces will not be approved for use.) The units shall be arranged to bring in sufficient outdoor air (min. 1-1/2 air changes per hour) to ventilate the building and to prevent build-up of harmful dusts and fumes and remove excess moisture, especially to prevent damage to built-up roofing. During warm weather, the Heating Contractor shall provide an adequate supply of fresh air (min. 1-1/2 air changes per hour) when necessary to properly ventilate for moisture, dust, and fumes from paints, cements, or adhesives in tightly enclosed areas where natural ventilation will not be sufficient.

All heating and ventilation work for construction purposes shall comply with all local, state and federal requirements and manufacturer's recommendations. Warranties and guarantees for permanent mechanical equipment used for temporary purposes shall not be affected by this use. Maintenance of the equipment shall be the responsibility of this Contractor. Any heating units to be turned over with the building shall be thoroughly checked, cleaned and filters replaced prior to turnover.

When permanent enclosure is achieved and when approved by the Owner, use and maintain the permanent HVAC system for heating and ventilation. Maintenance shall include the following:

- Proper operation and maintenance of the HVAC plant until acceptance of building by Owner.

- Maintenance of temporary filters in all equipment to prevent accumulation of dust and direct coils, housings and ductwork.

- Before Final Inspection: Replacement of all (temporary and existing) filters with new filters, thorough cleaning of coils and other equipment, putting entire system into first class condition, cleaning traps and devices, adjustment and renewal of all materials and equipment not functioning correctly.

Use of permanent heating or cooling equipment for temporary heating or cooling shall not affect guarantee. Guarantee shall take effect at time of building acceptance by Owner.

Provide temporary filters over all return air registers before operating system. These shall remain in place until area is clean and system is ready for final balancing.

Replace filters in all equipment to prevent accumulation of dust and dirt in coils, housings and ductwork.

Should the permanent HVAC system not be operable or capable of furnishing temporary heating and ventilation at the time of permanent enclosure of the building, the HVAC Contractor shall bear the cost of equipment, fuel and power consumed until such time as the permanent HVAC system can furnish the required temporary heating and ventilation.

Before Final Inspection:

- Replace temporary filters with new filters.

- Thoroughly clean coils and other equipment.

- Clean traps and devices, adjust and renew any and all materials and equipment not functioning correctly.

- Vacuum clean the duct system.

- Restore equipment to original condition.

Temporary Paving: The General Contractor shall construct and maintain temporary roads and paving to adequately support the indicated loading and to withstand exposure to traffic during the construction period. Locate temporary paving for roads, storage areas, and parking, where the same permanent facilities will be located.

Paving: Comply with Division 2 Section "Asphalt Concrete Paving" for construction and maintenance of temporary paving.

- Coordinate development of temporary paving with subgrade grading, compaction, installation, and stabilization of sub-base, and installation of base and finish courses of permanent paving.

- Install temporary paving to minimize the need to rework the installations and result in permanent roads and paved areas that are without damage or deterioration when occupied by the Owner.

- Delay installation of the final course of permanent asphalt concrete paving until immediately before Substantial Completion. Coordinate with weather conditions to avoid unsatisfactory results.

- Extend temporary paving in and around the construction area as necessary to accommodate delivery and storage of materials, equipment usage, administration, and supervision.

Temporary Enclosures: Provide temporary enclosure for protection of construction from exposure, foul weather, other construction operations, and similar activities. Where heat is needed and the building enclosure is incomplete, provide enclosures where there is no other



provision for containment of heat. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions.

The General Contractor will provide, maintain and remove upon completion, any required closures.

Install tarpaulins securely, with incombustible wood framing and other materials. Close openings of 25 square feet or less with plywood or similar materials.

Close openings through floor or roof decks and horizontal surfaces with load-bearing wood-framed construction.

#### Cold Weather Protection:

The General Contractor shall provide any necessary cold weather protection (enclosure, temporary heat, fuel, straw, etc.) to continue with his work so as not to delay the Project. This includes any necessary protection of excavations to prevent freezing.

Cold Weather Protection for Masonry Work: The General Contractor shall provide any necessary cold weather protection (enclosures, temporary heat, fuel, etc.) to continue with his work so as not to delay the Project.

Project Identification and Temporary Signs: The General Contractor shall prepare project identification and other signs of the size indicated; install signs where indicated to inform the public and persons seeking entrance to the project. Support on posts or framing of preservative treated wood or steel. Do not permit installation of unauthorized signs.

Temporary Signs: Prepare signs to provide directional information to construction personnel and visitors.

Temporary Exterior Lighting: The General Contractor shall Install exterior yard and sign lights so that signs are visible when work is being performed.

Collection and Disposal of Waste: The General Contractor shall be responsible to 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 seven (7) days during normal weather or 3 days when the temperature is expected to rise above 80 degrees F. (27 degrees C.). Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material in a lawful manner.

Stairs: Until permanent stairs are available, the General Contractor shall provide temporary stairs where ladders are not adequate. Cover finished permanent stairs with a protective covering of plywood or similar material so finishes will be undamaged at the time of acceptance.

#### WATER CONTROL

Each Contractor shall provide, operate, and maintain pumps or other equipment necessary to drain his work and keep excavation pits, trenches, and ditches including the entire sub-grade free of water under any circumstances that may arise.

#### SNOW REMOVAL

Each Contractor is responsible for snow and ice removal in their own work areas and shall provide same at the direction of the General Contractor as required so as not to delay the Project.

SECURITY AND PROTECTION FACILITIES INSTALLATION: Except for use of permanent fire protection as soon as available, do not change from use of temporary security and protection facilities to permanent facilities until Substantial Completion.

Fire Protection: Until fire protection is supplied by permanent facilities, install and maintain temporary fire protection of types needed to protect against predictable and controllable fire losses.

Refer to Special Conditions for additional requirements.

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.

Store combustible materials in containers in fire-safe locations.

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

**Permanent Fire Protection:** At the earliest date, complete installation of the permanent fire protection facility, including connected services, and place into operation. Instruct key personnel on use of facilities.

**Barricades, Warning Signs, and Lights:** Comply with standards and code requirements for erection of barricades. Paint appropriate warning signs to inform personnel and the public of the hazard being protected against. Where needed, provide lighting, including flashing lights.

Refer to Special Conditions for additional requirements.

The General Contractor shall provide barriers around trees and plants designated to remain to protect against vehicular traffic, stored materials, dumping, chemically injurious materials, and puddling or continuous running water.

**Enclosure Fence:** When excavation begins, the General Contractor shall install an enclosure fence around the work area.

**Covered Walkway:** Where required by governing authorities, erect a structurally adequate protection covered walkway for passage of personal along the adjacent public street. Coordinate with entrance gates, other facilities, and obstructions. Comply with regulations of authorities having jurisdiction.

Construct using scaffold or shoring framing, waterproofed wood plank overhead decking, protective plywood enclosure walls, handrails, barricades, warning signs, lights, safe, and well-drained walkways and similar provision for protection and safe passage. Extend the backwall beyond the structure to complete the enclosure fence. Paint and maintain in a manner acceptable to the Architect.

**Environmental Protection:** Operate temporary facilities and conduct construction by methods that comply with environmental regulations, and minimize the possibility that air, waterways, and subsoil might be contaminated or polluted. Avoid use of tools and equipment which produce harmful noise. Restrict use of noise making tools and equipment to hours that will minimize complaints.

**OPERATION:** Enforce strict discipline in use of temporary facilities. Limit availability to intended use to minimize abuse. Maintain facilities in good operating condition until removal.

Protect from damage by freezing temperatures and the elements.

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

Prevent piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.

**TERMINATION AND REMOVAL:** Remove each facility when the need has ended, or replaced by a permanent facility, or no later than Substantial Completion. Complete or restore construction delayed because of interference with the facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

Temporary facilities are property of the installing Contractor.

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

At Substantial Completion, renovate permanent facilities used during the construction period, including but not limited to:

Replace air filters and clean inside of ductwork and housings.

Replace worn parts and parts subject to unusual operating conditions.

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

#### INSTALLATION

Use qualified personnel for installation of temporary facilities. Locate facilities where they serve the project adequately and result in minimum interference with performance of construction activities. Relocate and modify facilities as required.

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.

**END OF SECTION**



## **SECTION 01580**

### **PROJECT SIGN**

#### **PART 1 - GENERAL**

##### **RELATED DOCUMENTS**

Drawings and General Provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

**DESCRIPTION OF WORK:** Work of this Section shall include, but not necessarily be limited to, the following:

The General Contractor shall provide and maintain at the site one 4' x 8' project sign. He shall employ and pay an approved sign painter to letter the sign.

No other signs or advertisements will be allowed to be displayed on the premises.

##### **QUALITY ASSURANCE**

Design sign and structure to withstand 50 mph wind velocity.

Sign Painter: Engaged as professional sign painter for not less than three years.

Finishes, Painting: Adequate to withstand weathering, fading, and chipping for duration of construction.

#### **PART 2 - PRODUCTS**

##### **SIGN MATERIALS**

Structure and Framing: New wood, 4' x 4' treated posts, structurally adequate.

Sign Surfaces: 4' x 8', exterior grade, GPX yellow or green plywood with medium density overlay, minimum 3/4 inch thick.

Rough Hardware: Galvanized

Paint and Primers: Exterior quality, two coats. Colors designated by Architect. Paint to be special mix for sign painting.

Lettering: Exterior quality paint, contrasting colors designated by Architect.

#### **PART 3 - EXECUTION**

##### **GENERAL**

Design of sign shall be submitted to the General Contractor after award of the Contract.

Install project identification sign within 30 days after date fixed by Owner-Contractor Agreement.

Erect at designated location as directed by Architect.

Erect supports and framing with uprights 36 inches below surface, braced and framed to resist wind loadings.

Install sign surface plumb and level, with butt joints. Anchor securely.

Paint sight-exposed surfaces of sign, supports, and framing.

##### **MAINTENANCE**

Maintain signs and supports clean. Repair deterioration and damages.

##### **REMOVAL**

Remove signs, framing, supports, and foundations at completion of the Project, when directed by Architect, and restore the area.

**END OF SECTION**



**SECTION 01700**  
**PROJECT CLOSEOUT**

**PART 1 - GENERAL**

**RELATED DOCUMENTS**

Drawings and General Provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

**DESCRIPTION OF WORK**

Definitions: Closeout is hereby defined to include general requirements near end of Contract Time, in preparation for final acceptance, final payment, normal termination of contract, occupancy by Owner, and similar actions evidencing completion of the work. Specific requirements for individual units of work are specified in sections of Divisions 2 through 15. Time of closeout is directly related to "Substantial Completion", and therefore may be either a single time period for entire work or a series of time periods for individual parts of the work which have been certified as substantially complete at different dates. That time variation (if any) shall be applicable to other provisions of this Section.

**PREREQUISITES TO SUBSTANTIAL COMPLETION**

General: Prior to requesting inspection for certification of substantial completion (for either entire work or portions thereof), complete the following and list known exceptions in request:

Include supporting documentation for completion as indicated in these Contract Documents.

Submit statement showing accounting of changes to Contract Sum.

The General Contractor shall prepare, submit and complete a punch list in accordance with General Conditions.

Submit specific warranties, workmanship/maintenance bonds, maintenance agreements, final certifications, and similar documents.

Obtain and submit releases enabling Owner's full and unrestricted use of the work and access to services and utilities, including (where required) occupancy permits, operating certificates, waivers of lien, and similar releases.

Submit record drawings, maintenance manuals, and similar final record information.

Deliver tools, spare parts, extra stocks of materials, and similar physical items to Owner.

Complete start-up testing of systems, and instructions of Owner's operating/maintenance personnel. Discontinue (or change over) and remove from project site temporary facilities and services, along with construction tools and facilities, mock-ups, and similar elements.

Complete final cleaning up requirements, including touch-up painting of marred surfaces.

Touch-up and otherwise repair and restore marred, exposed finishes.

**INSPECTION PROCEDURES:** Upon receipt of Contractor's request, the Architect will either proceed with inspection or advise Contractor of prerequisites not fulfilled. Following initial inspection, the Architect will either prepare certificate of substantial completion, or advise Contractor of work which must be performed prior to issuance of certificate; and repeat inspection when requested and assured that work has been substantially completed. Results of completed inspection will form initial "punch-list" for final acceptance.

**RECORD DOCUMENT SUBMITTALS**

General: Specific requirements for record documents are indicated in individual sections of these Specifications. Other requirements are indicated in General Conditions. General submittal requirements are indicated in "Submittals" sections. Do not use record documents for construction purposes; protect from deterioration and loss in a secure, fire-resistive location; provide access to record documents for Architect's reference during normal working hours.

Record Drawings: The General Contractor shall maintain in white-print set (blue-line or black-line) of Contract Drawings and Shop Drawings in clean, undamaged condition, with mark-up of actual installations which vary substantially from the work as originally shown. Mark whichever drawing is most capable of showing "field" condition fully and accurately; however, where Shop Drawings are used for mark-up, record a cross reference at corresponding location on working drawings. Mark with red eraseable pencil and, where feasible, use other colors to distinguish between variations in separate categories of work. Mark-up new information which is recognized to be of importance to Owner, but was for some reason not shown on either Contract Drawings or Shop Drawings. Give particular attention to concealed work, which would be difficult to measure and record at a later date. Note related change order numbers where applicable. Organize record drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates, and other identification on cover of each set.

Record Specifications: The General Contractor shall maintain one copy of specifications, including addenda, change orders, and similar modifications issued in printed form during construction, and mark-up variations (of substance) in actual work in comparison with text of specifications and modifications as issued. Give particular attention to substitutions, selection of option, and similar information on work where it is concealed or cannot otherwise be readily discerned at a later date by direct observation. Note related record drawing information and product data, where applicable. Upon completion of mark-up, submit to Architect for Owner's records.

Maintenance Manuals: Organize maintenance-and-operating manual information into suitable sets of manageable size, and bind into individual binders properly identified and indexed (thumb-tabbed). Include emergency instructions, spare parts listing, copies of warranties, wiring diagrams, recommended "turn-around" cycles, inspection procedures, shop drawings, product data, and similar applicable information. Bind each manual of each set in a heavy-duty two- or three-ring vinyl-covered binder, and include pocket folders for folded sheet information. Mark identification on both front and spine of each binder.

## **PART 2 - PRODUCTS**

Not Used

## **PART 3 - EXECUTION**

### **FINAL CLEANING**

General: Special cleaning for specific units of work is specified in sections of Divisions 2 through 16. General cleaning during progress of work is specified in General Conditions and as temporary services in "Special Conditions" section of this Division. Provide final cleaning of the work, at time indicated, consisting of cleaning each surface or unit of work to normal "clean" condition expected for a first-class building cleaning and maintenance program. Comply with manufacturer's instructions for cleaning operations. Refer to Section 01710 of these Specifications.

Where extra materials of value remain after completion of associated work have become Owner's property, dispose of these to Owner's best advantage as directed.

**END OF SECTION**



## **SECTION 01710**

### **CLEANING**

#### **PART 1 - GENERAL**

##### **RELATED DOCUMENTS**

Drawings and General Provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

**DESCRIPTION OF WORK:** Throughout all phases and items of the construction period, maintain the building and site in a standard of cleanliness as described in this Section.

##### **RELATED WORK**

In addition to standards described in this Section, comply with all requirements for cleaning-up as described in various other Sections of these Specifications.

##### **QUALITY ASSURANCE**

**Inspection:** Conduct daily inspection, and more often if necessary, to verify that requirements of cleanliness are being met

**Codes and Standards:** In addition to the standards described in this Section, comply with all pertinent requirements of Governmental agencies having jurisdiction.

Disposal of volatile fluid wastes (such as mineral spirits, oil, or paint thinner) in storm or sanitary sewer systems or into streams or waterways is not permitted.

#### **PART 2 - PRODUCTS**

**CLEANING MATERIALS AND EQUIPMENT:** Provide all required personnel, equipment, and materials needed to maintain the specified standard of cleanliness.

**COMPATIBILITY:** Use only the cleaning materials and equipment which are compatible with the surface being cleaned, as recommended by the manufacturer of the material or as approved by the Architect.

#### **PART 3 - EXECUTION**

##### **PROGRESS CLEANING**

###### **General**

Retain all stored items in an orderly arrangement allowing maximum access, not impeding traffic, and providing the required protection of materials.

Do not allow the accumulation of scrap, debris, waste material, and other items not required for the construction of this work.

Twice weekly, and more often if necessary, the General Contractor shall completely remove all scrap, debris, and waste material from the job site, and shall place into container furnished by the General Contractor.

Provide adequate storage for all items awaiting removal from the job site, observing all requirements for fire protection.

**Project Site;** The General Contractor shall:

Daily, and more often if necessary, inspect the project site and pick up all scrap, debris, and waste material. Remove all such items to the place designated for their storage.

Weekly, and more often if necessary, sweep all interior places clean. "Clean", for the purpose of this subparagraph, shall be interpreted as meaning free from dust and other material capable of being removed by reasonable diligence using a hand held broom.

As required preparatory to installation of succeeding materials, clean the structures or pertinent portions thereof to the degree of cleanliness recommended by the manufacturer

of the succeeding material, using all equipment and materials required to achieve the required cleanliness.

Following the installation of finish floor materials, protect by covering with temporary coverings and/or clean the finish floor daily (and more often if necessary) at all times while work is being performed in the space in which finish materials have been installed. "Clean", for the purpose of this subparagraph, shall be interpreted as meaning free from all foreign material, which in the opinion of the Architect, may be injurious to the finish floor material.

#### **FINAL CLEANING**

**Definition:** Except as otherwise specifically provided, "Clean" (for the purpose of this Article) shall be interpreted as meaning the level of cleanliness generally provided by commercial building maintenance Subcontractors using commercial quality building maintenance equipment and materials.

**General:** Prior to completion of the work, remove from the job site all tools, temporary structures, surplus materials, equipment, scrap, debris, and waste. Conduct final progress cleaning as described in Article 3.1 above.

**Interior:** Visually inspect all interior surfaces and remove all traces of soil, waste material, smudges, and other foreign matter. Remove all traces of splashed materials from adjacent surfaces. Remove all paint droppings, spots, stains, and dirt from finished surfaces. Use only the specified cleaning materials and equipment.

Repair, patch, and touch-up marred or damaged surfaces to match adjacent finishes.

Clean the following if located within the project area:

Plumbing Fixtures, Strainers and Floor Drains

Light Fixtures and Lamps

Replace filters of ventilating equipment when units have been operating during construction. In addition, clean grilles and louvers.

Excess lubrication is to be removed from mechanical and electrical equipment.

All Electrical Panels

Clean all transparent materials, including glass and mirrors. Remove glazing compound and other substances that are noticeable from vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.

Remove labels that are not permanent labels.

**Polished and Resilient Surfaces:** To all surfaces requiring the routine application of protective waxes and/or buffed polish, apply the specified coating and/or polish as recommended by the manufacturer of the material being treated, as specified in individual Specification Sections.

Leave concrete floors broom clean. Vacuum carpeted surfaces.

Clean areas traversed by construction personnel.

Clean the site, including landscape development areas, of rubbish, litter, and other foreign substances. Sweep paved areas broom clean. Remove stains, spills, and other foreign deposits.

Maintain cleaning until the building, or portion thereof, is accepted by the Owner.

**Timing:** Schedule final cleaning as approved by the Architect to enable the Owner to accept a completely clean project.

#### **END OF SECTION**

## **SECTION 02200 EARTHWORK**

### **1. GENERAL**

- A. Applicable provisions of ALL CONDITIONS OF THE CONTRACT as hereinbefore set forth govern work under this section and are made a part hereof.

### **2. SCOPE**

- A. Stripping of topsoil in the building, and sidewalk areas. Topsoil is to be stockpiled at a designated area of the property.
- B. Excavate for the foundations.
- C. Backfill.
- D. All earthwork shall be in accordance with recommendations as described in the subsurface investigation which is part of these specifications.

### **3. SITE CLEARANCE**

- A. Strip all topsoil in building area and parking lot area and stockpile this material at a designated area of the property. Remove all trees and stumps from the building and parking areas. Remove stone retaining walls.

### **4. BUILDING AND SITE FILL**

- A. The building area shall be cut where indicated by finish grades and used as fill. Fill shall be placed to the elevations indicated on the plot plan.
- B. The fill shall be applied in layers not to exceed 6" with the excavation equipment working over the top to compact the fill. Fill to be compacted to 95% proctor density with a vibratory compactor roller or to the density specified on the subsurface investigation recommendations.
- C. The filling operation shall be under the strict control of the Project Manager, General Contractor and Construction Engineer. Compaction tests will be performed at a minimum of every 18" of fill or more frequently if specified by the Construction Engineer, Project Manager, or site engineering firm. Proof rolling will be performed at the request of the Project Manager.

### **5. EXCAVATION AND BACKFILL**

- A. Excavate to the required depth and width for all work. Excavation for floors on ground to be sufficient depth to receive the filling specified under sub-grading.
  - 1. Topsoil Stripping: Remove and stockpile soils encountered containing organics and loam primarily, found at the original grades. Remove and stockpile topsoil in locations shown on the Drawings or designated by the Owner's Representative. Over excavation of material will not be an addition to the Contract. After completing topsoil stripping and prior to further excavation or fills, cross-section the area so that volumes may be calculated.
  - 2. Excavation: Unclassified includes excavation to sub grade elevations indicated, regardless of character of materials and obstructions encountered unless the use of rock equipment or blasting is required.
- B. Place no foundations on earth fill. Any excess cut under foundations due to negligence shall be filled with concrete at the Contractor's expense.

- C. Excavate to the exact size for footings, trenches, and other work where forms are not used. Clean, level, and trim excavations as required. Do this work immediately before placing concrete.
- D. Provide, maintain, and operate sufficient pumping equipment to keep excavations free of water at all times.
- E. Before backfilling, remove all rubbish and foreign matter or materials.
- F. No fill material shall be placed during unfavorable weather conditions, or while the material is frozen or thawing.
- G. Ground Surface Preparation: Remove vegetation, debris, unsatisfactory soil material, obstructions and deleterious materials from ground surface prior to placement of fills. Prior to placement of fill, proof roll the grade to verify stability.
  - 1. Place mass fills in layers not to exceed 8 inches. Compact building and pavement areas to a minimum of 95 percent maximum dry density as determined by the standard proctor method, ASTM D-698 or to 92 percent of modified proctor ASTM D-1557. Include in the building area a minimum buffer area of 20 feet outside the building lines or as shown on the Drawings.
  - 2. Place initial trench backfill by hand in 6 inch lifts after compaction. After a minimum of one foot cover over the pipe, structure or appurtenance, place backfill lifts not to exceed 12 inches. Compact each lift to maximum dry density on the Drawings or as specified in above paragraph B. Place the final backfill lift to the grades indicated on the Drawings or to original grade.
  - 3. Place backfill and fill materials evenly adjacent to structures, piping, or conduit to required elevations. Prevent wedging action of backfill against structures or displacement of piping or conduit by carrying material uniformly around structure, piping, or conduit to approximately same elevation in each lift.
  - 4. Control soil and fill compaction, providing minimum percentage of density specified for each area classification indicated below. Correct improperly compacted areas of lifts as directed by Owner's Representative if soil density tests indicate inadequate compaction.
    - a. Moisture Control: Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, contain frost or ice, or have not been compacted to the specified percentage of maximum dry density.
      - 1). Where sub-grade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of sub-grade or layer of soil material. Apply water in minimum quantity as necessary to prevent free water from appearing on surface during or subsequent to compaction operations.
      - 2). Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.
      - 3). Stockpile or spread soil material that has been removed because it is too wet to permit compaction. Assist drying by disking, harrowing, or pulverizing until moisture content is reduced to a satisfactory value.
- H. Quality Control Testing During Construction: Employ, at Contractor's expense, a testing laboratory acceptable to the Owner to perform material evaluation tests. Allow testing service to inspect and approve each sub-grade and fill layer before further backfill or construction work is performed.

1. Perform field density tests in accordance with ASTM D 1556 (sand cone method) or ASTM D 2922 (nuclear method) as applicable.
  - a. Periodically check and adjust field density test with ASTM D 2922, to correlate to tests performed using ASTM D 1556. In conjunction with each density calibration check, check the calibration curves furnished with the moisture gages in accordance with ASTM D 3017.
  - b. If field tests are performed using nuclear methods, make calibration checks of both density and moisture gages at beginning of work, on each different type of material encountered, and at intervals reviewed by the Engineer.
2. Footing Sub-grade: For each strata of soil on which footings will be placed, perform at least one test to verify required design bearing capacities, Subsequent verification and approval of each footing sub grade may be based on a visual comparison of each sub grade with related tested strata when reviewed by the Engineer.
3. Paved Areas and Building Slab Sub grade: Perform at least one field density test of sub grade for every 2,000 sq. ft. of paved area or building slab, but in no case fewer than three tests in each compacted fill layer.
4. Foundation Wall Backfill: Perform at least two field density tests at locations and elevations as directed.
5. If in the opinion of the Owner's Representative, based on testing service reports and inspection, sub grade of fills that have been placed are below specified density, perform additional compaction and testing until specified density is obtained.
- I. Disposal of excess and waste materials: Remove and transport excess excavated material to an off-site location.
  1. Secure necessary permits to legally dispose of excess material, including unacceptable excavated material, trash, and debris off-site.

**6. ROCK**

- A. If rock is encountered, contact the Architect to discuss removal and disposal methods and costs.

END OF SECTION 02200



SECTION 02281  
TERMITE CONTROL

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Soil treatment under slab for termite control.
- B. Soil treatment at concrete foundation for termite control.
- C. Soil treatment in crawl spaces.
- D. Termite damage guarantee with annually renewable termite inspection control contract.

1.02 RELATED WORK

- A. Section 02220 - Structure Excavation and Backfill.
- B. Section 03001 - Concrete Work.

1.03 QUALITY ASSURANCE

- A. The applicator shall be licensed by the State of Arkansas to perform the Work of this section.
- B. The applicator shall be bonded and insured by an insurance company authorized to practice business in the State of Arkansas.

1.04 REGULATORY REQUIREMENTS

- A. Local Laws: All Work performed under this section shall conform with North Carolina Law.

1.05 GUARANTEE

- A. Submit a five year written guarantee stating that all additional treatment of areas where termites appear, and any damages caused by the termite appearance, will be performed at no cost to the Owner.
- B. Provide the Owner an annually renewable termite inspection control contract, effective five years from date of the original soil treatment, to assure necessary re-treatment and liability for termite damage.
- C. The damage guarantee shall provide service and re-service for any subterranean termite infestation without cost to the Owner and shall cover all such damage to the structure or contents thereof in a maximum amount of five thousand dollars (\$5,000.00).
- D. Draw the guarantee in favor of the Owner, with copies of the guarantee of the renewable inspection control contract provided for the Owner, the Contractor, the Consulting Architect, and the Architect/Engineer.
- E. No payment will be made for termite control Work until the above guarantee has been

submitted in satisfactory form.

## PART 2 - PRODUCTS

### 2.01 MATERIALS

#### A. Chemicals:

1. Use chemicals formulated as an emulsive concentrate for subsequent dilution with water.
2. Fuel oil will not be permitted as a diluent.
3. Use chemicals of a type currently known to give insurable protection for the soil and fill at the foundation and under the new addition.

#### B. Mixing Solution

1. Deliver chemicals to the job site in factory-sealed cans.
2. Prepare the working solution by diluting the chemicals with water at the job site.

## PART 3 - EXECUTION

### 3.01 PREPARATION

- A. The applicator shall visit the job site to determine the soil texture or otherwise obtain the information from the County Agent, the U.S. Soil Conservation Service or other approved authorities.
- B. The Contractor shall remove all wood and other cellulose containing materials from the area within the building walls before the solution is applied.
- C. The Contractor shall set tentative dates with the applicator for initial treatment services and schedule subsequent service as deemed necessary for completion of the termite control work.
- D. The Contractor shall give the applicator 24 hour notice prior to installing the moisture barrier in preparation for placement of the floor slabs.

### 3.02 APPLICATION

#### A. Soil Conditions:

1. Do not apply the working solution when the soil is frozen, excessively wet, or immediately after heavy rains.
2. Do not disturb treated areas during subsequent construction operations.

- B. Apply the working solution to the soil over the entire surface under slabs and at the concrete foundations at the rate of application recommended by the chemicals manufacturers and in accordance with regulatory requirements to provide the required guarantee.

END OF SECTION 02281



**SECTION 02416**  
**STRUCTURE DEMOLITION**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. This Section includes the following:
  - 1. Demolition and removal of buildings and site improvements.
  - 2. Removing below-grade construction.
  - 3. Disconnecting, capping or sealing, and removing site utilities.
- B. Related Sections include the following:
  - 1. Division 31 Section "Site Clearing" for site clearing and removal of above- and below-grade site improvements not part of building demolition.

**1.3 DEFINITIONS**

- A. Demolish: Completely remove and legally dispose of off-site.
- B. Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner. Include fasteners or brackets needed for reattachment elsewhere.

**1.4 MATERIALS OWNERSHIP**

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.
- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
  - 1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

**1.5 SUBMITTALS**

- A. Qualification Data: For refrigerant recovery technician.
- B. Proposed Protection Measures: Submit informational report, including drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and for noise control. Indicate proposed locations and construction of barriers.
  - 1. Adjacent Buildings: Detail special measures proposed to protect adjacent buildings to remain.
- C. Schedule of Building Demolition Activities: Indicate the following:
  - 1. Detailed sequence of demolition work, with starting and ending dates for each activity.
  - 2. Temporary interruption of utility services.
  - 3. Shutoff and capping or re-routing of utility services.
- D. Predemolition Photographs: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by building demolition operations. Submit before the Work begins.
- E. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.
- F. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

## 1.6 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.
- B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- C. Standards: Comply with ANSI A10.6 and NFPA 241.
- D. Predemolition Conference: Conduct conference at Project site.

## 1.7 PROJECT CONDITIONS

- A. Buildings to be demolished will be vacated and their use discontinued before start of the Work.
- B. Buildings immediately adjacent to demolition area will be occupied. Conduct building demolition so operations of occupied buildings will not be disrupted.
  - 1. Provide not less than 72 hours' notice of activities that will affect operations of adjacent occupied buildings.
  - 2. Maintain access to existing walkways, exits, and other facilities used by occupants of adjacent buildings. Do not close or obstruct walkways, exits, or other facilities used by occupants of adjacent buildings without written permission from authorities having jurisdiction.
- C. Owner assumes no responsibility for buildings and structures to be demolished. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
  - 1. Hazardous materials will be removed by Owner before start of the Work.
  - 2. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- E. On-site storage or sale of removed items or materials is not permitted.

## 1.8 COORDINATION

- A. Arrange demolition schedule so as not to interfere with operations of adjacent occupied buildings.

## PART 2 - PRODUCTS

### 2.1 SOIL MATERIALS

- A. Satisfactory Soils: Comply with requirements in Division 31 Section "Earth Moving."

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting demolition operations.
- B. Review Project Record Documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- C. Inventory and record the condition of items to be removed and salvaged. Provide photographs of conditions that might be misconstrued as damage caused by salvage operations.
- D. Engage a professional engineer to perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during building demolition operations.
- E. Verify that hazardous materials have been remediated before proceeding with building demolition operations.

### 3.2 PREPARATION

- A. Refrigerant: Remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction before starting demolition.
- B. Existing Utilities: Locate, identify, disconnect, and seal or cap off indicated utilities serving buildings and structures to be demolished.
  - 1. Arrange to shut off indicated utilities with utility companies.
  - 2. If removal, relocation, or abandonment of utility services will affect adjacent occupied buildings, then provide temporary utilities that bypass buildings and structures to be demolished and that maintain continuity of service to other buildings and structures.
  - 3. Cut off pipe or conduit a minimum of 24 inches below grade. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing according to requirements of authorities having jurisdiction.
- C. Existing Utilities: Refer to Divisions 22 and 26 Sections for shutting off, disconnecting, removing, and sealing or capping utilities. Do not start demolition work until utility disconnecting and sealing have been completed and verified in writing.
- D. Temporary Shoring: Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent unexpected movement or collapse of construction being demolished.
  - 1. Strengthen or add new supports when required during progress of demolition.
- E. Salvaged Items: Comply with the following:
  - 1. Clean salvaged items of dirt and demolition debris.
  - 2. Pack or crate items after cleaning. Identify contents of containers.
  - 3. Store items in a secure area until delivery to Owner.
  - 4. Transport items to storage area designated by Owner.
  - 5. Protect items from damage during transport and storage.

### 3.3 PROTECTION

- A. Existing Facilities: Protect adjacent walkways, loading docks, building entries, and other building facilities during demolition operations. Maintain exits from existing buildings.
- B. Existing Utilities: Maintain utility services to remain and protect from damage during demolition operations.
  - 1. Do not interrupt existing utilities serving adjacent occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction.
  - 2. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and authorities having jurisdiction. Provide at least 72 hours' notice to occupants of affected buildings if shutdown of service is required during changeover.
- C. Temporary Protection: Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction and as indicated.
  - 1. Protect adjacent buildings and facilities from damage due to demolition activities.
  - 2. Protect existing site improvements, appurtenances, and landscaping to remain.
  - 3. Erect a plainly visible fence around drip line of trees to remain.
  - 4. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
  - 5. Provide protection to ensure safe passage of people around building demolition area and to and from occupied portions of adjacent buildings and structures.
- D. Remove temporary barriers and protections where hazards no longer exist. Where open excavations or other hazardous conditions remain, leave temporary barriers and protections in place.

### 3.4 DEMOLITION, GENERAL

- A. General: Demolish indicated existing buildings and site improvements completely. Use methods required to complete the Work within limitations of governing regulations and as follows:
  - 1. Do not use cutting torches until work area is cleared of flammable materials. Maintain portable fire-suppression devices during flame-cutting operations.
  - 2. Maintain fire watch during and for at least 2 hours after flame cutting operations.
  - 3. Maintain adequate ventilation when using cutting torches.
  - 4. Locate building demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.

- B. Engineering Surveys: During demolition, perform surveys to detect hazards that may result from building demolition activities.
- C. Site Access and Temporary Controls: Conduct building demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
  - 1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
  - 2. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations. Do not use water when it may damage adjacent construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.
- D. Explosives: Use of explosives is not permitted.

### 3.5 DEMOLITION BY MECHANICAL MEANS

- A. Proceed with demolition of structural framing members systematically, from higher to lower level. Complete building demolition operations above each floor or tier before disturbing supporting members on the next lower level.
- B. Remove debris from elevated portions of the building by chute, hoist, or other device that will convey debris to grade level in a controlled descent. Remove structural framing members and lower to ground by method suitable to minimize ground impact and dust generation.
- C. Below-Grade Construction: Demolish foundation walls and other below-grade construction.
  - 1. Remove below-grade construction, including basements, foundation walls, and footings, completely.
- D. Existing Utilities: Demolish and remove existing utilities and below-grade utility structures.
  - 1. Piping: Disconnect piping at unions, flanges, valves, or fittings.
  - 2. Wiring Ducts: Disassemble into unit lengths and remove plug-in and disconnecting devices.

### 3.6 SITE RESTORATION

- A. Below-Grade Areas: Completely fill below-grade areas and voids from building demolition operations with satisfactory soil materials according to backfill requirements in Division 31 Section "Earth Moving."
- B. Site Grading: Uniformly rough grade area of demolished construction to a smooth surface, free from irregular surface changes. Provide a smooth transition between adjacent existing grades and new grades.

### 3.7 REPAIRS

- A. Promptly repair damage to adjacent buildings caused by demolition operations.

### 3.8 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from Project site and legally dispose of them in an EPA-approved landfill acceptable to authorities having jurisdiction.
  - 1. Do not allow demolished materials to accumulate on-site.
  - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Do not burn demolished materials.

### 3.9 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by building demolition operations. Return adjacent areas to condition existing before building demolition operations began.

END OF SECTION 024116

SECTION 02510  
SIDEWALKS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Providing 4 or 6 inch thick concrete sidewalks where shown and as indicated on Drawings.

1.02 RELATED WORK

- A. Section 02200 - Site Grading.
- B. Section 02220 - Structure Excavation and Backfill.

1.03 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM):
  - 1. ASTM D 994, Specification for Preformed Expansion Joint Fillers for Concrete (Bituminous Type).

PART 2 - PRODUCTS

2.01 MATERIALS

- A. General: Materials for use in sidewalk construction shall conform to the requirements of the Section 2515, and shall be 4000 psi air entrained concrete.
- B. Pre-formed expansion joint filler: ASTM D994.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Prepare subgrade for walks by excavating or filling to a depth below the top of an intended pavement equal to the thickness of the finished walk and in exact conformity to the grade approved by the Engineer. Remove vegetable matter or material that will not compact properly and replace with suitable material. Place all fill required to bring the subgrade to the proper level in thin layers not exceeding 4 inches deep, and thoroughly ram, tamp, or roll each layer to a minimum density of 98- of the maximum dry density at or near optimum moisture content as determined by Standard Proctor procedures, ASTM D 698. Bring subgrade to true grade in a uniformly firm condition before the placing of the concrete. Do not place concrete on the subgrade until the Consulting Architect has inspected and approved both grade and condition of subgrade.

3.02 INSTALLATION

- A. Refer to Drawings for location and sizes

- B. Stake the Work and execute sidewalk construction in accordance with plans and details

END OF SECTION

**SECTION 02600  
WATER SERVICE PIPING**

**1. GENERAL**

A. Related Documents

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

B. Summary

1. This Section includes water service piping and appurtenances from the source or existing system to a point 5 feet outside the building or to limits shown.

C. Quality Assurance

1. Comply with requirements of utility supplying water to the project.
2. Comply with local Fire Department/Marshall Standards pertaining to materials, hose threads and installation.
3. Comply with local Health Department or Agency requirements.

D. Project Conditions

1. Site Information: Verify existing utility locations and verify that water service piping may be installed in compliance with the original design and referenced standards. If existing conditions are found not to be compatible with the design intent, give the Owner's Representative sufficient notice to prevent delays.

E. Sequencing and Scheduling

1. Coordinate connection to public water main with utility company.
2. Coordinate with other utility work.

**2. PRODUCTS**

A. Pipe and Pipe Fittings, General

1. Pipe and pipe fitting materials shall be compatible with each other. Supply pipe, pipe fittings and appurtenances in accordance with Authority having jurisdiction or as shown on Drawings.
2. Copper Water Tube: Supply ASTM B 88; Type K. seamless, annealed temper unless indicated differently on Drawings or otherwise required by Authority having jurisdiction.
  - a. Copper Fittings: Type required by Authority having jurisdiction and conforming to AWWA C800.

B. Valves

1. Valves, Valve Boxes, Curb Stops, Curb Boxes, Tapping Sleeves, Tapping Saddles,

Corporations and Other Appurtenances: Type specified by Authority having jurisdiction and compatible with pipe and fittings specified.

2. Non rinsing Stem Gate Valves 3 Inches and Larger: AWWA C500, cast-iron double disc, bronze disc and seat rings, or AWWA C509, resilient seated; bronze stem, cast-iron or ductile-iron body and bonnet, stem nut, 250-psi working pressure, mechanical joint ends.
3. Valve Boxes: Cast-iron box having top section and cover with lettering "WATER," bottom section with base of size to fit over valve and barrel approximately 5 inches in diameter, and adjustable cast-iron extension of length required for depth of bury of valve.
4. Curb Stops: Bronze body, ground key plug or ball, and wide tee head, with inlet and outlet to match service piping material.
5. Service Boxes for Curb Stops: Cast-iron box having telescoping top section of length required for depth of bury of valve and cover having lettering "WATER," and bottom section with base of size to fit over curb stop and barrel approximately 3 inches in diameter.
6. Tapping Sleeve and Tapping Valve: Complete assembly, including tapping sleeve, tapping valve, and bolts and nuts. The sleeve and valve shall be compatible with the tapping machine to be used.
  - a. Tapping Sleeve: Cast-iron or ductile-iron 2-piece bolted sleeve with flanged outlet for new branch connection. Sleeve may have mechanical joint ends with rubber gaskets or have sealing rings in the sleeve body. Sleeve shall mate with the size and type pipe material being tapped. Outlet flange shall be size required for branch connection.
7. Service Clamps and Corporation Stops: Complete assembly, including service clamp, corporation stop, and bolts and nuts. The clamp and stop shall be compatible with the drilling machine to be used.
  - a. Service Clamp: Cast-iron or ductile-iron with gasket and AWWA C800 threaded outlet for corporation stop, and threaded end straps.
  - b. Corporation Stops: Bronze body and ground key plug, with AWWA C800 threaded inlet and outlet to match service piping material.

#### C. Anchorages

1. Perform anchorages in accordance with Authority having jurisdiction and as shown on Drawings. Provide sufficient anchorages, sized in accordance with pressure rating of pipe being installed.

#### D. Fire Hydrants

1. Hydrants: Of type acceptable to Authority having jurisdiction over water system as well as the Fire Department/Marshall. Coordinate required type hydrant, color and threads.
2. Hydrant Requirements: Conform to AWWA C502.

### 3. EXECUTION

#### A. Preparation of Buried Pipe Foundation



1. Grade trench bottom to provide a smooth, firm, stable, and rock-free foundation throughout the length of the piping. If bedding or encasement is required, excavate, install and compact to lines shown.
2. Remove unstable, soft, and unsuitable materials at the surface upon which pipes are to be laid and backfill with indicated encasement or select backfill.
3. Shape bottom of trench to fit bottom of piping. Fill unevenness with tamped sand backfill. Dig bell holes at each pipe joint to relieve the bells of all loads and to ensure continuous bearing of the pipe barrel on the foundation.



**SECTION 02650  
WASTE WATER COLLECTION SYSTEM**

**1. GENERAL**

A. Related Documents

1. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 0 and Division 1 Specification Sections, apply to this Section.

B. Summary

1. This Section includes sanitary sewer system piping and appurtenances from a point 5 feet outside the building to the point of disposal.

C. Quality Assurance

1. Environmental Compliance: Comply with applicable portions of local environmental agency regulations pertaining to sanitary sewer systems.
2. Utility Compliance: Comply with local utility regulations and standards pertaining to sanitary sewer systems.

D. Project Conditions

1. Site Information: Verify existing utility locations and that sanitary sewer system piping may be installed in compliance with original design and referenced standards. If existing conditions are found not to be compatible with the design intent, give the Owner's Representative sufficient notice to prevent delays.
  - a. Locate existing sanitary sewer system piping and structures.

**2. PRODUCTS**

A. Pipe and Fittings

1. General: Provide pipe and pipe fitting materials compatible with each other. Provide materials specified by Agency having jurisdiction or as indicated on Drawings.
2. PVC (Polyvinyl Chloride) Sewer Pipe and Fittings: ASTM D 3034, SDR 35, unless otherwise shown on Drawings or required by Agency having jurisdiction, use elastomeric seal gasket joints.
  - a. Gaskets: ASTM D 3212, elastomeric seal.
  - b. Solvent Cement: ASTM D 2564.

B. Cleanouts

1. Supply cleanouts of same pipe and fitting materials as lateral unless required otherwise on Drawings or by local Authority.
2. Cleanout Cover: Cast iron, ASTM A48, Class 30B as shown on Drawings or as required by Authority having jurisdiction.

C. Oil/Water Separator

1. Provide precast, 2 chamber concrete, fiberglass or steel 1,000 gallon tank with lid, clean-out and manhole sections as required. Refer to drawings. Steel/FRP tank available at

Containment Solutions 410-552-9343 Penske National account.

2. Provide cast iron ring and manhole cover with 24" interior clearance. Heavy duty in traffic areas.

### **3. EXECUTION**

#### **A. Preparation of Foundation for buried Sanitary Sewer Systems.**

1. Grade trench bottom to provide a smooth, firm, stable, and rock-free foundation, throughout the length of the pipe.
2. Remove unstable, soft, and unsuitable material at the surface upon which pipes are to be laid, and backfill with acceptable fill as specified in Division 2C, "Earthwork".
3. Over excavate bottom of trench to provide bedding or encasement as shown on Drawings or as required by Authority having jurisdiction.
4. Shape bottom of trench to fit bottom of pipe. Fill unevenness with crushed stone bedding material. Dig bell holes at each pipe joint to relieve the bells of all loads and to ensure continuous bearing of the pipe barrel on the foundation.

#### **B. Installation, General**

#### **C.**

1. General Locations and Arrangements: Drawings (plans and details) indicate the general location and arrangement of the underground sanitary sewer system piping.
2. Install piping beginning at low point of systems, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and coupling in accordance with manufacturer's recommendations for use of lubricants, cements, and other installation requirements. Maintain swab or drag in line and pull past each joint as it is completed.
3. Use proper size increasers, reducers, and couplings, where different size or material of pipes and fittings are connected. Reduction of the size of piping in the direction of flow is prohibited.

#### **D. Pipe Joint Construction and Installation**

1. Join and install PVC pipe as follows:
  - a. Pipe and gasketed fitting, joining with elastomeric seals in accordance with ASTM D 3212.
  - b. Solvent cement joint pipe and fittings, joining with solvent cement in accordance with ASTM D 2855 and ASTM D 2321.
  - c. Installation in accordance with ASTM D 2321.

#### **E. Cleanouts**

1. Install cleanouts in appropriate encasement and in accordance with applicable pipe requirements.

#### **F. Tap Connections**

1. Make connections to existing piping and underground structures so that finished work will conform as nearly as practicable to the requirements specified for new work. Perform work in accordance with Authority having jurisdiction, and as reviewed by Engineer.
2. Use commercially manufactured wye fittings for piping branch connections. Remove

section of existing pipe, install wye fitting into existing piping, and encase entire wye fitting plus 6-inch overlap, with not less than 6 inches of 3000-psi 28-day compressive-strength concrete.

3. Make branch connections from side into existing piping by cutting a hole in the existing pipe and installing the appropriate saddle or sleeve fitting onto existing piping. Encase entire system with not less than 6 inches of 3000 psi 28-day compressive-strength concrete.
4. Protect existing piping and structures to prevent concrete or debris from entering while making tap connections. Remove debris, concrete, or other extraneous material that may accumulate.

#### G. Field Quality Control

1. Testing: Perform testing of completed piping in accordance with local authorities having jurisdiction.

Cleaning: Clear interior of piping and structures of dirt and other superfluous material as work progresses. Maintain swab or drag in piping and pull past each joint as it is completed.



**SECTION 02950  
LANDSCAPE PLANTINGS**

**1. GENERAL**

A. Related Document

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

B. Summary

1. This section includes providing all labor, materials, equipment and services to complete the landscape plantings including initial maintenance and guarantee.

C. Quality Assurance

1. Landscape work to be performed by a single firm specializing in landscape work.
2. Source Quality Control:
  - a. General: Ship landscape materials with certifications of inspection required by governing authorities. Comply with regulations applicable to landscape materials.
  - b. Do not make substitutions. If specified landscape material is not obtainable, submit proof of non-availability to Owner's Representative, together with proposal for use of equivalent material.
  - c. Label at least one plant of each variety with a securely attached waterproof tag bearing legible designation of botanical and common name.
  - d. Inspection: Notify Owner's Representative to perform an inspection of plant materials prior to commencing planting operations. The Owner's Representative may inspect plants either at place of growth or at site before planting, for compliance with requirements for genus, species, variety, size and quality. Owner's Representative retains the right to further inspect trees and shrubs for size and quality. Owner's Representative retains the right to further inspect trees and shrubs for size and condition of balls and root systems, insects, injuries and latent defects, and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from project site.

**LANDSCAPE PLANTINGS**

**SECTION 02950-1**





**SECTION 03300**  
**CAST-IN-PLACE CONCRETE**

**PART 1 - GENERAL**

**RELATED DOCUMENTS**

Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

**DESCRIPTION OF WORK:** Work in this Section includes, but is not necessarily limited to, furnishing and installing the following:

Extent of cast-in-place concrete is shown on drawings. This Section includes the following miscellaneous materials associated with cast-in-place concrete:

- Waterstops
- Premolded joint filler
- Underslab moisture barrier

**SUBMITTALS**

Shop Drawings:

Shop Drawings/Reinforcement: See ACI 301, Section 5.1 Detailing shall conform to ACI 315-80 "Details of concrete reinforcement".

Shop drawing submittals shall consist of a direct reading transparency plus 2 prints of each drawing.

"Standard Specifications for Structural Concrete for Buildings, ACI-301-Chapter 4, Formwork"

"Recommended Practice for Concrete Formwork, ACI-347-78 Chapter 1, Design"

Mix Design: See paragraph 2.7 herein for submittal requirements.

Product Data: Submit data for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, waterstops, joint systems, curing compounds, dry-shake finish materials, and as requested by Architect.

Laboratory Test Reports: Submit laboratory test reports for concrete materials and mix design.

Materials Certificates: Provide materials certificates in lieu of materials laboratory test reports when permitted by Owner's Representative. Materials certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with, or exceeds, specified requirements. Provide certification that total chloride content of concrete complies with specification requirements. Maximum water-soluble chloride ion in concrete, percent by mass of cement shall be 0.10.

**QUALITY ASSURANCE**

Codes and Standards: Comply with provisions of following codes, specifications, and standards, except where more stringent requirements are shown or specified:

Reference Specification: To be complete, this Specification Section requires the use of ACI 301-89 "Specifications for Structural Concrete for Buildings". This specification Section is intended to supplement and modify ACI 301, and will take precedence where conflict exists. Requirements of ACI 301 shall govern the work, except as noted herein.

Field References: Attention is called to requirement (see ACI 301, Section 1.6) for keeping a copy of ACI SP-15 Field Reference manual, in the Concrete Installer's field office at all times. Supervisory personnel shall be familiar with ACI 301 and other standards contained in SP015, as well as with the project specification.

ACI 305-77 (82) "Hot Weather Concreting"

ACI 306-88 "Cold Weather Concreting"

All Admixtures shall be produced by a single manufacturer, unless otherwise approved by Architect.

Materials and installed work may require testing and retesting at anytime during progress of work. Tests, including retesting of rejected materials for installed work, shall be done at Contractor's expense.

Source Quality Control: Materials are subject to inspection and tests in field, conducted by a qualified inspection agency. Such inspections and tests will not relieve contractor of responsibility for providing materials in compliance with specification requirements. Promptly remove and replace materials or components which do not comply.

Concrete Testing Service: The Owner shall engage a testing laboratory to perform material evaluation tests and to design concrete mixes.

The reinforcing steel supplier shall certify that all reinforcing steel has been manufacturer in the United States and meets the designated ASTM specifications.

Testing: As per ACI 301, Chapter 16, except as noted.

Required testing services of Sections 16.3 and 16.4 will be performed by an independent testing laboratory employed by the Owner. Testing services required in Section 16.5 shall be performed by same laboratory but at Contractor's expense.

All samples shall be taken after any addition of water at the job site is complete. When pumping or pneumatic equipment is used, samples shall be taken at discharge end. This is for both cylinders and slump tests.

Mold and cure three specimens (cylinders) in accordance with ASTM C31. Three specimens constitute a strength test. Test on cylinder at 7 days and 2 at 28 days. Acceptance of structure will be based on results of 28 day tests.

Air Content:

Determine air content of concrete for each strength test by either the pressure method (ASTM C231) or the volumetric method (ASTM C173). The "chase" air indicator shall not be used.

A minimum of one air content test shall be made in the morning and one in the afternoon. Air content tests shall be made on all concrete whether the concrete is designate as air-entrained or not.

Additional air content tests, for concrete specified as air-entrained, shall be made when any of the following conditions occur:

A change in appearance or consistency of concrete.

Possible reduction of air content due to time delays of truck and/or hot weather.

When air temperature is over 80 degrees F, check each truck load.

Inform Engineer immediately of any slump and/or air content tests that do not meet these specifications. If strength, durability or aesthetics of the structure would be impaired, that concrete shall not be used.

Concrete test reports shall contain the following information: Concrete supplier, quantity of concrete represented, location of samples taken, design strength requirement at 28 days, list of all materials and admixtures used with quantity and brand or source, actual slump, actual air content, air temperature, concrete temperature, weather, cylinder weight as received, date molded, number of days on job site, date tested, test results for 7 and 28 days, and any other information necessary to evaluate test results.

Send one copy of reports on all required laboratory testing directly to the Owner's Representative, one copy to the Contractor and one copy to the concrete supplier. A copy of all test reports shall be in Owner's Representative's office within a minimum of five (5) working days from date of test or inspection.

Verbal information on any concrete not meeting these specifications shall be communicated to the Owner's Representative immediately by phone.

Contractor's responsibility: Provide a box for storing concrete test specimens while on job; maintain temperature in the box between 60 and 80 degrees F; prevent loss of moisture from specimens in accordance with ASTM C31.

Evaluation and acceptance of Concrete: Chapter 17 and as follows: Any test results on in-place concrete conducted without prior knowledge and input of the Owner's

Representative, will not be accepted. Owner's Representative reserves the right to reject any nondestructive test results that he considers improperly calibrated or correlated.

Acceptance of Structure: Chapter 18 and as follows: If 28 day test results do not meet requirements of Section 17.2, the Engineer shall have the right to order a change in mix proportions for remaining portions of structure. he may require core test in accordance with Section 17.3.2 to be made at Contractor's expense. Any such testing shall be done by an independent testing agency acceptable to the Owner's Representative.

Testing agencies affidavit that construction is in conformance with the Drawings and specifications.

Contractor shall be responsible for construction loads and necessary supplemental support of members during construction with regard to project safety and construction damage.

Concrete floor sample panel in accordance with item 3.14.3 of ACI-89 shall be placed and maintained as a standard of quality during construction of this project.

#### PROJECT CONDITIONS

Protection of Footings Against Freezing: Cover completed work at footing level with sufficient temporary or permanent cover as required to protect footings and adjacent subgrade against possibility of freezing; maintain cover for time period as necessary.

Protect adjacent finish materials against spatter during concrete placement.

#### DELIVERY, STORAGE AND HANDLING

See ACI 301, Section 2.5.

Store reinforcement off the ground to avoid soiling by foreign materials.

### **PART 2 - PRODUCTS**

#### MATERIALS, GENERAL

Where applicable, reference is made herein to material requirements given in ACI 301.

Use manufactured materials in accordance with manufacturer's recommendations. If such recommendations differ from requirements specified herein, call to Engineer's attention before proceeding. Generally, the more stringent requirements will apply.

#### FORM MATERIALS

General: As per ACI 301, Sections 4.2 and 10.2, except as noted.

Forms for Exposed Finish Concrete: Unless otherwise indicated, construct formwork for exposed concrete surfaces with plywood, metal, metal-framed plywood faced or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sized to minimize number of joints and to conform to joint system shown on Drawings. Provide form material with sufficient thickness to withstand pressure of newly placed concrete without bow or deflection.

Plywood shall comply with U.S. Product Standard PS-1 "B-B (Concrete Form) Plywood", Class I, Exterior Grade or better, mill-oiled and edge-sealed, with each piece bearing legible inspection trademark.

Forms for Unexposed Finish Concrete: Form concrete surfaces which will be unexposed in finished structure with plywood, lumber, metal or other acceptable material. Provide lumber dressed on at least 2 edges and one side for tight fit.

Form Coatings: Provide commercial formulation form-coating compounds that will not bond with, stain, nor adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces.

Carton Forms: Waffle configuration, Jefferson-Smurfit Corporation of America or equal, double wall, laminated using water-resistant adhesive and coated with paraffin containing 10% polyethylene, sizes as indicated. Materials in sheets of 2 to 3 feet wide and 8 feet long of thickness shown on Drawings with protection board. Distributor: Redipackaging, Contact: Darrel Maples (214) 330-9286.

Form Ties: Factory-fabricated, adjustable-length, removable or snap-off metal form ties, designed to prevent form deflection and to prevent spalling concrete upon removal. Provide units which will leave no metal closer than 1-1/2" to surface.

Provide ties which, when removed, will leave holes not larger than 1" diameter in concrete surface.

## REINFORCING MATERIALS

Reinforcement: As per ACI 301, Section 5.2, with Selections and Supplements as follows:

Reinforcing Bars: ASTM A 615-87, Grade 60, deformed.

Steel Wire: ASTM A 82-85, plain, cold-drawn steel.

Welded Wire Fabric: ASTM A 185-85, for plain wire, welded steel wire fabric.

Supports for Reinforcement: Provide bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Use wire bar type supports complying with CRSI specifications.

For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs.

For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs which are plastic protected (CRSI, Class 1) or stainless steel protected (CRSI, Class 2).

Slab Bolsters: For support of all reinforcement over carton forms.

## CONCRETE MATERIALS

General:

Cements, admixtures, water and aggregates shall conform to ACI 301, Chapter 2, with selections and supplements as specified herein.

Cements: All cements used shall be Portland Cements conforming to ASTM C150, Type I or III, unless otherwise acceptable to Architect. Types 1A and 1P and fly ash are not acceptable. Use one brand of cement throughout project.

Normal Weight Aggregates: ASTM C 33-86, and as specified. Provide aggregates from a single source for exposed concrete.

For exterior exposed surfaces, do not use fine or coarse aggregates containing spalling-causing deleterious substances.

Local aggregates not complying with ASTM C33 but which have shown by special test or actual service to produce concrete of adequate strength and durability may be used when acceptable to the Architect.

Water: Drinkable.

Air-Entraining Admixture: ASTM C 260-86, certified by manufacturer to be compatible with other required admixtures. Allowable admixture shall be a Vinsol Resin.

Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:

"Air-Mix"; Euclid Chemical Co.

"MB-AE 90"; Master Builders.

Approved Equal

Water-Reducing Admixture: ASTM C 494-86, Type A, and containing not more than 0.1 percent chloride ions.

Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:

"Pozzolith Normal" Master Builders

"Polyheed"; Master Builders

"Plastocrete 160"; Sika Chemical Corp

"Chemtard"; Chem-Masters Corp

Approved Equal

High-range, water-reducing admixture (super plasticizer) conforming to ASTM C494, Type F or G. Free of chlorides and alkalines, batch plant added, providing a minimum of 20 percent water reduction. Slump shall not exceed 9 inches.

Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:

"Rheobuild"; Master Builders

"Sikament 300", Sika Corporation

Approved Equal

Freeze Protection Admixture: At the contractor's option, a water-reducing, non-chloride accelerating admixture conforming to ASTM C-494, Type E containing not more than 0.1% chloride ions, specially formulated to provide concrete protection from freezing to as low as 20 degrees F., may be used.

Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:

"Pozzutec 20"; Master Builders

"Accelguard 80", Euclid Chemicals Company

Approved Equal

Prohibited Admixtures: Calcium chloride thyocyanates or admixtures containing more than 0.1 percent chloride ions by weight of cement are not permitted.

#### RELATED MATERIALS

Granular Base: Evenly graded mixture of fine and coarse aggregates to provide, when compacted, a smooth and even surface below slabs on grade.

Non-Shrink Grout: CRD-C 621, Factory Pre-Mixed Grout

Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:

"Set Grout"; Master Builders.

"Euco-NS"; Euclid Chemical Co.

"Sika Grout 212", Sika Corporation

"Sono Grout 14K", Sonneborn

Vapor Retarder: Provide vapor retarder cover over prepared base material where indicated below slabs on grade. Use only materials which are resistant to decay when tested in accordance with ASTM E 154, as follows:

Polyethylene sheet not less than 15 mils thick.

Curing Materials:

General: As per ACI 301, Sections 12.1 and 12.2, with selections and supplements as specified herein.

Moisture Retaining Cover: One of the following, complying with ASTM C-171.

Waterproof Paper

4 mil (.004") Polyethylene Film

White Polyethylene-Coated Burlap

Liquid Membrane-Forming Curing Compound: Liquid type, membrane-forming curing compound complying with ASTM C 309, Type I Class A. Moisture loss not more than 0.055 gr./sq. c.m. when applied at 200 sq. ft./gal.

Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following.

Exposed Flooring: Two (2) coats of one of the following liquid membrane-forming curing compounds:

"Kure-N-Seal", Sonneborn

"Spray Cure and Seal 15", Spray-Cure.

"Eucocure", Euclid Chemicals.

Concrete to be covered with coating material, such as floor hardener, flooring (carpet, tile), painting, or other finish materials. Contractor to verify compatibility with adhesive manufacturer.

"Kure-N-Seal", Sonneborn-Rexnord.

"Spray Cure and Seal 15", Spray-Cure.

"Eucocure", Euclid Chemicals.

Bonding Compound: Polyvinyl acetate (interior only) or acrylic base.

Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:

Sonocrete; Sonneborn-Contech

"Euco Weld", Euclid Chemicals

"Weld-Crete", Larsen Products Corporation

"Polyweld", Chem-Masters Corporation

"Daraweld"; W.R. Grace

"Everbond"; L & M Construction Chemicals

Epoxy Adhesive: ASTM C 881, two component material suitable for use on dry or damp surfaces. Provide material "Type", "Grade", and "Class" to suit project requirements.

Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:

"Sikadur 32-Hi-Mod", Sika Chemical Corporation

"Concresive LPL", Master Builders

Euco Epoxy System #452 or #620", Euclid Chemical Company

Waterstops: Provide flat, dumbbell type or centerbulb type waterstops at construction joints and other joints as indicated, sized to suit joints, either rubber, Corps of Engineers (CE) CRD-C 513, or polyvinyl chloride (PVC), CE CDR-C, 572.

Sealing Materials: For laps in sheet covering, provide pressure sensitive tape, nonstaining mastic, or other effective adhesive recommended by covering manufacturer.

Finishing Aid: Sprayable material designed to form a monomolecular film on fresh plastic concrete, and to retard moisture evaporation prior to finishing; such as Confilm of Master Builders Company.

## PROPORTIONING AND DESIGN OF MIXES

General: As per ACI 301, Chapter 3, except as noted.

Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. If trial batch method used, use an independent testing facility acceptable to Architect for preparing and reporting proposed mix designs. The testing facility shall not be the same as used for field quality control testing.

Submit written reports to Owner's Representative of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until mixes have been reviewed by and acceptable to the Owner's Representative. No concrete shall be placed until the mixes have been approved in writing by the Owner's Representative.

All concrete shall be normal weight to concrete, 145 pcf, except where otherwise specified and all concrete shall have minimum slump of 4" unless noted otherwise.

Maximum permissible water cement ratio by weight including free surface moisture on aggregate and liquid admixtures shall be as follows:

Non Air-Entrained Concrete

3000 PSI - 0.60

4000 PSI - 0.55

Air-Entrained Concrete

## CAST-IN-PLACE CONCRETE

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3000 PSI - 0.50

4000 PSI - 0.45

Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant; at no additional cost to Owner and as accepted by Architect. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Architect before using in work.

Concrete Quality: Delete Section 3.14 ACI 301 and accompanying tables from this specification. See notes on Structural Drawings for compressive strength, cement content, and other quality requirements for various areas.

Use of Admixtures:

All concrete shall contain the specified water-reducing admixture. Concrete slabs placed at temperatures below 50 degrees F. shall contain an accelerator. When increase workability or pumpability, lower water-cement ratio and higher ultimate and/or initial strength are required, superplasticizer may be used.

When more than one admixture is used in a concrete mix, they shall be of the same manufacturer.

Use air-entraining admixture in all exterior exposed concrete, unless otherwise indicated. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having total air content of 6% with a tolerance of plus-or-minus 1 percent.

Use admixtures for water-reducing and set-control in strict compliance with manufacturer's directions.

Minimum Cement Factor: Provide concrete for following conditions with minimum cement factor as follows:

Subjected to freezing and thawing; 564 pounds per cubic yard.

Concrete containing superplasticizer shall have a maximum slump of 8" after the addition of superplasticizer at the truck, unless otherwise directed by the Owner's Representative. This concrete shall arrive at the job site having slump between 2" and 3", to be verified, and then the superplasticizer added to reach approved slump level.

Selection of Proportions

Proportions for all classes of concrete shall be selected by one of the methods described in Sections 3.9 and 3.10 of ACI 301. Mixes must be approved by the Owner's Representative before use on the job. No deviations from the approved mixes will be permitted without the Owner's Representative prior approval.

Mix designs proportioned on the basis of previous field experience or trial mixtures (Section 3.9) shall be prepared by an independent testing laboratory within the past 12 months.

For computation of standard deviation referred to in Section 3.9.1.1 of ACI 301, show data in tabular form.

## CONCRETE PRODUCTION

General: As per ACI 301, Chapter 7, except as noted.

Ready-Mixed Concrete: Use for all work, except that when small quantities (not over 1/2 cu yd) are needed for isolated or relatively unimportant items, concrete may be batch mixed at site, subject to Owner's Representative prior approval.

Delivery Ticket: In addition to information required on the delivery ticket in ASTM C 94, the following data regarding water, expressed in gal./cu. yd., shall be shown on the delivery ticket or on an attached batch ticket for each truckload of concrete:

Mix design water requirement

Free water in aggregate

Water added at plant

## CAST-IN-PLACE CONCRETE

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Permissible water to add at job site.

Mixing Time: Concrete which has attained its initial set or as contained water for longer than listed below, shall not be deposited in the work.

<u>Concrete Temperature at Time of Placement, Degrees Maximum Time Before Placement,</u>	
<u>Hour</u>	
Under 80	1-1/2
80 to 85	1-1/4
86 to 90	1
Over 90	1, with Architect's approval dependent on
slump and	use

#### FABRICATING REINFORCEMENT

General: As per ACI 301, Sections 5.3 and 5.4, except as follows:

No welding of reinforcing bars will be permitted without approval of the Architect.

### **PART 3 - EXECUTION**

#### GENERAL

General: As per ACI 301, Chapter 4, except as noted.

Coordinate the installation of joint materials and vapor barriers with placement of forms and reinforcing steel.

#### FORMS

Design, erect, support, brace, and maintain formwork to support vertical and lateral, static, and dynamic loads that might be applied until such loads can be supported by concrete structure. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position. Maintain formwork construction complying with ACI 117.

Design formwork to be readily removable without impact, shock, or damage to cast-in-place concrete surfaces and adjacent materials.

Construct forms to sizes, shapes, lines, and dimensions shown, and to obtain accurate alignment, location, grades, level and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in work. Use selected materials to obtain required finishes. Solidly butt joints and provide back-up at joints to prevent leakage of cement paste.

Carton Forms:

Forms to be assembled and placed in accordance with manufacturer's directions.

Sequence of construction over cardboard carton forms is of utmost importance. The carton form base of sand must be level and compacted to provide a stable base for the forms.

Forms must not be placed if rain is expected within the next several days. The reinforcing mat should follow so that a given section of slab can be formed, reinforcing laid and slab poured in the shortest time possible.

It is critical that these forms are protected from moisture. A dewatering under slab trench system should be installed to allow any surface water a route out from under the slab and cardboard forms, in the event the pour/project is subject to a rain storm. If Forms are water soaked after installation, they must be allowed adequate time to dry before concrete is placed over them.

If water has destroyed the structural integrity of the forms and they are unable to withstand the concrete slab load, the forms **must be removed and replaced**.

All forms are to be supported with temporary shoring so as to resist any lateral movement which may result in the forms being crushed when the concrete is placed.



An accurate record of the required concrete quantity must be maintained to assure that no concrete has crushed the forms and has filled the resulting cavity.

The top protective board shall be installed perpendicular to the form sheets and nailed down as per the manufacturer's written instructions.

It will be the concrete subcontractor's responsibility to inspect the forms prior to concrete placement and to assure all voids, cracks, seams, pipe and electrical penetrations have been adequately sealed so that no concrete can flow into the void below.

Reinforcing steel to be supported from forms should be carried on slab bolsters with runners to prevent puncture of forms and consequent displacement of steel.

Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like, to prevent swelling and for easy removal.

Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Securely brace temporary openings and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings on forms at inconspicuous locations.

Chamfer exposed corners and edges as indicated, using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.

Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses, and chases from trades providing such items. Accurately place and securely support items built into forms.

Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before concrete is placed. Retightening forms and bracing after concrete placement is required to eliminate mortar leaks and maintain proper alignment.

#### VAPOR BARRIER INSTALLATION

Following leveling and tamping of granular base for slabs on grade, place vapor barrier sheeting with longest dimension parallel with direction of pour.

Lap joints 6" and seal with appropriate tape.

After placement of moisture barrier, cover with granular material and compact to depth as shown on drawings.

#### PLACING REINFORCEMENT

General: As per ACI 301, Sections 5.4 and 5.5, except as noted:

Comply with Concrete Reinforcing Steel Institute's recommended practice for "placing reinforcing bars", for details and methods of reinforcement placement and supports, and as herein specified.

Avoiding cutting or puncturing vapor barrier during reinforcement placement and concreting operations.

Clean reinforcement of loose rust and mill scale, earth, ice, and other materials which reduce or destroy bond with concrete.

Accurately position, support, and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as required.

Place reinforcement to obtain at least minimum coverages for concrete protection. Arrange space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire tie so ends are directed into concrete, not toward exposed concrete surfaces.

Install welded wire fabric in sheets. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset end laps in adjacent widths to prevent continuous laps in either directions.

#### JOINTS

General: As per ACI 301, Chapter 6, with joint locations as noted:

Construction Joints: Locate and install construction joints as indicated or, if not indicated, locate so as not to impair strength and appearance of the structure, as acceptable to Architect.

Provide keyways at least 1-1/2" deep in construction joints in walls, slabs, and between walls and footings: accepted bulkheads designed for this purpose may be used for slabs.

Place contraction joints perpendicular to main reinforcement. Continue reinforcement across construction joints, except as otherwise indicated.

Construction joints shall be spaced at a maximum of 125 feet at all footings.

Isolation Joints in slabs-on-ground: Construct isolation joints in slabs-on-ground at points of contact between slabs-on-ground and vertical surfaces, such as column pedestals, foundation walls, grade beams, and elsewhere as indicated.

Joint filler and sealant materials are specified in Division 7 Sections of these Specifications.

Contraction (Control) Joints in Slabs-on-Ground: Construct contraction joints in slabs-on-ground to form panels of patterns as shown. Use saw cuts 1/8" x 1/3 slab depth or inserts 1/4" wide x 1/3 of slab depth, unless otherwise indicated.

Form contraction joints by inserting premolded plastic, hardboard or fiberboard strip into fresh concrete until top surface of strip is flush with slab surface of strip is flush with slab surface. Tool slab edges round on each side of insert. After concrete has cured, remove inserts and clean groove of loose debris.

Contraction Joints in unexposed floor slabs may be formed by saw cuts as soon as possible after slab finishing as may be safely done without dislodging aggregate.

If joint pattern is not shown, provide joints not exceeding 15' in either direction and located to conform to bay spacing wherever possible (at column centerlines, half bays, third-bays).

Joint sealant material is specified in Division 7 Sections of these Specifications.

#### INSTALLATION OF EMBEDDED ITEMS

General: It is this Contractor's responsibility to coordinate with all trades for the setting of the sleeves, anchors, dovetail slots, inserts, frames, flashing reglets, and other embedded items and provide all openings required for the installation of other work in accordance with the Contractor's shop drawings and certified prints.

Structural Integrity: Provide no sleeves or openings in structural concrete unless shown on the structural drawings or approved by the Architect.

Edge Form and Screed Strips for Slabs: Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in finished slab surface. Provide and secure units sufficiently strong to support types of screed strips by use of strike-off templates or accepted compacting type screeds.

#### PREPARATION OF FORM SURFACES

Clean reused forms of concrete matrix residue, repair and patch as required to return forms to acceptable surface condition.

Coat contact surfaces of forms with a form-coating compound before reinforcement is placed.

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

#### CONCRETE PLACEMENT

General: As per ACI 301, Chapter 8, except as noted.

Preplacement Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast-in. Notify other crafts to permit installation of their work; cooperate with other trades in setting such work. Moisten wood forms immediately before placing concrete where form coatings are not used.

Apply temporary protective covering to lower two feet of finished walls adjacent to poured floor slabs and similar conditions, and guard against spattering during placement.

Placing: No concrete shall be placed except when Architect or independent testing laboratory representative is present, unless this requirement is specifically waived by the Architect. Give adequate notice to the Architect, the testing laboratory, and all contractors affected before placing concrete. Allow adequate time for installation of all necessary parts.

General: Comply with ACI 304 R-85 "Guide for Measuring, Mixing, Transporting, and Placing Concrete", and as herein specified.

Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete as nearly as practicable to its final location to avoid segregation.

Placing Concrete in Forms: Deposit concrete in forms in horizontal layers not deeper than 24" and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.

Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete in accordance with ACI 309(R-87).

Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Place vibrators to rapidly penetrate placed layer and at least 6" into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix.

Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed.

Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.

Bring slab surfaces to correct level with straightedge and strikeoff. Use bull floats or darbies to smooth surface, free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.

Maintain reinforcing in proper position during concrete placement operations.

Cold Weather Placing: Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with ACI 306 R-88 (new specification) and as specified.

When air temperature has fallen to or is expected to fall below 40 deg F (4 deg. C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg. F (10 deg. C), and not more than 80 deg F (27 deg C) at point of placement.

Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

Do not use calcium chloride, salt, and other materials containing antifreeze agents or chemical accelerators, unless otherwise accepted in mix designs.

Water-reducing, non-chloride accelerator admixture may be allowable only with prior approval by Architect.

Hot Weather Placing: When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACI 305 R-72 (88) and as herein specified.

Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 degrees Fahrenheit. Mixing water may be chilled, or chopped ice may be used to control temperature provided water.

Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedment

in concrete. Fog spray forms, reinforcing steel and subgrade just before concrete is placed.

#### REPAIR OF SURFACE DEFECTS

General: As per ACI 301, Chapter 9, except that concealed concrete surfaces not exposed to view upon completion, may be patched with nonshrink mortar in lieu of ACI specified mortar.

#### FINISH OF FORMED SURFACES

General: As per ACI 301, Chapter 10, with sections as follows:

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

Smooth Form Finish: For formed concrete surfaces exposed-to-view, or that are to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, painting, or other similar system. This is as-cast concrete surface obtained with selected form facing material, arranged orderly and symmetrically with a minimum of seams. Repair and patch defective areas with fins or other projections completely removed and smoothed.

Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

#### MONOLITHIC SLAB FINISHES

General: Finish concrete floor surfaces in accordance with ACI 301.

Examination:

Verify that all floor surfaces are ready to receive Work.

Starting Work constitutes acceptance of the existing conditions and this Contractor shall then, at their expense, be responsible for correcting all unsatisfactory and defective Work encountered.

Initial Working:

Remove surface irregularities with bull float before water appears on concrete surface.

Do no further working of the surface until time for floating; do not work surface while water is present.

"Dry Sprinkle" method finishing is not acceptable and will be cause for rejection.

Scratch Finish: Apply scratch finish to monolithic slab surfaces that are to receive concrete floor topping or mortar setting beds for tile, portland cement terrazzo, and other bonded applied cementitious finish flooring material, and as otherwise indicated.

After placing slabs, plane surface to tolerances for floor flatness (FF) of 15 and floor levelness (FL) of 13. Slope surfaces uniformly to drains where required. After leveling, roughen surface before final set, with stiff brushes, brooms, or rakes.

Float Finish: Apply float finish to monolithic slab surface to receive trowel finish and other finishes as hereinafter specified, and slab surfaces which are to be covered with membrane or elastic waterproofing, membrane or elastic roofing, or sand-bed terrazzo, and as otherwise indicated.

After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating when surface water has disappeared or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Walking on surface shall not leave heel prints more than 1/4 inch deep. Consolidate surface with power-driven floats, or by hand-floating if area is small or inaccessible to power units. Check and level surface plane to tolerances of FF 18 - FL 15. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.

Trowel Finish: Apply trowel finish to monolithic slab surfaces to be exposed-to-view, and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint, or other thin film finish coating, system.

After floating, begin first trowel finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and with surface leveled to tolerances of FF 20 - FL 17. Grind smooth surface defects which would telegraph through applied floor covering system.

Trowel and Fine Broom Finish: Where ceramic or quarry tile is to be installed with thin-set mortar, apply trowel finish as specified, then immediately follow with slightly scarifying surface by fine brooming.

Non-Slip Broom Finish: Apply non-slip broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.

Immediately after float finishing, slightly roughen concrete surface by brooming with fiber bristle broom perpendicular to main traffic route. Coordinate required final finish with Owner's Representative before application.

#### CONCRETE CURING AND PROTECTION

General: As per ACI 301, Chapter 12, except as noted. Requirements for curing and protection specified in ACI 301 shall be strictly observed, with particular emphasis on the following:

Initial curing may be accomplished by any of the methods given in ACI 301, Section 12.2, except as noted, using materials specified herein.

Maintain initial curing for approximately 12 hours after finishing. Increase this period to 24 hours when air temperature is 75 degrees F and above.

Total curing period shall consist of 7 cumulative days, (3 days for high-early strength concrete) not necessarily consecutive, during which air in contact with concrete is above 50 degrees F.

For formed surfaces, keep wood forms in contact with concrete wet, as well as steel forms heated by the sun. After form removal, maintain curing for any time remaining of required curing period.

General: Protect freshly place concrete from premature drying and excessive cold or hot temperatures.

Warm, Dry or Windy Weather: Use finishing aid specified herein to reduce moisture evaporation from freshly placed concrete when it is exposed to rapid dry conditions: direct sunlight, low humidity, heated interior, high wind, etc. Prepare dilute solution and spray apply on rate of 10 to 20 gallons solution/5000 sq. ft. if drying conditions are particularly severe, make additional applications as required following various finishing steps.

Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 7 days.

Begin final curing procedures immediately following initial curing and before concrete has dried. Continue final curing for at least 7 days in accordance with ACI 301 procedures. Avoid rapid drying at end of final curing period.

Curing Methods: Perform curing of concrete by curing and sealing compound, by moist curing, by moisture-retaining cover curing, or by combinations thereof, as specified.

Provide curing and sealing compound to interior slabs and to exterior slabs, walks, and curbs, as follows:

Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours). Apply uniformly in continuous operation by power-spray or roller in accordance with manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.

Reflective Materials: During hot sunny weather (generally 75 degrees F. and above) use of white or light colored curing materials is recommended to help keep down concrete surface temperature. White or gray pigmented curing compound shall not be used when determined by the Architect to be objectionable.

Do not use membrane curing compounds on surfaces which are to be covered with coating material applied directly to concrete, liquid chemical floor hardener, waterproofing, dampproofing, membrane roofing, flooring (such as ceramic or quarry tile, glue-down carpet), painting, and other coatings and finish materials, unless otherwise acceptable to Architect.

Membrane curing compounds may be used where flooring (i.e., carpet, tile) is scheduled upon verifying compatibility with adhesive manufacturer.

Where membrane curing and sealing compound is not permitted, Contractor shall provide moisture curing by the following method:

Cover concrete surfaces with moisture-retaining cover for curing concrete placed in widest practicable width with sides and ends lapped at least three inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

Curing Formed Surfaces: Cure formed concrete surfaces, including undersides of beams, supported slabs, and other similar surfaces by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.

Curing Unformed Surface: Cure unformed surfaces, such as slabs, floor topping, and other flat surfaces by application of appropriate curing method.

Final cure concrete surfaces to receive finish flooring by use of moisture retaining cover, unless specified otherwise.

Sealer and Dustproofer: Apply a second coat of specified curing and sealing compound only to surfaces given a first coat.

#### REMOVAL OF FORMS

Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form removal operations, and provided curing and protection operations are maintained.

Formwork supporting weight of concrete, such as beam soffits, joists, slabs, and other structural elements, may not be removed in less than 14 days and until concrete has attained design minimum compressive strength at 28 days. Determine potential compressive strength of in-place concrete by testing field-cured specimens representative of concrete location or members.

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

#### RE-USE OF FORMS

Clean and repair surfaces of forms to be reused in work. Split, frayed, delaminated, or otherwise damaged form facing material will not be acceptable for exposed surfaces. Apply new form coating compound as specified for new formwork.

When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use "patched" forms for exposed concrete surfaces, except as acceptable to Architect.

#### MISCELLANEOUS CONCRETE ITEMS

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

Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

Equipment Bases and Foundations: Provide machine and equipment bases and foundations, as shown on drawings. Set anchor bolts for machines and equipment to template at correct elevations, complying with certified diagrams or templates of manufacturer furnishing machines and equipment.

Grout base plates and foundations as indicated, using specified non-shrink grout. Use non-metallic grout for exposed conditions, unless otherwise indicated.

#### CONCRETE SURFACE REPAIRS

Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removal of forms, when acceptable to Architect.

Cut out honeycomb, rock pockets, voids over 1/4" in any dimension, and holes left by tie rods and bolts, down to solid concrete but, in no case to a depth of less than 1". Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush-coat the area to be patched with specified bonding agent. Place patching mortar after bonding compound has dried.

For exposed-to-view surfaces, blend white portland cement and standard portland cement so that, when dry, patching mortar will match color surrounding. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.

Repair of Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to the satisfaction of Architect. Surface defects, as such, include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets; fins and other projections on surface; and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes, fill with dry pack mortar, or precast cement cone plugs secured in place with bonding agent.

Correct high areas in uniformed surfaces by grinding, after concrete has cured at least 14 days.

Correct low areas in uniformed surfaces during or immediately after completion of surface finishing operations by cutting out low areas and replacing with fresh concrete. Finish repaired areas to blend into adjacent concrete. Proprietary patching compounds may be used when acceptable to Architect.

Repair methods not specified above may be used, subject to acceptance of Architect.

#### END OF SECTION





## **SECTION 04100 MORTAR**

### **PART 1 -GENERALSUMMARY**

#### Related sections:

Section 04150: Masonry Accessories.

Section 04220: Concrete Unit Masonry.

#### REFERENCES: Standards of the following are referenced:

American Society for Testing and Materials (ASTM).

Portland Cement Association (PCA).

#### DEFINITIONS: Terms:

AMU: Architectural unit masonry.

CMU: Concrete unit masonry or concrete masonry unit.

#### SUMITTALS:

Product data: Submit manufacturer's product specifications and mixing and installation instructions for each manufactured product.

Samples: Submit actual mortal samples for colored mortar; indicate color range of each color selected.

#### DELIVERY, STORAGE, AND HANDLING:

Packing and shipping: Provide bagged materials in original unopened packages or containers with manufacturer's labels intact and legible.

Acceptance at site: Punctured or wet bagged materials will not be accepted; immediately remove from site.

Storage and protection: Store materials under cover and off ground away from damp surfaces; remove wet or deteriorated bagged materials.

#### QUALITY ASSURANCE:

##### Qualifications:

Use only one brand of cement for each type specified throughout Project.

Provide sand for all Work from single source and pit, consistent in color.

### **PART 2 –PRODUCTS and MATERIALS**

#### Portland cement:

Meeting ASTM C150-86, natural color, domestic manufacturer.

Normal weather and conditions: Type 1.

Cold weather: Type III or Type IIIA.

Hydrated lime: Meeting ASTM C207-79, Type S.

#### Masonry cement:

##### Acceptable manufacturers:

Blue Circle, Inc.

Giant Cement Company

U.S. Cement Company

##### Characteristics:

Meeting ASTM C91-87a, non-staining, 22% maximum air content by volume.

##### Color:

AMU: To match Architect's selection.

Normal CMU: Natural, similar to Giant Cement Company; Giant Dark Gray.

#### Aggregate:

Mortar: Clean, hard, natural, washed sand meeting ASTM C144084 and ASTM C404-85, Size No. 2, Natural.

Cement grout: Meeting ASTM C404-85, fine aggregate, Size No. 1.

Prepackaged color admixture for AMU Work: Submit standard color for architect's selection; made available for purchase from AMU manufacturer.

Integral water repellent mortar additive for exterior CMU and AMU Work: Compatible with integral system in CMU and AMU; made available for purchase from CMU and AMU manufacturers. MORTAR TO BE MIXED WITH "ACME SHIELD" INTEGRAL WATER REPELLENT ADMIXTURE and integral color as used in the manufacture of the CMU's

Nonshrink grout: Mix prepared nonshrink grout product with water as directed by manufacturer's product data to achieve a minimum compressive strength of 7000 psi at 28 days.

Water: Clean, potable, free from deleterious amounts of alkalies, acids, and organic materials.

## MIXES

Mortar proportions:

Type "S" job mixed or bag mixed mortar:

Proportion materials by volume in accord with ASTM C270-87a OR;  
One part Portland cement and over  $\frac{1}{4}$  to  $\frac{1}{2}$  parts Type "S" hydrated lime to aggregate proportioned at not less than 2-1/4 nor more than three times combined volume of cement and lime used OR;

$\frac{1}{2}$  part Portland cement to one part Type N masonry cement to aggregate proportioned at not less than 2-1/4 nor more than three times volumes of cementitious materials used OR;

One part Type S premixed masonry cement to aggregate proportioned at not less than 2-1/4 nor more than three times volumes of cementitious materials used.

Type "N" job mixed or bag mixed mortar:

Proportion materials by volume in accord with ASTM C270-87a OR;  
One part Portland cement and over  $\frac{1}{2}$  to 1-1/4 parts hydrated lime to aggregate proportioned at not less than 2-1/4 nor more than three times combined volume of cement and lime used OR;

One part Type N premixed masonry cement to aggregate proportioned at not less than 2-1/4 nor more than three times volumes of cementitious materials used.

Grout proportions:

Fine grout: Proportion materials by volume in accord with ASTM C476-83 at one part Portland cement to 0.0 to 1/10 part hydrated lime to fine aggregate proportioned at not less than 2-1/4 nor more than three times sum of volumes of cement and lime used.

Course grout: Proportion materials by volume in accord with ASTM C476-83 at one part Portland cement and 0.0 to 1/10 part lime to coarse aggregate proportioned at not less than one nor more than two times sum of volumes of cement and lime used and slump measured according to ASTM C143-78 of 8".

Mixing:

Mix mortar and cement grout in power driven mixers. Operate mixer minimum of five minutes after addition of all materials.

Job mixed CMU and AMU mortars: Add water repellent mortar additive in accord with admixture manufacturer's product data.  
Addition of other admixtures including anti-freeze ingredients are prohibited.  
Measure materials for job mixed mortars in containers with known volume; measurement by shovels is prohibited.

Masonry/Mortar combination:

CMU: Type "S"; exterior units with water repellent additive.

AMU masonry:

Veneer construction: Type "N", colored mortar to match AMU.

Load bearing walls: Type "S", colored mortar to match AMU.

### PART 3 –EXECUTION

#### INSTALLATION:

General:

Place mortar under Concrete Unit Masonry and Architectural Unit Masonry (Brick) sections.

Use masonry/mortar combination indicated above.

Use pan type mortar boards where colored mortar is required.

Retemper mortar as necessary to keep plastic; retempering AMU matched mortar is prohibited.

Use of mortar after setting has begun or after 2-1/2 hours has elapsed since initial mixing is prohibited.

Grouts: Placement specified in other sections.

**END OF SECTION**



SECTION 04150  
MASONRY ACCESSORIES

PART 1 –GENERAL

SUMMARY

Related Sections:

Section 04100: Mortar.  
Section 04210: Brick.  
Section 04220: Concrete Unit Masonry.  
Section 07600: Flashing and Sheet metal.  
Section 07650: Flexible Flashing.

REFERENCES:

Standards of the following as referenced:  
American Concrete Institute (ACI).  
American Society for Testing and Materials (ASTM).

SUBMITTALS:

Product data:

Submit complete list of products for use; indicate compliance with specified requirements.  
Indicate manufacturer, product, and correlation to specified item if from other manufacturer than specified item.  
Intent to use specified products does not relieve responsibility of submitting product line.

PART 2 –PRODUCTS

MANUFACTURERS:

Acceptable manufacturers:

Products specified as standard of quality are manufactured by Dur-O-Wal, Inc.  
Products of the following manufacturers similar in type and quality are acceptable, subject to compliance with specified requirements.  
AA Wired Products Company.  
Heckmann building Products, Inc.  
Hohmann & Barnard, Inc.  
Masonry Reinforcing Corp. of America.  
National Wire Products Corp.

MANUFACTURED UNITS:

Masonry joint reinforcement:

Fabricate from cold drawn wire meeting ASTM A82-85.  
Galvanize all items in accord with ASTM A153-82, Class B-2.  
Longitudinal rods: Nine gauge deformed wires.  
Cross wires: Nine gauge deformed wires.

Type:

At single wythe masonry: Truss type.  
At double wythe masonry: Ladder type with three longitudinal rods.  
At double wythe masonry where veneer coursing does not align with coursing of masonry back-up: Ladder type with adjustable box ties.

Reinforcement width: 2" less than total wall width.

Provide reinforcement in 10'-0" lengths with prefabricated "L" and "T" units at intersecting walls of same design and finish as joint reinforcement.

Column or beam anchors, select from either type:

Type: Channel slots and anchors.

Slots: Dur-O-Wal, Inc.; D/A 904; 16 gauge steel; galvanize in accord with ASTM A153-82, Class B-2; fasteners type recommended by manufacturer for substrate face and embed 2" minimum in bed joints.

Anchors: Dur-O-Wal, Inc.; D/A 918-921; 3/16" wire; galvanize in accord with ASTM A153-82, Class B-2, minimum; length required to attach to substrate face and embed 2" minimum in bed joints.

Adjustable weld-on anchors and flexible ties:

Type: Two piece anchor and tie

Anchor: Dur-O-Wal, Inc.; D/A 710; 1/4" dia., steel meeting ASTM A82-85; galvanize in accord with ASTM A153-82, Class B-2, minimum; for weld-on attachment to structural column, 9" long with 4" vertical adjustment.

Triangular tie: Dur-O-Wal, Inc.; D/A 709-711; 3/16" dia., steel meeting ASTM A82-85; galvanize in accord with ASTM A153-82, Class B-2, minimum; sizes required for conditions encountered.

Provide code required lateral restraint while permitting horizontal and vertical movement in system.

Reinforcement bar positioners:

Horizontal bars: Dur-O-Wal D/A 811; nine gauge basic brite finish steel wire meeting ASTM A82-85.

Vertical bars: Dur-O-Wal D/A 810; nine gauge basic brite finish steel wire meeting ASTM A82-85.

Extruded control joints: Dur-O-Wal D/A 2000 Series: extruded natural or synthetic rubber, meeting ASTM D2000-80, Type 2AA-805, 80 durometer hardness.

Mesh hardware cloth: Dur-O-Wal, Inc.: Dur-O-Stop: monofilament corrosion resistant screen; width 2" less than wall width.

### PART 3 –EXECUTION

#### INSTALLATION

General: Install accessories in accord with manufacturer's product data.

Masonry joint reinforcement:

Install in single wythe and double wythe masonry walls at 1'-4" o.c. vertically unless otherwise indicated on drawings. Lap side rods 6" minimum at splices.

Fully embed longitudinal rods in mortar for entire length with 5/8" minimum cover on exterior wall side and 1/2" minimum cover at other locations.

Stop reinforcement 1" back from expansion and control joints and openings in masonry walls.

Masonry openings over 1'-0" wide: Install reinforcement in first and second bed joint above and under openings with non-continuous reinforcement; extend 2'-0" beyond jamb, each side; bridge control joints.

Build prefabricated "L" and "T" sections to provide continuity at corners and intersections. Cut and bend units as indicated in manufacturer's offsets, pipe enclosures, and special conditions.

Parapets: Space reinforcing at 8" O.C. vertically, unless otherwise indicated.

Column or beam anchors:

Channel slots and anchors: Fasten to steel column's or beam's flange at 1'-4" O.C. vertically at columns; horizontally at beams.

Weld-on anchors: Weld to steel columns or beam's flange at 1'-4" O.C. vertically at columns; horizontally at beams. Wire brush clean; paint welded areas at column or beam and anchor with zinc and rich primer.

Install triangular ties at anchors; set in mortar bed.

Reinforcement bar positioners:

Vertical type: Install in accord with ACE Committee 530 Code recommendations.

Horizontal type: Install in U-block or lintel block in accord with code requirements.

Rubber control joints: Install in concrete Unit Masonry and Architectural Unit Masonry sections; locate rubber control joints in unit masonry construction as required.

Mesh hardware cloth: Install in bed joints of unit masonry as required to prevent migration of grout.





## **SECTION 04200**

### **UNIT MASONRY**

#### **PART 1 - GENERAL**

##### **RELATED DOCUMENTS**

Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

**DESCRIPTION OF WORK:** The work of this Section includes, but is not necessarily limited to, furnishing and installing the following:

Extent of each type of masonry work is indicated on Drawings.

Types of masonry work required include:

Standard Concrete Masonry Units.

Special Masonry Shapes.

Required Masonry Anchors.

##### **QUALITY ASSURANCE**

**Unit Masonry Standard:** Comply with ACI 530.1/ASCE 6, "Specifications for Masonry Structures", except as otherwise indicated.

Revise ACI 530.1/ASCE 6 to exclude Sections 1.4 and 1.7; Parts 2.1.2, 3.1.2, and 4.1.2; and Articles 1.5.1.2, 1.5.1.3, 2.1.1.1, 2.1.1.2, and 2.3.3.9 and to modify Article 2.1.1.4 by deleting requirement for installing vent pipes and conduits built into masonry.

**Fire Performance Characteristics:** Where indicated, provide materials and construction which are identical to those of assemblies whose fire endurance has been determined by testing in compliance with ASTM E 119 by a recognized testing and inspecting organization or by another means, as acceptable to authority having jurisdiction.

**Single Source Responsibility for Masonry Units:** Obtain exposed masonry units of uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from one manufacturer for each different product required for each continuous surface or visually related surfaces.

**Single Source Responsibility for Mortar Materials:** Obtain mortar ingredients of uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source and producer for each aggregate.

##### **SUBMITTALS**

**Product Data:** Submit manufacturer's product data for each type of masonry unit, accessory, and other manufactured products, including certifications that each type complies with specified requirements.

For information only, submit copies of referenced standards utilized for this project unless duplicated in product data.

**Samples for Verification Purposes:** Submit samples of unit masonry of each type and shape of exposed unit required. Include in each set, the full range of exposed color and texture.

##### **DELIVERY, STORAGE, AND HANDLING**

Deliver masonry materials to project in undamaged condition.

Store and handle masonry units to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion or other causes.

Limit moisture absorption of concrete masonry units during delivery and until time of installation to the maximum percentage specified for Type I units for the average annual relative humidity as reported by the U.S. Weather Bureau Station nearest project site.

Store cementitious materials off the ground, under cover and in dry location.

Store aggregates where grading and other required characteristics can be maintained.

Store masonry accessories, including metal items, to prevent deterioration by corrosion and accumulation of dirt.

#### PROJECT CONDITIONS

Protection of Work: During erection, cover top of walls with waterproof sheeting at end of each day's work. Cover partially completed structures when work is not in progress.

Extend cover a minimum of 24 inches down both sides and hold cover securely in place.

Do not apply uniform roof loading for at least 12 hours after building masonry walls or columns.

Do not apply concentrated loads for at least 3 days after building masonry walls or columns.

Staining: Prevent grout or mortar or soil from staining the face of masonry to be left exposed or painted. Remove immediately, grout or mortar in contact with such masonry.

Protect base of walls from rain-splashed mud and mortar splatter by means of coverings spread on ground and over wall surface.

#### COLD WEATHER PROTECTION

Do not lay masonry units which are wet or frozen.

Remove any ice or snow formed on masonry bed by carefully applying heat until top surface is dry to the touch.

Remove masonry damaged by freezing conditions.

Concrete Masonry Units: Heat masonry units so that they are above 20 deg. F. at time of laying.

Provide enclosure and auxiliary heat to maintain an air temperature of at least 40 deg. F. for 24 hours after laying units.

Do not heat water for mortar to above 160 deg. F.

### **PART 2 - PRODUCTS**

#### CONCRETE MASONRY UNITS

General: Comply with referenced standards and other requirements indicated below applicable to each form of concrete masonry unit required.

Provide special shapes where required for lintels, corners, jambs, sash, control joints, headers, bonding and other special conditions.

Concrete Masonry Units: Provide units complying with characteristics indicated below for grade, type, face size, exposed face and, under each form of block included, for weight classification:

##### Grade N-1

Sizes: Manufacturer's standard units with nominal face dimensions of 16" long x 8" high (15-5/8" x 7-5/8" actual) x thickness indicated. Type I, Moisture-Controlled Units, as Indicated on Drawings. BLOCKS TO BE MANUFACTURED WITH "ACME SHIELD" INTEGRAL WATER REPELLENT ADMIXTURE and integral color as manufactured by ABC Block Company

##### Exposed Faces

Manufacturer's Standard Colors and Texture

Manufacturer's Standard Colors Split Face

Manufacturer's Standard Colors Striface

Hollow Loadbearing Block: ASTM C 90, and as follows:

Weight Classification: Medium weight, minimum compressive strength of 2000 psi (net area).

Solid Loadbearing Block: ASTM C 145, and as follows:

Weight Classification: Medium weight, minimum compressive strength of 2000 psi.

**SPECIAL SHAPES:** Provide where shown and where required for lintels, corners, jambs, sash, control joints, headers, bonding, pilasters and other special conditions.

**FIRE RATINGS:** Where fire ratings on masonry walls are shown on the Drawings, the Contractor shall make certain that the fire-resistant units to be used qualify for the ratings.

#### **MORTAR AND GROUT MATERIALS**

Masonry Cement: ASTM C-91

Acceptable Manufacturers

Medusa Cement Co.

Leheigh

Approved Equal

**Grout for Unit Masonry:** Comply with ASTM C-476 for grout for use in construction of reinforced and nonreinforced unit masonry. Use grout of consistency indicated or, if not otherwise indicated, of consistency (fine or coarse) at time of placement which will completely fill all spaces intended to receive grout. Minimum compressive strength shall be 2,500 psi in 28 days.

Use fine grout in grout spaces less than 2" in horizontal direction, unless otherwise indicated.

Use coarse grout (maximum 3/8" aggregate) in grout spaces 2" or more in least horizontal dimension, unless otherwise indicated.

Mortar color as selected by Architect.

#### **JOINT REINFORCEMENT, TIES AND ANCHORING DEVICES**

**Materials:** Comply with requirements indicated below for basic materials and with requirements indicated under each form of joint reinforcement, tie and anchor for size and other characteristics:

Zinc-Coated (galvanized) Steel Wire: ASTM A 82 for uncoated wire and with ASTM C 641 for zinc coating of class indicated below:

Class 1 (0.40 oz. per sq. ft. of wire surface).

**Joint Reinforcement:** Provide welded-wire units prefabricated with deformed continuous side rods and plain cross rods into straight lengths of not less than 10', with prefabricated corner and tee units, and complying with requirements indicated below:

**Width:** Fabricate joint reinforcement in units with widths of approximately 2" less than nominal width of walls and partitions as required to provide mortar coverage of not less than 5/8" on joint faces exposed to exterior.

**Wire Size for Side and Cross Rods:** #9 Gauge

Side Rods: 3/16 Inch

Cross Rods: No. 9 Gauge

For single-wythe masonry, provide type as follows with single pair of side rods:

Truss design with continuous diagonal cross rods spaced not more than 16" o.c.

For multi-wythe masonry with cavity filled solid with mortar, provide type as follows:

Truss design with diagonal cross rods spaced not more than 16" o.c. and number of side rods as follows:

Number of Side Rods for Multiple-Wythe Concrete Masonry: One side rod for each face shell of concrete masonry back-up and of concrete masonry facing wythe.

**Flexible Anchors:** Where flexible anchors are indicated for connecting masonry to structural framework, provide 2-piece anchors, which permit vertical or horizontal differential movement between wall and framework parallel to, but resist tension and compression forces perpendicular to, plane of wall.

Anchors and Ties for Masonry with Wood Frame Backup:

Corrosion-resistant metal meeting or exceeding ASTM A153, corrugated veneer ties, 22 gage, 7/8" minimum width, 6" length minimum. Fasten to wood frame with corrosion-resistant nails of sufficient length to penetrate a minimum of 1-1/2" into studs.

#### MISCELLANEOUS MASONRY ACCESSORIES

Reinforcing Bars: Deformed Steel, ASTM A 615, Grade 60 for Bars No. 3 to No. 18

Premolded Control Joint Strips: Material as indicated below, designed to fit standard sash block and to maintain lateral stability in masonry wall. Size and configuration as indicated.

Polyvinyl Chloride Complying with ASTM D 2287, General Purpose Grade, Designation PVC-63506

Bond Breaker Strips: Asphalt-Saturated Organic Roofing Felt Complying with ASTM D 226, Type I (No. 15 Asphalt Felt)

Weepholes: Provide the following for weepholes:

Plastic Tubing: Medium Density Polyethylene with Rope Insert, Outside Diameter and Length as Indicated Below:

3/8" X 4"

Anchor Bolts: Provide steel bolts with hex nuts and flat washers complying with ASTM A-307, Grade A, hot-dip galvanized to comply with ASTM C-153, Class C, in sizes and configuration indicated.

#### MASONRY CLEANERS

Job-Mixed Detergent Solution: Solution of trisodium phosphate (1/2 cup dry measure) and laundry detergent (1/2 cup dry measure) dissolved in one gallon of water.

Acidic Cleaner: Manufacturer's standard strength general purpose cleaner designed for new masonry surfaces of type indicated; composed of blended organic and inorganic acids combined with special wetting systems and inhibitors; expressly approved for intended use by manufacturer of masonry units being cleaned.

Available Products: Subject to compliance with requirements, a product which may be used to clean unit masonry surfaces includes, but is not limited to, the following:

"Sure Klean" No. 600 Detergent; ProSoCo, Inc.

#### MORTAR AND GROUT MIXES

General: Do not add admixtures including coloring pigments, air-entraining agents, accelerators, retarders, water repellent agents, anti-freeze compounds or other admixtures, unless otherwise indicated.

Do not use calcium chloride in mortar or grout.

Mixing: Combine and thoroughly mix cementitious, water and aggregates in a mechanical batch mixer; comply with referenced ASTM standards for mixing time and water content.

Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification, for types of mortar required, unless otherwise indicated.

Use Type mortar as shown on Drawings.

Minimum compressive strength as shown on Drawings.

### **PART 3 - EXECUTION**

#### INSTALLATION, GENERAL

Do not wet concrete masonry units.

Cleaning Reinforcing: Before placing, remove loose rust, ice and other coatings from reinforcing.

Thickness: Build cavity and composite walls, floors and other masonry construction to the full thickness shown. Build single-wythe walls (if any) to the actual thickness of the masonry units, using units of nominal thickness indicated.

Build chases and recesses as shown or required for the work of other trades. Provide not less than 8" of masonry between chase or recess and jamb of openings, and between adjacent chases and recesses.

Leave openings for equipment to be installed before completion of masonry work. After installation of equipment, complete masonry work to match work immediately adjacent to the opening.

Cut masonry units using motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide continuous pattern and to fit adjoining work. Use full-size units without cutting where possible.

Use dry cutting saws to cut concrete masonry units.

#### CONSTRUCTION TOLERANCES

Variation from Plumb: For vertical lines and surfaces of columns, walls and arises do not exceed 1/4" in 10', or 3/8" in a story height not to exceed 20'. For external corners, expansion joints, control joints and other conspicuous lines, do not exceed 1/4" in any story or 20' maximum, nor 1/2" in 40' or more. For vertical alignment of head joints, do not exceed plus or minus 1/4" in 10'.

Variation from Level: For bed joints and lines of exposed lintels, sills, parapets, horizontal grooves and other conspicuous lines, do not exceed 1/4" in any bay or 20' maximum, nor 1/2" in 40' or more. For top surface of bearing walls, do not exceed 1/8" between adjacent floor elements in 10' or 1/16" within width of a single unit.

Variation of Linear Building Line: For position shown in plan and related portion of columns, walls and partitions, do not exceed 1/2" in any bay or 20' maximum, nor 3/4" in 40' or more.

Variation in Mortar Joint Thickness: Do not exceed bed joint thickness indicated by more than plus or minus 1/8", with a maximum thickness limited to 1/2". Do not exceed head joint thickness indicated by more than plus or minus 1/8".

#### LAYING MASONRY WALLS

Layout walls in advance for accurate spacing of surface bond patterns with uniform joint widths and to accurately locate openings, movement-type joints, returns and offsets. Avoid the use of less-than-half-size units at corners, jambs and wherever possible at other locations.

Lay-up walls to comply with specified construction tolerances, with courses accurately spaced and coordinated with other work.

Pattern Bond: Lay exposed masonry in the bond pattern shown or, if not shown, lay in running bond with vertical joint in each course centered on units in courses above and below. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 2". Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4" horizontal face dimensions at corners or jambs.

Stopping and Resuming Work: Rack back 1/2-unit length in each course; do not tooth. Clean exposed surfaces of set masonry, wet units lightly (if required) and remove loose masonry units and mortar prior to laying fresh masonry.

Built-in Work: As the work progresses, build-in items specified under this and other Sections of these Specifications. Fill in solidly with masonry around built-in items.

Fill space between hollow metal frames and masonry solidly with mortar, unless otherwise indicated.

Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core.

Fill cores in hollow concrete masonry units with grout 3 courses (24") under bearing plates, beams, lintels, posts and similar items, unless otherwise indicated.

#### MORTAR BEDDING AND JOINTING

Lay solid masonry units with completely filled bed and head joint; butter ends with sufficient mortar to fill head joints and shove into place. Do not slush head joints.

Lay hollow concrete masonry units with full mortar coverage on horizontal and vertical face shells. Bed webs in mortar in starting course on footings and in all courses of piers, columns and pilasters, and where adjacent to cells or cavities to be reinforced or filled with concrete or grout. For starting course on footings where cells are not grouted, spread out full mortar bed including areas under cells.

Maintain joint widths shown, except for minor variations required to maintain bond alignment. If not shown, lay walls with 3/8" joints.

Cut joints flush for masonry walls which are to be concealed or to be covered by other materials, unless otherwise indicated.

All exposed joints shall be well-tooled to a concave or rodded profile, unless otherwise indicated.

Provide raked joints at all vertical scores in scored brick units. Strike to match concave or rodded profile of horizontal joints.

Rake-out expansion joints and joints indicated on Drawings to receive sealant.

Mortar joints shall be struck at a consistent time interval when mortar is at the same medium stiff consistency in order to minimize color variations.

Remove masonry units disturbed after laying; clean and reset in fresh mortar. Do not pound corners or jambs to shift adjacent stretcher units which have been set in position. If adjustments are required, remove units, clean off mortar and reset in fresh mortar.

Collar Joints: After each course is laid, fill the vertical longitudinal joint between wythes solidly and with mortar for the following masonry work:

All exterior walls, except cavity walls, and interior walls and partitions.

Use continuous horizontal joint reinforcement installed in horizontal mortar joints for bond tie between wythes. Install at not more than 16" o.c. vertically.

Corners: Provide interlocking masonry unit bond in each course at corners, unless otherwise shown.

Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, provide same type of bonding specified for structural bonding between wythes and space as follows:

Provide individual metal ties at not more than 24" o.c. vertically.

Provide weep holes in exterior wythe of cavity wall located immediately above ledges and flashing, spaced 2'-0" o.c., unless otherwise indicated.

#### HORIZONTAL JOINT REINFORCEMENT

General: Provide continuous horizontal joint reinforcement as indicated. Install longitudinal side rods in mortar for their entire length with a minimum cover of 5/8" on exterior side of walls. Lap reinforcing a minimum of 6".

Cut or interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.

Reinforce walls with continuous horizontal joint reinforcing, unless specifically noted to be omitted.

Provide continuity at corners and wall intersections by use of prefabricated "L" and "T" sections. Cut and bend reinforcement units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures and other special conditions.

Space continuous horizontal reinforcement as follows:

For multi-wythe walls (solid or cavity) which are structurally bonded by masonry headers or individual wire ties, space horizontal reinforcement 24" o.c. vertically.

For single-wythe walls, space reinforcement at 16" o.c. vertically, unless otherwise indicated.

For parapets, space reinforcement at 8" o.c. vertically, unless otherwise indicated.

Reinforce masonry openings greater than 1'-0" wide, with horizontal joint reinforcement placed in 2 horizontal joints approximately 8" apart, immediately above the lintel and immediately below the sill. Extend reinforcement a minimum of 2'-0" beyond jambs of the opening, except at control joints.

In addition to wall reinforcement, provide additional reinforcement at openings as required to comply with the above.

#### ANCHORING MASONRY WORK

General: Provide anchor devices of type indicated.

Anchor single wythe masonry veneer to metal studs with masonry veneer anchors to comply with the following requirements:

Fasten each anchor section through sheathing to metal studs with two metal fasteners of type indicated.

Embed tie section in masonry joints. Provide not less than 1" air space between back of masonry veneer wythe and face of sheathing.

Locate anchor section relative to course in which tie section is embedded to allow maximum vertical differential movement of tie up and down.

Space anchors as indicated, but not more than 16" o.c. vertically and 24" o.c. horizontally. Install additional anchors within 1'-0" of openings and at intervals around perimeter not exceeding 3'-0".

#### CONTROL AND EXPANSION JOINTS

General: Provide vertical and horizontal expansion, control and isolation joints in masonry where shown. Build-in related items as the masonry work progresses.

Control Joint Spacing: If location of control joints is not shown, place vertical joints spaced not to exceed 35'-0" o.c. for concrete masonry wythes if reinforced, or 30'-0" o.c. if not reinforced. Locate control joints at points of natural weakness in the masonry work.

Build-in nonmetallic joint fillers where indicated.

#### LINTELS

Provide masonry lintels where shown and wherever openings of more than 2'-0" for block size units are shown without structural steel or other supporting lintels. Provide precast or formed-in-place masonry lintels. Cure precast lintels before handling and installation. Temporarily support formed-in-place lintels.

Provide minimum bearing of 8" at each jamb, unless otherwise indicated.

#### FLASHING OF MASONRY WORK

General: Provide concealed flashing in masonry work at, or above, shelf angles, lintels, ledges and other obstructions to the downward flow of water in the wall so as to divert such water to the exterior. Prepare masonry surfaces smooth and free from projections which could puncture flashing. Place through-wall flashing on sloping bed of mortar and cover with mortar. Seal penetrations in flashing with mastic before covering with mortar. Extend flashings through exterior face of masonry and turn down to form drip.

Refer to Division 7 Specification Sections for flashing materials.

Extend flashing the full length of lintels and shelf angles and minimum of 4" into masonry each end. Extend flashing from exterior face of outer wythe of masonry, through the outer wythe, turned up a minimum of 4", and through the inner wythe to within 1/2" of the interior face of the wall in exposed work. Where interior surface of inner wythe is concealed by furring, carry flashing completely through the inner wythe and turn up approximately 2". At heads and sills, turn up ends not less than 2" to form a pan.

Install flashing to comply with manufacturer's instructions.

Provide weep holes in the head joints of the first course of masonry immediately above concealed flashings. Space 24" o.c., unless otherwise indicated.

## REPAIR, POINTING AND CLEANING

Remove and replace masonry units which are loose, chipped, broken, stained or otherwise damaged, or if units do not match adjoining units as intended. Provide new units to match adjoining units and install in fresh mortar or grout, pointed to eliminate evidence of replacement.

Pointing: During the tooling of joints, enlarge any voids or holes, except weep holes, and completely fill with mortar. Point-up all joints including corners, openings and adjacent work to provide a neat, uniform appearance, prepared for application of sealants.

Final Cleaning: After mortar is thoroughly set and cured, clean masonry as follows:

- Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.

- Test cleaning methods on sample wall panel. Leave 1/2 panel uncleaned for comparison purposes. Obtain Engineer's and Architect's approval of sample cleaning before proceeding with cleaning of masonry.

- Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film or waterproof masking tape.

- Clean concrete unit masonry to comply with masonry manufacturer's directions and applicable NCMA "Tek" bulletins.

## PROTECTION

Provide final protection and maintain conditions in a manner acceptable to Installer, which ensures unit masonry work being without damage and deterioration at time of substantial completion.

**END OF SECTION**



## **SECTION 04816**

### **PRECAST CONCRETE SPLASH BLOCKS**

#### **PART 1 GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Precast concrete splash blocks for downspouts.
- B. Related Sections:
  - 1. Division 01: Administrative, procedural, and temporary work requirements.

##### **1.2 SUBMITTALS**

- A. Submittals for Review:
  - 1. Product Data: Provide unit configuration and dimensions.

#### **PART 2 PRODUCTS**

##### **2.1 MATERIALS**

- A. Concrete Mix:
  - 1. Minimum [5000] psi compressive strength at 28 days, air entrained to 5 to 7 percent.

##### **2.2 FABRICATION**

- A. Use rigid molds, constructed to maintain precast units uniform in shape, size and finish. Maintain consistent quality during manufacture.
- B. Cure units to develop concrete quality, and to minimize appearance blemishes including non uniformity, staining, and surface cracking.
- C. Minor patching in plant is acceptable, providing appearance of units is not impaired.
- D. Nominal Size: [4] inches high x [16] inches wide x [30] inches long.
- E. Provide raised lip at sides and rear edge.
- F. Finish: Manufacturer's standard.

#### **PART 3 EXECUTION**

##### **3.1 INSTALLATION**

- A. Place splash blocks under each downspout.

END OF SECTION



## SECTION 05120

### STRUCTURAL STEEL FRAMING

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

##### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Structural steel.
  - 2. Grout.
- B. Related Sections include the following:
  - 1. Division Section 014000 "Quality Requirements" for independent testing agency procedures and administrative requirements.
  - 2. Division Section 055000 "Metal Fabrications" for miscellaneous steel fabrications and other metal items not defined as structural steel.
  - 3. Division 09 painting Sections for surface preparation and priming requirements.

##### 1.3 DEFINITIONS

- A. Structural Steel: Elements of structural-steel frame, as classified by AISC's "Code of Standard Practice for Steel Buildings and Bridges," that support design loads.

##### 1.4 PERFORMANCE REQUIREMENTS

- A. Connections: Provide details of simple shear connections required by the Contract Documents to be selected or completed by structural-steel fabricator to withstand loads indicated and comply with other information and restrictions indicated.
  - 1. Select and complete connections using AISC's "Manual of Steel Construction, Load and Resistance Factor Design," Volume 2, Part 9 and AISC's "Manual of Steel Construction, Allowable Stress Design," Part 4.
  - 2. Engineering Responsibility: Fabricator's responsibilities include using a qualified professional engineer to prepare structural analysis data for structural-steel connections.

##### 1.5 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication of structural-steel components.
  - 1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
  - 2. Include embedment drawings.
  - 3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.
  - 4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.
  - 5. For structural-steel connections indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Welding certificates.
- D. Qualification Data: For Installer and fabricator.

- E. Mill Test Reports: Signed by manufacturers certifying that the following products comply with requirements:
  - 1. Structural steel including chemical and physical properties.
  - 2. Bolts, nuts, and washers including mechanical properties and chemical analysis.
  - 3. Non-shrink grout.
- F. Source quality-control test reports.

## 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category CSE.
- B. Fabricator Qualifications: A qualified fabricator who participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category Sbd.
- C. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel."
- D. Comply with applicable provisions of the following specifications and documents:
  - 1. AISC's "Code of Standard Practice for Steel Buildings and Bridges."
  - 2. AISC's "Seismic Provisions for Structural Steel Buildings" and "Supplement No. 2."
  - 3. AISC's Load and Resistance Factor Design Specification for Structural Steel Buildings."
  - 4. AISC's "Manual of Steel Construction, Allowable Stress Design."
  - 5. AISC's "Specification for the Design of Steel Hollow Structural Sections."
  - 6. AISC's "Specification for Load and Resistance Factor Design of Single-Angle Members."
  - 7. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from erosion and deterioration.
  - 1. Store fasteners in a protected place. Clean and relubricate bolts and nuts that become dry or rusty before use.
  - 2. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

## 1.8 COORDINATION

- A. Furnish anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

## PART 2 - PRODUCTS

### 2.1 STRUCTURAL-STEEL MATERIALS

- A. W-Shapes: ASTM A 36 and ASTM A 529, Grade 50.
- B. Channels, Angles, M, S-Shapes: ASTM A 36.
- C. Plate and Bar: ASTM A 36.

- D. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B, structural tubing.
- E. Steel Pipe: ASTM A 53, Type E or S, Grade B., and standard weight class
  - 1. Finish: Black.
- F. Medium-Strength Steel Castings: ASTM A 27, Grade 65-35, carbon steel.
- G. Welding Electrodes: Comply with AWS requirements.

## 2.2 BOLTS, CONNECTORS, AND ANCHORS

- A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy hex steel structural bolts; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.
  - 1. Finish: Plain.
- B. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1, Type B.
- C. Unheaded Anchor Rods: ASTM F 1554, Grade 36.
  - 1. Configuration: Straight, unless otherwise indicated on Drawings.
  - 2. Nuts: ASTM A 563 hex carbon steel.
  - 3. Plate Washers: ASTM A 36 carbon steel.
  - 4. Washers: ASTM F 436 hardened carbon steel.
  - 5. Finish: Plain.
- D. Headed Anchor Rods: ASTM F 1554, Grade 36, straight.
  - 1. Nuts: ASTM A 563 hex carbon steel.
  - 2. Plate Washers: ASTM A 36 carbon steel.
  - 3. Washers: ASTM F 436 hardened carbon steel.
  - 4. Finish: Plain.
- E. Threaded Rods: ASTM A 193.
  - 1. Nuts: ASTM A 563 hex carbon steel.
  - 2. Washers: ASTM F 436 hardened carbon steel.
  - 3. Finish: Plain.
- F. Clevises and Turnbuckles: ASTM A 108, Grade 1035, cold-finished carbon steel.
- G. Eye Bolts and Nuts: ASTM A 108, Grade 1030, cold-finished carbon steel.
- H. Sleeve Nuts: ASTM A 108, Grade 1018, cold-finished carbon steel.
- I. Anchor Bolts exposed to weather: ASTM F 1554, Grade 36, threaded carbon-steel hex-headed bolts and carbon-steel nuts; flat hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153, Class C.

## 2.3 PRIMER

- A. Primer: SSPC-Paint 25, Type II, iron oxide, zinc oxide, raw linseed oil, and alkyd.
- B. Primer: Fabricator's standard lead and chromate-free, non-asphaltic, rust-inhibiting primer.

## 2.4 GROUT

- A. Non-metallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, non-corrosive, non-staining, mixed with water to consistency suitable for application and a 30-minute working time.

## 2.5 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges," AISC's "Load and Resistance Factor Design Specification for Structural Steel Buildings," and AISC's "Manual of Steel Construction, Allowable Stress Design."
  - 1. Camber structural-steel members where indicated.
  - 2. Identify high-strength structural steel according to ASTM A 6 and maintain markings until structural steel has been erected.
  - 3. Mark and match-mark materials for field assembly.
  - 4. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
- B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
  - 1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1.
- C. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.
- D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- E. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's written instructions.
- F. Holes: Provide holes required for securing other work to structural steel and for passage of other work through steel framing members.
  - 1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
  - 2. Base-Plate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
  - 3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

## 2.6 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
  - 1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.

## 2.7 SHOP PRIMING

- A. Shop prime steel surfaces except the following:
  - 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members full depth.
  - 2. Surfaces to be field welded.
  - 3. Surfaces to be high-strength bolted.
  - 4. Surfaces to receive sprayed fire-resistive materials, where required to meet fire rating requirements.
- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
  - 1. SSPC-SP 3, "Power Tool Cleaning."
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a dry film thickness of not less than

1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
2. Apply two coats of shop paint to inaccessible surfaces after assembly or erection. Change color of second coat to distinguish it from first.

## 2.8 SOURCE QUALITY CONTROL

- A. Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
- B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.
- C. Bolted Connections: Shop-bolted connections will be inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- D. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected according to AWS D1.1 and the following inspection procedures, at testing agency's option:
  1. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
  2. Ultrasonic Inspection: ASTM E 164.
- E. In addition to visual inspection, shop-welded shear connectors will be tested and inspected according to requirements in AWS D1.1 for stud welding and as follows:
  1. Bend tests will be performed if visual inspections reveal either a less-than- continuous 360-degree flash or welding repairs to any shear connector.
  2. Tests will be conducted on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify elevations of concrete and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments, with steel erector present, for compliance with requirements.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place, unless otherwise indicated.

### 3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC's "Code of Standard Practice for Steel Buildings and Bridges," AISC's "Load and Resistance Factor Design Specification for Structural Steel Buildings," and AISC's "Manual of Steel Construction, Allowable Stress Design."
- B. Base and Bearing Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting base and bearing plates. Clean bottom surface of base and bearing plates.

1. Set base and bearing plates for structural members on wedges, shims, or setting nuts as required.
  2. Weld plate washers to top of base plate.
  3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of base or bearing plate before packing with grout.
  4. Promptly pack grout solidly between bearing surfaces and base or bearing plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."
- D. Align and adjust various members forming part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
1. Level and plumb individual members of structure.
  2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
- E. Splice members only where indicated.
- F. Do not use thermal cutting during erection, unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1.
- G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.
- H. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's written instructions.

### 3.4 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.
1. Comply with AISC's "Code of Standard Practice for Steel Buildings and Bridges," AISC's "Load and Resistance Factor Design Specification for Structural Steel Buildings," and AISC's "Manual of Steel Construction, Allowable Stress Design," for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.

### 3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.
- B. Bolted Connections: Shop-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- C. Welded Connections: Field welds will be visually inspected according to AWS D1.1.
1. In addition to visual inspection, field welds will be tested according to AWS D1.1 and the following inspection procedures, at testing agency's option:



- a. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
  - b. Ultrasonic Inspection: ASTM E 164.
- D. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

### 3.6 REPAIRS AND PROTECTION

- A. Touchup Painting: After installation, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joists and accessories, bearing plates, and abutting structural steel.
  - 1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
  - 2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.

END OF SECTION 051200



## SECTION 05310

### STEEL DECKING

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

##### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Roof deck.
- B. Related Sections include the following:
  - 1. Division Section 055000 "Metal Fabrications" for framing deck openings with miscellaneous steel shapes.
  - 2. Division 09 painting Sections for repair painting of primed deck.

##### 1.3 SUBMITTALS

- A. Product Data: For each type of deck, accessory, and product indicated.
- B. Shop Drawings: Show layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.
- C. Product Certificates: For steel deck, signed by product manufacturer.
- D. Welding certificates.
- E. Field quality-control test and inspection reports.
- F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that each of the following complies with requirements:
  - 1. Power-actuated mechanical fasteners.
- G. Research/Evaluation Reports: For steel deck.

##### 1.4 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency qualified according to ASTM E 329 for testing indicated.
- B. Welding: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."
- C. Fire-Test-Response Characteristics: Where indicated, provide steel deck units identical to those tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
  - 1. Fire-Resistance Ratings: Indicated by design designations of applicable testing and inspecting agency.
  - 2. Steel deck units shall be identified with appropriate markings of applicable testing and inspecting agency.
- D. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."
- E. FMG Listing: Provide steel roof deck evaluated by FMG and listed in its "Approval Guide, Building Materials" for Class 1 fire rating and Class 1-90 windstorm ratings.

##### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Steel Deck:
    - a. Epic Metals Corporation.
    - b. Nucor Corp.; Vulcraft Division.
    - c. Roof Deck, Inc.
    - d. United Steel Deck, Inc.
    - e. Verco Manufacturing Co.
    - f. Wheeling Corrugating Company; Div. of Wheeling-Pittsburgh Steel Corporation.

### 2.2 ROOF DECK

- A. Steel Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 30, and with the following:
  - 1. Prime-Painted Steel Sheet: ASTM A 1008, Structural Steel (SS), Grade 33 minimum, shop primed with manufacturer's standard baked-on, rust-inhibitive primer.
    - a. Color: Gray or white
  - 2. Galvanized and Shop-Primed Steel Sheet: ASTM A 653, Structural Steel (SS), Grade 33, G60 zinc coating; cleaned, pretreated, and primed with manufacturer's standard baked-on, rust-inhibitive primer
    - a. Color: Gray or white
  - 3. Deck Profile: Type WR, wide rib, Type "B"-composite
  - 4. Profile Depth: 2 inches and 3 inches as shown on plans or as otherwise indicated on Drawings.
  - 5. Design Uncoated-Steel Thickness: 20 gauge, 18 gauge and 16 gauge as shown on drawings or as otherwise indicated on drawings,
  - 6. Span Condition: Triple span or more
  - 7. Side Laps: Overlapped
  - 8. End Joints: Overlapped 2" minimum

### 2.3 ACCESSORIES

- A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.
- C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.
- D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.
- E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- F. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck, unless otherwise indicated.
- G. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, 0.0598 inch thick, with factory-punched hole of 3/8-inch minimum diameter.

- H. Flat Sump Plate: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck. For drains, cut holes in the field.
- I. Galvanizing Repair Paint: ASTM A 780.
- J. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.

#### 3.2 INSTALLATION, GENERAL

- A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 30, manufacturer's written instructions, and requirements in this Section.
- B. Install temporary shoring before placing deck panels, if required to meet deflection limitations.
- C. Locate deck bundles to prevent overloading of supporting members.
- D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
- E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
- H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.
- I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

#### 3.3 ROOF-DECK INSTALLATION

- A. Fasten roof-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter that is not less than 1-1/2 inches long, and as follows:
  - 1. Weld Diameter: 5/8 inch nominal.
  - 2. Weld Spacing: Weld edge and interior ribs of deck units with a minimum of two welds per deck unit at each support. Space welds 12 inches apart in the field of roof and 6 inches apart in roof corners and perimeter, based on roof-area definitions in FMG Loss Prevention Data Sheet 1-28, unless otherwise indicated on Drawings.
  - 3. Weld Washers: Install weld washers at each weld location.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of 1/2 of the span or 36 inches, and as follows:
  - 1. Mechanically fasten with self-drilling, No. 10 diameter or larger, carbon-steel screws.
  - 2. Fasten with a minimum of 1-1/2-inch long welds.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:
  - 1. End Joints: Lapped 2 inches minimum.
- D. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and weld flanges to top of deck. Space welds not more than 12 inches apart with at least one weld at each corner.
  - 1. Install reinforcing channels or zees in ribs to span between supports and weld.

- E. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld or mechanically fasten to substrate to provide a complete deck installation.
  - 1. Weld cover plates at changes in direction of roof-deck panels, unless otherwise indicated.
- F. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.

#### 3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Field welds will be subject to inspection.
- C. Testing agency will report inspection results promptly and in writing to Contractor and Architect.
- D. Remove and replace work that does not comply with specified requirements.
- E. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

#### 3.5 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation, and apply repair paint.
  - 1. Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.
  - 2. Wire brushing, cleaning, and repair painting of bottom deck surfaces are included in Division 09 Section "Interior Painting."
- C. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION 053100

## SECTION 05400

### COLD-FORMED METAL FRAMING

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

##### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Interior non-load-bearing wall framing.
- B. Related Sections include the following:
  - 1. Division Section 092216 "Non-Structural Metal Framing" for interior non-load-bearing, metal-stud framing and ceiling-suspension assemblies.

##### 1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide cold-formed metal framing capable of withstanding design loads within limits and under conditions indicated.
  - 1. Design Loads: As indicated on structural drawings.
  - 2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
    - a. Exterior Load-Bearing Wall Framing: Horizontal deflection of 1/240 of the wall height.
    - b. Exterior Non-Load-Bearing Framing: Horizontal deflection of 1/360 of the wall height.
    - c. Roof Trusses: Vertical deflection of 1/360 of the span.
  - 3. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.
  - 4. Design framing system to accommodate deflection of primary building structure and construction tolerances and to maintain clearances at openings.
- B. Cold-Formed Steel Framing, General: Design according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions."
  - 1. Headers: Design according to AISI's "Standard for Cold-Formed Steel Framing - Header Design."
  - 2. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.

##### 1.4 SUBMITTALS

- A. Product Data: For each type of cold-formed metal framing product and accessory indicated.
- B. Shop Drawings: Show layout, spacing, sizes, thicknesses, and types of cold-formed metal framing; fabrication; and fastening and anchorage details, including mechanical fasteners. Show reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.
  - 1. For cold-formed metal framing indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Welding certificates.

## 1.5 QUALITY ASSURANCE

- A. Engineering Responsibility: Preparation of Shop Drawings, design calculations, and other structural data by a qualified professional engineer.
- B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of cold-formed metal framing that are similar to those indicated for this Project in material, design, and extent.
- C. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.
- D. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."
- E. AISI Specifications and Standards: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing - General Provisions."
  - 1. Comply with AISI's "Standard for Cold-Formed Steel Framing - Header Design."

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide cold-formed metal framing by one of the following:
  - 1. Dietrich Metal Framing; a Worthington Industries Company.
  - 2. Unimast.

### 2.2 MATERIALS

- A. Steel Sheet: ASTM A 1003, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:
  - 1. Grade: ST33H.
  - 2. Coating: G60.
- B. Steel Sheet for Vertical Deflection Clips: ASTM A 653, structural steel, zinc coated, of grade and coating as follows:
  - 1. Grade: As required by structural performance.
  - 2. Coating: G90.

### 2.3 INTERIOR LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
  - 1. Minimum Base-Metal Thickness: 0.0428 inch.
  - 2. Flange Width: 1-5/8 inches, unless otherwise indicated on Drawings.
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with straight flanges, and as follows:
  - 1. Minimum Base-Metal Thickness: Matching steel studs.
  - 2. Flange Width: 1-1/4 inches, unless otherwise indicated on Drawings.



- C. Steel Box or Back-to-Back Headers: Manufacturer's standard C-shapes used to form header beams, of web depths indicated, punched, with stiffened flanges, and as follows:
    - 1. Minimum Base-Metal Thickness: 0.0428 inch.
    - 2. Flange Width: 2 inches.
- 2.4 INTERIOR NON-LOAD-BEARING WALL FRAMING
- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
    - 1. Minimum Base-Metal Thickness: 0.0428 inch.
    - 2. Flange Width: 1-5/8 inches, unless otherwise indicated on Drawings.
  - B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
    - 1. Minimum Base-Metal Thickness: Matching steel studs.
    - 2. Flange Width: 1-1/4 inches, unless otherwise indicated on Drawings.
  - C. Vertical Deflection Clips: Manufacturer's standard head clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
  - D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal and lateral loads and transfer them to the primary structure, and as follows:
    - 1. Minimum Base-Metal Thickness: 0.0428 inch.
    - 2. Flange Width: 1 inch plus the design gap for 1-story structures.
- 2.5 FRAMING ACCESSORIES
- A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.
  - B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
    - 1. Supplementary framing.
    - 2. Bracing, bridging, and solid blocking.
    - 3. Web stiffeners.
    - 4. Anchor clips.
    - 5. End clips.
    - 6. Foundation clips.
    - 7. Gusset plates.
    - 8. Stud kickers, knee braces, and girts.
    - 9. Hangers and end closures.
    - 10. Hole reinforcing plates.
    - 11. Backer plates.
- 2.6 ANCHORS, CLIPS, AND FASTENERS
- A. Steel Shapes and Clips: ASTM A 36, zinc coated by hot-dip process according to ASTM A 123.
  - B. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel hex-headed bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153, Class C.
  - C. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

- D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.
- E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.
  - 1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.
- F. Welding Electrodes: Comply with AWS standards.

## 2.7 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035.
- B. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
- C. Non-metallic, Non-shrink Grout: Premixed, nonmetallic, non-corrosive, non-staining grout containing selected silica sands, portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C 1107, with fluid consistency and 30-minute working time.
- D. Shims: Load bearing, high-density multi-monomer plastic, non-leaching.
- E. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

## 2.8 FABRICATION

- A. Fabricate cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
  - 1. Fabricate framing assemblies using jigs or templates.
  - 2. Cut framing members by sawing or shearing; do not torch cut.
  - 3. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
    - a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    - b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by not less than three exposed screw threads.
  - 4. Fasten other materials to cold-formed metal framing by welding, bolting, or screw fastening, according to Shop Drawings.
- B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.
- C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
  - 1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
  - 2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance.
  - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Before sprayed fire-resistive materials are applied (when required by construction), attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials, when required.
- B. After applying sprayed fire-resistive materials (when required by construction), remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that are required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage, when required.
- C. Install load bearing shims or grout between the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations to ensure a uniform bearing surface on supporting concrete or masonry construction.
- D. Install sealer gaskets to isolate the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations.

### 3.3 INSTALLATION, GENERAL

- A. Cold-formed metal framing may be shop or field fabricated for installation, or it may be field assembled.
- B. Install cold-formed metal framing according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions" and to manufacturer's written instructions unless more stringent requirements are indicated.
- C. Install shop or field-fabricated, cold-formed framing and securely anchor to supporting structure.
  - 1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.
- D. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened.
  - 1. Cut framing members by sawing or shearing; do not torch cut.
  - 2. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
    - a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    - b. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.
- E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
- F. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
- G. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.
- H. Install insulation, specified in Division Section 072100 "Thermal Insulation," in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
- I. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.
- J. Erection Tolerances: Install cold-formed metal framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
  - 1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

### 3.4 LOAD-BEARING WALL INSTALLATION

- A. Install continuous top and bottom tracks sized to match studs. Align tracks accurately and securely anchor at corners and ends, and at spacings as follows:
  - 1. Anchor Spacing: 24 inches.
- B. Squarely seat studs against top and bottom tracks with gap not exceeding of 1/8 inch between the end of wall framing member and the web of track. Fasten both flanges of studs to top and bottom tracks. Space studs as follows:
  - 1. Stud Spacing: 16 inches.
- C. Set studs plumb, except as needed for diagonal bracing or required for non plumb walls or warped surfaces and similar configurations.
- D. Align studs vertically where floor framing interrupts wall-framing continuity. Where studs cannot be aligned, continuously reinforce track to transfer loads.
- E. Align floor and roof framing over studs. Where framing cannot be aligned, continuously reinforce track to transfer loads.
- F. Anchor studs abutting structural columns or walls, including masonry walls, to supporting structure as indicated.
- G. Install headers over wall openings wider than stud spacing. Locate headers above openings as indicated. Fabricate headers of compound shapes indicated or required to transfer load to supporting studs, complete with clip-angle connectors, web stiffeners, or gusset plates.
  - 1. Frame wall openings with not less than a double stud at each jamb of frame as indicated on Shop Drawings. Fasten jamb members together to uniformly distribute loads.
  - 2. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with clip angles or by welding, and space jack studs same as full-height wall studs.
- H. Install supplementary framing, blocking, and bracing in stud framing indicated to support fixtures, equipment, services, casework, heavy trim, furnishings, and similar work requiring attachment to framing.
  - 1. If type of supplementary support is not indicated, comply with stud manufacturer's written recommendations and industry standards in each case, considering weight or load resulting from item supported.
- I. Install horizontal bridging in stud system, spaced 48 inches. Fasten at each stud intersection installed according to manufacturer's written instructions.
- J. Install steel sheet diagonal bracing straps to both stud flanges, terminate at and fasten to reinforced top and bottom tracks. Fasten clip-angle connectors to multiple studs at ends of bracing and anchor to structure.
- K. Install miscellaneous framing and connections, including supplementary framing, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

### 3.5 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.
- B. Fasten both flanges of studs to top and bottom track, unless otherwise indicated. Space studs as follows:
  - 1. Stud Spacing: 16 inches.
- C. Set studs plumb, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces and similar requirements.
- D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
  - 1. Install single-leg deflection tracks and anchor to building structure.
  - 2. Connect vertical deflection clips to infill studs and anchor to building structure.

- E. Install horizontal bridging in wall studs, spaced in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.
    - 1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of flat, taut, steel sheet straps of width and thickness indicated and stud or stud-track solid blocking of width and thickness matching studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
      - a. Install solid blocking at 96-inch centers.
    - 2. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
  - F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, fasteners, and stud girts, to provide a complete and stable wall-framing system.
- 3.6 FIELD QUALITY CONTROL
- A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
  - B. Field and shop welds will be subject to testing and inspecting.
  - C. Testing agency will report test results promptly and in writing to Contractor and Architect.
  - D. Remove and replace work where test results indicate that it does not comply with specified requirements.
  - E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- 3.7 REPAIRS AND PROTECTION
- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
  - B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed metal framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 054000



## **SECTION 05500**

### **METAL FABRICATIONS**

#### **PART 1 - GENERAL**

##### **RELATED DOCUMENTS**

Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

**DESCRIPTION OF WORK:** Work in this Section includes, but is not necessarily limited to, furnishing and installing the following:

- Rough Hardware
- Loose Bearing and Leveling Plates
- Miscellaneous Steel Trim
- Steel Columns and Beams

##### **RELATED SECTIONS**

##### **SUBMITTALS**

General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

Product data for products used in miscellaneous metal fabrications, including paint products and grout.

Shop Drawings detailing fabrication and erection of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide templates for anchors and bolts specified for installation under other sections.

Samples representative of materials and finished products as may be requested by Architect.

##### **QUALITY ASSURANCE**

Quality welding processes and welding operators in accordance with AWS D1.1 "Structural Welding Code - Steel," D1.3 "Structural Welding Code - Sheet Steel", and D1.2 "Structural Welding Code - Aluminum."

Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

##### **PROJECT CONDITIONS**

Field Measurements: Check actual locations of walls and other construction to which metal fabrications must fit, by accurate field measurements before fabrication; show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of Work.

#### **PART 2 - PRODUCTS**

##### **FERROUS METALS**

Metal Surfaces, General: For metal fabrications exposed to view upon completion of the Work, provide materials selected for their surface flatness, smoothness, and freedom from surface blemishes. Do not use materials whose exposed surfaces exhibit pitting, seam marks, roller marks, rolled trade names, roughness, and, for steel sheet, variations in flatness exceeding those permitted by reference standards for stretcher-leveled sheet.

Steel Plates, Shapes, and Bars: ASTM A 36

Steel Pipe: ASTM A53

Black finish, unless otherwise indicated.

Galvanized finish for exterior installations.

Type F, standard weight (schedule 40), unless otherwise indicated, or another weight, type, and grade required by structural loads.

Gray Iron Castings: ASTM A 48, Class 30

Malleable Iron Castings: ASTM A 47, Grade 32510

Brackets, Flanges and Anchors: Cast or formed metal of the same type material and finish as supported rails, unless otherwise indicated.

Concrete Inserts: Threaded or wedge type; galvanized ferrous castings, either malleable iron, ASTM A 47, or cast steel, ASTM A 27. Provide bolts, washers, and shims as required, hot-dip galvanized per ASTM A 153.

Welding Rods: Select in accordance with AWS Specifications for the metal alloy to be welded.

#### GROUT AND ANCHORING CEMENT

Nonshrink Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with CE CRD-C 621. Provide grout specifically recommended by manufacturer for interior and exterior applications of type specified in this Section.

Interior Anchoring Cement: Factory-prepackaged, nonshrink, nonstaining, hydraulic controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound. Use for interior applications only.

#### FASTENERS

General: Provide zinc-coated fasteners for exterior use or where built into exterior walls. Select fasteners for the type, grade, and class required for each application and complying with applicable standards.

Bolts and Nuts: Regular hexagon head type, ASTM A-307, Grade A

Lag Bolts: Square head type, FS FF-B-561

Machine Screws: Cadmium plated steel FS FF-S-92

Wood Screws: Flat head carbon steel, FS FF-S-111

Plain Washers: Round, carbon steel, FS FF-W-92

Drilled-in Expansion Anchors: Expansion Anchors Complying with FS FF-S-325, Group VIII (anchors, expansion), Type I (internally threaded tubular expansion anchor); and machine bolts complying with FS FF-B-S75, Grade 5.

#### PAINT

Shop Primer for Ferrous Metal: Manufacturer's or fabricator's standard, fast-curing, lead-free, universal modified alkyd primer selected for good resistance to normal atmospheric corrosion, for compatibility with finish paint systems indicated, and for capability to provide a sound foundation for field-applied topcoats despite prolonged exposure complying with performance requirements of FS TT-P-645.

Galvanizing Repair Paint: High zinc dust content paint for reglazing welds in galvanized steel, with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035 or SSPC-Paint-20.

Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12 except containing no asbestos fibers.

Zinc Chromate Primer: FS TT-P-645.

#### FABRICATION

Form metal fabrications from materials of size, thickness, and shapes indicated but not less than that needed to comply with performance requirements indicated. Work to dimensions indicated or accepted on shop drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of each metal fabrication.



Allow for thermal movement resulting from the following maximum change (range) of exterior metalwork in ambient temperature in the design, fabrication, and installation of installed metal assemblies to prevent buckling, opening up of joints, and overstressing of welds and fasteners. Base design calculations on actual surface temperatures of metals due to both solar heat gain and nighttime sky heat loss. Temperature Change (Range): 150 deg. F.

Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flathead (countersunk) screws or bolts. Locate joints where least conspicuous.

Weld corners and seams continuously to comply with AWS recommendations and the following:

- Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

- Obtain fusion without undercut or overlap.

- Remove welding flux immediately.

- At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour

Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to provide adequate support for intended use.

Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation. Cut, reinforce, drill and tap miscellaneous metal work as indicated to receive finish hardware, screws, and similar items.

Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.

#### ROUGH HARDWARE

Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels, and other miscellaneous steel and iron shapes as required for framing and supporting woodwork, and for anchoring or securing woodwork to concrete or other structures. Fabricate items to sizes, shapes, and dimensions required. Furnish malleable-iron washers for heads and nuts which bear on wood structural connections; elsewhere, furnish steel washers.

#### LOOSE BEARING AND LEVELING PLATES

Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction, made flat, free from warps or twists, and of required thickness and bearing area. Drill plates to receive anchor bolts and for grouting as required. Galvanize after fabrication.

#### LOOSE STEEL LINTELS

Fabricate loose structural steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Weld adjoining members together to form a single unit where indicated.

Galvanize loose steel lintels located in exterior walls.

Size loose lintels for equal bearing of one inch per foot of clear span but not less than 8 inches bearing at each side of openings, if not indicated on Drawings.

#### MISCELLANEOUS FRAMING AND SUPPORTS

General: Provide steel framing and supports for applications indicated or which are not a part of structural steel framework, as required to complete work.

Fabricate units to sizes, shapes, and profiles indicated and required to receive adjacent other construction retained by framing and supports. Fabricate from structural steel shapes, plates, and steel bars of welded construction using mitered joints for field connection. Cut, drill, and tap units to receive hardware, hangers, and similar items.

Equip units with integrally welded anchors for casting into concrete or building into masonry. Furnish inserts if units must be installed after concrete is placed. Spacing of anchors shall not be more than 24" o.c.

#### MISCELLANEOUS STEEL TRIM

Provide shapes and sizes indicated for profiles shown. Unless otherwise indicated, fabricate units from structural steel shapes, plates, and steel bars, with continuously welded joints and smooth exposed edges. Use concealed field splices wherever possible. Provide cutouts, fittings, and anchorages as required for coordination of assembly and installation with other work.

Galvanize miscellaneous framing and supports in exterior locations and where shown to be painted.

#### CONCRETE FILL AND REINFORCING MATERIALS

Concrete Materials and Properties: Comply with requirements of Concrete Specifications shown on Drawings.

Non-slip Aggregate Finish: Factory-graded, packaged material containing fused aluminum oxide grits or crushed emery as abrasive aggregate; rustproof and non-glazing; unaffected by freezing, moisture, or cleaning materials.

Reinforcing Bars: ASTM A-615, Grade 60, unless noted otherwise.

#### FINISHES, GENERAL

Comply with NAAMM "Metal Finishes Manual" for recommendations relative to application and designations of finishes. Finish metal fabrications after assembly.

#### STEEL AND IRON FINISHES

Galvanizing: For those items indicated for galvanizing, apply zinc-coating by the hot-dip process in compliance with the following requirements:

ASTM A-153 for galvanizing iron and steel hardware.

ASTM A-123 for galvanizing both fabricated and unfabricated iron and steel products made of uncoated rolled, pressed, and forged shapes, plates, bars, and strip 0.0299 inch thick and heavier.

Preparation for Shop Priming: Prepare uncoated ferrous metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications: Interiors (SSPC Zone 1A): SSPC0SP3 "Power Tool Cleaning".

Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finish or to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with requirements of SSPC-PA1 "Paint Application Specification No. 1" for shop painting. Stripe paint all edges, corners, crevices, bolts, welds, and sharp edges.

### **PART 3 - EXECUTION**

#### PREPARATION

Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, including concrete inserts, sleeves, anchor bolts, and miscellaneous items having integral anchors that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.

Set sleeves in concrete with tops flush with finish surface elevations; protect sleeves from water and concrete entry.

#### INSTALLATION, GENERAL

**Fastening to In-Place Construction:** Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction; include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as required.

**Cutting, Fitting, and Placement:** Perform cutting, drilling, and fitting required for installation of miscellaneous metal fabrications. Set metal fabrication accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

Provide temporary bracing or anchors in formwork for items that are to be built into concrete masonry or similar construction.

**Field Welding:** Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance and quality of welds made, methods used in correctly welding work, and the following:

- Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

- Obtain fusion without undercut or overlap.

- Remove welding flux immediately.

- At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surface matches those adjacent.

#### **SETTING LOOSE PLATES**

Clean concrete and masonry bearing surfaces of any bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of bearing plates.

Set loose leveling and bearing plates on wedges, or other adjustable devices. After the bearing members have been positioned and plumbed, tighten the anchor bolts. Do not remove wedges or shims, but if protruding, cut off flush with the edge of the bearing plate before packing with grout.

- Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

- Use nonmetallic nonshrink grout, unless otherwise indicated.

**TOUCH-UP PAINTING:** Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA requirements for touch-up of field painted surfaces.

- Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.

- For galvanized surfaces clean welds, bolted connections and abraded areas and apply galvanizing repair paint to comply with ASTM A 780.

### **END OF SECTION**



**SECTION 05521**  
**PIPE AND TUBE RAILINGS**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. This Section includes the following:
  - 1. Steel pipe railings.

**1.3 PERFORMANCE REQUIREMENTS**

- A. General: In engineering railings to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:
  - 1. Steel: 72 percent of minimum yield strength.
- B. Structural Performance: Provide railings capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
  - 1. Top Rails of Guards:
    - a. Uniform load of 50 lbf/ ft. applied horizontally and concurrently with 100 lbf/ ft. applied vertically downward.
    - b. Concentrated load of 200 lbf applied in any direction.
    - c. Uniform and concentrated loads need not be assumed to act concurrently.
  - 2. Infill of Guards:
    - a. Concentrated load of 200 lbf applied horizontally on an area of 1 sq. ft.
    - b. Infill load and other loads need not be assumed to act concurrently.
- C. Thermal Movements: Provide exterior railings that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
  - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- D. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

**1.4 SUBMITTALS**

- A. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
  - 1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- B. Welding certificates.

**1.5 QUALITY ASSURANCE**

- A. Source Limitations: Obtain railing through one source from a single manufacturer.
- B. Welding: Qualify procedures and personnel according to the following:
  - 1. AWS D1.1, "Structural Welding Code--Steel."

## PART 2 - PRODUCTS

### 2.1 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

### 2.2 STEEL AND IRON

- A. Pipe: ASTM A 53, Type F or Type S, Grade B, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.
  - 1. Provide galvanized finish for exterior installations and where indicated.
- B. Steel Bars: ASTM A 36.

### 2.3 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Zinc-Rich Primer: Complying with SSPC-Paint 20 or SSPC-Paint 29 and compatible with topcoat.
  - 1. Use primer with a VOC content of 420 g/L (3.5 lb/gal.) or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
  - 2. Products: Subject to compliance with requirements, provide one of the following:
    - a. Benjamin Moore & Co.; Epoxy Zinc-Rich Primer CM18/19.
    - b. ICI Devoe Coatings; Catha-Coat 313.
    - c. PPG Architectural Finishes, Inc.; Aquapon Zinc-Rich Primer 97-670.
    - d. Sherwin-Williams Company; Corothane I GalvaPac Zinc Primer.
    - e. Tnemec Company, Inc.; Tneme-Zinc 90-97.
- C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
- D. Non-Shrink, Non-Metallic Grout: Factory-packaged, non-staining, non-corrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- E. Anchoring Cement: Factory-packaged, non-shrink, non-staining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.
  - 1. Water-Resistant Product: At exterior locations provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

### 2.4 FABRICATION

- A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch, unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form work true to line and level with accurate angles and surfaces.
- D. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- E. Connections: Fabricate railings with welded connections, unless otherwise indicated.

- F. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
    - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
    - 2. Obtain fusion without undercut or overlap.
    - 3. Remove flux immediately.
    - 4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
  - G. Form changes in direction by radius bends of radius indicated.
  - H. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- 2.5 FINISHES, GENERAL
- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- 2.6 STEEL AND IRON FINISHES
- A. Galvanized Railings: Hot-dip galvanize exterior steel and iron railings after fabrication.
  - B. Fill vent and drain holes that will be exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.
  - C. Preparation for Shop Priming: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with metallic-phosphate process.
  - D. Apply shop primer to prepared surfaces of railings, unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION, GENERAL

- A. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
  - 1. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication.
  - 2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.

#### 3.2 RAILING CONNECTIONS

- A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in Part 2 "Fabrication" Article whether welding is performed in the shop or in the field.

#### 3.3 ANCHORING POSTS

- A. Form or core-drill holes not less than 5 inches deep and 3/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with non-shrink, non-metallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.

- B. Cover anchorage joint with flange of same metal as post, welded to post after placing anchoring material.

#### 3.4 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

#### 3.5 PROTECTION

- A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.
- B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 05521



**SECTION 06100**  
**ROUGH CARPENTRY**

**PART 1 - GENERAL**

**RELATED DOCUMENTS**

Drawings and General Provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

**DESCRIPTION OF WORK:** Work of this Section includes, but is not necessarily limited to, furnishing and installing the following:

Wood Grounds, Nailers, and Blocking

Wall Sheathing.

All fasteners, adhesives, and other attachment devices shall be furnished by this Contractor.

**RELATED WORK**

Section 06200 - Finish Carpentry

Section 06400 - Casework

Section 07620 - Sheet Metal Flashing and Trim

**SUBMITTALS:** Submit the following:

Product data, installation instructions and recommendations from manufacturer, including data that materials comply with requirements.

Shop Drawings for wood trusses showing sizes, design values, materials, and dimensional relationships of components, as well as bearing and anchorage details.

Provide Shop Drawings that have been signed and stamped by a professional engineer legally authorized to practice in jurisdiction where project is located.

Wood treatment data, including treatment plant's certification of compliance with indicated requirements.

**QUALITY ASSURANCE**

Single-Source Responsibility for Trusses and Engineered Wood Products: Obtain each type of engineered wood products from one source from a single manufacturer.

Single-Source Responsibility for Fire Retardant Treated Wood: Obtain each type of fire-retardant-treated wood products from one source for both treatment and fire-retardant formulation.

Standards: Comply with N.F.P.A. "National Design Specification for Wood Construction" and with TPI standards, including "Quality Standard for Metal Plate Connected Wood Trusses", "Commentary and Recommendations for Handling and Erecting Wood Trusses", "Commentary and Recommendations for Bracing Wood Trusses", and "Design Specification for Metal Plate Connected Wood Trusses".

**DEFINITIONS**

Gypsum Board Construction Terminology Standard: Refer to ASTM C 11 and GA 505 for definitions of terms for gypsum board construction not otherwise defined in this Section or other referenced standards.

**PRODUCT HANDLING**

Delivery and Storage: Keep materials under cover and dry. Protect against exposure to weather and contact with damp or wet surfaces. Stack lumber as well as plywood and other panels. Provide for air circulation within and around stacks and under temporary coverings, including polyethylene and similar materials.

For lumber and plywood pressure treated with waterborne chemicals, sticker between each course to provide air circulation.

Handle and store trusses with care and comply with TPI recommendations to avoid damage from bending, overturning, or other cause.

**COORDINATION**

Fit carpentry work to other work. Scribe and cope as required for accurate fit. Correlate location of nailers, blocking, grounds, and similar supports to allow attachment of other work.

## **PART 2 - PRODUCTS**

### **LUMBER, GENERAL**

Lumber Standards: Manufacture lumber to comply with PS 20 "American Softwood Lumber Standard" and with applicable grading rules of inspection agencies certified by American Lumber Standards Committee's (ALSC) Board of Review.

Grade Stamps: Factory-mark each piece of lumber with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.

Nominal sizes are indicated, except as shown by detail dimensions. Provide actual sizes as required by PS 20 for moisture content specified for each use.

Provide dressed lumber, S4S, unless otherwise indicated.

Provide seasoned lumber with 15 percent maximum moisture content at time of dressing and shipment for sizes 2" or less in nominal thickness, unless otherwise indicated.

Framing lumber unless noted otherwise, shall be of a structural grade with minimum allowable working stresses as shown on Drawings.

Studs, furring, plates, and sills shall be standard construction grade lumber unless noted otherwise on Drawings.

Miscellaneous Lumber: Provide wood for support or attachment of other work including support bases, cant strips, bucks, nailers, blocking, furring, grounds, stripping, and similar members. Provide lumber of sizes indicated, worked into shapes shown.

### **CONSTRUCTION SIP ROOF PANELS, GENERAL**

See Specification section for SIP structural roof panels.

### **WALL SHEATHING**

Exterior Fire-Rated Gypsum Sheathing: 5/8" thick "Dens-Glass Gold Firestop Type X", by Georgia-Pacific, 5/8" thick "Fiberbond Wall Sheathing", by Louisiana Pacific Corporation.

Oxboard, by Potlatch Corporation or approved equal; thickness as shown on drawings.

### **MISCELLANEOUS MATERIALS**

Fasteners and Anchorages: Provide size, type, material, and finish as indicated and as recommended by applicable standards, complying with applicable federal Specifications for nails, staples, screws, bolts, nuts, washers, and anchoring devices. Provide metal hangers and framing anchors of the size and type recommended by the manufacturer for each use including recommended nails.

Where rough carpentry work is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners and anchorages with a hot-dip zinc coating (ASTM A-153).

Foundation Anchors and Wall Bracing: Galvanized steel as manufactured by Teco, Simpson, or Kant Sag.

### **WOOD TREATMENT MATERIALS**

Preservative Treatment: Where lumber or plywood is indicated as "Treated," or is specified herein to be treated, comply with applicable requirements of AWPB Standards C2 (Lumber and C9 Plywood) and of AWPB Standards listed below. Mark each treated item with the AWPB Quality Mark Requirements.

Pressure-treat above-ground items with water-borne preservatives to comply with AWPB LP-2. After treatment, kiln-dry lumber and plywood to a maximum moisture content of 15 percent. Treat indicated items and the following:

Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers and waterproofing.

Wood sills, sleepers, blocking, furring, stripping and similar concealed members in contact with masonry or concrete.

Wood floor plates installed over concrete slabs directly in contact with earth.

Pressure-treat the following with water-borne preservatives for ground contact use complying with AWPB LP-22:

Wood members in contact with ground.

Complete fabrication of treated items prior to treatment, where possible. If cut after treatment, coat cut surfaces with heavy brush coat of same chemical used for treatment and to comply with AWPB M-4. Inspect each piece of lumber or plywood after drying and discard damaged or defective pieces.

**Fire-Retardant Treatment:** Where fire-retardant treated wood is indicated, pressure impregnate lumber and plywood with fire-retardant chemical to comply with AWPB C20 and C27, respectively, for treatment type indicated below. Identify fire-retardant treated wood lumber with appropriate classification marking of Underwriters Laboratories, Inc., U.S. Testing, Timber Products Inspection or other testing and inspecting agency acceptable to authorities having jurisdiction.

**Interior Type A:** Use where fire-retardant treated wood is indicated for interior applications.

**Exterior type:** Use where fire-retardant treated wood is indicated for exterior, exposed applications.

Inspect each piece of treated lumber or plywood after drying and discard damaged or defective pieces.

Kiln dry wood after pressure treatment to maximum 19 percent moisture content.

#### ADHESIVE

Adhesive shall be PL-400, Liquid Nail, or an equal approved by the Architect.

### **PART 3 - EXECUTION**

#### WOOD TREATMENT

Shop pressure treat and deliver to site ready for installation, wood materials requiring pressure impregnated preservatives.

#### INSTALLATION, GENERAL

Discard units of material with defects which might impair quality of work, and units which are too small to use in fabricating work with minimum joints or optimum joint arrangement.

Set carpentry work to required levels and lines, with members plumb and true to line and cut and fitted.

Fit rough carpentry to other construction. Scribe and cope as required for accurate fit. Correlate location of nailers, blocking, grounds, and similar supports to allow attachment of other construction.

Securely attach carpentry work to substrate by anchoring and fastening as shown, and to comply with "Recommended Nailing Schedule" of "Manual for Wood Frame Construction" and "National Design Specifications for Wood Construction" published by N.F.P.A.

Countersink nail heads on exposed carpentry work and fill holes.

Use common wire nails, except as otherwise indicated. Use finishing nails for finish work. Select fasteners of size that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting of wood. Predrill as required.

#### WOOD GROUNDS, NAILERS, BLOCKING, AND SLEEPERS

Provide wherever shown and where required for screeding or attachment of other work. Form to shapes as shown and cut as required for true line and level of work to be attached. Coordinate location with other work involved.

Attach to substrates as required to support applied loading. Countersink bolts and nuts flush with surfaces, unless otherwise indicated. Build into masonry during installation of masonry work. Where possible, anchor to formwork before concrete placement.

## INSTALLATION OF CONSTRUCTION PANELS

General: Comply with applicable recommendations BY SIP PANEL MANUFACTURERER for types of construction panels and applications indicated.

Fastening Methods: Fasten panels as indicated below:

Roof Panels: Screw and glue to wood nailers on steel framing PER mfr recommendations. No staples will be permitted.

At Roof Sheathing, provide suitable edge support as recommended by ADA by use of panel clips, or lumber blocking between Joist. Panel End Joints shall occur over framing. Provide 1/8" spacing at Panel Edges and Ends.

## INSTALLATION OF GYPSUM SHEATHING

General: Install gypsum sheathing to comply with manufacturer's instructions, GA-253, and the following:

Cut boards at penetrations, edges, and other obstructions of the work. Fit tightly against abutting construction, except provide a 3/8" setback where non-load-bearing construction abuts structural elements.

Coordinate sheathing installation with flashing and joint sealant installation so that these combined materials are installed in the sequence and manner that prevents exterior moisture from passing through completed exterior wall assembly.

Apply fasteners so that screw heads bear tightly against face of gypsum sheathing boards, but do not cut into face paper.

Do not bridge building expansion joints with gypsum sheathing. Cut and space edges to match spacing of structural support elements.

Vertical Installation: Install four-foot-wide gypsum sheathing boards vertically with vertical edges centered over flanges of studs. Abut ends and edges of each board with those of adjoining boards. Screw-attach boards at perimeter and within field of board to each steel stud as follows:

Fasteners spaced approximately 8" o.c. and set-back 3/8" minimum from edges and ends of boards.

## PROTECTION

Protect gypsum sheathing that will be left exposed to weather for more than one month as follows:

Protect cutouts, corners, and joints in the sheathing by filling with a flexible sealant or by applying sheathing tape recommended by sheathing manufacturer at the time sheathing is applied.

**END OF SECTION**

SECTION 07113  
Masonry Waterproofing

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
  - 1. Cold applied water based emulsified asphalt vapor retarding coating for exterior above grade cavity walls.
- B. Related Sections:
  - 1. Section 04 21 00 – Masonry Assemblies Unit Masonry.

1.2 SYSTEM DESCRIPTION

- A. Performance Requirements: Provide material complying with the following requirements:
  - 1. Nonflammable.
  - 2. VOC Content:
    - a. 0.25 pounds per gallon (30 g/L) less water and exempt solvents.
  - 3. Service Temperature Range:
    - a. Minus 40 degrees F (Minus 40 degrees C) to 150 degrees F to (66 degrees C).
  - 4. Compliance:
    - a. Trowel applied long fiber reinforced complying with ASTM D1227, Type 2, Class I and ASTM D1187, Type 1.

1.3 SUBMITTALS

- A. Comply with Submittal Section
- B. Product Data: Submit manufacturer's technical bulletins and MSDS on each product.
- C. Submit list of project references as documented in this Specification under Quality Assurance Article. Include contact name and phone number of person charged with oversight of each project.
- D. Quality Control Submittals:
  - 1. Provide protection plan of surrounding areas and surfaces not to receive damproofing.

#### 1.4 QUALITY ASSURANCE

- A. Comply with Section.
- B. Qualifications:
  - 1. Manufacturer Qualifications: Company with minimum 15 years of experience in manufacturing of specified products and systems.
  - 2. Manufacturer Qualifications: Company shall be ISO 9001:2000 Certified.
  - 3. Applicator Qualifications: Company with minimum of 5 years experience in application of specified products and systems on projects of similar size and scope, and is acceptable to product manufacturer.
    - a. Successful completion of a minimum of 5 projects of similar size and complexity to specified Work.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Comply with Section.
- B. Comply with manufacturer's ordering instructions and lead-time requirements to avoid construction delays.
- C. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- D. Store tightly sealed materials off ground and away from moisture, direct sunlight, extreme heat, and freezing temperatures.

#### 1.6 PROJECT CONDITIONS

- A. Environmental Requirements:
  - a. Keep from freezing in the container.
  - b. Do not apply at temperatures below 40 degrees F (4 degrees C) or when temperatures are expected to fall to 40 degrees F (4 degrees C) within 24 hours.
  - c. Protect from rain until coating has set.
  - d. Application shall be protected or covered within 7 days of application.
  - e. Do not expose to long-term UV.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Subject to compliance with requirements, provide products from the following manufacturer:
  - 1. BASF Building Systems  
889 Valley Park Drive

Shakopee, MN 55379  
Customer Service: 800- 433-9517  
Technical Service: 800-243-6739  
Direct Phone: 952-496-6000  
Internet: <http://www.BASFbuildingsystems.com>

- B. Substitutions: Comply with Section.
- C. Specifications and Drawings are based on manufacturer's proprietary literature from BASF Building Systems. Other manufacturers shall comply with minimum levels of material, color selection, and detailing indicated in Specifications or on Drawings. Architect will be sole judge of appropriateness of substitutions.

## 2.2 MATERIALS

- A. Cold applied water based emulsified asphalt:
  - 1. Long-fiber Fibrated Product: Hydrocide 700 by BASF Building Systems.
- B. Insulation Board: – 1-1/2" rigid polyurethane board refer to other section.
- C. Chemical Cleaner: Reducer 990 by BASF Building Systems.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Comply with Section.

### 3.2 SURFACE PREPARATION

- A. Protect adjacent Work areas and finish surfaces from damage during damproofing application.
- B. Surface should be free of oil, grease, dirt, laitance, and loose material. Dry surfaces shall be dampened with water and kept damp until application.

### 3.3 APPLICATION

- 1. Apply long fiber fibrated material in 1 coat by trowel.
  - 2. Fill in crevices and grooves, providing continuous coating and free from breaks and pinholes. Carry coating over exposed top and outside edge of footing. Spread around joints, grooves, and slots, and into chases, corners, reveals, and soffits. Bring coating to finished grade.
  - 3. Place backfill at least 24 to 48 hours after application, but within 7 days. Do not rupture or damage film or displace coating or membranes.
- B. Cavity wall construction Above Grade – Vapor Retarder:

1. Apply fibrated material in 1 coat, carrying coating in and around joints, grooves, and slots, following reveals and soffits of windows, and continuing 12 inches (305 mm) out on adjoining partitions and soffits.
  - C. Install above grade insulation board in conjunction with bituminous material application with fibrated asphalt material.
- 3.4 CLEANING
- A. Clean tools and equipment immediately with hot, soapy water. Cured material can be removed with solvent.
  - B. Clean up and properly dispose of debris remaining on Project site related to application.
  - C. Remove temporary coverings and protection from adjacent Work areas.
- 3.5 PROTECTION
- A. Protect application from damage during construction.

END OF SECTION



## SECTION 07121

### Concrete Masonry Unit Waterproofing

#### **PART 1 - GENERAL**

##### RELATED DOCUMENTS

Drawings and General Provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

**DESCRIPTION OF WORK:** Work in this Section includes, but is not necessarily limited to, waterproofing exterior surface of all concrete masonry units

##### RELATED SECTIONS

Section 07620 - Sheet Metal Flashing and Trim

##### SUBMITTALS

Submit product data, samples and manufacturer's surface preparation and installation instructions.

For information only, submit copies of all referenced standards utilized for this project, unless duplicated in product data.

##### QUALITY ASSURANCE.

###### **Test Area**

Test a minimum 4 ft. by 4 ft. area on each type of masonry. Use the manufacturer's application instructions. Let test area protective treatment cure before inspection. Keep test panels available for comparison throughout the protective treatment project.

##### WARRANTY

Submit two copies of a written guarantee agreeing to repair or replace waterproofing applications which fail to perform as water tight surfaces and watertight joints; or fail weather resistance, or general durability; or appear to deteriorate in any other manner not clearly specified by submitted manufacturer's data as an inherent quality of the material for the exposure indicated. Provide two-year warranty.

Replace sealants which fail because of loss of cohesion or adhesion or do not cure.

#### **PART 2 - PRODUCTS**

**WATER PROOFING PRODUCT:** **Manufacturer:** PROSOCO, Inc., 3741 Greenway Circle, Lawrence, KS 66046. Phone: (800) 255-4255; Fax: (785) 830-9797. E-mail: [ustomerCare@prosoco.com](mailto:ustomerCare@prosoco.com)

##### **Product Description**

Sure Klean® Weather Seal Siloxane WB Concentrate is a concentrated water repellent designed for dilution with fresh water at the job site. This solvent-free blend of silanes and oligomeric alkoxysiloxanes mixes easily with water to produce a penetrating low-VOC water repellent ideal for application to dense or porous masonry surfaces.

##### **Technical Data**

FORM: Clear amber liquid

SPECIFIC GRAVITY: 0.96

ACTIVE CONTENT: 100%

pH: N/A

WT./GAL.: 7.9 lbs.

FLASH POINT: 69 degrees F (21 degrees C) concentrate ASTM D 3278

140 degrees F (60 degrees C) in 1:9 dilution

145 degrees F (62 degrees C) in 1:14 dilution

FREEZE POINT: < -22 degrees F (< -30 degrees C)

VOC CONTENT: Complies with all known national, state and district AIM VOC regulations at recommended dilutions.

##### **Limitations**

- Product must be applied within 24 hours of dilution for maximum effectiveness.
- Will not prevent water penetration through structural cracks, defects or open joints.

### **PART 3 - EXECUTION**

#### **Application**

Before applying, read "Preparation" and "Safety Information" sections in the Manufacturer's Product Data Sheet for Weather Seal Siloxane WB Concentrate. Refer to the Product Data Sheet for additional information about application and dilution rates of Weather Seal Siloxane WB Concentrate.

#### **Dilution**

Dilute with clean, potable water only. Mixing vessels must be clean, dry and free of contaminants. When added to water, Siloxane WB turns milky white. Mix lightly to produce a uniform consistency.

Siloxane WB is most effective when prepared solutions are applied within 8 hours of dilution, and must be applied within 24 hours of dilution.

#### **Dilution Ratios**

##### *Vertical Surfaces*

Porous 1 part concentrate : 9 parts water

Semiporous 1 part concentrate : 14 parts water

Dense 1 part concentrate : 19 parts water

##### *Horizontal Surfaces*

Porous 1 part concentrate : 7 parts water

Semiporous 1 part concentrate : 9 parts water

Dense 1 part concentrate : 14 parts water

#### **Vertical Application Instructions**

For best results, apply diluted protective treatment "wet-on-wet" to a visibly dry and absorbent surface.

**Spray:** Saturate from the bottom up, creating a 4" to 8" (15 to 20 cm) rundown below the spray contact point. Let the first application penetrate for 2-3 minutes. Resaturate. Less material will be needed for the second application.

**Brush or roller:** Saturate uniformly. Let diluted protective treatment penetrate for 2 to 3 minutes. Brush out heavy runs and drips that do not penetrate.

#### **Fluted architectural block:**

Spray in an "overlapping X pattern" for complete coverage of recessed surfaces.

#### **Horizontal Application Instructions**

1. Saturate in a single application. Use enough to keep the surface wet for 2 to 3 minutes before penetration.

2. Broom out puddles until they penetrate the surface.

Note: Protect treated surfaces from rain for 4 hours and from pedestrian and vehicular traffic until visibly dry.

**END OF SECTION 07121**

## **SECTION 07210**

### **BUILDING BATT AND SHEET FOAM INSULATION**

#### **PART 1 - GENERAL**

##### **RELATED DOCUMENTS**

Drawings and General Provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

**WORK INCLUDED:** Work included under this Section includes, but is not necessarily limited to, furnishing and installing the following:

Batt Insulation below pre-fab metal roof and exterior walls and limited other uses.

Foundation Wall and Under Slab Insulation

Insulation baffles if required

##### **RELATED SECTIONS**

Section 04200 - Unit Masonry

Section 09221 – Non-structural metal framing

Section 13121 – Pre-fab building

##### **QUALITY ASSURANCE**

**Thermal Resistivity:** Where thermal resistivity properties of insulation materials are designated by r-values, they represent the rate of heat flow through a homogeneous material exactly 1" thick, measured by test method included in referenced material standard or otherwise indicated. They are expressed by the temperature difference in degrees F between the two exposed faces required to cause one BTU to flow through one square foot per hour at mean temperatures indicated.

**Fire Performance Characteristics:** Provide insulation materials which are identical to those whose fire performance characteristics, as listed for each material or assembly of which insulation is a part, have been determined by testing, per methods indicated below, by UL or other testing and inspecting agency acceptable to authorities having jurisdiction.

Surface Burning Characteristics: ASTM E-84

Fire Resistance Ratings: ASTM E-119

Combustion Characteristics: ASTM E-136

**Asbestos Content of Inorganic Insulations:** provide insulations composed of mineral fibers or mineral ores which contain no asbestos of any type of mixture of types occurring naturally as impurities as determined by polarized light microscopy test per Appendix A of 40 CFR 763.

All insulation in roof and wall assemblies shall be approved for use without an additional thermal barrier in accordance with Local Building Codes.

##### **SUBMITTALS**

**Product Data:** Submit manufacturer's product literature and installation instructions for each type of insulation and vapor retarder material required.

**Certified Test Reports:** With product data, submit copies of certified test reports showing compliance with specified performance values, including R-values (aged values for plastic insulations), densities, compression strengths, fire performance characteristics, perm ratings, water absorption ratings and similar properties.

##### **DELIVERY, STORAGE, AND HANDLING**

Deliver insulation in original labeled bundles.

**General Protection:** Protect insulations from physical damage and from becoming wet, soiled, or covered with ice or snow. Comply with manufacturer's recommendations for handling, storage, and protection during installation.

Protection for Plastic Insulation

Do not expose to sunlight, except to extent necessary for period of installation and concealment.

Protect against ignition at all times. Do not deliver plastic insulating materials to project site ahead of installation time.

Complete installation and concealment of plastic materials as rapidly as possible in each area of work.

#### **JOB CONDITIONS**

The Installer must examine the substrate and the conditions under which insulation work is to be performed and notify the Architect in writing of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

Weather Conditions: Proceed with work only when weather conditions are in compliance with manufacturer's recommended limitations, and when conditions will permit the work to proceed in accordance with requirements and the manufacturer's recommendations.

Do not apply insulation to damp, frozen, dirty, dusty, or surfaces unacceptable to manufacturer.

Coordinate this work with all trades and protect it after installation.

### **PART 2 - PRODUCTS**

#### **ACCEPTABLE INSULATION MANUFACTURERS**

Unfaced Glass Fiber Batt Insulation

Owens-Corning Fiberglass Corp.

Schuller International (Manville).

Certainteed Corp.

Approved Equal

Extruded Polystyrene Foam Board Insulation

Foundation Walls and Under Slab.

"Styrofoam Square Edge" by Dow Chemical Company.

"Foamular 150" by UC Industries.

Approved Equal.

#### **INSULATING MATERIALS**

General: Provide insulating materials which comply with requirements indicated for materials, compliance with referenced standards, and other characteristics.

Extruded Polystyrene Board Insulation: Rigid, cellular thermal insulation with closed-cells and integral high density skin, formed by the expansion of polystyrene base resin in an extrusion process to comply with ASTM C-578 for Type indicated; with 5-year aged r-values of 5.4 and 5 at 40 and 75 deg. F. (4.4 and 23.9 deg. C.), respectively; and as follows:

Type IV, 1.6 lb./cu. ft. min. density, unless otherwise indicated.

UnFaced Mineral Fiber Blanket/Batt Insulation: Thermal insulation produced by combining glass mineral fibers with thermosetting resins to comply with ASTM C 665 for Type I.

Insulation Baffles: Preformed Rigid fiberboard or Plastic Sheets designed and sized to fit between Roof Framing Members, and to provide Cross Ventilation between insulated Attic Spaces and Vented Eaves..

### **PART 3 - EXECUTION**

#### **INSPECTION AND PREPARATION**

Require Installer to examine substrates and conditions under which insulation work is to be performed. A satisfactory substrate is one that complies with requirements of the section in which substrate and related work is specified. Obtain Installer's written report listing conditions

detrimental to performance of work in this section. Do not proceed with installation of insulation until unsatisfactory conditions have been corrected.

Verify adjacent materials are dry and ready to receive insulation.

Verify mechanical and electrical services within insulated spaces have been installed and tested.

Verify substrate surface is flat, free of honeycomb, fins, irregularities, and materials that will impede adhesive bond.

Clean substrates of substances harmful to insulations or vapor retarders, including removal of projections which might puncture vapor retarders.

#### INSTALLATION, GENERAL

Comply with manufacturer's instructions for particular conditions of installation in each case. If printed instructions are not available or do not apply to project conditions, consult manufacturer's technical representative for specified recommendations before proceeding with work.

Verify insulation boards are unbroken and free of damage.

Extend insulation full thickness as shown over entire area to be insulated. Cut and fit tightly around obstructions, and fill voids with insulation. Remove projections which interfere with placement.

Apply a single layer of insulation of required thickness, unless otherwise shown or required to make up total thickness.

Trim insulation neatly to fit spaces. Use boards free of damage.

Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within the plane of insulation. Leave no gaps or voids.

Install all insulation in accordance with manufacturer's specifications.

#### INSTALLATION OF PERIMETER AND UNDERSLAB INSULATION

On vertical surfaces, set units in adhesive applied in accordance with manufacturer's instructions. Use type of adhesive recommended by manufacturer of insulation.

Protect top surface of horizontal insulation (from damage during concrete work) by application of protection board.

#### INSTALLATION OF GENERAL BUILDING INSULATION

Apply insulation units to substrate by method indicated, complying with manufacturer's recommendations. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

Set vapor retarder faced units with vapor retarder to warm side of construction, except as otherwise indicated. Do not obstruct ventilation spaces, except for firestopping.

Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to surrounding construction to ensure airtight installation.

Pour granular fill insulation into cavities as shown, to completely fill void spaces. Maintain inspection ports to show presence of insulation at extremities of each pour area. Close ports after complete coverage has been confirmed. Limit fall of insulation to one story in height, but not to exceed 10'-0".

#### PROTECTION

General: Protect installed insulation and vapor retarders from harmful weather exposures and from possible physical abuses, where possible by non-delayed installation of concealing work or, where that is not possible, by temporary covering or enclosure.

#### END OF SECTION



## SECTION 07211

### FOAMED-IN-PLACE CMU INSULATION

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Section Includes:
  - 1. Foamed-in-place insulation in all open cell masonry cavities.
  - 2. Foamed-in-place insulation at junctions of dissimilar wall and roof materials to achieve a thermal and air seal.
- B. Related Sections:
  - 1. Division 01: Administrative, procedural, and temporary work requirements.

##### 1.2 REFERENCES

- A. ASTM International (ASTM):
  - 1. C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
  - 2. C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
  - 3. D5116 - Standard Guide for Small-Scale Environmental Chamber Determinations of Organic Emissions From Indoor Materials/Products.
  - 4. E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

##### 1.3 SUBMITTALS

- A. Submittals for Review:
  - 1. Product Data: Provide product description, insulation properties, and preparation requirements.
- B. Quality Control Submittals:
  - 1. Certificates of Compliance: Certification from an independent testing laboratory that insulation meets fire hazard classification requirements.
- C. Sustainable Design Submittals:
  - 1. Low-Emitting Materials.

##### 1.4 QUALITY ASSURANCE

- A. Applicator Qualifications: Minimum 5 years documented experience in work of this Section.
- B. Fire Hazard Classification: Maximum flame spread/smoke developed rating of 25/450, tested to ASTM E84.

##### 1.5 PROJECT CONDITIONS

- A. Do not install insulation when ambient temperature is below 70 degrees F.

#### PART 2 PRODUCTS

##### 2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
  - 1. Core Foam. ([www.cfifoam.com](http://www.cfifoam.com))
  - 2. Demilec USA ([www.demilecusa.com](http://www.demilecusa.com))
  - 3. Polymaster, Inc. ([www.polymaster.com](http://www.polymaster.com))
  - 4. Thermal Corp. of America. ([www.thermcofoam.com](http://www.thermcofoam.com))

Substitutions: [Under provisions of Division 01.]

## 2.2 MATERIALS

- A. Foamed-In-Place Insulation:
  - 1. Type: Two component, plastic resin and catalyst, cold setting foam, [open] [closed] cell.
  - 2. R-value: Minimum 4.4 per inch at [75] [ ] degrees F, tested to ASTM C177 or ASTM C518.
  - 3. No CFC or HCFC emissions and total formaldehyde emissions less than 1 percent, cured for 7 days and tested to ASTM D5116 for 24 hours.

## PART 3 EXECUTION

### 3.1 PREPARATION

- A. Protect adjacent surfaces from accidental application.

### 3.2 APPLICATION

- A. Apply insulation in accordance with manufacturer's instructions.
- B. Apply insulation by froth method, to uniform monolithic density without voids.

### 3.3 ADJUSTING

- A. Patch damaged areas.

END OF SECTION



**SECTION 07270**  
**FIRE BARRIER SYSTEMS**

**PART 1 - GENERAL**

**RELATED DOCUMENTS**

Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

**DESCRIPTION OF WORK:** Work of this Section shall include, but not necessarily be limited to, furnishing and installing the following:

Penetrations through fire-resistance-rated floor and roof construction, including both empty openings and openings containing cables, pipes, ducts, conduits, and other penetrating items.

Penetrations through fire-resistance-rated walls and partitions, including both empty openings and openings containing cables, pipes, ducts, conduits, and other penetrating items.

**RELATED SECTIONS**

Refer to Division 15 and 16 Sections for additional requirements.

**SYSTEM PERFORMANCE REQUIREMENTS**

**General:** Provide firestopping systems that are produced and installed to resist the spread of fire, according to requirements indicated, and the passage of smoke and other gases.

**F-Rated Through-Penetration Firestop Systems:** Provide through-penetration firestop systems with F ratings indicated, as determined per ASTM E 814, but not less than that equaling or exceeding the fire-resistance rating of the constructions penetrated.

**T-Rated Through-Penetration Firestop Systems:** Provide through-penetration firestop systems with T ratings, in addition to F ratings, as determined per ASTM E 814, where indicated and where systems protect penetrating items exposed to contact with adjacent materials in occupiable floor areas. T-rated assemblies are required where the following conditions exist:

Where firestop systems protect penetrations located outside of wall cavities.

Where firestop systems protect penetrations located outside fire-resistive shaft enclosures.

Where firestop systems protect penetrations located in construction containing doors required to have a temperature-rise rating.

Where firestop systems protect penetrating items larger than a 4-inch-diameter nominal pipe or 16 sq. in. in overall cross-sectional area.

For firestopping exposed to view, traffic, moisture, and physical damage, provide products that do not deteriorate when exposed to these conditions.

For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.

For floor penetrations with annular spaces exceeding 4 inches or more in width and exposed to possible loading and traffic, provide firestop systems capable of supporting the floor loads involved either by installing floor plates or by other means.

For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.

**SUBMITTALS**

**General:** Submit the following according to Conditions of Contract and Division 1 Specification Sections.

Product data for each type of product specified.

Certification by firestopping manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs) and are nontoxic to building occupants.

Product certificates signed by manufacturers of firestopping products certifying that their products comply with specified requirements.

Product test reports from, and based on tests performed by, a qualified testing and inspecting agency evidencing compliance of firestopping with requirements based on comprehensive testing of current products.

## QUALITY ASSURANCE

**Fire-Test-Response Characteristics:** Provide firestopping that complies with the following requirements and those specified under the "System Performance Requirements" article:

Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL, Warnock Hersey, or another agency performing testing and follow-up inspection services for firestop systems that is acceptable to authorities having jurisdiction.

Through-penetration firestop systems are identical to those tested per ASTM E 814 under conditions where positive furnace pressure differential of at least 0.01 inch of water is maintained at a distance of 0.78 inch below the fill materials surrounding the penetrating items in the test assembly. Provide rated systems complying with the following requirements:

Through-penetration firestop system products bear classification marking of qualified testing and inspecting agency.

Through-penetration firestop systems correspond to those indicated by reference to through-penetration firestop system designations listed by UL in their "Fire Resistance Directory", by Warnock Hersey or by another qualified testing and inspecting agency.

Information within construction documents referring to specific design designations of through-penetration firestop systems is intended to establish requirements for performance based on conditions that are expected to exist during installation. Any changes in conditions and designated systems require the Architect's prior approval. Submit documentation showing that the performance of proposed substitutions equals or exceeds that of the systems they would replace and are acceptable to authorities having jurisdiction.

**Single-Source Responsibility:** Obtain through-penetration firestop systems for each kind of penetration and construction condition indicated from a single manufacturer.

Provide firestopping products containing no detectable asbestos as determined by the method specified in 40 CFR Part 763, Subpart F, Appendix A, Section 1, "Polarized Light Microscopy".

**Coordinate Work:** Coordinate construction of openings and penetrating items to ensure that designated through-penetration firestop systems are installed per specified requirements.

## DELIVERY, STORAGE, AND HANDLING

Deliver firestopping products to project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, lot number, shelf life, if applicable, qualified testing and inspecting agency's classification marking applicable to project, curing time, and mixing instructions for multicomponent materials.

Store and handle firestopping materials to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

## PROJECT CONDITIONS

**Environmental Conditions:** Do not install firestopping when ambient or substrate temperatures are outside limits permitted by firestopping manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

**Ventilation:** Ventilate firestopping per firestopping manufacturers' instructions by natural means or, where this is inadequate, forced air circulation.

## **PART 2 - PRODUCTS**

### FIRESTOPPING, GENERAL

**Compatibility:** Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping

under conditions of service and application, as demonstrated by firestopping manufacturer based on testing and field experience.

Accessories: Provide components for each firestopping system that are needed to install fill materials and to comply with "System Performance Requirements" article in Part 1. Use only components specified by the firestopping manufacturer and approved by the qualified testing and inspecting agency for the designated fire-resistance-rated systems. Accessories include, but are not limited to, the following items:

Permanent Forming/Damming/Backing Materials, Including the Following:

Semirefractory Fiber (mineral wool) Insulation

Ceramic Fiber

Sealants Used in Combination with Other Forming/Damming Materials to Prevent Leakage of Fill Materials in Liquid State

Fire-rated Formboard

Temporary Forming materials

Substrate Primers

Collars

Steel Sleeves

Fire barrier penetration sealing systems shall be as manufactured by one of the following:

3M Brand Fire Protection Products

"Firemaster", by Thermal Ceramics

Tremco

United States Gypsum Company

Hilti

INSTALLATION DETAILS: Refer to details at the end of this Section.

Systems shall include all necessary items for use in areas as shown on the Drawings.

3M fire protection product details are included in these Specifications only to establish the level of quality, except where specific manufacturer products not listed above is specified. Equivalent products by any of the listed manufacturers will be acceptable, as approved by the Architect.

Under normal environmental conditions, all material used shall be non-corrosive to metal and compatible with synthetic cable jackets. When exposed to flame or heat, it should be capable of expanding up to ten times.

Provide all miscellaneous items required to attach materials as specified and shown on Drawings.

### **PART 3 - EXECUTION**

#### **EXAMINATION**

Examine substrates and conditions, with installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of firestopping. Do not proceed with installation until unsatisfactory conditions have been corrected.

#### **PREPARATION**

Surface Cleaning: Clean out openings and joints immediately prior to installing firestopping to comply with recommendations of firestopping manufacturer and the following requirements:

Remove all foreign materials from surfaces of opening and joint substrates and from penetrating items that could interfere with adhesion of firestopping.

Clean opening and joint substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with firestopping. Remove loose particles remaining from cleaning operation.

Remove laitance and form release agents from concrete.

Priming: Prime substrates where recommended by firestopping manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond. Do not allow spillage and migration onto exposed surfaces.

Masking Tape: Use masking tape to prevent firestopping from contacting adjoining surfaces that will remain exposed upon completion of work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestopping materials. Remove tape as soon as it is possible to do so without disturbing firestopping's seal with substrates.

#### INSTALLING THROUGH-PENETRATION FIRESTOPS

General: Comply with the "System Performance Requirements" article in Part 1 and the through-penetration firestop manufacturer's installation instructions and drawings pertaining to products and applications indicated.

Install forming/damming materials and other accessories of types required to support fill materials during their application and in the position needed to produce the cross-sectional shapes and depths required to achieve fire ratings of designated through-penetration firestop systems. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.

Install fill materials for through-penetration firestop systems by proven techniques to produce the following results:

- Completely fill voids and cavities formed by openings, forming materials, accessories, and penetrating items.

- Apply materials so they contact and adhere to substrates formed by openings and penetrating items.

- For fill materials that will remain exposed after completing work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

#### CLEANING

Clean-off excess fill materials and sealants adjacent to openings and joints as work progresses by methods and with cleaning materials approved by manufacturers of firestopping products and of products in which opening and joints occur.

Protect firestopping during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated firestopping immediately and install new materials to produce firestopping complying with specified requirements.

Promptly remove any excess materials from any exposed finish surfaces. Repair floors, walls, or other surfaces which have been stained, marred, or otherwise damaged during installation of fire barrier materials.

**END OF SECTION 07270**

**SECTION 07270**  
**FIRE BARRIER SYSTEMS**

**PART 1 - GENERAL**

**RELATED DOCUMENTS**

Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

**DESCRIPTION OF WORK:** Work of this Section shall include, but not necessarily be limited to, furnishing and installing the following:

Penetrations through fire-resistance-rated floor and roof construction, including both empty openings and openings containing cables, pipes, ducts, conduits, and other penetrating items.

Penetrations through fire-resistance-rated walls and partitions, including both empty openings and openings containing cables, pipes, ducts, conduits, and other penetrating items.

**RELATED SECTIONS**

Refer to Division 15 and 16 Sections for additional requirements.

**SYSTEM PERFORMANCE REQUIREMENTS**

**General:** Provide firestopping systems that are produced and installed to resist the spread of fire, according to requirements indicated, and the passage of smoke and other gases.

**F-Rated Through-Penetration Firestop Systems:** Provide through-penetration firestop systems with F ratings indicated, as determined per ASTM E 814, but not less than that equaling or exceeding the fire-resistance rating of the constructions penetrated.

**T-Rated Through-Penetration Firestop Systems:** Provide through-penetration firestop systems with T ratings, in addition to F ratings, as determined per ASTM E 814, where indicated and where systems protect penetrating items exposed to contact with adjacent materials in occupiable floor areas. T-rated assemblies are required where the following conditions exist:

Where firestop systems protect penetrations located outside of wall cavities.

Where firestop systems protect penetrations located outside fire-resistive shaft enclosures.

Where firestop systems protect penetrations located in construction containing doors required to have a temperature-rise rating.

Where firestop systems protect penetrating items larger than a 4-inch-diameter nominal pipe or 16 sq. in. in overall cross-sectional area.

For firestopping exposed to view, traffic, moisture, and physical damage, provide products that do not deteriorate when exposed to these conditions.

For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.

For floor penetrations with annular spaces exceeding 4 inches or more in width and exposed to possible loading and traffic, provide firestop systems capable of supporting the floor loads involved either by installing floor plates or by other means.

For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.

**SUBMITTALS**

**General:** Submit the following according to Conditions of Contract and Division 1 Specification Sections.

Product data for each type of product specified.

Certification by firestopping manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs) and are nontoxic to building occupants.

Product certificates signed by manufacturers of firestopping products certifying that their products comply with specified requirements.

Product test reports from, and based on tests performed by, a qualified testing and inspecting agency evidencing compliance of firestopping with requirements based on comprehensive testing of current products.

#### QUALITY ASSURANCE

**Fire-Test-Response Characteristics:** Provide firestopping that complies with the following requirements and those specified under the "System Performance Requirements" article:

Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL, Warnock Hersey, or another agency performing testing and follow-up inspection services for firestop systems that is acceptable to authorities having jurisdiction.

Through-penetration firestop systems are identical to those tested per ASTM E 814 under conditions where positive furnace pressure differential of at least 0.01 inch of water is maintained at a distance of 0.78 inch below the fill materials surrounding the penetrating items in the test assembly. Provide rated systems complying with the following requirements:

Through-penetration firestop system products bear classification marking of qualified testing and inspecting agency.

Through-penetration firestop systems correspond to those indicated by reference to through-penetration firestop system designations listed by UL in their "Fire Resistance Directory", by Warnock Hersey or by another qualified testing and inspecting agency.

Information within construction documents referring to specific design designations of through-penetration firestop systems is intended to establish requirements for performance based on conditions that are expected to exist during installation. Any changes in conditions and designated systems require the Architect's prior approval. Submit documentation showing that the performance of proposed substitutions equals or exceeds that of the systems they would replace and are acceptable to authorities having jurisdiction.

**Single-Source Responsibility:** Obtain through-penetration firestop systems for each kind of penetration and construction condition indicated from a single manufacturer.

Provide firestopping products containing no detectable asbestos as determined by the method specified in 40 CFR Part 763, Subpart F, Appendix A, Section 1, "Polarized Light Microscopy".

**Coordinate Work:** Coordinate construction of openings and penetrating items to ensure that designated through-penetration firestop systems are installed per specified requirements.

#### DELIVERY, STORAGE, AND HANDLING

Deliver firestopping products to project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, lot number, shelf life, if applicable, qualified testing and inspecting agency's classification marking applicable to project, curing time, and mixing instructions for multicomponent materials.

Store and handle firestopping materials to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

#### PROJECT CONDITIONS

**Environmental Conditions:** Do not install firestopping when ambient or substrate temperatures are outside limits permitted by firestopping manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

**Ventilation:** Ventilate firestopping per firestopping manufacturers' instructions by natural means or, where this is inadequate, forced air circulation.

## **PART 2 - PRODUCTS**

### **FIRESTOPPING, GENERAL**

Compatibility: Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by firestopping manufacturer based on testing and field experience.

Accessories: Provide components for each firestopping system that are needed to install fill materials and to comply with "System Performance Requirements" article in Part 1. Use only components specified by the firestopping manufacturer and approved by the qualified testing and inspecting agency for the designated fire-resistance-rated systems. Accessories include, but are not limited to, the following items:

Permanent Forming/Damming/Backing Materials, Including the Following:

Semirefractory Fiber (mineral wool) Insulation

Ceramic Fiber

Sealants Used in Combination with Other Forming/Damming Materials to Prevent Leakage of Fill Materials in Liquid State

Fire-rated Formboard

Temporary Forming materials

Substrate Primers

Collars

Steel Sleeves

Fire barrier penetration sealing systems shall be as manufactured by one of the following:

3M Brand Fire Protection Products

"Firemaster", by Thermal Ceramics

Tremco

United States Gypsum Company

Hilti

INSTALLATION DETAILS: Refer to details at the end of this Section.

Systems shall include all necessary items for use in areas as shown on the Drawings.

3M fire protection product details are included in these Specifications only to establish the level of quality, except where specific manufacturer products not listed above is specified. Equivalent products by any of the listed manufacturers will be acceptable, as approved by the Architect.

Under normal environmental conditions, all material used shall be non-corrosive to metal and compatible with synthetic cable jackets. When exposed to flame or heat, it should be capable of expanding up to ten times.

Provide all miscellaneous items required to attach materials as specified and shown on Drawings.

## **PART 3 - EXECUTION**

### **EXAMINATION**

Examine substrates and conditions, with installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of firestopping. Do not proceed with installation until unsatisfactory conditions have been corrected.

### **PREPARATION**

Surface Cleaning: Clean out openings and joints immediately prior to installing firestopping to comply with recommendations of firestopping manufacturer and the following requirements:

Remove all foreign materials from surfaces of opening and joint substrates and from penetrating items that could interfere with adhesion of firestopping.

Clean opening and joint substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with firestopping. Remove loose particles remaining from cleaning operation.

Remove laitance and form release agents from concrete.

Priming: Prime substrates where recommended by firestopping manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond. Do not allow spillage and migration onto exposed surfaces.

Masking Tape: Use masking tape to prevent firestopping from contacting adjoining surfaces that will remain exposed upon completion of work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestopping materials. Remove tape as soon as it is possible to do so without disturbing firestopping's seal with substrates.

#### INSTALLING THROUGH-PENETRATION FIRESTOPS

General: Comply with the "System Performance Requirements" article in Part 1 and the through-penetration firestop manufacturer's installation instructions and drawings pertaining to products and applications indicated.

Install forming/damming materials and other accessories of types required to support fill materials during their application and in the position needed to produce the cross-sectional shapes and depths required to achieve fire ratings of designated through-penetration firestop systems. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.

Install fill materials for through-penetration firestop systems by proven techniques to produce the following results:

- Completely fill voids and cavities formed by openings, forming materials, accessories, and penetrating items.

- Apply materials so they contact and adhere to substrates formed by openings and penetrating items.

- For fill materials that will remain exposed after completing work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

#### CLEANING

Clean-off excess fill materials and sealants adjacent to openings and joints as work progresses by methods and with cleaning materials approved by manufacturers of firestopping products and of products in which opening and joints occur.

Protect firestopping during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated firestopping immediately and install new materials to produce firestopping complying with specified requirements.

Promptly remove any excess materials from any exposed finish surfaces. Repair floors, walls, or other surfaces which have been stained, marred, or otherwise damaged during installation of fire barrier materials.

**END OF SECTION 07270**



**SECTION 07620**  
**SHEET METAL FLASHING AND TRIM**

**PART 1 - GENERAL**

**RELATED DOCUMENTS**

Drawings and General Provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

**DESCRIPTION OF WORK:** Work of this Section includes, but is not necessarily limited to, furnishing and installing the following:

Exposed Trim and Fascia

Roof Drainage Systems

Metal Flashing

Flashing at Windows, Doors and other locations as shown on Drawings.

**RELATED SECTIONS**

Section 06100 - Rough Carpentry: Installation of Wood Blocking, Nailers, and Grounds.

Section 07530 – Membrane roofing

Section 07900 - Joint Sealers

**QUALITY ASSURANCE**

**Installer Qualifications:** Engage an experienced installer who has completed sheet metal flashing and trim work similar in material, design, and extent to that indicated for this project and with a record of successful in-service performance.

**SUBMITTALS**

Submit Shop Drawings, color samples, product information, and samples clearly detailing shaping, jointing, length of sections, fastening, and installation details.

For information only, submit two copies of Specifications, installation instructions, and general recommendations by the manufacturer of flashing and sheet metal materials. Include published data or certified test data for each material showing compliance with the requirements. Indicate by transmittal form that one copy of each installation instruction has been distributed to the installer.

**EXISTING CONDITIONS**

Exercise care when working on or about roof surfaces to avoid damaging or puncturing membrane or flexible flashings.

Place plywood panels on roof surfaces adjacent to work of this Section and on access routes. Keep in place until completion of work.

Roofing and flashing shall not be applied during precipitation and shall not be started in the event there is a probability of precipitation during application. Metal faced flashing shall not be applied when ambient temperature is below 35 degrees F.

**WARRANTY**

Provide Owner with warranty stating that flashing material and metal wall fascia will properly shed water and protect roof and wall from physical damage for a minimum period of five years from date of Substantial Completion and the damage resulting from failure to provide above stated performances will be repaired to satisfaction of Owner at no additional cost.

**PART 2 - PRODUCTS**

**ALUMINUM FLASHING**

**Materials**

Aluminum Sheet: ASTM B209, Alloy 3003, Temper H14, AA-C22A41, minimum .027 inch thick (24 gauge) sheet of smooth finish with factory applied anodized finish.

Fasteners: Concealed type; of same material as flashings; sized to suit application.

Size and shape as shown on Drawings.

## GUTTERS AND DOWNSPOUTS

### Materials

Minimum .024 inch thick sheet aluminum conforming to requirements of ASTM B209, with factory applied anodized finish.

Anchorage Devices: Type recommended by manufacturer and acceptable to the Architect.

Size and shape as shown on Drawings.

WALL FLASHING: Perm-A-Barrier wall flashing and Perm-A-Barrier primer as manufactured by W.R. Grace & Company.

## MISCELLANEOUS MATERIALS AND ACCESSORIES

Bituminous Paint: Acid and alkali-resistant type; black color; FS TT-C-494 or SSPC-Paint 12 solvent type, nominally free of sulfur, compounded for 15-mil dry film thickness per coat.

Fasteners: Same metal as sheet metal flashing or other noncorrosive metal as recommended by sheet metal manufacturer. Match finish of exposed heads with material being fastened.

Elastomeric Sealant: Generic type recommended by sheet metal manufacturer and fabricator of components being sealed and complying with requirements for joint sealants as specified in Division 7 Section "Joint Sealants".

Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior and interior nonmoving joints, including riveted joints.

Adhesives: Type recommended by flashing sheet metal manufacturer for waterproof and weather-resistant seaming and adhesive application of flashing sheet metal.

Metal Accessories: Provide sheet metal clips, straps, anchoring devices, and similar accessory units as required for installation of work, matching or compatible with material being installed; noncorrosive; size and thickness required for performance.

## FABRICATION, GENERAL

Sheet Metal Fabrication Standard: Fabricate sheet metal flashing and trim to comply with recommendations of SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of the item indicated.

Form gutters and downspouts of profiles and sizes indicated and as required to properly collect and remove water. Fabricate complete with required connection pieces.

Form sections square, true, and accurate in size, in maximum possible lengths and free of distortions and defects detrimental to appearance or performance. Hem exposed edges. Allow for expansion at joints.

Comply with details shown to fabricate sheet metal flashing and trim that fit substrates and result in waterproof and weather-resistant performance once installed. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

Form exposed sheet metal work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems.

Seams: Fabricate nonmoving seams in aluminum with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.

Expansion Provisions: Comply with SMACNA standards. Space movement joints at maximum of 10 feet (3 m) with no joints allowed within 24 inches (610 mm) of corner or intersection. Where lapped or bayonet-type expansion provisions in work cannot be used or would not be sufficiently weatherproof and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).

Sealed Joints: Form non expansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.

Separate metal from non compatible metal or corrosive substrates by coating concealed surfaces at locations of contact with asphalt mastic or other permanent separation as recommended by manufacturer.

Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of sheet metal exposed to public view.

Fabricate cleats and attachment devices from same material as sheet metal component being anchored or from compatible, noncorrosive metal recommended by sheet metal manufacturer.

Size: As recommended by SMACNA manual or sheet metal manufacturer for application, but never less than thickness of metal being secured.

### **PART 3 - EXECUTION**

#### **GENERAL INSTALLATION REQUIREMENTS**

Comply with manufacturer's instructions and recommendations for handling and installation of flashing and sheet metal work.

Performance: Coordinate the work with other work for the correct sequencing of items which make up the entire membrane or system of weatherproofing or waterproofing and rain drainage. It is required that the flashing and sheet metal work be permanently watertight, and not deteriorate in excess of manufacturer's published limitations.

Examine substrates and conditions under which sheet metal flashing and trim are to be installed and verify that work may properly commence. Do not proceed with installation until unsatisfactory conditions have been corrected.

#### **INSTALLATION**

GENERAL: Unless otherwise indicated, install sheet metal flashing and trim to comply with performance requirements, manufacturer's installation instructions, and SMACNA's "Architectural Sheet Metal Manual". Anchor units of work securely in place by methods indicated, providing for thermal expansion of metal units; conceal fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weatherproof.

Install exposed sheet metal work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

Roof-Edge Flashings: Secure metal flashings at roof edges according to FM Loss Prevention Data Sheet 1-49 for specified wind zone.

Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards. Fill joint with sealant and form metal to completely conceal sealant.

Use joint adhesive for nonmoving joints specified not to be soldered.

Seams: Fabricate nonmoving seams in sheet metal with flat-lock seams. Tin edges to be seamed, form seams, and solder. Fabricate nonmoving seams in aluminum with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.

Separations: Separate metal from noncompatible metal or corrosive substrates by coating concealed surfaces, at locations of contact, with asphalt mastic or other permanent separation as recommended by manufacturer.

Roof-Penetration Flashing: Coordinate roof-penetration flashing installation with roofing and installation of items penetrating roof. Install flashing as follows:

Turn lead flashing down inside vent piping, being careful not to block vent piping with flashing

Seal and clamp flashing to pipes penetrating roof, other than lead flashing on vent piping.

Cleaning and Protection

Clean exposed metal surfaces, removing substances that might cause corrosion of metal or deterioration of finishes.

Provide final protection and maintain conditions that ensure sheet metal flashing and trim work during construction is without damage or deterioration other than natural weathering at the time of Substantial Completion.

**END OF SECTION**

## **SECTION 07900**

### **JOINT SEALERS**

#### **PART 1 - GENERAL**

##### **RELATED DOCUMENTS**

Drawings and General Provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

**DESCRIPTION OF WORK:** Work in this Section includes, but is not necessarily limited to, furnishing and installing the following:

Clean and Prepare Joint Surfaces

Sealant and Backing Materials

##### **RELATED SECTIONS**

Section 07620 - Sheet Metal Flashing and Trim

##### **SUBMITTALS**

Submit product data, samples and manufacturer's surface preparation and installation instructions.

For information only, submit copies of all referenced standards utilized for this project, unless duplicated in product data.

Submit samples of each color required for each type of joint sealer exposed to view.

##### **WARRANTY**

Submit two copies of a written guarantee agreeing to repair or replace joint sealers which fail to perform as air tight and watertight joints; or fail in joint adhesion, cohesion, abrasion resistance weather resistance, or general durability; or appear to deteriorate in any other manner not clearly specified by submitted manufacturer's data as an inherent quality of the material for the exposure indicated. Provide two-year warranty.

Replace sealants which fail because of loss of cohesion or adhesion or do not cure.

#### **PART 2 - PRODUCTS**

**SEALANT MATERIALS - GENERAL CAULKING:** Masonry walls, window perimeters, Ceramic Tile and other exterior joints as shown on Drawings.

Sealant composition shall be an epoxidized polyurethane terpolymer in a multicomponent form.

Specified products are "Dymeric 511", as manufactured by Tremco or "Sonolastic NP11" as manufactured by Sonneborn Building Products. Color to be selected from Tremco "Fastpack" color system or approved equal.

Performance Characteristics: Hardness, Average 35 (Shore A) after 5 years, Sagging - none up to 122 degrees F, low temperature flexibility -64 degrees F, meets U.S. Spec. TT-S-00227E, Class A.

##### **SEALANT MATERIALS - GLAZING**

Sealant composition shall be a silicone base, single component, solvent curing, capable of withstanding movement of up to 50 percent of joint width and shore a hardness of 26. Sealant shall conform to ASTM C920, TTS-S-001543A and TT-S-00230C (COM-NBS).

Specified product is "SILGLAZE N" as manufactured by General Electric Company, "SPECTREM 2" by Tremco, or approved equal.

##### **SEALANT MATERIALS - HOLLOW METAL FRAMES**

Sealant composition shall be an epoxidized polyurethane terpolymer in a single component form.

Specified products are "Dymonic" as manufactured by Tremco, "Sonolastic NPI" as manufactured by Sonneborn Building Products, or approved equal.

Sealant shall be used continuously between the intersection of the frame and adjacent wall material.

#### ACCESSORIES

Primer: Non-staining type, recommended by sealant manufacturer to suit application.

Joint Cleaner: Non-corrosive and nonstaining type, recommended by sealant manufacturer; compatible with joint forming materials.

Joint Filler: ASTM D1056; D1565; round, closed cell polyethylene, non-gassing rod oversized 30 percent.

"Sonofoam Soft Backer-Rod", by Sonneborn

Approved Equal

Bond Breaker: Pressure sensitive polyethylene tape recommended by sealant manufacturer to suit application.

Cleaners for Nonporous Surfaces: Provide nonstaining, chemical cleaners of type which are acceptable to manufacturers of sealants and sealant backing materials, which are not harmful to substrates and adjacent non-porous materials, and which do not leave oily residues or otherwise have a detrimental effect on sealant adhesion or in-service performance.

Masking Tape: Provide nonstaining, nonabsorbent type compatible with joint sealants and to surfaces adjacent to joints.

### **PART 3 - EXECUTION**

#### EXAMINATION

Examine joints indicated to receive joint sealers, with Installer present, for compliance with requirements for joint configuration, installation tolerances and other conditions affecting joint sealer performance. Do not proceed with installation of joint sealers until unsatisfactory conditions have been corrected.

#### PREPARATION

Surface Cleaning of Joints: Clean out joints immediately before installing joint sealers to comply with recommendations of joint sealer manufacturers and the following requirements:

Remove all foreign material from joint substrates which could interfere with adhesion of joint sealer, including dust; paints, except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer; old joint sealers; oil; grease; waterproofing; water repellents; water; surface dirt; and frost.

Clean concrete, masonry, unglazed surfaces of ceramic tile and similar porous joint substrate surfaces, by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealers. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air. Remove laitance and form release agents from concrete.

Joint Priming: Prime joint substrates where indicated or where recommended by joint sealer manufacturer based on pre-construction joint sealer-substrate tests or prior experience. Apply primer to comply with joint sealer manufacturer's recommendations. Confine primers to areas of joint sealer bond, do not allow spillage or migration onto adjoining surfaces.

Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces which otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears such as masonry or EIFS materials. Remove tape immediately after tooling without disturbing joint seal.

#### INSTALLATION OF JOINT SEALERS

General: Comply with joint sealer manufacturers' printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.

Installation of Sealant Backings: Install sealant backings to comply with the following requirements:

Install joint fillers of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths which allow optimum sealant movement capability. Do not leave gaps between ends of joint fillers. Do not stretch, twist, puncture, or tear joint fillers. Remove absorbent joint fillers which have become wet prior to sealant application and replace with dry material.

Install bond breaker tape between sealants and joint fillers, compression seals, or back of joints where adhesion of sealant to surfaces at back of joints would result in sealant failure. Bond breaker must be used in all conditions where three-sided adhesion may be possible.

Install compressible seals serving as sealant backings to comply with requirements indicated above for joint fillers.

Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint widths which allow optimum sealant movement capability.

Tooling of Nonsag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents which discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

Provide concave joint configuration per Figure 6A in ASTM C 962, unless otherwise indicated.

Use masking tape to protect adjacent surfaces of recessed tooled joints.

All joints shall be free of air pockets, foreign embedded matter, ridges, and sags.

CURE: Cure sealant in compliance with manufacturer's instructions and recommendations to obtain high, early bond strength, internal cohesion strength and surface durability.

CLEANING: Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealers and of products in which joints occur.

PROTECTION: Protect joint sealers during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage and deterioration occurs, cut out and remove damaged or deteriorated joint sealers immediately and reseal joints with new materials to produce joint sealer installations with repaired areas indistinguishable from original work.

**END OF SECTION 07900**





## SECTION 08100

### HOLLOW METAL DOORS AND FRAMES

#### 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. Standard and custom hollow metal doors and frames.
2. Steel sidelight, borrowed lite and transom frames.
3. Factory finishing hollow metal doors and frames and factory machining for hardware.
4. Louvers installed in hollow metal doors
5. Light frames and glazing installed in hollow metal doors.

###### B. Related Sections:

1. Division 01 Section "Sustainable Design Requirements" for additional LEED documentation and requirements.
2. Division 04 Section "Unit Masonry" for embedding anchors for hollow metal work into masonry construction.
3. Division 08 Section "Glazing" for glass view panels in hollow metal doors.
4. Division 08 Sections "Door Hardware" for door hardware for hollow metal doors and frames.
5. Division 09 Sections "Exterior Painting" and "Interior Painting" for field painting hollow metal doors and frames.

###### C. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI/SDI A250.8 - Recommended Specifications for Standard Steel Doors and Frames.
2. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, Frames Anchors and Hardware Reinforcing.
3. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.
4. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
5. ANSI/SDI A250.11 - Recommended Erection Instructions for Steel Frames.
6. ANSI/SDI A250.13 - Testing and Rating of Sever Windstorm Resistant Components for Swing Door Assemblies.
7. ASTM A1008 - Standard Specification for Steel Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.

### HOLLOW METAL DOORS AND FRAMES

8. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
9. ASTM A924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
10. ASTM C 1363 - Standard Test Method for Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus.
11. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
12. ASTM E283 - Standard Test Method for Determining Rate of Air Leakage Through Exterior Doors Under Specified Pressure Differences Across the Specimens.
13. ASTM E330 - Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
14. ASTM E 413 - Classification for Rating Sound Insulation.
15. ASTM E1332 - Standard Classification for Determination of Outdoor-Indoor Transmission Class.
16. ASTM E1886 - Test Method for Performance of Exterior Windows, Curtin Walls, Doors and Shutters Impacted by Missiles and Exposed to Cyclic Pressure Differentials.
17. ASTM E1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors and Storm Shutters Impacted by Windborne Debris in Hurricanes.
18. ANSI/NAMM/HMMA 867-06 - Guide Specifications for Commercial Laminated Core Hollow Metal Doors and Frames.
19. ANSI/BHMA A156.15 - Hardware Preparation in Steel Doors and Frames.
20. ANSI/SDI 122 - Installation and Troubleshooting Guide for Standard Steel Doors and Frames.
21. ANSI/NFPA 80 - Standard for Fire Doors and Fire Windows; National Fire Protection Association.
22. ANSI/NFPA 105: Standard for the Installation of Smoke Door Assemblies.
23. FEMA 361 2008 – Design and Construction Guidance for Community Safe Rooms
24. ICC 500 - ICC/NSSA Standard for the Design and Construction of Storm Shelters.
25. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association.
26. TAS-201-94 - Impact Test Procedures.
27. TAS-202-94 - Criteria for Testing Impact and Non-Impact Resistant Building Envelope Components using Uniform Static Air Pressure.
28. TAS-203-94 - Criteria for Testing Products Subject to Cyclic Wind Pressure Loading.
29. UFC 4-010-0 - Department of Defense Minimum Antiterrorism Standards for Building, October 2003, including Change 1, January 2007.
30. UL 10C - Positive Pressure Fire Tests of Door Assemblies; UL 10B - Fire Test of Door Assemblies; UL 1784 - Standard for Air Leakage Tests of Door Assemblies.

### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, hardware reinforcements, profiles, anchors, fire-resistance rating, and finishes.
- B. Door hardware supplier is to furnish templates, template reference number and/or physical hardware to the steel door and frame supplier in order to prepare the doors and frames to receive the finish hardware items.

C. Shop Drawings: Include the following:

1. Elevations of each door design.
2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.
5. Details of anchorages, joints, field splices, and connections.
6. Details of accessories.
7. Details of moldings, removable stops, and glazing.
8. Details of conduit and preparations for power, signal, and control systems.

D. Samples for Verification:

1. Samples are only required by request of the architect and for manufactures that are not current members of the Steel Door Institute.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain hollow metal doors and frames through one source from a single manufacturer wherever possible.
- B. Quality Standard: In addition to requirements specified, comply with ANSI/SDI A250.8, latest edition, "Recommended Specifications for Standard Steel Doors and Frames".
- C. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 (neutral pressure at 40" above sill) or UL 10C..
1. Smoke Control Door Assemblies: Comply with NFPA 105.
    - a. Smoke "S" Label: Doors to bear "S" label, and include smoke and draft control gasketing applied to frame and on meeting stiles of pair doors.
- D. Fire-Rated, Borrowed-Light Frame 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 257. Provide labeled glazing material.
- E. Severe Storm Shelter Openings: Provide complete door systems for hurricane or tornado storm shelters, and other areas of refuge, complying and tested according to FEMA 361, Second Edition (2008), Design and Construction Guidance for Community Safe Rooms; and ICC 500 (2008), ICC/NSSA Standard for the Design and Construction of Storm Shelters.
1. Each unit to bear third party permanent label indicating compliance with the referenced testing standards.
- F. Pre-Submittal Conference: Conduct conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier, Installer, and Contractor to review proper methods and procedures for installing hollow metal doors and frames and to verify installation of electrical knockout boxes and conduit at frames with electrified or access control hardware.

## 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project site storage. Do not use non-vented plastic.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch high wood blocking. Do not store in a manner that traps excess humidity.
  - 1. Provide minimum 1/4-inch space between each stacked door to permit air circulation. Door and frames to be stacked in a vertical upright position.

## 1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

## 1.7 COORDINATION

- A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

## 1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
- B. Warranty includes installation and finishing that may be required due to repair or replacement of defective doors.

# PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. CECO Door Products.
  - 2. Curries Company.
  - 3. Steelcraft.

## 2.2 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.
- C. Frame Anchors: ASTM A 653/A 653M, Commercial Steel (CS), Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

## 2.3 STANDARD HOLLOW METAL DOORS

- A. General: Provide 1-3/4 inch doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8.
- B. Exterior Doors: Face sheets fabricated of commercial quality hot-dipped zinc coated steel that complies with ASTM A 653/A 653M, Coating Designation A60. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
  - 1. Design: Flush panel.
  - 2. Core Construction: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, mineral core, or vertical steel-stiffener core.
    - a. Polystyrene and Polyurethane (Insulated) Doors: Where indicated, provide doors fabricated as thermal-rated assemblies with a minimum R-value 11 or better.
    - b. Standard Vertical Steel-Stiffener Core: Minimum 22 gauge steel-stiffeners at 6 inches on-center construction attached by spot welds spaced not more than 5" on centers. Spaces between stiffeners filled with fiberglass insulation (minimum density 0.8#/cubic ft.).
    - c. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.
  - 3. Level/Model: Level 3 and Physical Performance Level A (Extra Heavy Duty), Minimum 16 gauge (0.053-inch - 1.3-mm) thick steel, Model 2.
  - 4. Level/Model: Level 2 and Physical Performance Level B (Heavy Duty), Minimum 18 gauge (0.042-inch - 1.0-mm) thick steel, Model 2.
  - 5. Vertical Edges: Vertical edges to have the face sheets joined by a continuous weld extending the full height of the door. Welds are to be ground, filled and dressed smooth. Beveled Lock Edge, 1/8 inch in 2 inches (3 mm in 50 mm).
  - 6. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gauge, extending the full width of the door and welded to the face sheet. Doors with an inverted top channel to include a steel closure channel, screw attached, with the web of the channel flush with the face sheets of the door. Plastic or composite channel fillers are not acceptable.
  - 7. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9" or minimum 14 gauge continuous channel with pierced holes, drilled and tapped.
  - 8. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

- C. Interior Doors: Face sheets fabricated of commercial quality cold rolled steel that complies with ASTM A 1008/A 1008M. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
1. Design: Flush panel.
  2. Core Construction: Manufacturer's standard kraft-paper honeycomb, or one-piece polystyrene core, securely bonded to both faces.
    - a. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.
  3. Level/Model: Level 2 and Physical Performance Level B (Heavy Duty), Minimum 18 gauge (0.042-inch - 1.0-mm) thick steel, Model 2.
  4. Level/Model: Level 3 and Physical Performance Level A (Extra Heavy Duty), minimum 16 gauge (0.053-inch - 1.3-mm) thick steel, Model 2.
  5. Vertical Edges: Vertical edges to have the face sheets joined by a continuous weld extending the full height of the door. Welds are to be ground, filled and dressed smooth. Beveled Lock Edge, 1/8 inch in 2 inches (3 mm in 50 mm).
  6. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gauge, extending the full width of the door and welded to the face sheet. Doors with an inverted top channel to include a steel closure channel, screw attached, with the web of the channel flush with the face sheets of the door. Plastic or composite channel fillers are not acceptable.
  7. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9" or minimum 14 gauge continuous channel with pierced holes, drilled and tapped.
  8. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.
- D. Manufacturers Basis of Design:
1. CECO Door Products (C): Regent Series.
  2. Curries Company (CU): 607 Series.

## 2.4 HOLLOW METAL DOORS FOR SEVERE STORM SHELTERS

- A. General: Provide complete tornado or hurricane resistant door and frame shelter assemblies constructed to resist the design wind pressures for components and cladding and missile impact loads as described in ICC 500 - 2008, ICC/NSSA Standard for the Design and Construction of Storm Shelters. Only single opening and paired opening doors and their frames constructed to resist calculated design wind pressures and laboratory tested missile impacts are acceptable.
1. Door systems, both single doors and paired openings, tested and complying with ICC 500 and FEMA 361 (2008), Design and Construction Guidance for Community Safe Rooms and supported by third party test results.
  2. Sheets fabricated on exterior openings from commercial quality hot dipped zinc coated steel complying with ASTM A924 A60. Gauges to be in accordance with manufacturers tested assemblies.

3. Vertical Edges: Vertical edges to have the face sheets joined by a continuous weld extending the full height of the door. Welds are to be ground, filled and dressed smooth. Beveled Lock Edge, 1/8 inch in 2 inches (3 mm in 50 mm).
4. Top Edge: Reinforce top of doors with a continuous steel channel extending the full width of the door and welded to the face sheet. Doors with an inverted top channel to include a steel closure channel, screw attached and welded in place with the web of the channel flush with the face sheets of the door. Plastic or composite channel fillers are not acceptable.
5. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9".

B. Manufacturers Basis of Design:

1. CECO Door Products (C) - StormPro Series.
2. Curries Company (CU) - StormPro Series.

## 2.5 STANDARD HOLLOW METAL FRAMES

A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.

B. Exterior Masonry Frames: Fabricated of hot-dipped zinc coated steel that complies with ASTM A 653/A 653M, Coating Designation A60.

1. Fabricate frames with mitered or coped corners.
2. Fabricate frames, with the exception of knock down types, with "closed and tight" miter seams continuously welded on face, finished smooth with no visible seam unless otherwise indicated.
3. Frames for Level 3 Steel Doors (up to 48 inches in width): Minimum 14 gauge (0.067-inch -1.7-mm) thick steel sheet.
4. Frames for Level 3 Steel Doors (48 inches and up in width): Minimum 12 gauge (0.081-inch -2.7-mm) thick steel sheet.
5. Frames for Level 2 Steel Doors: Minimum 16 gauge (0.053-inch -1.3-mm) thick steel sheet.
6. Manufacturers Basis of Design:

- a. CECO Door Products (C) - SQ Series.

C. Interior Frames: Fabricated from cold-rolled steel sheet that complies with ASTM A 1008/A 1008M.

1. Fabricate frames with mitered or coped corners.
2. Fabricate frames, with the exception of slip-on drywall types, with "closed and tight" miter seams continuously welded on face, finished smooth with no visible seam unless otherwise indicated.
3. Frames for Level 2 Steel Doors: Minimum 16 gauge (0.053-inch -1.3-mm) thick steel sheet.
4. Frames for Level 3 Steel Doors (up to 48 inches in width): Minimum 16 gauge (0.053-inch -1.3-mm) thick steel sheet.]
5. Frames for Level 3 Steel Doors (48 inches and up in width): Minimum 14 gauge (0.067-inch -1.7-mm) thick steel sheet.]
6. Frames for Wood Doors: Minimum 16 gauge (0.053-inch-1.3-mm-) thick steel sheet.

7. Frames for Borrowed Lights: Minimum 16 gauge (0.053-inch-1.3-mm-) thick steel sheet.
8. Manufacturers Basis of Design:

- a. CECO Door Products (C) - SQ Series (Masonry).
- b. CECO Door Products (C) - SR Series (Masonry).
- c. CECO Door Products (C) - SU Series (Masonry).
- d. Curries Company (CU) - G Series (Masonry).
- e. Curries Company (CU) - M Series (Masonry).

- D. Fire rated frames: Fabricate frames in accordance with NFPA 80, listed and labeled by a qualified testing agency, for fire-protection ratings indicated.
- E. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 Table 4 with reinforcement plates from same material as frames.

## 2.6 FRAMES FOR SEVERE STORM SHELTERS

- A. General: Subject to the same compliance standards and requirements as standard hollow metal frames, provide complete tornado or hurricane resistant door and frame assemblies, for both single doors and paired openings, tested and labeled as complying with ICC 500 and FEMA 361 and supported by third party test results.
  1. Fabricate exterior frames from 14 gauge hot dipped zinc coated steel that complying with ASTM designations A924 A60.
  2. Manufacturers Basis of Design:
    - a. CECO Door Products - StormPro Series.
    - b. Curries Company - StormPro Series.

## 2.7 FRAME ANCHORS

- A. Jamb Anchors:
  1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, formed from A60 metallic coated material, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
  2. Stud Wall Type: Designed to engage stud and not less than 0.042 inch thick.
  3. Compression Type for Drywall Slip-on (Knock-Down) Frames: Adjustable compression anchors.
  4. Windstorm Opening Anchors: Types as tested and required for indicated wall types to meet specified wind load design criteria.
  5. FEMA 361 Storm Shelter Anchors: Masonry T-shaped, wire masonry type, or existing opening type anchors.
- B. Floor Anchors: Floor anchors to be provided at each jamb, formed from A60 metallic coated material, not less than 0.042 inches thick.
- C. Mortar Guards: Formed from same material as frames, not less than 0.016 inches thick.



## 2.8 HOLLOW METAL PANELS

- A. Provide hollow metal panels of same materials, construction, and finish as specified for adjoining hollow metal work.

## 2.9 LOUVERS

- A. Metal Louvers: Door manufacturer's standard metal louvers unless otherwise indicated.
  - 1. Blade Type: Vision proof inverted V or inverted Y.
  - 2. Metal and Finish: Galvanized steel, 0.040 inch thick, factory primed for paint finish with baked enamel or powder coated finish. Match pre-finished door paint color where applicable.
- B. Louvers for Fire Rated Doors: Metal louvers with fusible link and closing device, listed and labeled for use in doors with fire protection rating of 1-1/2 hours and less.
  - 1. Manufacturers: Subject to compliance with requirements, provide door manufacturers standard louver to meet rating indicated.
  - 2. Metal and Finish: Galvanized steel, 0.040 inch thick, factory primed for paint finish with baked enamel or powder coated finish. Match pre-finished door paint color where applicable.

## 2.10 LIGHT OPENINGS AND GLAZING

- A. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints at fabricators shop. Fixed and removable stops to allow multiple glazed lites each to be removed independently. Coordinate frame rabbet widths between fixed and removable stops with the type of glazing and installation indicated.
- B. Moldings for Glazed Lites in Doors and Loose Stops for Glazed Lites in Frames: Minimum 20 gauge thick, fabricated from same material as door face sheet in which they are installed.
- C. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch (16 mm) high unless otherwise indicated. Provide fixed frame moldings and stops on outside of exterior and on secure side of interior doors and frames
- D. Preformed Metal Frames for Light Openings: Manufacturer's standard frame formed of 0.048-inch-thick, cold rolled steel sheet; with baked enamel or powder coated finish; and approved for use in doors of fire protection rating indicated. Match pre-finished door paint color where applicable.
- E. Glazing: Comply with requirements in Division 08 Section "Glazing" and with the hollow metal door manufacturer's written instructions.
  - 1. Factory Glazing: Factory install glazing in doors as indicated. Doors with factory installed glass to include all of the required glazing material.

## 2.11 ACCESSORIES

- A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.
- B. Grout Guards: Formed from same material as frames, not less than 0.016 inches thick.

## 2.12 FABRICATION

- A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. When shipping limitations so dictate, frames for large openings are to be fabricated in sections for splicing or splining in the field by others.
- B. Tolerances: Fabricate hollow metal work to tolerances indicated in ANSI/SDI A250.8.
- C. Hollow Metal Doors:
  - 1. Exterior Doors: Provide optional weep-hole openings in bottom of exterior doors to permit moisture to escape where specified.
  - 2. Glazed Lites: Factory cut openings in doors with applied trim or kits to fit. Factory install glazing where indicated.
  - 3. Louvers: Factory cut openings in door and install louvers into prepared openings where indicated.
  - 4. Astragals: Provide overlapping astragals as noted in door hardware sets in Division 08 Section "Door Hardware" on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted.
  - 5. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge strap for continuous hinges specified in hardware sets in Division 08 Section "Door Hardware".
  - 6. Electrical Raceways: Provide hollow metal doors to receive electrified hardware with concealed wiring harness and standardized Molex™ plug connectors on both ends to accommodate up to twelve wires. Coordinate connectors on end of the wiring harness to plug directly into the electrified hardware and the through-wire transfer hardware or wiring harness specified in hardware sets in Division 08 Sections "Door Hardware" and "Access Control Hardware". Wire nut connections are not acceptable.
- D. Hollow Metal Frames:
  - 1. Shipping Limitations: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
  - 2. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
    - a. Welded frames are to be provided with two steel spreaders temporarily attached to the bottom of both jambs to serve as a brace during shipping and handling. Spreader bars are for bracing only and are not to be used to size the frame opening.

3. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
4. Equal Rabbet Frames: Provide frames with equal rabbet dimensions unless glazing and removable stops require wider dimensions on glass side of frame.
5. High Frequency Hinge Reinforcement: Provide high frequency hinge reinforcements at door openings 48-inches and wider with mortise butt type hinges at top hinge locations.
6. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge straps for continuous hinges specified in hardware sets in Division 08 Section "Door Hardware".
7. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated for removable stops, provide security screws at exterior locations.
8. Mortar Guards: Provide guard boxes at back of hardware mortises in frames at all hinges and strike preps regardless of grouting requirements.
9. Electrical Thru-Wiring: Provide hollow metal frames receiving electrified hardware with loose wiring harness (not attached to open throat components or installed in closed mullion tubes) and standardized Molex™ plug connectors on one end to accommodate up to twelve wires. Coordinate connectors on end of the wiring harness to plug directly into the electric through-wire transfer hardware or wiring harness specified in hardware sets in Division 08 Sections "Door Hardware" and "Access Control Hardware".
10. Electrical Knock Out Boxes: Factory weld 18 gauge electrical knock out boxes to frame for electrical hardware preps; including but not limited to, electric through wire transfer hardware, electrical raceways and wiring harnesses, door position switches, electric strikes, magnetic locks, and jamb mounted card readers as specified in hardware sets in Division 08 Sections "Door Hardware" and "Access Control Hardware".
  - a. Provide electrical knock out boxes with a dual 1/2-inch and 3/4-inch knockouts.
  - b. Conduit to be coordinated and installed in the field (Division 26) from middle hinge box and strike box to door position box.
  - c. Electrical knock out boxes to comply with NFPA requirements and fit electrical door hardware as specified in hardware sets in Division 08 Section "Door Hardware".
  - d. Electrical knock out boxes for continuous hinges should be located in the center of the vertical dimension on the hinge jamb.
11. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
12. Jamb Anchors: Provide number and spacing of anchors as follows:
  - a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
    - 1) Two anchors per jamb up to 60 inches high.
    - 2) Three anchors per jamb from 60 to 90 inches high.
    - 3) Four anchors per jamb from 90 to 120 inches high.
    - 4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.
  - b. Stud Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

- 1) Three anchors per jamb up to 60 inches high.
  - 2) Four anchors per jamb from 60 to 90 inches high.
  - 3) Five anchors per jamb from 90 to 96 inches high.
  - 4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
  - 5) Two anchors per head for frames above 42 inches wide and mounted in metal stud partitions.
- c. Severe Storm Shelter Openings: Provide jamb, head, and sill anchors in accordance with manufacturer's tested and approved assemblies.
13. Door Silencers: Except on weatherstripped or gasketed doors, drill stops to receive door silencers. Silencers to be supplied by frame manufacturer regardless if specified in Division 08 Section "Door Hardware".
14. Bituminous Coating: Where frames are fully grouted with an approved Portland Cement based grout or mortar, coat inside of frame throat with a water based bituminous or asphaltic emulsion coating to a minimum thickness of 3 mils DFT, tested in accordance with UL 10C and applied to the frame under a 3rd party independent follow-up service procedure.
- E. Hardware Preparation: Factory prepare hollow metal work to receive template mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."
1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
  2. Reinforce doors and frames to receive non-template, mortised and surface mounted door hardware.
  3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
  4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.

## 2.13 STEEL FINISHES

- A. Prime Finishes: Doors and frames to be cleaned, and chemically treated to insure maximum finish paint adhesion. Surfaces of the door and frame exposed to view to receive a factory applied coat of rust inhibiting shop primer.
1. Shop Primer: Manufacturer's standard, fast-curing, lead and chromate free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; and compatible with substrate and field-applied coatings.
- B. Factory Pre-Finishes: Factory apply electrostatic paint finish to doors and frames in accordance with ANSI A250.3 test procedure acceptance criteria for steel doors and frames with factory applied finished coatings.

## 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. General Contractor to verify the accuracy of dimensions given to the steel door and frame manufacturer for existing openings or existing frames (strike height, hinge spacing, hinge back set, etc.).
- 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. Prior to installation, adjust and securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness.
- C. Tolerances shall comply with SDI-117 "Manufacturing Tolerances Standard Steel Doors and Frames."
- D. Drill and tap doors and frames to receive non-template, mortised, and surface-mounted door hardware.

### 3.3 INSTALLATION

- A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.
- B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11 and NFPA 80 at fire rated openings.
  - 1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete and frames properly set and secured, remove temporary braces, leaving surfaces smooth and undamaged. Shim as necessary to comply with installation tolerances.
  - 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.
  - 3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with mortar.
  - 4. Grout Requirements: Do not grout head of frames unless reinforcing has been installed in head of frame. Do not grout vertical or horizontal closed mullion members.
- C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Standard Steel Doors:

- a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
- b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
- c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
- d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.

- D. Field Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.

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 installation.
- C. Prime-Coat and Painted Finish Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat, or painted finishes, and apply touchup of compatible air drying, rust-inhibitive primer, zinc rich primer (exterior and galvanized openings) or finish paint.

END OF SECTION

08100

## SECTION 08141

### FLUSH WOOD DOORS

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Section Includes:
  - 1. Wood veneer faced flush doors.
  - 2. Factory finishing.
- B. Related Sections:
  - 1. Division 01: Administrative, procedural, and temporary work requirements.
  - 2. Section 08 7100 - Door Hardware.
  - 3. Section 08 8000 - Glazing.

##### 1.2 REFERENCES

- A. Architectural Woodwork Institute (AWI) - Architectural Woodwork Quality Standards.
- B. ASTM International (ASTM) E90 - Standard Test Method for Measurement of Airborne-Sound Transmission Loss of Building Partitions.
- C. Forest Stewardship Council (FSC) STD-40-004 - Chain of Custody Standard.
- D. National Fire Protection Association (NFPA) 80 - Standard for Fire Doors and Fire Windows.
- E. Underwriters Laboratories (UL):
  - 1. 10B - Standard for Fire Tests of Door Assemblies.
  - 2. 10C - Standard for Positive Pressure Fire Tests of Door Assemblies.
- F. Window and Door Manufacturers Association (WDMA) - I.S.1A - Industry Standard for Architectural Flush Wood Doors.

##### 1.3 SUBMITTALS

- A. Submittals for Review:
  - 1. Shop Drawings: Show locations, elevations, dimensions, [fire] [acoustical] ratings, and preparation for hardware.
  - 2. Samples:
    - a. 6 x 6 inch door samples showing edges, core, and faces.
- B. Quality Control Submittals:
  - 1. Certificates of Compliance: Manufacturer's certification that doors comply with specified acoustical requirements.

##### 1.4 QUALITY ASSURANCE

- A. Flush Wood Doors: [AWI [Premium] [Custom] [Economy] Grade.] [WDMA [Premium] [Custom] Grade.]
- B. Fire Door Construction: Conform to UL [10B.] [10C.]
- C. Installed Fire Rated Door Assembly: Conform to NFPA 80.
- D. Acoustic Rated Doors: Tested by independent testing laboratory in accordance with ASTM E90 and certified for STC Class of [\_\_].

##### 1.5 DELIVERY, STORAGE AND HANDLING

- A. Package doors in heavy plastic with identifying marks; slit plastic wrap on site to permit ventilation, but do not remove from plastic until ready to install.
- B. Do not deliver doors until building is substantially water and weather tight and HVAC system is operational.
- C. Store doors flat and level, with spacers between doors to allow for air circulation, in protected, dry area.
- D. Maintain humidity in storage areas between 25 and 55 percent.

## 1.6 WARRANTIES

- A. Furnish[manufacturer's 2 year warranty providing coverage against defects in materials and workmanship and warpage beyond specified amount.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
  - 1. Algoma Hardwoods, Inc. ([www.algomahardwoods.com](http://www.algomahardwoods.com))
  - 2. Eggers Industries. ([www.eggersindustries.com](http://www.eggersindustries.com))
  - 3. Marshfield DoorSystems, Inc. ([www.marshfielddoors.com](http://www.marshfielddoors.com))
  - 4. Oshkosh Door Co. ([www.oshkoshdoor.com](http://www.oshkoshdoor.com))
  - 5. VT Industries, Inc. ([www.vtindustries.com](http://www.vtindustries.com))
  - 6. [\_\_\_\_\_].
  - 7. [\_\_\_\_\_].
  - 8. [\_\_\_\_\_].
- B. Substitutions: [Under provisions of Division 01.] [Not permitted.]

### 2.2 MATERIALS

- A. Flush Wood Doors: AWI Section 1300.
  - 1. Core type:
    - a. Solid, fire rated: Mineral.
    - b. Solid, non rated: [PC - Bonded Particle Core.] [SLC - Bonded Staved Lumber Core.] [FPC - Nonbonded Particle Core.] [SLC - Nonbonded Staved Lumber Core.]
    - c.
  - 2. Number of plies: [5.] [7.]
  - 3. Wood veneers faces:
    - a. Species: [oak.]
    - b. Cut: [book match.]
    - c. **Certified to FSC STD-04-004.]**
  - 4. Fiberboard faces: Minimum 1/8 inch thick high density fiberboard, [flush.] [paneled profile.]

\*\*\*\* OR \*\*\*\*

- B. Flush Wood Doors: WDMA I.S.1A.
  - 1. Core type:
    - a. Solid, fire rated: [FD - Neutral Pressure Tested Fire Door.] [FD-PP - Positive Pressure Tested Fire Door.]
    - b. Solid, non rated: Type [PC - Particleboard Core, bonded.] [FPC] - Particleboard Core, non-bonded.] [SCLC - Structural Composite Lumber Core, bonded.] [FSCLC - Structural Composite Lumber Core, non-bonded.] [SLC - Stave Lumber Core, bonded.] [FSLC - Stave Lumber Core, non-bonded.]
  - 2. Number of plies: [5.] [7.]
  - 3. Performance duty level: [Extra Heavy Duty.] [Heavy Duty.] [Standard Duty.]
  - 4. Wood veneer faces:
    - a. Species: [\_\_\_\_\_].



- b. Cut: [\_\_\_\_.]
  - c. Grade: [A.] [AA.] [B.]
- 5. Fiberboard faces: Minimum 1/8 inch thick high density fiberboard, [flush.] [paneled profile.]
- 6. Veneer matching:
  - a. Piece match: [Book.] [Slip.]
  - b. Face match: [Running.] [Balance.] [Center.]
  - c. Appearance of pairs, sets, and transoms: [Matched.] [Not matched.]
- 7. Glazing beads: [Solid wood [of species and cut to match face veneers].] [Formed metal.]
- 8. Adhesives: [Waterproof] [Water Resistant] type.
- 9. Louvers: [Solid wood, of species and cut to match face veneers,] [Steel,] [Aluminum,] [straight 45 degree slat] [inverted Y] [\_\_\_\_] profile, [sightproof].

## 2.3 ACCESSORIES

- A. Glass and Glazing Accessories: Specified in Section 08 8000.

## 2.4 FABRICATION

- A. Fabricate doors in accordance with [AWI Section 1300.] [WDMA I.S.1A.]
- B. Prefitting: Factory fit doors to frames.
- C. Premachining: Factory machine doors to receive hardware specified in Section 08 7100.

## 2.5 FINISHES

- A. Transparent Finish System:
  - 1. Finish system: AWI Section 1500, [Premium] [Custom] [Economy] Grade, [Conversion Varnish. ] [Post-Catalyzed Lacquer.] [Pre-Catalyzed Lacquer.] [CAB and Water Acrylic Lacquer.] [Nitrocellulose Lacquer.] [\_\_\_\_.]
  - 2. Stain color [To be selected from manufacturer's full color range.]
  - 3. Sheen: [Satin.]

# PART 3 EXECUTION

## 3.1 PREPARATION

- A. Condition doors to average humidity that will be encountered after installation.

## 3.2 INSTALLATION

- A. Install doors in accordance with [AWI Section 1700.] [WDMA I.S.1A.]
- B. Install doors plumb and level.
- C. Field Fitting to Frames:
  - 1. [Fire] [and] [Acoustic] rated doors:
    - a. Width: Cut lock edge only; [3/16] [\_\_\_\_] inch maximum.
    - b. Height: Cut bottom edge only; [1] [\_\_\_\_] inch maximum.
  - 2. Non-rated doors:
    - a. Width: Cut hinge and lock edges equally.
    - b. Height: Cut bottom edge only; maximum [3/4] [\_\_\_\_] inch.
  - 3. Edge clearances:
    - a. Jambs and head: [1/8] [\_\_\_\_] inch maximum between door and frame.
    - b. Sills without thresholds: [1/8] [\_\_\_\_] inch maximum between door and top of finish floor.
    - c. Sills with thresholds: [1/4] [\_\_\_\_] inch maximum between door and top of threshold.
    - d. Meeting stiles of pairs: [1/8] [\_\_\_\_] inch maximum between doors.
  - 4. Lock edge: Bevel [1/8] [\_\_\_\_] inch in 2 inches.

5. Do not cut doors down to opening sizes smaller than those for which they were manufactured.

\*\*\*\* OR \*\*\*\*

- D. If field cutting for height is necessary, cut bottom edge only, [3/4] [ ] inch maximum.
- E. Seal field cut surfaces with [paint.] [same finish as door faces.]
- F. Install door hardware in accordance with Section 08 7100.
- G. Install glass as specified in Section 08 8000.
- H. Installation Tolerances:
  - 1. Warp: Maximum [1/4] [ ] inch in any 3'-0" x 7'-0" portion of door, measured with taut string or straight edge on concave face of door.

END OF SECTION

**SECTION 08410**  
**ALUMINUM ENTRANCES AND STOREFRONTS**

**PART 1 - GENERAL**

**RELATED DOCUMENTS**

Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

**DESCRIPTION OF WORK:** Work in this Section includes, but is not necessarily limited to, furnishing and installing the following:

Interior and Exterior Aluminum Storefront Framing, Doors, Door Frames and Lights  
Anchors, Brackets, and Attachments  
Door Hardware  
Perimeter Sealant

**WORK INSTALLED BUT FURNISHED UNDER OTHER SECTIONS**

Section 08700 - Hardware: Additional Door hardware items other than specified in this Section, and keying requirements.

**RELATED WORK**

Section 00870 - Finish Color Schedule  
Section 07900 - Joint Sealers: Perimeter Sealant and Back-Up Materials  
Section 08700 - Finish Hardware  
Section 08800 - Glass and Glazing

**REFERENCES**

ANSI/ASTM A36 - Structural Steel  
ANSI/ASTM A386 - Zinc Coating (Hot-Dip) on Assembled Steel Products  
ANSI/ASTM A446 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality  
ANSI/ASTM B221 - Aluminum-Alloy Extruded Bar, Rod, Wire, Shape, and Tube  
ANSI/ASTM E283 - Rate of Air Leakage through Exterior Windows, Curtain Walls and Doors

**PERFORMANCE**

System to provide for expansion and contraction within system components caused by a cycling temperature range of 170 degrees F. without causing detrimental effects to system or components.

Design for windload of 30 PSF with maximum deflection in both vertical and horizontal mullions not to exceed 1/175 of span.

Drain water entering joints, condensation occurring in glazing channels, or migrating moisture occurring within system, to exterior.

Limit air infiltration through assembly to 0.6 CFM/SF of assembly surface area, measured at a reference differential pressure across assembly of 0.3 inches water gage as measured in accordance with ANSI/ASTM E283.

System to accommodate, without damage to system or components, or deterioration of perimeter seal: Movement within system; movement between system and perimeter framing components; dynamic loading and release of loads; and deflection of structural support framing.

**QUALITY ASSURANCE**

Inspection: General Contractor shall provide, in writing to Owner, an inspection of all aluminum entrances and storefronts for conformance to specifications. Inspection shall include checking for fit tolerance plumb and level, as well as proper hardware and operation.

SUBMITTALS: Submit Shop Drawings and product data and manufacturer's installation instructions. Include system and component dimensions; components within assembly; framed opening requirements and tolerances; anchorage and fasteners; glass and infills; door hardware requirements; and affected related work.

#### DELIVERY, STORAGE, AND HANDLING

TRANSPORTATION AND HANDLING: Transport products by methods to avoid product damage; deliver in undamaged condition in manufacturer's unopened containers or packaging, dry. Provide equipment and personnel to handle products by method to prevent soiling or damage. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.

STORAGE AND PROTECTION: Store products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weather-tight enclosures; maintain within temperature and humidity ranges required by manufacturer's instructions.

#### SPECIAL WARRANTY

The work of this Section shall be jointly guaranteed by the manufacturer and installer for a period of five (5) years after final payment.

All materials shall be free from manufacturing defects and defects in installation workmanship. Any material or workmanship judged defective during this period shall be removed and replaced at no cost to the Owner.

## **PART 2 - PRODUCTS**

#### ACCEPTABLE MANUFACTURERS

For purpose of designating design and quality of aluminum storefront system, fixed window system, Drawings and Specifications are based on the following:

Entry Framing System:

"350 Tuffline Entrance Framing" by Kawneer Company

Approved equal, by Tubelite Architectural Products

Approved equal, by EFCO Corporation.

For purpose of designating design and quality of entrance doors, Drawings and Specifications are based on Tuffline Series, Continuous Hinge-Hung Doors with 1/4" clear tempered glazing as manufactured by Kawneer Company with 3 1/2" Stiles, 6" Rails and 5/16" vertical and horizontal mutins, as shown on Drawings. Door frames to be heavy wall frames. Standard wall thickness for door frames is not acceptable.

Other manufacturer's aluminum doors, as manufactured by EFCO, and Tubelite are acceptable upon approval when design fabrication and installation meet or exceed requirements specified and detailed on Drawings.

#### MATERIALS

All framing members shall be extruded aluminum of 6063T-5 alloy and shall be of the size, shape, and intended function as shown on the Drawings. Performance requirements shall conform to standards established by local jurisdiction in relation to wind load and deflection limits.

FASTENERS: Stainless Steel

FINISH: All exposed aluminum surfaces shall have a manufactured-applied, 20-year warrantied, Kynar 500 fluorocarbon finish, free from blemishes and surface defects. Color as scheduled in Section 00870.

#### FABRICATION

Aluminum door shall have tight hairline joints where rails are fitted against stiles and shall be fastened by means of tensioned steel tie rods in top and bottom rails. Doors shall have an adjusting mechanism in the top rail to provide for minor clearance adjustments. Glass stops shall be snap-in type with bulb type glazing strips. Weather stripping shall be pile.

Store front sections shall be square cut and assembled with the proper clips and screws as provided by the manufacturer to form neat hairline joints. All fastenings shall be concealed except those specifically detailed otherwise at certain transition areas. All glazing gaskets shall be cut over length and installed in slight linear compression to prevent shrinkage from the corners. All framing shall be erected square and true into correct size rough openings prepared by others and in strict accord with the Drawings.

#### HARDWARE

Standard Kawneer entrance door hardware shall be supplied with doors as follows, unless indicated otherwise:

Exterior Main Entry Doors, pair 3'-0" X 7'-0", ALD X ALF

2 each - Continuous Hinges, SL-11HD, Select Products Limited, white

2 each - Pull Handles, 550 GK, as manufactured by Hewi, Inc., white

1 each - Exit Device, concealed rod type, 8610 x Less Pull x US26D, by Sargent

1 each - Exit Device, concealed rod type, 8610 x US26D, by Sargent

2 each - Closers, surface mounted type, 4020N x 4020-18, by LCN

1 each - Weather Stripping (3 sides), white

2 each - Bottom Sweep, white

1 each - Handicapped Threshold

2 each - Floor or Wall Stops

Note: Cylinder by Section 08700

#### SEALANTS

For metal to metal joints use Standard Products Company Stan Pro Urethane Epoxy Sealant No. 103, Dow Corning Silicone Rubber Sealant, or approved equal, color to match finish of aluminum to which applied.

For perimeter of framing members, refer to Section 07900 - Joint Sealers.

### **PART 3 EXECUTION**

#### INSPECTION

Verify wall openings and adjoining air and vapor seal materials are ready to receive work of this Section.

Beginning of installation means acceptance of existing conditions.

#### INSTALLATION

Install doors, frames, glazing and hardware in accordance with manufacturer's instructions.

Use anchorage devices to securely attach frame assembly to structure.

Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.

Coordinate attachment and seal of air and vapor barrier materials. Install sill flashings where required.

Apply one coat of bituminous paint to concealed aluminum and steel surfaces in contact with cementitious, stone or other dissimilar materials.

Install glass and infill panels in accordance with Section 08800, using exterior wet method of glazing.

Install perimeter non-hardening, non-skinning type sealant, and installation requirements in accordance with Section 07900.

Adjust operating hardware.

#### **TOLERANCES**

Variation from Plane: 0.03 inches per foot maximum or 0.25 inches per 30 feet, whichever is less.

Misalignment of Two Adjoining Members Abutting in Plane: 0.015 inches.

#### **CLEANING**

Remove protective material from prefinished aluminum surfaces.

Wash-down exposed surfaces using a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

Remove excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant manufacturer.

#### **END OF SECTION**

**SECTION 08520**  
**ALUMINUM WINDOWS**

**1. GENERAL**

- A. Applicable provisions of THE CONDITIONS OF THE CONTRACT as hereinbefore set forth govern work under which section and are made a part hereof.

**2. DESCRIPTION OF WORK**

- A. The extent of aluminum window units is shown on the accompanying documents. The applications of aluminum windows on the project include the following:

1. OPERABLE SINGLE HUNG Units set in masonry work.

**3. QUALITY ASSURANCE**

A. STANDARDS

1. Except as otherwise indicated, the requirements for aluminum windows, and the terminology and standards of performance and fabrication workmanship, are those specified and recommended in ANSI A134.1, and the applicable general recommendations published by AAMA, NAAMM, and AA.

B. MANUFACTURER

1. Provide double paned thermal aluminum window units produced by a single firm, capable of showing prior successful production of units similar to those required. Manufacturers offering products to comply with the requirements include the following:
- a. Tri-fab 451T or Insulcast 45 as made by Kawneer. Aluminum extrusions shall be **THERMALLY BROKEN** so that there is no metal to metal contact through the frame.

C. PERFORMANCE AND TESTING:

1. Except as otherwise indicated, comply with the air infiltration tests, water resistance tests and applicable load tests specified in ANSI A134.1 (sponsored by AAMA) for the type and classification of window unit required in each case.

**4. SUBMITTALS**

A. SHOP DRAWINGS

1. Submit shop drawings for the fabrication and installation of aluminum window units and associated components of the work. Include wall elevations at 1/4" scale, typical unit elevations at 1" scale, and full-size detail sections of every typical composite member. Show anchors, hardware, and other components not included in manufacturer's standard data. Include glazing details.

B. GUARANTEE

1. Submit 2 copies of written guarantee signed by the manufacturer, installer and contractor, agreeing to replace aluminum window units which fail in materials or workmanship within 3 years of the date of acceptance. Failure of materials or workmanship shall include (but not limited to) excessive leakage or air infiltration, excessive deflections, faulty operation of sash, deterioration of finish or metal in excess of normal weathering, and defects in hardware, weather-stripping, and other components of the work.

**5. MATERIALS**

**ALUMINUM WINDOWS**  
**SECTION 08520 -1**

#### A. ALUMINUM EXTRUSIONS

1. Allow and temper recommended by window manufacturer for strength, corrosion resistance, and application of required finish, but not less than 22,000 psi ultimate tensile strength and not less than 0.062" thickness at any location for main frame and sash members.

#### B. FASTENERS

1. Aluminum, stainless steel or other metallic or non-metallic materials guaranteed by the manufacturer to be non-corrosive and compatible with the aluminum window members, trim, hardware, anchors, and other components of the window units.
  - a. Do not use fasteners except where unavoidable for the application of hardware. Match the finish of the metal surrounding the fastener, unless otherwise indicated.

#### C. SEALANT

1. Unless otherwise indicated for sealants required within the fabricated window units, provide type recommended by window manufacturer for the joint size and movement, to remain permanently elastic, non-shrinking and non-migrating.

#### D. GLASS AND GLAZING MATERIALS

1. Refer to Section 08800 Glazing.

#### E. OPERABLE SINGLE HUNG WINDOWS

1. Thermo-Break Type: Construct entire unit, including frame and sash with locked-in plastic or rubber thermo-breaks, so that none of the aluminum exposed to the exterior has metal-to-metal contact with the aluminum exposed on the interior.
2. Fabricate units with corners and intersections of frames and sash mortised and welded or rivets, and sealed by welding to prevent leakage. Fabricate secondary joints similarly, or use concealed mechanical fasteners and sealants.
3. Provide metal thickness as required for performance, but not less than 0.062", tapered to 0.050" for projecting fins, for main sash and frame units.

### 6. FABRICATION AND ACCESSORIES

#### A. GENERAL

1. Provide manufacturer's standard fabrication and accessories, except to the extent more specific or more stringent requirements are indicated. Include complete system for assembly of components and anchorage of window units, and prepare sash for glazing.

#### B. SIZES AND PROFILES

1. The required sizes for window units and the profile requirements are shown on the drawings. Variable dimensions as required to achieve design requirements and coordination with other work. The details shown are based upon standard details by one manufacturer. It is intended that similar details by other manufacturers will be acceptable, provided they comply with the size requirements, and with minimum/maximum profile requirements as shown.

### 7. ALUMINUM WINDOW FINISHES

#### A. COLOR ANODIZED FINISHES



1. NAAHM AA-C22A42, Class 1 (minimum thickness of 0.7 mils), integral color anodized finish as follows:
  - a. Provide standard aluminum industry color similar to Duranodic Dark Bronze. Apply protective coating of clear acrylic lacquer, not less than 0.5 mil dry film thickness, over anodized finish.

## **8. PREGLAZED FABRICATION**

- A. It is required that the window units, wherever installation requirements will permit, be glazed in the shop prior to installation. However, Contractor, at his option may elect to glaze the units after installation to facilitate the overall project construction requirements. Comply with manufacturer's specification and recommendations for the installation of window units, hardware, operators, and other components of the work.
- B. Set units plumb, level, and true to line, without warp or rack of frames or sash. Anchor securely in place. Separate aluminum and other corrodible metal surfaces from sources of corrosion of electrolytic action at points of contact with other materials. Set sill members in a bed of compound, or with joint fillers or gaskets to provide weathertight construction.
- C. Clean aluminum surfaces promptly after installation of windows, exercising care to avoid damage of the protective coating. Remove excess glazing and sealant compounds, dirt, and other substances. Advise Contractor of protective treatment and other precautions required through the remainder of the construction period, to ensure that window units will be without damage or deterioration (other than normal weathering) at time of acceptance.

END OF SECTION



SECTION 08700  
DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes commercial door hardware for the following:
  - 1. Swinging doors.
  - 2. Sliding Doors
  - 3. Other doors to the extent indicated.
- B. Door hardware includes, but is not necessarily limited to, the following:
  - 1. Mechanical door hardware.
  - 2. Cylinders specified for doors in other sections.
- C. Related Sections:
  - 1. Section 06 10 00 – Rough Carpentry.
  - 2. Section 06 20 00 – Finish Carpentry.
  - 3. Section 08 01 00 – Operations and Maintenance.
  - 4. Section 08 06 10 – Door Schedule.
  - 5. Section 08 06 71 – Door Hardware Schedule.
  - 6. Section 08 11 13 – Hollow Metal Doors and Frames.
  - 7. Section 08 14 16 – Flush Wood Doors.
  - 8. Section 08 14 23 – Clad Wood Doors.
  - 9. Section 08 14 33 – Stile and Rail Wood Doors.
  - 10. Section 08 17 00 – Integrated Door Opening Assemblies.
  - 11. Section 08 41 13 – Aluminum-Framed Entrances and Storefronts.
  - 12. Section 08 42 26 – All-Glass Entrances.
  - 13. Section 08 42 29 – Automatic Entrances.
  - 14. Section 08 71 13 – Automatic Door Operators.
  - 15. Section 08 71 63 – Detention Door Hardware.
  - 16. Section 08 74 00 – Access Control Hardware.
  - 17. Section 08 81 00 – Glass and Glazing.
  - 18. Section 09 90 00 – Painting and Coating.
  - 19. Section 28 13 00 – Access Control.
- D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
  - 1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.

2. ANSI/SDI A250.13 - Testing and Rating of Severe Windstorm Resistant Components for Swing Door Assemblies.
3. ASTM E1886 - Test Method for Performance of Exterior Windows, Curtin Walls, Doors and Shutters Impacted by Missiles and Exposed to Cyclic Pressure Differentials.
4. ASTM E330 - Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure difference.
5. ASTM E1996 - Standard specification for performance of exterior windows, curtain walls, doors and storm shutters impacted by Windborne Debris in Hurricanes.
6. FEMA 361 2008 - Design and Construction Guidance for Community Safe Rooms.
7. ICC 500 - ICC/NSSA Standard for the Design and Construction of Storm Shelters.
8. ICC/IBC - International Building Code.
9. NFPA 70 - National Electrical Code.
10. NFPA 80 - Fire Doors and Windows.
11. NFPA 101 - Life Safety Code.
12. NFPA 105 - Installation of Smoke Door Assemblies.
13. TAS-201-94 - Impact Test Procedures.
14. TAS-202-94 - Criteria for Testing Impact and Non-Impact Resistant Building Envelope Components using Uniform Static Air Pressure.
15. TAS-203-94 - Criteria for Testing Products Subject to Cyclic Wind Pressure Loading.
16. State Building Codes, Local Amendments.

E. Standards: All hardware specified herein shall comply with the following industry standards:

1. ANSI/BHMA Certified Product Standards - A156 Series
2. UL10C – Positive Pressure Fire Tests of Door Assemblies

### 1.3 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.
- B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.
- C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

### 1.4 COORDINATION

- A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.
- B. Door Hardware and Electrical Connections: Coordinate the layout and installation of scheduled electrified door hardware and related access control equipment with required connections to

DOOR HARDWARE

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source power junction boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.

- C. Door and Frame Preparation: Related Division 08 Sections (Steel, Aluminum and Wood) doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

## 1.5 WARRANTY

- A. General Warranty: Reference Division 01, General Requirements. Special warranties 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. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
  - 1. Structural failures including excessive deflection, cracking, or breakage.
  - 2. Faulty operation of the hardware.
  - 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
  - 4. Electrical component defects and failures within the systems operation.
- C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.
- D. Special Warranty Periods:
  - 1. Ten years for mortise locks and latches.
  - 2. Ten years for extra heavy duty cylindrical (bored) locks and latches.
  - 3. Seven years for heavy duty cylindrical (bored) locks and latches.
  - 4. Five years for standard duty cylindrical (bored) locks and latches.
  - 5. Five years for exit hardware.
  - 6. Ten years for manual door closers.
  - 7. Two years for electromechanical door hardware.

## 1.6 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.
- B. Continuing Service: Beginning at Substantial Completion, and running concurrent with the specified warranty period, provide continuous (6) months full maintenance including repair and replacement of worn or defective components, lubrication, cleaning, and adjusting as required

for proper door opening operation. Provide parts and supplies as used in the manufacture and installation of original products.

## PART 2 - PRODUCTS

### 2.1 SCHEDULED DOOR HARDWARE

- A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.
  - 1. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:
    - a. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.
  - 2. Products furnished, but not installed, under this Section include the following. Coordinating, purchasing, delivering, and scheduling remain requirements of this Section.
    - a. Permanent cylinders, cores, and keys to be installed by Owner.
- B. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

### 2.2 HANGING DEVICES

- A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles as specified in the Door Hardware Sets.
  - 1. Quantity: Provide the following hinge quantity, unless otherwise indicated:
    - a. Two Hinges: For doors with heights up to 60 inches.
    - b. Three Hinges: For doors with heights 61 to 90 inches.
    - c. Four Hinges: For doors with heights 91 to 120 inches.
    - d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
  - 2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:

- a. Widths up to 3'0": 4-1/2" standard or heavy weight as specified.
  - b. Sizes from 3'1" to 4'0": 5" standard or heavy weight as specified.
- 3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
  - a. Exterior Doors: Heavy weight, non-ferrous, ball bearing hinges unless Hardware Sets indicate standard weight.
  - b. Interior Doors: Standard weight, steel, ball bearing hinges unless Hardware Sets indicate heavy weight.
  - c. Tornado Resistant Assemblies: At a minimum, provide heavy weight hinges with stainless steel screws used in accordance with and specified as part of a Severe Storm Shelter Opening meeting ICC 500 and FEMA 361.
- 4. Hinge Options: Comply with the following where indicated in the Hardware Sets or on Drawings:
  - a. Non-removable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the following applications:
    - 1) Out-swinging exterior doors.
    - 2) Out-swinging access controlled doors.
- 5. Acceptable Manufacturers:
  - a. McKinney Products (MK).

## 2.3 DOOR OPERATING TRIM

- A. Flush Bolts and Surface Bolts: ANSI/BHMA A156.3 and A156.16, Grade 1, certified automatic, self-latching, and manual flush bolts and surface bolts. Manual flush bolts to be furnished with top rod of sufficient length to allow bolt location approximately six feet from the floor. Furnish dust proof strikes for bottom bolts. Surface bolts to be minimum 8" in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.
  - 1. Acceptable Manufacturers:
    - a. Door Controls International (DC).
    - b. Rockwood Manufacturing (RO).
    - c. Trimco (TC).

## 2.4 CYLINDERS AND KEYING

- A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.

- B. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.
- C. Cylinders: Original manufacturer cylinders complying with the following:
1. Mortise Type: Threaded cylinders with rings and straight- or clover-type cam.
  2. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
  3. Bored-Lock Type: Cylinders with tailpieces to suit locks.
  4. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
- D. Keying System: Each type of lock and cylinders to be factory keyed. Conduct specified "Keying Conference" to define and document keying system instructions and requirements. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner. Incorporate decisions made in keying conference, and as follows:
1. Master Key System: Cylinders are operated by a change key and a master key.
  2. Grand Master Key System: Cylinders are operated by a change key, a master key, and a grand master key.
  3. Great-Grand Master Key System: Cylinders are operated by a change key, a master key, a grand master key, and a great-grand master key.
  4. Existing System: Master key or grand master key locks to Owner's existing system.
  5. Keyed Alike: Key all cylinders to same change key.
- E. Key Quantity: Provide the following minimum number of keys:
1. Top Master Key: One (1)
  2. Change Keys per Cylinder: Two (2)
  3. Master Keys (per Master Key Group): Two (2)
  4. Grand Master Keys (per Grand Master Key Group): Two (2)
  5. Construction Control Keys (where required): Two (2)
  6. Permanent Control Keys (where required): Two (2)
- F. Construction Keying: Provide construction master keyed cylinders or temporary keyed construction cores where specified. Provide construction master keys in quantity as required by project Contractor. Replace construction cores with permanent cores. Furnish permanent cores for installation as directed under specified "Keying Conference".

## 2.5 MECHANICAL LOCKS AND LATCHING DEVICES

- A. Multi-Point Locksets, Security: Three-point locking system device engineered for in-swinging door applications on windstorm safe shelter rooms. Extra heavy duty steel component construction securing the door to the frame at top, bottom and center latch positions. All three latching points are automatically activated when the device is locked.

1. Acceptable Manufacturers:
  - a. Corbin Russwin Hardware (RU) - FE6800 Series.



- b. Sargent Manufacturing (SA) - FM7100 Series.
- B. Cylindrical Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.2, Series 4000, Grade 1 certified cylindrical (bored) locksets furnished in the functions as specified in the Hardware Sets. Lock chassis fabricated of heavy gauge steel, zinc dichromate plated, with through-bolted application. Furnish with solid cast levers, standard 2 3/4" backset, and 1/2" (3/4" at rated paired openings) throw brass or stainless steel latchbolt. Locks are to be non-handed and fully field reversible.
  - 1. Acceptable Manufacturers:
    - a. Corbin Russwin Hardware (RU) – CL3300 Series.
    - b. Sargent Manufacturing (SA) – 10 Line.
- C. Lock Trim Design: As specified in Hardware Sets.

## 2.6 AUXILIARY LOCKS

- A. Push-Pull Latches, Ligature Resistant, Cylindrical: ANSI/BHMA A156.2, Series 4000, Operational Grade 1 hospital type push-pull latches with ligature-resistant paddle trim capable of being mounted vertically, horizontally, or in mixed combinations. Non-handed units, standard 2 3/4", 5", or 7" backsets available, and UL listed for all labeled metal or wood doors. Provide optional lead-lining and engraved cases or handles as specified in Hardware Sets.
  - 1. Acceptable Manufacturers:
    - a. Corbin Russwin (RU) – HP3000 Series.
    - b. Sargent Manufacturing (SA) - HPU Series.

## 2.7 LOCK AND LATCH STRIKES

- A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
  - 1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
  - 2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
  - 3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
- B. Standards: Comply with the following:
  - 1. Strikes for Mortise Locks and Latches: BHMA A156.13.
  - 2. Strikes for Bored Locks and Latches: BHMA A156.2.
  - 3. Strikes for Auxiliary Deadlocks: BHMA A156.5.
  - 4. Dustproof Strikes: BHMA A156.16.

## 2.8 CONVENTIONAL EXIT DEVICES

- A. Security Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 certified rim panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Mounting rails to be formed from smooth stainless steel, brass or bronze architectural materials no less than 0.072" thick, with push rails a minimum of 0.062" thickness. Painted or aluminum metal rails are not acceptable. Exit device latch to be constructed of high grade, heat treated, corrosion resistant nickel steel alloy, and have a full 3/4" throw projection with slide action positive deadlocking.
  - 1. Static Load Force Resistance: Minimum 3000 lbs certified independent tested.
  - 2. Acceptable Manufacturers:
    - a. Corbin Russwin Hardware (RU) - ED4000S / ED5000S Series.
    - b. Yale Locks and Hardware (YA) - 7150 / 7250 Series.
- B. Multi-Point Exit Devices for Severe Storm Shelters Openings: Multi-point exit devices specifically engineered for out-swinging door applications on tornado or hurricane resistant safe shelter rooms. Extra heavy duty steel component construction with each of the latching points automatically activated when the device is locked. The multi-point exit device is approved for usage as part of a complete ICC 500 (2008) and FEMA 361 door, frame and hardware assembly.
  - 1. Acceptable Manufacturers:
    - a. Corbin Russwin Hardware (RU) - FE5400S Series.
    - b. Sargent Manufacturing (SA) - FM8700 Series.
- C. Tube Steel Removable Mullions: ANSI/BHMA A156.3 removable steel mullions with malleable-iron top and bottom retainers and a primed paint finish. Provide keyed removable feature, stabilizers, and mounting brackets as specified in the Hardware Sets. At openings designed for severe wind load conditions due to hurricanes or tornadoes, provide manufacturers approved mullion and accessories to meet applicable state and local windstorm codes.
  - 1. Acceptable Manufacturers:
    - a. Corbin Russwin Hardware (RU) - 700/900 Series.
    - b. Sargent Manufacturing (SA) - 980S Series.

## 2.9 DOOR CLOSERS

- A. Door Closers, Surface Mounted (Commercial Duty): ANSI/BHMA 156.4, Grade 1 certified surface mounted, institutional grade door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck, closing sweep, and latch speed control valves. Provide non-handed units with high impact, non-corrosive plastic covers standard.

1. Acceptable Manufacturers:
  - a. Corbin Russwin Hardware (RU) - DC6000 Series.
  - b. Norton Door Controls (NO) - 8500 Series.
  - c. Sargent Manufacturing (SA) - 1431 Series.

## 2.10 ARCHITECTURAL TRIM

### A. Door Protective Trim

1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.
3. Metal Protection Plates: ANSI/BHMA A156.6 certified metal protection plates (kick, armor, or mop), beveled on four edges (B4E), fabricated from the following.
  - a. Stainless Steel: .050-inch thick, with countersunk screw holes (CSK).
  - b. Brass or Bronze: .050-inch thick, with countersunk screw holes (CSK).
  - c. Laminate Plastic or Acrylic: 1/8-inch thick, with countersunk screw holes (CSK).
4. Fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets.
5. Metal Door Edging: Door protection edging fabricated from a minimum .050-inch thick metal sheet, formed into an angle or "U" cap shapes, surface or mortised mounted onto edge of door. Provide appropriate leg overlap to account for protection plates as required. Height to be as specified in the Hardware Sets.
6. Acceptable Manufacturers:
  - a. Rockwood Manufacturing (RO).
  - b. Trimco (TC).

## 2.11 DOOR STOPS AND HOLDERS

- A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.
- B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.

1. Acceptable Manufacturers:
  - a. Rockwood Manufacturing (RO).
  - b. Trimco (TC).

## 2.12 ARCHITECTURAL SEALS

- A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.
- B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
  1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.
- C. Fire Labeled Gasketing: :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 UL-10C.
  1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and UBC 7-2, Fire Tests of Door Assemblies.
- D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated, based on testing according to ASTM E 1408.
- E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.
- F. Acceptable Manufacturers:
  1. Pemko Manufacturing (PE).
  2. Reese Enterprises, Inc. (RS).

## 2.13 FABRICATION

- A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

## 2.14 FINISHES

- A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

- B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.
- C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- D. Antimicrobial Finishes: Where specified, finishes on locksets, latchsets, exit devices and push/pull trim to incorporate an FDA recognized. Silver Ion, antimicrobial coating (MicroShield™) listed for use on equipment as a suppressant to the growth and spread of a broad range of bacteria, algae, fungus, mold and mildew.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

### 3.2 PREPARATION

- A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.
- B. Wood Doors: Comply with ANSI/DHI A115-W series.

### 3.3 INSTALLATION

- A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
  - 1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.
- B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
  - 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
  - 2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."

3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
  4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.
- C. Integrated Wiegand access control products are required to be installed through current members of the ASSA ABLOY "Certified Integrator" (CI) program.
  - D. Power Operator products and accessories are required to be installed through current members of the manufacturer's "Power Operator Preferred Installer" program.
  - E. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
  - F. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."
  - G. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.
- 3.4 FIELD QUALITY CONTROL
- A. Field Inspection: Supplier will perform a final inspection of installed door hardware and state in report whether work complies with or deviates from requirements, including whether door hardware is properly installed, operating and adjusted.
- 3.5 ADJUSTING
- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
- 3.6 CLEANING AND PROTECTION
- A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.
  - B. Clean adjacent surfaces soiled by door hardware installation.

- C. Clean operating items as necessary to restore proper finish. and provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

### 3.7 DEMONSTRATION

- A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

### 3.8 DOOR HARDWARE SCHEDULE

- A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.
- B. THE FOLLOWING MANUFACTURERS ARE ALLOWED FOR FINISH HARDWARE  
With Abbreviations:

	1. MK - McKinney		
	2. RO - Rockwood		
	3. RU - Corbin Russwin		
	4. NO - Norton		
	5. RF - Rixson		
	6. PE - Pemko		

END OF SECTION 087100





**SECTION 08800**  
**GLASS AND GLAZING**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Flat glass materials.
- B. Insulating glass units.
- C. Glazing accessories.

**1.2 RELATED SECTIONS**

- Section 07900 - Sealants
- Section 08110 - Steel Doors and Frames
- Section 08211 - Flush Wood Doors.
- Section 08410 - Aluminum Entrances and Storefronts (exterior and interior)
- Section 08441- Glazed Aluminum Curtain Walls Systems

**1.3 REFERENCES**

**1.4 DEFINITIONS**

- A. Sealed Insulating Glass Unit Surfaces:
  - Surface 1 - Exterior surface of outer pane.
  - Surface 2 - Interior surface of outer pane.
  - Surface 3 - Interior surface of inner pane.
  - Surface 4 - Exterior surface of inner pane.

**1.5 SYSTEM DESCRIPTION**

- A. Design requirements:
  - 1. Size glass to withstand dead loads and positive and negative live loads acting normal to plane of glass in accordance with IBC CODE 2006.
  - 2. Size glass to withstand dead loads and positive and negative live loads acting normal to plane of glass to a design pressure of (PER IBC CODE 2006 of specified pound per square foot) in accordance with ASTM E 1300.
  - 3. Limit glass deflection to 3/4 inch or flexure limit of glass with full recovery of glazing materials, whichever is less.

**1.6 SUBMITTALS**

**1.7 QUALITY ASSURANCE**

- A. Qualifications:
  - 1. Manufacturer, Flat Glass Materials: Minimum five (5) years documented experience producing glass products specified this section.
  - 2. Fabricator, Sealed Insulating Glass Units: Minimum five (5) years documented experience producing sealed insulating glass units specified this section.
  - 3. Installer: Minimum five (5) years documented experience installing products specified in this

**GLASS AND GLAZING**  
**SECTION 08800-1**

section, and approved by fabricator.

#### 1.8 PROJECT/SITE CONDITIONS

A. Environmental Requirements: Installation of glass products at ambient air temperature below 50 degrees F (10 degrees C) is prohibited.

B. Field Measurements: When construction schedule permits, verify field measurements with drawing dimensions prior to fabrication of glass products.

#### 1.9 WARRANTY

A. Provide ten (10) year warranty to include replacement of sealed glass units exhibiting seal failure, interpane dusting or misting.

B. Provide ten (10) year warranty to include replacement for laminated glass exhibiting delamination.

#### 1.10 MAINTENANCE

A. Extra Materials: Supply two of each size and type of insulating glass units.

### PART 2 PRODUCTS

#### 2.1 MANUFACTURERS

A. Acceptable Manufacturers: Flat Glass Materials:

Sun Management Glass System, supplied by Pilkington; P.O. Box 799, 811 Madison Ave., Toledo, OH 43697-0799; Telephone 419-247-4721, FAX 419-247-4517, Internet Address: [www.pilkington.com](http://www.pilkington.com).

PPG Industries, Inc.

LOF, Libbey-Owens-Ford Company

AFG, American Float Glass

B. Substitutions will be considered in accordance with Section 01630 - Product Options and Substitutions.

#### 2.2 MATERIALS - Exterior surfaces

A. Pyrolytic Selective Low-E Glass

1. Acceptable Product: Pilkington EverGreen Eclipse Advantage<sup>TM</sup> Reflective Low-E Glass

2. Description: Pyrolytic Selective Low-E Glass meeting requirements of ASTM C 1036, Type 1, Class 2, Quality q3.

3. Nominal Glass Thickness: 1/4 inch (6 mm).

4. Performance Characteristics:

a. Visible Light Transmittance: 49 Percent.

b. Visible Light Glass Surface Reflectance: 14 Percent.

c. Visible Light Pyrolytic Surface Reflectance: 26 Percent.

d. Total Solar Energy Transmittance: 23 Percent.

e. Total Solar Energy Reflectance: 8 Percent.

f. UV Transmittance: 7 Percent.

B. Solar-Control Low-Emissivity Pyrolytic Float Glass

### GLASS AND GLAZING

#### SECTION 08800-2

1. Acceptable Product: Pilkington Solar E<sup>TM</sup> Solar Control Low-E
2. Description: Solar-Control Low-Emissivity Pyrolytic Float Glass meeting requirements of ASTM C 1036, Type 1, Class 1, Quality q3.
3. Nominal Glass Thickness: 1/4 inch (6 mm).
4. Performance Characteristics:
  - a. Visible Light Transmittance: 60 Percent.
  - b. Visible Light Pyrolytic Surface Reflectance: 9 Percent.
  - c. Visible Light Glass Surface Reflectance: 7 Percent.
  - d. Total Solar Energy Transmittance: 42 Percent.
  - e. Total Solar Energy Reflectance: 7 Percent.
  - f. UV Transmittance: 41 Percent.

C. Setting Blocks: ASTM C 864, neoprene, 80 to 90 Shore A durometer hardness; length 4 inches (100 mm), width of glazing rabbet space less 1/16 inch (1.5 mm), height required for glazing method, pane weight, and pane area.

D. Spacer Shims: ASTM C 864, neoprene, 50 to 60 Shore A durometer hardness; length 3 inches (75 mm), one half height of glazing stop, thickness required for application , one face self-adhesive.

E. Glazing Tape: Butyl compound tape with integral resilient tube spacer, 10 to 15 Shore A durometer hardness, black color, coiled on release paper; widths required for specified installation.

F. Glazing Tape: Closed cell polyvinyl chloride foam, maximum water absorption by volume 2 percent, designed for 25 percent compression percent for air barrier and vapor retarder seal, black color, coiled on release paper over adhesive on two sides; widths required for specified installation.

G. Glazing Splines: ASTM C 864, resilient polyvinyl chloride, extruded shape to fit glazing channel retaining slot; black color.

H. Glazing Gaskets: ASTM C 864, resilient polyvinyl chloride, extruded shape to fit glazing channel retaining slot; black color.

I. Glazing Clips: Manufacturer's standard type.

J. Sealants: Specified in Section 07900.

K. Silicone Polyester Enamel: Type recommended by flat glass materials manufacturer; color selected by Architect.

L. Smoke Removal Unit Targets: Adhesive targets for application to glass, identifying glass units designed for removal for smoke control.

## 2.3 MATERIALS – Interior Surfaces

A. Interior glass at storefront glazing: 1/4" Clear Plate Glass , tempered as required by code and location,

B. Interior Mirror Glass: 3/16" smoked plate glass conforming to FS DD-M-00411B with 15 year guarantee against silver spoilage. Polish all edges.

1. Mirror Mounting: Mirror Mastic: An adhesive setting compound, produced specifically for setting mirrors by spot application, certified as compatible with glass coating by organic protective coating manufacturer and approved by mirror manufacturer for use in high humidity conditions. Acceptable manufacturers:

## GLASS AND GLAZING

### SECTION 08800-3

"Pazwall Multi-Purpose Adhesive" by Paz Systems, Inc.

Approved equal.

## 2.4 FABRICATION

A. Acceptable Fabricators: Minimum five (5) years documented experience producing sealed insulating glass units specified this section.

B. Heat-Strengthened Glass:

1. Cut float glass materials to indicated sizes and provide cut-outs and holes, if indicated, before heat strengthening.
2. Heat strengthen float glass materials in accordance with ASTM C 1048, Kind HS.

C. Tempered Glass:

1. Cut float glass materials to indicated sizes and provide cut-outs and holes, if indicated, before heat strengthening.
2. Fully temper float glass materials in accordance with ASTM C 1048, Kind FT.

D. Laminated Glass:

1. Cut float glass materials to indicated sizes and provide cut-outs and holes, if indicated, before heat strengthening.
2. Heat strengthen float glass materials in accordance with ASTM C 1048, Kind HS.
3. Laminate plastic interlayer between glass panes in accordance with ASTM C 1172.
4. Laminated glass to conform to GANA (LGDG) and requirements of ANSI Z97.1.

E. Sealed Insulating Glass Units:

1. Fabricate units in accordance with ASTM E 774, Class CBA, with components and performance characteristics specified in SCHEDULES Article of this section.

2. Fabricate units in accordance with ASTM E 774, Class CBA:

3. Components:

a. Outer Pane:

- (1) Glass Type: Pilkington EverGreen Eclipse Advantage<sup>TM</sup> Reflective Low-E Glass Pyrolytic Surface #2
- (2) Glass Color: Natural Green
- (3) Glass Thickness: 1/4 inch (6 mm).
- (4) Heat Treating: Heat strengthened or Fully tempered as required by condition near exits or by Spandrel glass

b. Air Space: 1/2 inch wide, hermetically sealed, argon-filled.

c. Inner Pane:

- (1) Glass Type: Pilkington Solar E<sup>TM</sup> Solar Control Low-E Glass #3 Surface
- (2) Glass Color: Clear.
- (3) Glass Thickness: 1/4 inch (6 mm).
- (4) Heat Treating: Heat strengthened or Fully tempered as required by condition near exits or by Spandrel glass

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4. Performance Characteristics:

- a. Visible Light Transmittance: 29 Percent. /(spandrel required at some locations) - see drawings
- b. Visible Light Exterior Reflectance: 18 Percent.
- c. Visible Light Interior Reflectance: 17 Percent.
- d. Total Solar Energy Transmittance: 12 Percent.
- e. Total Solar Energy Reflectance: 9 Percent.
- f. UV Transmittance: 4 Percent.
- g. Summer U-Value: 0.25
- h. Winter U-Value: 0.26
- i. Solar Heat Gain Coefficient: 0.26
- j. Shading Coefficient: 0.30

5. Provide unit edge seals meeting requirements of ASTM E 773, with aluminum spacers having mitered and corners, and silicone sealant for glass-to-spacer seals.

**PART 3 EXECUTION**

3.1 ACCEPTABLE INSTALLERS Minimum five (5) years documented experience installing products specified in this section, and approved by fabricator.

3.2 EXAMINATION

- A. Verify that openings for glazing are correct size and within tolerance.
- B. Verify that glazing channels and recesses are clean and free of obstructions, that weeps are clear, and that channels and recesses are ready for glazing.

3.3 PREPARATION

- A. Clean contact surfaces to receive sealant with solvent; wipe dry.
- B. Seal porous glazing channels and recesses with primer or sealer compatible with substrate.
- C. Prime surfaces to receive sealant in accordance with sealant manufacturer's instructions.

3.4 INSTALLATION

- A. Install Outboard Pyrolytic glass with Pyrolytic surface to interior (Surface 2).
- B. Install Inboard Pyrolytic glass, if used, with Pyrolytic surface #3.
- C. Install sealants in accordance with sealant manufacturers' written instructions and recommendations.
- D. Exterior Dry Method (Tape and Gasket Spline):
  - 1. Apply glazing tape or spline to glass; butt-joint tape edges; seal joints with butyl sealant.
  - 2. Place setting blocks with edge blocks maximum 6 inches from glass edges and intermediate blocks at 1/4 points of glass panel length.
  - 3. Set glass unit on setting blocks; apply pressure against fixed stop for full contact.
  - 4. Install removable stops without displacing glazing tape or spline; apply pressure for full continuous contact.

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5. Trim sight-exposed tape flush with stop.

**E. Exterior Wet/dry Method (Formed Tape and Sealant):**

1. Apply glazing tape to glass; butt-joint tape edges; seal joints with butyl sealant.
2. Apply glazing tape to permanent stops, 1/4 inch below sight line; butt-joint tape edges; seal joints with butyl sealant.
3. Apply heel bead of butyl sealant along intersection of permanent stop with frame; ensure full perimeter seal between glass and frame for continuity of air and vapor seal.
4. Place setting blocks with edge blocks maximum 6 inches from glass edges and intermediate blocks at 1/4 points of glass panel length.
5. Set glass unit on setting blocks; apply pressure against fixed stop for full contact.
6. Install removable stops without displacing glazing tape; insert spacer strips between glazing and applied stops; terminate spacer strips 1/4 inch below sight line; apply pressure for full continuous contact.
7. Fill gap between glazing and stop with sealant to depth equal to bite of frame on glazing and to 3/8 inch below sight line.
8. Apply cap bead of sealant along void between stop and glazing to uniform line flush with sight line; tool sealant surface smooth.

**F. Exterior Wet Method (Sealant and Sealant):**

1. Place setting blocks at 1/4 points; install glazing unit.
2. Install removable stops; center glass unit in space by inserting spacer shims both sides at intervals of 24 inches; set spacer shims 1/4 inch below sight line.
3. Fill gaps between glazing and stops with sealant to depth equal to bite of frame on glazing and to 3/8 inch below sight line; ensure full contact with glazing for continuity of air and vapor seal.
4. Apply sealant to uniform line flush with sight line. Tool sealant surface smooth.

**G. Exterior Butt Glazed Method (Sealant Only):**

1. Brace glass in position for duration of glazing process; mask edges of glass at adjoining glass edges and between glass edges and framing members.
2. Secure small diameter non-adhering foamed rod on back side of joint.
3. Apply sealant to open side of joint in continuous operation; completely fill joint without displacing foam rod; tool sealant surface smooth to concave profile.
4. Allow sealant to cure, then remove foam backer rod.
5. Apply sealant to opposite side; tool sealant smooth to concave profile.
6. Remove masking tape.

**H. Interior Dry Method (Tape and Tape):**

1. Apply glazing tape to permanent stops, allowing tape edge to project 1/16 inch above stop; butt-joint tape edges; seal joints with butyl sealant.
2. Place setting blocks with edge blocks maximum 6 inches from glass edges and intermediate blocks at 1/4 points of glass panel length.

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3. Set glass unit on setting blocks; apply pressure against fixed stop for full contact.
4. Apply glazing tape on free perimeter of glazing as described above.
5. Install removable stops without displacing glazing tape; apply pressure for full continuous contact.
6. Trim sight-exposed tape flush with stop.

I. Interior Wet/Dry Method (Tape and Sealant):

1. Apply glazing tape to glass; butt-joint tape edges; seal joints with butyl sealant.
2. Place setting blocks with edge blocks maximum 6 inches from glass edges and intermediate blocks at 1/4 points of glass panel length.
3. Set glass unit on setting blocks; apply pressure against fixed stop for full contact.
4. Install removable stops without displacing glazing tape; insert spacer strips between glazing and applied stops; terminate spacer strips 1/4 inch below sight line; apply pressure for full continuous contact.
5. Fill gap between glazing and stop with sealant to depth equal to bite of frame on glazing and to uniform line flush with sight line; tool sealant surface smooth.
6. Trim sight-exposed tape flush with stop.

J. Interior Wet Method (Compound and Compound):

1. Place setting blocks at 1/4 points; install glazing unit.
2. Install applied stops; center glass unit in space by inserting spacer shims both sides at intervals of 24 inches; set spacer shims 1/4 inch below sight line.
3. Locate and secure glazing pane using glazers' clips.
4. Fill gaps between glazing and stops with glazing compound to flush with sight line; tool surface to straight line.

L. Installation of glazing in flush wood doors is specified in Section 08210.

M. Installation of glazing in aluminum entrances and storefronts is specified in Section 08410.

N. Installation of glazing in aluminum curtain wall system is specified in Section 8441

O. MIRROR INSTALLATION General: Install mirrors to comply with printed directions of mirror manufacturer, and with referenced FGMA standard and NAMM document. Mount mirrors in place to avoid distorting reflected images and provide space for air circulation between back of mirror and face of mounting surface.

Mastic Spot Installation System: Install mirrors with mastic as follows: Identify and examine surfaces over which mirror is to be mounted. Comply with manufacturer's printed installation directions for preparation of mounting surfaces including coating surfaces with mastic manufacturer's special bond coating where applicable. Apply barrier coat to mirror backing where approved by manufacturers of mirror and backing material. Apply mastic in spots to comply with mastic manufacturer's printed directions for coverage and to allow air circulation between back of mirror and face of mounting surface. After mastic is applied, align mirror and press into place while maintaining a minimum air space of 3/16 inch between back of mirror and mounting surface.

### 3.5 CLEANING

## GLASS AND GLAZING

### SECTION 08800-7

Protect exterior glass from breakage immediately upon installation by use of crossed streamers attached to framing and held away from glass. Do not apply markers to surfaces of glass. Remove nonpermanent labels and clean surfaces. Remove glazing materials from finish surfaces.

Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove immediately by method recommended by glass manufacturer. Remove labels after glass installation is complete.

Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less often than once a month, for buildup of dirt, scum, alkali deposits or staining. When examination reveals presence of these forms of residue, remove by method recommended by glass manufacturer.

Remove and replace glass which is broken, chipped, cracked, abraded or damaged in other ways during construction period, including natural causes, accidents and vandalism.

Clean glass surfaces and adjacent surfaces. Wash glass on both faces not more than 4 days prior to date scheduled for inspections intended to establish date of substantial completion.

### 3.6 SCHEDULES

A. See drawings. All exterior glass is to be of the same type and color as specified herein

**END OF SECTION 08810**

**GLASS AND GLAZING**

**SECTION 08800-8**



## SECTION 09221

### NON-STRUCTURAL METAL FRAMING

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

##### 1.2 SUMMARY

- A. This Section includes non-load-bearing steel framing members for the following applications:
  - 1. Interior framing systems (e.g., supports for partition walls, framed soffits, furring, etc).
  - 2. Interior suspension systems (e.g., supports for ceilings, suspended soffits, etc).
- B. Related Sections include the following:
  - 1. Division 05 Section "Cold-Formed Metal Framing" for exterior and interior load-bearing and exterior non-load-bearing wall studs.
  - 2. Division 07 Section "Thermal Insulation" for insulation installed with Z-shaped furring members.
  - 3. Division 07 Section "Fire-Resistive Joint Systems" for head-of-wall joint systems installed with non-load-bearing steel framing.

##### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.

##### 1.4 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

#### PART 2 - PRODUCTS

##### 2.1 NON-LOAD-BEARING STEEL FRAMING, GENERAL

- A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
  - 1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal, unless otherwise indicated.
  - 2. Protective Coating: ASTM A 653, G40, hot-dip galvanized, unless otherwise indicated.

##### 2.2 SUSPENSION SYSTEM COMPONENTS

- A. Tie Wire: ASTM A 641, Class 1 zinc coating, soft temper, 0.0625-inch diameter wire, or double strand of 0.0475-inch diameter wire.
- B. Wire Hangers: ASTM A 641, Class 1 zinc coating, soft temper, 0.162-inch diameter.
- C. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.0538 inch and minimum 1/2-inch wide flanges.
  - 1. Depth: 2-1/2 inches, unless otherwise indicated on Drawings.
- D. Furring Channels (Furring Members):

1. Cold-Rolled Channels: 0.0538-inch bare-steel thickness, with minimum 1/2-inch wide flanges, 3/4 inch deep.
  2. Steel Studs: ASTM C 645.
    - a. Minimum Base-Metal Thickness: 0.0179 inch, unless otherwise indicated on Drawings or to meet performance requirements.
    - b. Depth: 3-5/8 inches, 6-inches, or 8-inches, as indicated on Drawings.
  3. Resilient Furring Channels: 1/2-inch deep members designed to reduce sound transmission.
    - a. Configuration: Asymmetrical or hat shaped.
- E. Grid Suspension System for Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.
1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Armstrong World Industries, Inc.; Drywall Grid Systems.
    - b. USG Corporation; Drywall Suspension System.

## 2.3 STEEL FRAMING FOR FRAMED ASSEMBLIES

- A. Steel Studs and Runners: ASTM C 645.
1. Minimum Base-Metal Thickness: 0.0179 inch, unless otherwise indicated on Drawings or to meet performance requirements.
    - a. Provide 0.0312 inch thick metal stud framing at walls to support ceramic tile finishes.
    - b. Depth: 3-5/8 inches, 6-inches, or 8-inches, as indicated on Drawings.
- B. Slip-Type Head Joints: Where indicated, provide the following:
1. Single Long-Leg Runner System: ASTM C 645 top runner with 2-inch- 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 of the top of studs to provide lateral bracing.
- C. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
1. Minimum Base-Metal Thickness: 0.0538 inch.
- D. Cold-Rolled Channel Bridging: 0.0538-inch bare-steel thickness, with minimum 1/2-inch- wide flanges.
1. Depth: 1-1/2 inches, unless otherwise indicated on Drawings.
  2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch- thick, galvanized steel.
- E. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
1. Minimum Base Metal Thickness: 0.0179 inch, unless otherwise indicated on Drawings.
  2. Depth: 7/8 inch.
- F. Resilient Furring Channels: 1/2-inch deep, steel sheet members designed to reduce sound transmission.
1. Configuration: Asymmetrical or hat shaped.
- G. Cold-Rolled Furring Channels: 0.0538-inch bare-steel thickness, with minimum 1/2-inch- wide flanges.
1. Depth: 3/4 inches, unless otherwise indicated on Drawings.
  2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum bare-steel thickness of 0.0312 inch.
  3. Tie Wire: ASTM A 641, Class 1 zinc coating, soft temper, 0.0625-inch- diameter wire, or double strand of 0.0475-inch- diameter wire.
- H. Z-Shaped Furring: With slotted or non-slotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum bare-metal thickness of 0.0179 inch, and depth required to fit insulation thickness indicated.

## 2.4 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
  - 1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
- B. Isolation Strip at Exterior Walls: Provide one of the following:
  - 1. Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt), non-perforated.
  - 2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.
  - 1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.
- B. Coordination with Sprayed Fire-Resistive Materials: Where required by construction or where indicated on Drawings.
  - 1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling runners (tracks) to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches o.c.
  - 2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

### 3.3 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C 754, except comply with framing sizes and spacing indicated.
  - 1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.
- B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- C. Install bracing at terminations in assemblies.
- D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

### 3.4 INSTALLING SUSPENSION SYSTEMS

- A. Install suspension system components in sizes and spacings indicated on Drawings, but not less than those required by referenced installation standards for assembly types and other assembly components indicated.
- B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
- C. Suspend hangers from building structure as follows:
  - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
    - a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
  - 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
    - a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
  - 3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
  - 4. Do not attach hangers to steel roof deck.
  - 5. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.
- E. Seismic Bracing: Sway-brace suspension systems with hangers used for support.
- F. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.
- G. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

### 3.5 INSTALLING FRAMED ASSEMBLIES

- A. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- B. Install studs so flanges within framing system point in same direction.
  - 1. Space studs as follows:
    - a. Single-Layer Application: 16 inches o.c., unless otherwise indicated.
    - b. Multilayer Application: 16 inches o.c., unless otherwise indicated.
    - c. Tile backing panels: 16 inches o.c., unless otherwise indicated.
- C. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.
  - 1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
  - 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.

- a. Install two studs at each jamb, unless otherwise indicated.
    - b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
    - c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
  3. Other Framed Openings: Frame openings other than door openings the same as required for door openings, unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
  4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
    - a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.
- D. Direct Furring:
1. Screw to wood framing.
  2. Attach to masonry with stub nails, screws designed for masonry attachment, or power-driven fasteners spaced 24 inches o.c.
- E. Z-Furring Members:
1. Erect insulation (specified in Division 07 Section "Thermal Insulation") vertically and hold in place with Z-furring members spaced 16 inches o.c.
  2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
  3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.
- F. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

END OF SECTION 092216



**SECTION 09260**  
**GYPSUM WALLBOARD SYSTEMS**

**PART 1 - GENERAL**

**RELATED DOCUMENTS**

Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

**DESCRIPTION OF WORK:** Work of this Section shall include, but not necessarily be limited to, furnishing and installing the following:

Gypsum Board, and Required Accessories  
Spray-Applied Acoustical Plaster Finish  
Sound Deadening Board

**RELATED SECTIONS**

Section 06100 - Rough Carpentry  
Section 07200 - Insulation  
Section 07270 - Fire Barrier Systems  
Section 09900 - Painting

**DEFINITIONS**

Gypsum Board Construction Terminology: Refer to ASTM C-11 and GA-505 for definitions of terms for gypsum board assemblies not defined in this section or in other referenced standards.

**QUALITY ASSURANCE**

**Fire-Resistance Ratings:** Where indicated, provide materials and construction which are identical to those of assemblies whose fire-resistance rating has been determined per ASTM E-119 by a testing and inspecting organization acceptable to authorities having jurisdiction.

Provide fire-resistance-rated assemblies identical to those indicated by reference to GA File Nos. in GA-600 "Fire Resistance Design Manual" or to design designations in U.L. "Fire Resistance Directory" or in listing of other testing and agencies acceptable to authorities having jurisdiction.

**Single Source Responsibility for Panel Products:** Obtain each type of gypsum board, other panel products, and related joint treatment materials from a single manufacturer.

**Sound Transmission Characteristics:** For gypsum board assemblies indicated to have STC ratings, provide materials and construction identical to those of assemblies whose STC ratings were determined per ASTM E 90 and classified per ASTM E 413 by a qualified independent testing agency.

**DELIVERY, STORAGE, AND HANDLING**

Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Neatly stack gypsum panels flat to prevent sagging. Handle gypsum board to prevent damage to edges, ends, and surfaces. Do not bend or otherwise damage metal corner beads and trim.

**PROJECT CONDITIONS**

**Environmental Conditions, General:** Establish and maintain environmental conditions for application and finishing gypsum board to comply with ASTM C-840 and with gypsum board manufacturer's recommendations, whichever are more stringent.

**Minimum Room Temperatures:** For nonadhesive attachment of gypsum board to framing, maintain not less than 40 deg. F. (4 deg. C.). For adhesive attachment and finishing of

gypsum board maintain not less than 50 deg. F. (10 deg. C.) for 48 hours prior to application and continuously thereafter until drying is complete. Do not exceed 95 deg. F (35 deg. C) when using temporary heat sources.

Ventilation: Ventilate building spaces as required for drying joint treatment materials. Avoid drafts during dry, hot weather to prevent materials from drying too rapidly.

#### REFERENCES

Gypsum Association, GA-216 Recommended Specifications for the application and finishing of gypsum board.

## **PART 2 - PRODUCTS**

### GYPSUM BOARD PRODUCTS

Acceptable Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:

Domtar Gypsum Company

Georgia-Pacific Company

Gold Bond Building Products Div., National Gypsum Company

United States Gypsum Company

General: Provide gypsum board of types indicated in maximum lengths available to minimize end-to-end butt joints.

Thickness: Provide gypsum board in thicknesses indicated or, if not otherwise indicated, in 1/2 and 5/8 inch thicknesses to comply with ASTM C 840 for application system and support spacing indicated.

Gypsum Wallboard: ASTM C 36 and as follows:

Type: Type X

Type: Sag-resistant type for ceiling surfaces.

Type: Moisture-resistant type for all toilet rooms.

Edges: Tapered and featured (rounded or beveled) for prefilling.

Sound Deadening Board: Provide 1/2" thick "G-P Hushboard" wood fiber sound deadening board by Georgia-Pacific.

### TRIM ACCESSORIES

Accessories for Interior Installation: Corner beads, edge trim, and control joints complying with ASTM C 1047 and requirements indicated below:

Material: Formed metal or metal combined with paper, unless otherwise indicated, complying with the following requirement:

Metal shall be sheet steel zinc-coated by hot-dip process.

All metal trims to be mud-set type

Shapes indicated below by reference to Fig. 1 designations in ASTM C 1047:

Cornerbead on outside corners, unless otherwise indicated.

LC-bead with both face and back flanges; face flange formed to receive joint compound. Use LC-beads for edge trim, unless otherwise indicated.

L-bead with face flange only; face flange formed to receive joint compound. Use L-bead where indicated.

At Joints between Gypsum Board and exterior door and window frames, trim shall be USG RP Series, rigid vinyl, or approved equal.

### JOINT TREATMENT MATERIALS



General: Provide materials complying with ASTM C-475, ASTM C-840, and recommendations of manufacturer of both gypsum board and joint treatment materials for the application indicated.

Joint Tape: Paper reinforcing tape, unless otherwise indicated.

Use pressure sensitive or staple-attached open-weave glass fiber reinforcing tape with compatible joint compound where recommended by manufacturer of gypsum board and joint treatment materials for application indicated.

Setting-Type Joint Compounds for Gypsum Board: Factory-packaged, job-mixed, chemical-hardening powder products formulated for uses indicated.

For prefilling gypsum board joints, use formulation recommended by gypsum board manufacturer for this purpose.

For filling joints and treating fasteners of water-resistant gypsum backing board behind base for ceramic tile, use formulation recommended by the gypsum board manufacturer for this purpose.

For topping compound, use sandable formulation.

Drying-Type Joint Compounds for Gypsum Board: Factory-packaged vinyl-based products complying with the following requirements for formulation and intended use.

Ready-Mixed Formulation: Factory-Mixed Product

Taping compound formulated for embedding tape and for first coat over fasteners and face flanges of trim accessories.

Topping compound formulated for fill (second) and finish (third) coats.

All-purpose compound formulated for both taping and topping compounds.

SPRAY-APPLIED TEXTURED FINISH: Abestos-free spray finish applied at a rate of 8 sq. ft. per pound minimum. Acceptable products shall include:

Spary Quick (Medium Finish), as manufactured by Gold Bond Building Products.

Imperial QT E-2 (Medium Finish), as manufactured by United States Gypsum Company.

Approved equal.

#### ACOUSTICAL SEALANT

Latex Acoustical Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 and the following requirements:

Product is effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies per ASTM E 90.

Product has flame-spread and smoke-developed ratings of less than 25 per ASTM E 84.

Acoustical Sealant for Concealed Joints: Manufacturer's standard nondrying, non-hardening, nonskinning, nonstaining, gunnable, synthetic rubber sealant recommended for sealing interior concealed joints to reduce transmission of airborne sound.

#### MISCELLANEOUS MATERIALS

General: Provide auxiliary materials for gypsum drywall construction which comply with referenced standards and the recommendations of the manufacturer of the gypsum board.

Laminating Adhesive: Special adhesive or joint compound recommended for laminating gypsum boards.

Spot Grout: ASTM C-475, setting-type joint compound of type recommended for spot grouting hollow metal door frames.

Gypsum Board Screws: ASTM C-1002

Gypsum Board Nails: ASTM C-514

Water: All water used in joint system shall be clean and free from deleterious amounts of foreign material.

Other Materials: All other materials not specifically described but required for a complete and proper installation of gypsum drywall shall be as selected by the Contractor, subject to approval by the Architect.

### **PART 3 - EXECUTION**

#### **EXAMINATION**

Examine substrates to which gypsum board assemblies attach or abut, installed hollow metal frames, cast-in-anchors, and structural framing, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of assemblies specified in this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.

#### **APPLICATION AND FINISHING OF GYPSUM BOARD, GENERAL**

Gypsum Board Application and Finishing Standards: Install and finish gypsum board to comply with ASTM C-840 and GA-216.

Install Batt insulation where indicated, prior to gypsum board unless readily installed after board has been installed on one side.

Locate exposed end-butt joints as far from center of walls and ceilings as possible and stagger not less than 24 inches in alternate courses of board.

Install ceiling boards across framing in the manner which minimizes the number of end-butt joints and which avoids end joints in the central area of each ceiling. Stagger end joints at least 24 inches.

Install wall/partition boards in manner which minimizes the number of end-butt joints or avoids them entirely where possible. At stairwells and similar high walls, install boards horizontally with end joints staggered over studs.

Install exposed gypsum board with face side out. Do not install imperfect, damaged, or damp boards. Butt boards together for a light contact at edges and ends with not more than 1/16 inch open space between boards. Do not force into place.

Locate both edge or end joints of sound board & gypsum board over supports, except in horizontal applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Position boards so that like edges abut, tapered edges against tapered edges and mill-cut or field-cut ends against mill-cut or field-cut ends. Do not place tapered edges against cut edges or ends. Stagger vertical joints over different studs on opposite sides of partitions.

Attach gypsum board to studs so that leading edge or end of each board is attached to open (unsupported) edge of stud flanged first.

Attach gypsum board to supplementary framing and blocking provided for additional support at openings and cutouts.

Form control joints and expansion joints at locations indicated, with space between edges of boards, prepared to receive trim accessories.

Isolate perimeter of non-load-bearing drywall partitions at structural abutments. Provide 1/4 inch to 1/2 inch space and trim edge with "U" bead edge trim. Seal joints with acoustical sealant.

Where STC-rated gypsum board assemblies are indicated, seal construction at perimeters, control and expansion joints, openings and penetrations with a continuous bead of acoustical sealant including a bead at both faces of partitions. Comply with ASTM C-919 and manufacturer's recommendations for location of edge trim and close off sound-flanking paths around or through construction, including sealing of partitions above acoustical ceilings.

Space fasteners in gypsum boards in accordance with referenced gypsum board application and finishing standard and manufacturer's recommendations.

#### **GYPSUM BOARD APPLICATION METHODS**

Single-Layer Application: Install gypsum wallboard as follows:

On ceilings, apply gypsum board prior to wall/partition board application to the greatest extent possible, at right angles to framing, unless otherwise indicated.

On partitions/walls, apply gypsum board vertically (parallel to framing), unless otherwise indicated, and provide panel lengths that will minimize end joints.

On Z-furring members, apply gypsum board vertically (parallel to framing) with no end joints. Locate edge joints over furring members.

Multiple-Layer Application: Install gypsum backing board for base layer and gypsum wallboard for face layer.

On ceilings, apply base layer prior to applying base layer on walls/partitions; apply face layers in same sequence. Offset face-layer joints at least 16 inches from parallel base-layer joints. Apply base layers at right angles to framing members unless otherwise indicated.

On partitions/wall, apply base layer and face layers vertically (parallel to framing) with joints of base layer over supports and face layer joints offset at least 10 inches with base layer joints.

On furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.

Single-Layer Fastening Methods: Apply gypsum boards to supports as follows:

Fasten with screws.

Multiple-Layer Fastening Methods: Apply base layer of gypsum board and face layer to base layer as follows:

Fasten both base layers and face layers separately to supports with screws.

Direct-Bonding to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members or base layer of gypsum board), comply with gypsum board manufacturer's recommendations, and temporarily brace or fasten gypsum panels until fastening adhesive has set.

## INSTALLING TRIM ACCESSORIES

General: Where feasible, use the same fasteners to anchor trim accessory flanges as required to fasten gypsum board to the supports. Otherwise, fasten flanges to comply with manufacturer's recommendations.

Install corner beads at external corners.

Install edge trim where edge of gypsum panels would otherwise be exposed or semi-exposed. Provide edge trim type with face flange formed to receive joint compound except where other types are indicated.

Install edge trim where edge of gypsum board would otherwise be exposed or semi-exposed. Provide edge trim-type with face flange to receive joint compound except where other types are indicated.

Install "LC" bead where gypsum panels are tightly abutted to other construction and back flange can be attached to framing or supporting substrate.

Install "L" bead where edge trim can only be installed after gypsum board is installed.

Install U-type trim where edge is exposed, revealed, gasketed, or sealant-filled (including expansion joints).

## FINISHING OF GYPSUM BOARD ASSEMBLIES

General: Apply joint treatment at gypsum board joints (both directions), flanges of corner bead, edge trim, and control joints, penetrations, fastener heads, surface defects and

elsewhere as required to prepare work for decoration and level of gypsum board finish indicated.

Prefill open joints, rounded or beveled edges, and damaged areas, using setting-type joint compound.

Apply joint tape over gypsum board joints except those with trim accessories having concealed face flanges not requiring taping to prevent cracks from developing in joint treatment at flange edges.

Levels of Gypsum Board Finish: Provide the following levels of gypsum board finish per GA-214.

Level 1 for ceiling plenum areas, concealed areas, and where indicated, unless a higher level of finish is required for fire-resistive-rated assemblies and sound-rated assemblies.

Level 2 where water-resistant gypsum backing board panels form substrates for tile, and where indicated.

Level 4 for gypsum board surfaces indicated to receive light-textured finishes, wallcoverings, and flat paints over light textures.

Level 4 for gypsum board surfaces indicated to receive gloss and semi-gloss enamels, nontextured flat paints, and where indicated.

Level 5 for gypsum board exposed ceilings to receive paint.

For Level 4 gypsum board finish, embed tape in finishing compound plus two separate coats applied over joints, angles, fastener heads, and trim accessories using one of the following combinations of joint compounds (not including prefill), and sand between coats and after last coat.

Where Level 5 gypsum board finish is indicated, apply joint compound combination specified for Level 4 plus a thin, uniform skim coat of joint compound over entire surface. Use joint compound specified for the finish (third coat) or a product specially formulated for this purpose and acceptable to gypsum board manufacturer. Produce surfaces free of tool marks and ridges ready for decoration of type indicated.

Where Level 2 gypsum board finish is indicated, apply joint specified for first coat in addition to embedding coat.

Where Level 1 gypsum board finish is indicated, apply joint compound specified for embedding coat.

Allow not less than 24 hours drying time between coats.

**SPRAY-APPLIED ACOUSTICAL PLASTER:** Apply in strict accordance with manufacturer's specifications. Prepare surface as directed. Apply a full coat of good quality flat white primer, as recommended and approved by manufacturer, over entire surface prior to applying textured finish.

#### **ADJUST AND CLEAN**

Cut, patch, repair, and point-up gypsum board as required. Repair cracks and indented surfaces.

Promptly remove compound from door frames, windows, and other surfaces. Repair floors, walls, and other surfaces which have been stained, marred, or otherwise damaged during the framing and gypsum board work. Daily remove unused materials, containers, and equipment. Clean floors of all gypsum board and wood debris and leave broom clean.

#### **PROTECTION**

Provide final protection and maintain conditions, in a manner suitable to installer, which ensures gypsum drywall construction being without damage or deterioration at time of Substantial Completion.

**END OF SECTION 09260**

**SECTION 09510**  
**SUSPENDED ACOUSTICAL CEILING**

**PART 1 - GENERAL**

**RELATED DOCUMENTS**

Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

**DESCRIPTION OF WORK:** Work of this Section includes, but is not necessarily limited to, furnishing and installing the following:

Suspended Metal Grid Systems Complete With Wall Trim

Ceiling Tiles

All in locations as shown on Drawings.

**QUALITY ASSURANCE**

**Qualifications of Installers**

The suspended ceiling Subcontractor shall have a record of successful installations of similar ceilings acceptable to the Architect.

For the actual fabrication and installation of all components of the system, use only personnel who are thoroughly trained and experienced in the skills required and completely familiar with the requirements established for this work.

**CODES AND STANDARDS:** In addition to complying with all pertinent codes and regulations, suspension system shall be installed according to ASTM C636, Installation of Metal Ceiling Suspension System for Acoustical Tile and Lay-in Panels.

**PRODUCT HANDLING:** Use all means necessary to protect the materials of this Section before, during, and after installation and to protect work and materials of all other trades.

**ENVIRONMENTAL REQUIREMENTS**

Do not install acoustical ceilings until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.

**SUBMITTALS**

Submit samples of all ceiling tile materials for approval.

**PART 2 - PRODUCTS**

**STRUCTURAL EXPOSED SUSPENSION SYSTEM**

**Manufacturer:** Design for this system is based on use of USG Interiors (Donn Products). System used shall be that upon which design was based, by Armstrong, Chicago Metallic, or an equal approved in advance by the Architect.

**Type I Grid:** DX-24 System

System used shall be double-web, direct hung, exposed system.

**Main Runners**

Number DX-24 with 1-1/2" ht., 15/16" face, steel.

The main runner shall have a non-directional bayonet coupling.

**Cross Runners:** Number DX-216 or DX-424 designed to support lay-in lighting fixtures and to receive acoustical tile at sides of fixture opening.

**Perimeter Wall Angles:** Hemmed Edge, 7/8" x 7/8".

**Accessories:** Provide all accessories needed for proper installation of system.

**Finish:** All exposed surfaces shall be finished to match color of ceiling tile.

General: The systems shall be such that the ceiling panels may be removed without damage; that the main runner and cross runners may be removed and replaced without deforming the runners or disturbing the balance of the grid system.

Type I: 24" x 24" x 3/4" ceiling panels with square-cut shadowline edge for use with Type I Grid System. Color to be white.

"Sandrift No. 808", by U.S.G. Interiors, Inc.

Approved Equal by Armstrong

Approved Equal by Celotex Corporation

LIGHTING: Contractor shall be responsible for providing sufficient support on grid systems to support light fixtures. All fixtures shall be supported at each and every corner.

REPLACEMENT STOCK: This Contractor shall supply Owner with replacement stock amounting to 2% of each type of tile and suspension system specified.

### **PART 3 - EXECUTION**

#### **SURFACE CONDITIONS**

Inspection: Prior to all work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence. Verify that suspended ceiling systems may be installed in strict accordance with all pertinent codes and regulations, and the manufacturer's recommendations.

Discrepancies: In the event of discrepancy, immediately notify the Architect. Do not proceed in areas of discrepancy until all such discrepancies have been fully resolved.

INSTALLATION: Fabricate and install all components of the suspended ceiling systems in strict accordance with all pertinent codes and regulations, and the manufacturer's recommendations, firmly anchoring all items in place for long life under hard use.

Suspension from electrical or mechanical equipment will not be allowed.

CLEANING UP: Completely remove all finger prints and traces of soil and damage from the surfaces of grid and acoustical materials, using only those cleaning materials recommended for that purpose by the manufacturer of the material being cleaned. Replace units which are damaged or improperly installed.

#### **END OF SECTION**

**SECTION 09650**  
**RESILIENT FLOORING**

**PART 1 - GENERAL**

**RELATED DOCUMENTS**

Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

**DESCRIPTION OF WORK:** Work in this Section includes, but is not necessarily limited to, furnishing and installing the following:

- Vinyl Composition Tile
- Sheet Vinyl Flooring
- Rubber Flooring
- Resilient Base
- Stair Treads Risers and Stringers
- Carpet Edge Guards

**RELATED SECTIONS**

**QUALITY ASSURANCE**

Single-Source Responsibility for Floor Tile: Obtain each type, color and pattern of flooring from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the work.

**DELIVERY, STORAGE, AND HANDLING**

Deliver tiles and installation accessories to Project site in original manufacturer's unopened cartons and containers each bearing names of product and manufacturer, Project identification, and shipping and handling instructions.

Store flooring materials in dry spaces protected from the weather with ambient temperatures maintained between 50 degrees F. (10 degrees C.) and 90 degrees F. (32 degrees C.). Store tiles on flat surfaces. Move tiles and installation accessories into spaces where they will be installed at least 48 hours in advance of installation.

**PROJECT CONDITIONS**

Maintain a minimum temperature of 70 degrees F. (21 degrees C.) in spaces to receive tiles for at least 48 hours prior to installation, during installation, and for not less than 48 hours after installation. After this period, maintain a temperature of not less than 55 degrees F. (13 degrees C.).

Do not install tiles until they are at the same temperature as the space where they are to be installed. Close spaces to traffic during tile installation.

**SEQUENCING AND SCHEDULING**

Do not install resilient flooring materials over concrete slabs until the slabs have cured and are sufficiently dry to bond with adhesive as determined by tile manufacturer's recommended bond and moisture test.

**TEST MATERIALS**

Deliver extra materials to Owner. Furnish extra materials matching products installed as described below, packaged with protective covering for storage and identified with labels clearly describing contents. Furnish not less than one box for each 50 boxes or fraction thereof, of each class, wearing surface, color, pattern, and size of resilient floor tile installed.

**SUBMITTALS**

Submit manufacturer's product and maintenance data for each type of resilient flooring and accessory.

Asbestos Content: Provide written certification that tile and adhesive materials containing no asbestos of any type or mixture of types occurring naturally as impurities as determined by polarized light microscopy test per Appendix A of 40 CFR 763 will be utilized on this Project.

Certification by resilient flooring manufacturer that products supplied for flooring installation comply with local regulations controlling use of volatile organic compounds (VOCS).

Submit color selection in the form of actual sections of resilient flooring, including accessories, for each type of resilient flooring required showing full range of colors and patterns available.

## **PART 2 - PRODUCTS**

VINYL COMPOSITION TILES: All vinyl tile shall be the maximum extent possible of a single batch number. Tile shall be 12" x 12" x 1/8" thick, with uniform disbursement of color and texture throughout the thickness of the tile. Comply with ASTM F 1066, Composition 1 (nonasbestos formulated).

Acceptable Manufacturers

Armstrong: "Imperial Excelon"

Approved Equal

SHEET VINYL FLOORING: All sheet vinyl shall be the maximum extent possible of a single batch number.

Flooring shall be .085 thick vinyl. Width shall be selected and installed with the fewest seams appropriate to the area. Color and pattern, see Section 00870. Acceptable manufacturer:

Armstrong: "Seagate"

Approved equal.

### **RUBBER FLOORING**

Raised Disc Tiles: Minimum .125 mm thick, minimum 24" X 24" size, with .025" high raised square patter. Color as scheduled in Section 00870. Acceptable manufacturers:

"Roundel RT" by Johnsonite

"Endura .130 Gauge" by Endura

"Norament 825C Square" by Nora Rubber Flooring

Cerrito Group II, "Raised Square Design" by Roppe Corporation

### **RESILIENT STAIR ACCESSORIES**

Rubber Stair Treads/Risers/Landings/Stringers: Two piece nosing, tread, and riser with low profile (0.40") raised square. Color per Section 00870. Acceptable manufacturers:

"Roundel" square nosing treads, landings, and matching risers/stringers, by Johnsonite.

Provide 930 Johnsonite epoxy caulking compound in the tread.

"Endura System", 3/16" Square Profile Treads, with matching landings, risers and stringers by Endura

Norament 825C/S1029U/S1030U, by Nora Rubber Flooring.

"Cerrito" raised square design, Type 94, with matching landings, risers/stringers, by Roppe Corporation.

BASE: Where called for in finish schedule, resilient bases shall be extruded rubber, cove type, 1/8" thick, 4" high with premolded inside and outside corners. Job mitering of corners will not be permitted. Colors shall be per Section 00870 from standard and designer colors. Acceptable manufacturers include:

Armstrong

Approved Equal

### **VINYL CARPET EDGE GUARDS**



Between carpet and resilient floor tile, system shall be CE-XX-B with CBD-00-A track base, as manufactured by Johnsonite or approved equal. Color per Section 00870.

#### INSTALLATION ACCESSORIES

Concrete Slab Primer: Nonstaining type as recommended by flooring manufacturer.

Trowelable Underlayments and Patching Compounds: Latex-modified, portland-cement-based formulation provided or approved by tile manufacturer for applications indicated.

Adhesives to be **Non-Toxic, Low Odor, and Solvent Free** with no alcohol, glycol, or ammonia. Adhesive shall be antimicrobial with no hazardous vapors and contain no carcinogenic materials, per OSHA Regulation 29 CFR 1910-1200. All containers shall contain material safety data sheets (MSDS) and be available at job site for inspection. Provide product as manufactured by W.F. Taylor Co., Inc. (800-397-4583) recommended for intended installation, as approved by base manufacturer, or approved equal.

Stair Tread Nose Filler: Two-part epoxy compound recommended by resilient tread manufacturer to fill nosing substrates not conforming to tread contours.

Other materials, including edge strips not specifically described, but required for a complete and proper installation of resilient flooring, shall be only as recommended by the manufacturer of material to which it is applied.

### **PART 3 - EXECUTION**

**INSPECTION:** Installer must examine the areas and conditions under which resilient flooring and accessories are to be installed and notify the Contractor in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

**CONCRETE SUBFLOORS:** Verify that concrete slabs comply with ASTM F 710 and the following:

Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials whose presence would interfere with bonding of adhesive. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by tile manufacturer.

Finishes of subfloors comply with tolerances and other requirements specified in Division 3 Section, "Cast-In-Place Concrete" for slabs receiving resilient flooring.

#### PREPARATION

General: Comply with manufacturer's installation specifications for preparing substrates to receive products indicated.

Prior to laying flooring, vacuum surfaces to be covered and inspect subfloor. Start of flooring installation indicates acceptance of subfloor and full responsibility for completed work.

This Contractor to remove coatings, including curing compounds, adhesives, plastics, and other substances that are incompatible with flooring adhesives and that contain soap, wax, oil, or silicone, by using a terrazzo or concrete grinder, a drum sander, or a polishing machine equipped with a heavy-duty wire brush. Surface to receive new flooring shall be prepared, including removal of existing materials not acceptable for proper installation of new materials, as required by manufacturer.

Use leveling compound as recommended by flooring manufacturer for filling small cracks and depressions in subfloors.

Apply concrete slab primer, if recommended by flooring manufacturer, prior to application of adhesive. Apply in compliance with manufacturer's directions.

Use stair tread nose filler per tread manufacturer's directions to fill nosing substrates not conforming to tread contours.

**INSTALLATION - GENERAL:** Install flooring after finishing operations, including painting, have been completed. Moisture content of concrete slabs, building air temperature, and relative humidity must be within limits recommended by flooring manufacturer's directions.

Patch and repair floors and walls to receive flooring for proper installation of flooring, stair accessories, and base.

Place flooring with adhesive cement in strict compliance with manufacturer's recommendations. Butt tightly to vertical surfaces and edgings. Scribe around obstructions and to produce neat joints, laid tight, even, and straight. Extend flooring into toe spaces.

Maintain reference markers, holes, or openings that are in place or plainly marked for future cutting by repeating on finish flooring as marked on subfloor. Use chalk or other non-permanent marking device.

Install flooring on covers for telephone and electrical ducts and other such items as occur within finished floor areas.

Maintain overall continuity of color and pattern with pieces of flooring installed in these covers. Tightly cement edges to perimeter of floor around covers and to covers.

Tightly cement flooring to subbase without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, or other surface imperfections.

**INSTALLATION - VINYL COMPOSITION TILE FLOORS:** Lay tile from center marks established from center of area so that tile at opposite edges of the area are of equal width. Adjust as necessary to avoid use of cut widths less than 1/2 tile at edge perimeters. Lay tile square to room axis unless otherwise indicated.

Match tiles for color and pattern by using tile from cartons in same sequence as manufactured and packaged. Cut tile neatly in and around all fixtures. Broken, cracked, chipped, or deformed tiles are not acceptable. Lay tile with grain in tile running in same direction.

**INSTALLATION - SHEET VINYL FLOORING:** Heat weld seams in accordance with manufacturer's specifications with matching color seam.

**INSTALLATION - RUBBER TILE FLOORING:** Install rubber tile in strict accordance with manufacturer's installation instructions with nonflammable adhesive recommended by the manufacturer.

**ACCESSORIES:** Apply resilient base to walls, columns, pilasters, casework, and other permanent fixtures in rooms or areas where base is required. Install base in as long lengths as practicable. Tightly bond base to backing throughout the length of each piece with continuous contact at horizontal and vertical surfaces. On irregular surfaces, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.

Place resilient edge strips tightly butted to adjacent materials of type indicated and bond to substrates with adhesive. Install edging strips at all unprotected edges of flooring unless otherwise shown. Apply resilient accessories to stairs and risers as indicated and according to manufacturer's installation instructions.

**CLEANING AND PROTECTION:** Remove any excess adhesive or other surface blemishes using neutral type cleaners as recommended by floor manufacturer.

Protect flooring against mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods indicated or recommended by manufacturer of resilient product involved.

Clean products specified in this Section not more than four days prior to dates scheduled for inspections intended to establish date of Substantial Completion in each area of Project. Clean products using method recommended by manufacturer. Strip protective floor polish that was applied after completing installation, prior to cleaning.

**FINISHING:** After completion of project and just prior to final inspection of work, thoroughly clean floors and accessories. Apply wax and buff with type of wax, number of coats, and buffing procedures in compliance with flooring manufacturer's instructions.

END OF SECTION

## **SECTION 09672**

### **DECORATIVE LAMINATE EPOXY FLOORING SPECIFICATION**

#### **PART 1 - GENERAL**

##### **1.01 DESCRIPTION OF WORK**

1. Furnish and install the decorative epoxy flooring system as specified and indicated. Prior to installation, provide decontamination and cleaning as specified. The term "decorative epoxy flooring system" as used in this section will include the primers, resin systems and aggregate materials, topcoats, cove building materials, and any related materials for the project.
2. Complete the decorative epoxy flooring system installation in strict accordance with these specifications, the coating system manufacturer's most current requirements for surface preparation, application and inspection, and the instructions for safety. In the event of a conflict between these specifications and the manufacturer's instructions, the more stringent requirements will apply.
3. The Contractor shall be responsible for providing ventilation, initial cleaning, inspection, supervision, dust control and equipment protection as specified herein and related sections for the work associated with this Section. The Contractor is responsible for all other work associated with this Section including protection of existing equipment and structures in the work area, surface preparation, flooring application, curing, coating repair, rework, inspection and supervision.

##### **1.02 RELATED SECTIONS**

Division 1      General Requirements

##### **1.03 REFERENCES:**

1. Society for Protective Coatings (SSPC) Specifications and Standards:
  1. SSPC-PA-3: "A Guide to Safety in Paint Application".
  2. SSPC-SP-13: "Surface Preparation of Concrete".
2. NACE (National Association of Corrosion Engineers)
  1. NACE Publication 6D-173, "A Manual for Painter Safety".
  2. NACE Publication 6G-164, "Surface Preparation Abrasives for Industrial Maintenance Painting".
3. ASTM (American Society for Testing and Materials)
  1. ASTM D4541 - L.R. "Standard Method for Pull-Off Strength of Coatings using Portable Adhesion Testers".
  2. ASTM E337 - L.R. "Standard Practice Test Method for Measuring Humidity with a Psychrometer".

### **DECORATIVE LAMINATE EPOXY FLOORING SPECIFICATION**

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3. ASTM D4263-83 (1999), "Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method".
4. ASTM F1869-98, "Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride".
5. ASTM D4414-95, "Standard Practice for Measurement of Wet Film Thickness by Notched Gages".
6. ICRI Guide No. 03732, "Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings and Polymer Overlays," International Concrete Repair Institute, Sterling, VA.
7. ASTM 4262, "Standard Test Method for Measuring Surface pH of Acid Etched Concrete".
8. ASTM D4259, "Standard Practice for Abrading Concrete".

#### 1.04 DEFINITIONS

1. Terms used in this Section are defined as follows:

- |    |                                |  |
|----|--------------------------------|--|
| 1. | Decorative Epoxy Flooring Work | The aspects involved with proper application of the specified high solids flooring system, including but not limited to cleaning, surface preparation, mixing, application, curing, and quality control. |
| 2. | Approved Materials             | The coating system, blast media, and other specified materials for this coating work.  |
| 3. | Wet Film Thickness             | The primer or coating films' actual thickness immediately following application. Wet film thickness is measured in mils or thousandths of an inch (0.001") and is abbreviated WFT.                       |
| 4. | Dry Film Thickness             | The primer or coating films' actual thickness following curing and drying. Dry film thickness is measured in mils or thousandths of an inch (0.001") and is abbreviated DFT.                             |
| 5. | Coating System Manufacturer    | Refers to the approved coating Manufacturer abbreviated as CSM in this Section.  |
| 6. | Manufacturer's Technical       | Refers to the technical representative(s) of the Representative(s) approved CSM.   |
| 7. | A/E                            | Architectural or Engineering Firm.   |

#### 1.05 QUALITY ASSURANCE

1. The Contractor shall meet the following requirements:

### **DECORATIVE LAMINATE EPOXY FLOORING SPECIFICATION**

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1. The Contractor is ultimately responsible for the workmanship and quality of the decorative epoxy flooring system installation. Inspections by the Owner, the Engineer, or others do not limit the Contractor's responsibility.
2. Do not use or retain contaminated, outdated, or diluted materials for flooring. Do not use materials from previously opened containers.
3. Use only products of the approved CSM. Provide the same products for repairs as for the original coating.
4. If any requirements of this specification are contradicted by a referenced standard or vice-versa, the matter shall be resolved in writing by the A/E or its representative.
5. Make available at all times all locations and phases of the work for access and inspection by the Engineer, the Owner, or other personnel designated by the Owner. The Contractor shall provide ventilation, egress, and whatever other means are required for the Owner, Engineer, or designated personnel to access and exit the work areas safely.
6. Conduct work so that the decorative epoxy flooring system is installed as specified herein. Inspect work continually to ensure that the coating system is installed as specified herein. The A/E shall inspect the work to determine conformance with the contract documents.
7. The Contractor's Supervisor shall be on site at all times and will be thoroughly familiar with the work in progress. This Supervisor shall have authority to receive and execute all direction provided by the A/E or the Owner.
8. The methods of construction shall be in accordance with all requirements of this specification and the best trade practices. Any changes in the decorative epoxy flooring system installation requirements shall be allowed only with the written approval of the A/E.
9. Installation shall be performed by an applicator having satisfactory experience in the application of these or similar materials or with on-site consultation by a qualified field service representative of the CSM.

#### 1.06 SUBMITTALS

1. Submit the following prior to commencing with any phase of the work covered by this Section:
  1. Manufacturer's current printed recommendations and product data sheets for all decorative epoxy flooring system products including performance criteria, surface preparation and applications, volatile organic compound (V.O.C.) data, and safety requirements.
  2. Material Safety Data Sheets (MSDS) for any materials brought on-site including all coating system materials, solvents, and abrasive blast media.
  3. Contractor's written verification that the personnel who will perform this work have the required experience as specified in 1.05 1.9. This document must list the names of all of the Contractor's supervisors and tradespeople who will work on the project covered by this Section.

#### **DECORATIVE LAMINATE EPOXY FLOORING SPECIFICATION**

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4. List of cleaning and thinner solutions allowed by the CSM.
5. Storage requirements including temperature, humidity, and ventilation for Coating System Materials.
2. Owner, contractor, and manufacturer's representative shall review and mutually agree upon color, grade, and final texture of coating system before starting installation. The acceptance of a sample will constitute the job standard by which installation will proceed.

#### 1.07 DELIVERY, STORAGE, AND HANDLING

1. Material shall be delivered to project site in manufacturer's original unopened containers.
2. Materials shall be stored indoors, protected from damage, moisture, direct sunlight and temperatures below 40 degrees F or above 90 degrees F.
3. Store all materials only in area or areas designated by the Owner solely for this purpose. Confine mixing, thinning, clean-up and associated operations, and storage of coating materials related debris before authorized disposal, to these areas. All materials are to be stored on pallets or similar storage/handling skids off the ground.
4. Mix all coating materials in a designated enclosed mixing area. This enclosed area must protect the mixing operation and materials from direct sunlight, inclement weather, freezing, or other means of damage or contamination. Protect all other concrete and metallic surfaces and finishes from any spillage of material(s) within the mixing area.
5. Do not use drain piping for disposal of coating materials.
6. The Contractor shall take all precautions and implement all measures necessary to avert potential hazards associated with the decorative epoxy flooring system materials as described on the pertinent Material Safety Data Sheets or container labels.
7. Deliver all materials to the job site in new, unopened containers. Each container shall bear the CSM's name and label.
  1. Labels on all material containers must show the following information:
    1. Name or title of product.
    2. Manufacturer's batch number.
    3. Manufacturer's name.
    4. Generic type of material.
    5. Application and mixing instructions.
    6. Hazardous material identification label.
    7. Shelf life date.
  2. All containers shall be clearly marked indicating any personnel safety hazards associated with the use of or exposure to the materials.
  3. All materials shall be handled and stored to prevent damage or loss of label.
  4. Do not use or retain contaminated, outdated, prematurely opened, diluted materials, or materials which have exceeded their shelf life.

#### **DECORATIVE LAMINATE EPOXY FLOORING SPECIFICATION**

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## 1.08 ENVIRONMENTAL CONDITIONS

1. Surfaces and surrounding air temperatures must exceed 55 degrees F, but must be less than 90 degrees F, with materials at not less than 70 degrees F during application.
2. Do not apply coating materials when dust is being generated.
3. If existing facility lighting is not adequate for flooring system application, the Contractor shall provide all temporary lighting during the work equivalent to one 200 watt explosion proof incandescent lamp per 100 square feet of work area.

## PART 2 - PRODUCTS

### 2.01 MATERIALS

1. Laminate Resinous Flooring: Series 222 Deco-Tread consisting of a two-component modified polyamine cured epoxy liquid and a colored quartz broadcast aggregate applied by double broadcast or as a slurry broadcast to provide a minimum 1/8" thickness.  
  
The Series 222 Deco-Tread is self-priming when installed as a double broadcast or prime with Series 201 when Series 222 is installed as a slurry broadcast. Apply Series 201 in this case at 6 to 8 dry mils.
2. Top Coat: Series 284 Deco-Clear two-component, modified polyamine cured epoxy glaze. Thickness and number of coats will vary depending on desired finish.
3. Coving (Optional): Series 222 Deco-Tread, a two-component, modified polyamine cured epoxy liquid, blended as a mortar with decorative aggregate applied to form a cant or rolled radius cove.
4. Flexible Underlayment (Optional): Series 206, flexible elastomeric epoxy underlayment used for bridging small substrate cracks in concrete and as a protective membrane under aggregate reinforced flooring systems. To be applied at 30 to 40 dry mils. Thickness and number of coats will vary depending on substrate roughness or profile depth.

### 2.02 MANUFACTURER

1. Tnemec Company, Incorporated.

## PART 3 - EXECUTION

### 3.01 GENERAL

1. Protection  
  
Mask, cover, or otherwise protect all surfaces, equipment, and finishes not to receive the decorative epoxy flooring system specified in this Section.
2. Strictly follow the approved CSM's written instructions and the requirements of this specification regarding all aspects of decorative epoxy flooring work including: mixing, application, recoat times and curing.

## **DECORATIVE LAMINATE EPOXY FLOORING SPECIFICATION**

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3. Mock-up
  1. Prior to commencing the installation, the Contractor shall install with the owner's approval, a mutually agreed upon mock-up test sample to show final color and appearance of the decorative epoxy flooring system.

### 3.02 PREPARATION

1. Allow new concrete to cure for 28 days. Verify dryness by testing for moisture with a "plastic film tape-down test". (Reference ASTM D4263)
2. Shot-blast or mechanically abrade to remove laitance, curing compounds, sealers and other contaminants and to provide surface profile. (Reference ASTM D4259, ICRI CSP 4-6).
3. Vacuum clean concrete to remove all dirt, dust, and other loose materials.
4. After mechanically abrading, verify that all surfaces are clean, dry and free of any contaminants, which could adversely affect the adhesion of the flooring system.
5. If between final surface preparation work and decorative epoxy flooring system application, contamination of the prepared and cleaned substrates occurs, recleaning shall be required until the requirements of this Section are met.

### 3.03 INSTALLATION

1. For Slurry Broadcast Application: The primer shall be mechanically mixed, applied and cured in strict accordance with manufacturer's printed instructions. Apply uniformly at a film thickness of 6 to 8 dry mils.
2. Cant Cove or rolled radius cove bases shall be installed in accordance with the CSM's written instructions and as indicated on the Standard Flooring Details.
3. Decorative Laminate Epoxy Resinous Flooring: The material shall be mixed, applied and cured in strict accordance with the manufacturer's printed instructions. Apply by double broadcast (self-priming) or slurry broadcast to a minimum of 1/8" thickness.

Note to Specifier: Floor and wall transitions can be formed to have a cant cove or rolled radius cove. This will provide a seamless wall to floor transition.

4. Top Coat: The high-solids, epoxy glaze coat shall be mechanically mixed, applied and cured in strict accordance with manufacturer's printed instructions. Apply at a film thickness of 6 to 12 dry mils. Skid resistance properties can be adjusted by the film thickness and number of topcoats and should be determined at the time the mock-up is completed.
5. Finish Coat (Optional): The high-solids, orange-peel, epoxy finish coat shall be mechanically mixed, applied and cured in strict accordance with manufacturer's printed instructions. Apply at a film thickness of 4 to 6 dry mils.
6. Fill all cracks and recessed joints, such as control and construction joints with Tnemec Series 201 Epoxoprime and fumed silica. When filled, joint should be flush with the floor surface.

### 3.04 CLEANUP

## **DECORATIVE LAMINATE EPOXY FLOORING SPECIFICATION**

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1. Remove waste materials, rubbish, and debris and dispose of them at the owner's direction. Leave work areas in a clean and tidy condition.

### 3.05 PROTECTION

1. Protect the completed work from water, airborne particles or other surface contaminants until cured for a minimum of 24 hours after application.
2. Protect from traffic, physical abuse, immersion and chemical exposure until the complete system has thoroughly cured for 24 hours at 75 degrees F. For different temperatures, consult the manufacturer's representative about curing times.

### 3.06 FIELD QUALITY CONTROL INSPECTION AND TESTING

1. Inspection by the Engineer, Owner or others does not limit the Contractor's responsibilities for quality as specified herein or as required by the CSM's instructions.
2. The Contractor shall perform the Q.C. procedures listed below in conjunction with the requirements of this Section. The Engineer will inspect the work to determine conformance to the contract documents.

#### 1. Degree of Cleanliness.

Visually inspect the degree of cleanliness of substrates to meet the requirements of this Section. The pH of the concrete substrates will be measured using pH indicating papers. pH testing is to be performed once every 100 sq. ft. of surface area to be coated.

Acceptable pH values shall be between 8.0 and 11.0 as measured by a full-range (1-12) color indicating pH paper with readable color calibrations and a scale at whole numbers (minimum). Use Hydrion Insta-Chek Jumbo 0-13 or 1-12 or equal. The paper shall be touched to the surface once using moderate finger pressure. The surface shall not be wiped or moved laterally to disturb the surface during pH testing. Following the one touch, lift the paper vertically to not "wipe" the surface. Compare the color indicated with the scale provided and record the pH.

*Note:* If the surface of the concrete is dry, it is not possible to take a pH measurement. However, pH values are still important on dry surfaces. When a dry concrete substrate is encountered for a pH test, the surface where the pH test is to be performed shall be sprayed lightly with distilled, deionized water from a commercially available spray bottle that has been properly rinsed to preclude any dissolved solids. The spray shall just wet the surface to a "shiny" appearance. Wait 60 seconds to allow chemical equilibria to be established and then test the pH of the water on the surface. Perform this test in accordance with ASTM D4262.

#### 2. Concrete Surface Profile

Using the replicate rubber specimens inspect the concrete surface profile in accordance with ICRI Guide No. 03732. This should be performed once for every 100 square feet of surface area to be coated.

3. Measure and record ambient air temperature once every two hours of each shift

### **DECORATIVE LAMINATE EPOXY FLOORING SPECIFICATION**

using a thermometer and measure and record substrate temperature once every two hours using a surface thermometer.

4. Measure and record relative humidity every two hours of each shift using a sling psychrometer in accordance with ASTM E337.
5. Inspect correct mixing of coating materials in accordance with the CSM's instructions.
6. Inspect and record that the "pot life" of coating materials used are not exceeded during installation.
7. Measure and record the thickness of the coating system using a notched gauge in accordance with ASTM D4414 for Wet Film Thickness at least once every 10 sq. ft. of coating area.
8. Perform moisture tests on concrete as follows:
  1. Once for every 500 square feet of surface area to be coated, perform the plastic sheet test in accordance with ASTM D4263. If moisture is indicated, proceed to step 2 below.
  2. Perform calcium chloride moisture tests in accordance with ASTM D1869 once for every 1000 square feet of surface area to be coated. The maximum limit for moisture vapor emissions rate should be 3.0 lbs. per 24 hours per 1000 sq. ft. If tests indicate rates higher than 3.0, consult with Tnemec's Technical Service Department for further evaluation.
9. Inspect to verify proper curing of the decorative epoxy flooring system as recommended by the CSM.

End of Section

## **SECTION 09900**

### **PAINTING**

#### **PART 1 - GENERAL**

##### **RELATED DOCUMENTS**

Drawings and General Provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

**DESCRIPTION OF WORK:** The work under this Section includes the furnishing of all labor, material, equipment, appliances, and tools to perform the work indicated on the Drawings or specified herein. The work shall include, but not be limited to, the following:

This Section includes surface preparation and the application of paint materials to exposed interior and exterior items and surfaces scheduled. Surface preparation, prime and finish coats specified are in addition to shop-priming and surface treatments.

Paint all exposed surfaces, whether or not colors are designated, except where a surface or material is indicated not to be painted or is to remain natural. Where an item or surface is not mentioned, paint the same color as similar adjacent materials or surfaces. If color or finish is not designated, the Owner will select from standard colors or finishes available.

Paint all exposed plumbing, heating, and electrical material to match the walls and ceilings of that area unless noted otherwise. This shall include, but not be limited to, pipes, insulation, conduit ducts, access panels, grilles, diffusers, whether the adjacent surfaces receive paint or not, and the like. Include dampers or baffles behind grilles.

Painting is not required on prefinished items, finished metal surfaces, concealed surfaces, operating parts, or labels.

Labels: Do not paint over Underwriter's Laboratories, Factory Mutual or other code-required labels, or equipment name, identification, performance rating, or nomenclature plates.

**DEFINITIONS:** "Paint" includes coating systems materials, primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as prime, intermediate or finish coats.

**RELATED SECTIONS:** The following listed work is included under other Sections:

Section 00870 - Finish Color Schedule

Prime coat on new hollow metal work shall be furnished under the "Steel Doors and Frames" Section 08110.

Prime coat on lintels shall be furnished under the Division 5 Sections.

##### **SUBMITTALS**

**Product Data:** Submit manufacturer's technical information, label analysis, and application instructions for each paint material proposed for use.

##### **QUALITY ASSURANCE**

**SINGLE SOURCE RESPONSIBILITY:** Provide primers and undercoat paint produced by the same manufacturer as the finish coats.

**COORDINATION OF WORK:** Review Sections in which primers are provided to ensure compatibility of the total systems for various substrates.

**MATERIAL QUALITY:** Provide the manufacturer's best quality trade sale type paint material of the various types specified. Paint material containers not displaying manufacturer's product identification will not be acceptable. Proprietary names used to designate colors or materials are not intended to imply that products named are required or to exclude of equal products of other manufacturers.

##### **DELIVERY AND STORAGE**

Deliver materials to the job site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label with trade name and manufacturer's instructions.

Store materials not in use in tightly covered containers in a well ventilated area at a minimum ambient temperature of 45 deg. F. (7 deg. C.). Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily.

PROJECT CONDITIONS: Do not apply paint in snow, rain, fog, or mist, or when the relative humidity exceeds 85 percent, or at temperatures less than 5 degrees F. (3 degrees C.) above the dew point, or to damp or wet surfaces.

MATERIALS: All finishing materials, thinners, etc., shall be the best quality, first line materials as manufactured by:

Pratt and Lambert, Inc.

Martin-Senour

Benjamin Moore

Pratt and Lambert materials are mentioned in these Specifications only to establish the level of quality, except where specific manufacturer product not listed above is specified. Equivalent products by any of the listed manufacturers will be acceptable, as approved by the Architect.

Raw linseed oil, turpentine, benzine, gloss oil, or coal oil shall not be used in any of the materials for painting work.

## **PART 2 - PRODUCTS**

Detailed specifications for the various surfaces follow. If these specifications conflict with the recommendations of the manufacturer, this discrepancy shall be brought to the attention of the Architect, and he (the Architect) shall decide which method shall be followed:

<u>Surface</u>	<u>Dry Mill Type &amp; Luster</u>	<u>No of Coats</u>	<u>Product</u>	<u>Thicknesses (Per Coat)</u>
A. Interior Ferrous Metal Shop Primed or Previously Painted	Acrylic Latex Semi-Gloss	1	P&L Suprime "1" 100% Acrylic Multi-Purpose Primer (Z1001)	1.25
		2	P&L Accolade Interior Semi-Gloss	1.50
B. Interior Gypsum Board	Acrylic Latex Satin	1	P&L Suprime "4" Interior Latex Wall Primer (Z1004)	1.50
		2	P&L Accolade Interior Velvet	1.50
C. Interior Gypsum Board	Acrylic Latex Satin Enamel	1	P&L Prohide Primer (Z8160)	1.00
		2	P&L Prohide Gold (Z8300)	1.20
<u>Surface</u>	<u>Dry Mill Type &amp; Luster</u>	<u>No of Coats</u>	<u>Product</u>	<u>Thicknesses (Per Coat)</u>
D. Interior Concrete Masonry Units or Concrete	Acrylic Latex Semi-Gloss	2	P&L Primafil (50 sf/gal)	12.00
		1	P&L Accolade Interior Semi-Gloss	1.50
E. Interior Concrete	Alkyd	2	P&L Withstand	1.25

Floor			Alkyd Floor Paint	
F. Interior Wood	Acrylic Latex Semi-Gloss	1	P&L Suprime "1" 100% Acrylic Multi- Purpose Primer (Z1001)	1.25
		2	P&L Accolade Interior Semi-Gloss	1.50
G. Interior Wood	Natural Finish	1	P&L Tonetic Wood Stain	Nominal
	Stain Satin	1	P&L Filler Sealer Finish	1.00 1.00
	Clear Finish	2	P&L Varmor	0.75
H. Exterior Wood	Acrylic Latex	1	P&L Stainshield EggShell Primer	2.3
		2	P&L Accolade Exterior Eggshell	1.25
I. Exterior Wood	Natural Finish  (wet-on-wet coats)	2	P&L Stainshield Penetrating oil Rustic Stain	Nominal
J. Exterior Aluminum	Acrylic Latex	1	P&L Effecto Primer	1.25
	EggShell	2	P&L Accolade Exterior EggShell	1.25
K. Exterior Ferrous Metal	Alkyd Satin	1	P&L Suprime "9" Int/Ext Alkyd Metal Primer (Z1009)	1.25
		2	P&L Effecto Enamel	1.25
<u>Surface</u>	<u>Dry Mill Type &amp; Luster</u>	<u>No of Coats</u>	<u>Product</u>	<u>Thicknesses (Per Coat)</u>
L. Pipes, Mechanical Equipment	Latex Acrylic Eggshell	1	P&L Techgard Acrylic Metal Primer (Z190)	1.25
		1	P&L Accolade Interior Velvet	1.50
M. Galvanized Ductwork	Latex Acrylic Eggshell	1	P&L Suprime "3" Int/Ext Latex Metal Primer (Z1003)	1.25
		1	P&L Accolade Interior Velvet	1.50

COLOR SAMPLES: The Contractor shall furnish samples of all finishes in triplicate and obtain the approval of color match before starting work. Final colors must match exactly with the approved sample. Refer to Section 00870, Finish Color Schedule, for colors required.

### **PART 3 - EXECUTION**

Examine substrates and conditions under which painting will be performed for compliance with requirements. Do not begin application until unsatisfactory conditions have been corrected.

PREPARATION: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and items in place that are not to be painted, or provide protection prior to surface preparation and painting. Remove items if necessary for complete painting of the items and adjacent surfaces. Following completion of painting, reinstall items removed using workmen skilled in the trades involved.

Clean surfaces before applying paint or surface treatments. Schedule cleaning and painting so dust and other contaminants will not fall on wet, newly painted surfaces.

Provide protection for adjacent surfaces as necessary to prevent paint from coming into contact with adjacent materials not scheduled for painting.

SURFACE PREPARATION: Clean and prepare surfaces to be painted in accordance with manufacturer's instructions for each particular substrate condition. Notify Architect in writing of problems anticipated using specified finish coat material with substrates primed by others.

Cementitious Surfaces: Prepare concrete, concrete masonry, cement plaster and similar surfaces to be painted by removing efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze.

Determine alkalinity and moisture content of surfaces to be painted. Do not paint surfaces where moisture content exceeds that permitted in manufacturer's printed directions.

Ferrous Metals: Clean non-galvanized ferrous metal surfaces that have not been shop-coated; remove oil, grease, dirt, loose mill scale and other foreign substances. Use solvent or mechanical cleaning methods that comply with recommendations of the Steel Structures Painting Council.

Touch-up shop-applied prime coats that have been damaged, and bare areas. Wire-brush, clean with solvents, and touch-up with the same primer as the shop coat.

Galvanized Surfaces: Utilize SSPC-SP1 solvent cleaning and chemical wash (tri-sodium phosphate). Power wash with tri-sodium phosphate type cleaner (5% solution at 140 degrees F.) and solvent clean after rinsing and drying with a non-petroleum based solvent cleaner so that surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock, by mechanical methods.

Touch-up shop-applied prime coats that have been damaged, and bare areas. Wire-brush clean with solvents, and touch-up with the same primer as the shop coat.

MATERIALS PREPARATION: Mix and prepare paint in accordance with manufacturer's directions.

Stir material before application to produce a mixture of uniform density; stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain before using.

Use only thinners approved by manufacturer, and only within recommended limits.

APPLICATION: Apply paint in accordance with manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.

Paint colors, surface treatments, and finishes are indicated in "schedules."

The number of coats and film thickness required is the same regardless of application method. Do not apply succeeding coats until previous coat has cured. Sand between applications where required to produce a smooth, even surface. Apply additional coats when undercoats or other conditions show through final coat, until paint film is of uniform finish, color, and appearance.

The term "exposed surfaces" includes areas visible when permanent or built-in items are in place. Extend coatings in these areas to maintain system integrity and provide desired protection.

Paint back sides of access panels and removable or hinged covers to match exposed surfaces.

Omit primer on metal surfaces that have been shop-primed, unless primer becomes worn, damaged, or more than six months old from date of delivery to job site.

**MINIMUM COATING THICKNESS:** Apply materials at the manufacturer's recommended spreading rate. Provide total dry film thickness of the system as recommended by the manufacturer.

**BLOCK FILLERS:** Apply block fillers at a rate to ensure complete coverage with pores filled.

**PRIME COATS:** Before application of finish coats, apply a prime coat as recommended by the manufacturer to material required to be painted or finished, and has not been prime coated by others.

Recoat primed and sealed substrates where there is evidence of suction spots or unsealed areas in the first coat to assure a finish coat with no burn-through or other defects due to insufficient sealing.

#### Back Priming

All wood trim shall be back primed before installation. Spot prime all ends of trim.

**BRUSH APPLICATION:** Brush-out and work brush coats into surfaces in an even film. Eliminate cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Draw neat glass lines and color breaks. Apply primers and first coats by brush unless manufacturer's instructions permit use of mechanical applicators.

**MECHANICAL APPLICATIONS:** Mechanical methods for paint application will ONLY be permitted by written permission of the Architect.

**COMPLETED WORK:** Match approved samples for color, texture and coverage. Remove, refinish or repaint work not in compliance with specified requirements.

#### CLEANING

At the end of each work day, remove empty cans, rags, rubbish, and other discarded paint materials from the site.

Upon completion of painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing, scraping, or other proper methods, using care not to scratch or damage adjacent finished surfaces.

Protect work of other trades, whether to be painted or not, against damage from painting. Correct damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect.

Provide "Wet Paint" signs to protect newly-painted finishes. Remove temporary protective wrappings provided by others for protection of their work after completion of painting operations. At completion of construction activities of other trades, touch-up and restore damaged or defaced painted surfaces.

### END OF SECTION





**SECTION 10400**  
**EXTERIOR AND INTERIOR SIGNAGE**

**EXTERIOR GENERAL:**

Cast aluminum tablet for building- furnish and install one (1) cast aluminum tablet as manufactured by the James H. Matthews Company or approved equal. Size to be 20" wide, 30" high. Inscription and composition of tablet will be furnished later and in general will consist of name of school, date erected, names of the School Board, name of the Superintendent, name of the General Contractor and name of the Architect.

**INTERIOR GENERAL:**

Interior signage shall be provided to direct guest to all appropriate facilities within the property. Signage shall be designed to be easily read, consistent with decor of property and relative uniform in size, letter style and color. Signage should include direction, information and restriction data. All signage must meet ADA requirements Signs shall be mounted adjacent to all doors on walls within the facility. One sign is required for each door. Mounting placement and wording/numbering of each sign will be verified by owner before installation

Contractor is to include an allowance in Contract of \$40.00 per interior door for purchase of plastic name plates for name of rooms. Name of rooms are also to be in Braille. Mount name plates on wall on strike side of door and 60" above floor.

**ALL SIGNS TO MEET ADA REQUIREMENTS FOR SIZE, COLOR, LETTER STYLE, MOUNTING  
HEIGHT AND ANY OTHER APPLICABLE ASPECT OF ADA REQUIREMENT.**

Helvetica letter style is recommended, however others may be considered. ADA requires specific size raised letters with Braille characters.

Contractor shall submit drawings showing the location and the wording and numbering of each sign for approval before installation

The following other special room identification requirements should be considered:

**END OF SECTION 10400**



## **SECTION 10522**

### **FIRE EXTINGUISHERS, CABINETS, AND ACCESSORIES**

#### **PART 1 - GENERAL**

##### **RELATED DOCUMENTS**

Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

**DESCRIPTION OF WORK:** Work under this Section includes, but is not necessarily limited to, furnishing and installing the following:

- Fire Extinguishers and Brackets
- Fire Extinguisher Cabinets
- Accessories

##### **REFERENCES**

NFPA 10 - Portable Fire Extinguishers

##### **QUALITY ASSURANCE**

Conform to NFPA 10 requirements for extinguishers.

##### **SUBMITTALS**

Submit product data which shall include physical dimensions, operational features, color and finish, anchorage details, rough-in measurements, location, and details.

Submit manufacturer's installation instructions.

##### **OPERATION AND MAINTENANCE DATA**

Do not install extinguishers when ambient temperatures may cause freezing.

#### **PART 2 - PRODUCTS**

##### **ACCEPTABLE MANUFACTURERS**

- J. L. Industries, Inc.
- Larsen's
- Watrous

##### **EXTINGUISHERS**

Furnish and install where shown on Plans,

fire extinguishers to be Larsens or equal, Model MO-6, six (6) pound multipurpose dry chemical type.

Cabinets to be Larsens or equal – Surface mtd if safe room installed – semi recessed if non safe room installed #2409-6R with 2 ½" rolled edges. Cabinet inside dimensions are to be 24" x 9 ½" x 6" with rough opening of 25" x 10" x 4". Cabinet to have a satin finish pull handle with a self adjusting roller catch and a continuous piano hinge.

Mounting Hardware: Appropriate to Cabinet Fabrication

Form body of cabinet with tight inside corners and seams.

Pre-drill holes for anchorage.

Form perimeter trim and door stiles by welding, filling, and grinding smooth.

Hinge doors for 180 degree opening with continuous piano hinge. Provide pull handle and roller type catch.

##### **FINISHES**

Extinguishers: Red Enamel.

#### **PART 3 - EXECUTION**

**INSPECTION-**Verify rough openings for cabinet are correctly sized and located.

Beginning of installation means acceptance of existing conditions.

**INSTALLATION-**Install cabinets plumb and level in wall openings. Secure rigidly in place in accordance with manufacturer's instructions.

**END OF SECTION**



## SECTION 10800

### TOILET ACCESSORIES

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

##### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Public-use washroom accessories.
  - 2. Under-lavatory guards.
  - 3. Custodial accessories.
- B. Related Sections include the following:
  - 1. Division 09 Section "Tiling" for resilient flooring.

##### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include the following:
  - 1. Construction details and dimensions.
  - 2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
  - 3. Material and finish descriptions.
  - 4. Features that will be included for Project.
  - 5. Manufacturer's warranty.
- B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
  - 1. Identify products using designations indicated on "Restroom Accessory Schedule" on Drawings.
- C. Maintenance Data: For toilet accessories to include in maintenance manuals.

##### 1.4 QUALITY ASSURANCE

- A. Source Limitations: For products listed together in the same articles in Part 2, provide products of same manufacturer unless otherwise approved by Architect.
- B. 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.

##### 1.5 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.

##### 1.6 WARRANTY

- A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: 10 years from date of Substantial Completion.

#### PART 2 - PRODUCTS

##### 2.1 MIRRORS

- A. Stainless Steel: ASTM A 666, Type 304, 0.0312-inch minimum nominal thickness, unless otherwise indicated.

- B. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.
- C. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.
- D. ABS Plastic: Acrylonitrile-butadiene-styrene resin formulation.

## 2.2 PUBLIC-USE WASHROOM ACCESSORIES

- A. Basis-of-Design Product: The design for accessories is based on products indicated as manufactured by Bradley Corporation. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:
  - 1. A & J Washroom Accessories, Inc.
  - 2. American Specialties, Inc.
  - 3. Bobrick Washroom Equipment, Inc.
- B. Manufacturers Supplier: Subject to compliance with requirements, provide toilet accessories as listed below
- C. Toilet Tissue (Roll) Dispenser; TOTAL REQUIRED-one per water closet
  - 1. Basis-of-Design Product: Bradely; #5412.
  - 2. Description: Double-roll dispenser.
  - 3. Mounting: Recessed.
  - 4. Operation: Noncontrol delivery with theft-resistant spindle.
  - 5. Capacity: Designed for 5-inch diameter tissue rolls.
  - 6. Material and Finish: Stainless steel, No. 4 finish (satin).
- D. Stainless Steel frame mirrors; TOTAL one per lavatory-size per plans
  - 1. Basis-of-Design Product: Bradley;
  - 2. Mounting: surface.
  - 3. Material and Finish: Stainless steel, No. 4 finish (satin)..
- E. Combination Towel (Folded) Dispenser/Waste Receptacle; PROVIDE 2 for each restroom
  - 1. Basis-of-Design Product: Bradley; #2251.
  - 2. Description: Combination unit for dispensing C-fold or multifold towels, with removable waste receptacle.
  - 3. Mounting: Recessed.
    - a. Designed for nominal 4-inch wall depth.
  - 4. Minimum Towel-Dispenser Capacity: 250 C-fold or 450 multifold paper towels.
  - 5. Minimum Waste-Receptacle Capacity: 5.3 gallon capacity.
  - 6. Material and Finish: Stainless steel, No. 4 finish (satin).
  - 7. Liner: Reusable, vinyl waste-receptacle liner.
  - 8. Lockset: Tumbler type for towel-dispenser compartment and waste receptacle.
  - 9. Materials: Stainless Steel piston and spout
- F. Liquid-Soap Dispenser; TOTAL one per lavatory required
  - 1. Basis-of-Design Product: Bradley, #6542 (Universal Manufacturing Co.)
  - 2. Description: Designed for dispensing soap in liquid or lotion form.
  - 3. Mounting: Horizontally oriented, wall mounted.
  - 4. Capacity: 40 ounces.
  - 5. Material and Finish: Stainless steel, No. 4 finish (satin).
- G. Grab Bar; Restroom Accessory Item- TOTAL one double bar set per handicapped rated water closet REQUIRED

1. Basis-of-Design Product: Bradley, #812-001-42, #812-001-36, or #812-001-24 (Universal Manufacturing Co.)
2. Mounting: Flanges with concealed fasteners.
3. Material: Stainless steel, 0.05 inch thick.
  - a. Finish: Smooth, No. 4, satin finish on ends and slip-resistant texture in grip area.
4. Outside Diameter: 1-1/2 inches].
5. Configuration and Length: Refer to Drawings for locations.

### 2.3 UNDERLAVATORY GUARDS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Plumberex Specialty Products, Inc.
  2. TCI Products.
  3. Truebro, Inc.
- B. Under-Lavatory Guard: TOTAL one per lavatory REQUIRED
  1. Description: Insulating pipe covering for supply and drain piping assemblies that prevent direct contact with and burns from piping, and allow service access without removing coverings.
  2. Material and Finish: Antimicrobial, molded-plastic, white.

### 2.4 CUSTODIAL ACCESSORIES

- A. Basis-of-Design Product: The design for accessories is based on products indicated as manufactured by Bradley Corporation. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:
  1. A & J Washroom Accessories, Inc.
  2. American Specialties, Inc.
  3. Bobrick Washroom Equipment, Inc.
- B. Mop and Broom Holder: TOTAL 1 REQUIRED
  1. Basis-of-Design Product: Bradley; #9983.
  2. Description: Unit with shelf, hooks, holders, and rod suspended beneath shelf.
  3. Length: 30 inches.
  4. Hooks: Two.
  5. Mop/Broom Holders: Three, spring-loaded, rubber hat, cam type.
  6. Material and Finish: Stainless steel, No. 4 finish (satin).
    - a. Shelf: Not less than nominal 0.05-inch thick stainless steel.
    - b. Rod: Approximately 1/4-inch diameter stainless steel.

### 2.5 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- B. Keys: Provide universal keys for internal access to accessories for servicing and re-supplying. Provide minimum of six (6) keys to Area Construction Manager.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

- B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to method in ASTM F 446.

### 3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION 10800



SECTION 13121  
PREFABRICATED METAL BUILDING AND INSULATION

13-01

GENERAL--Furnish and/or furnish and erect prefabricated steel building and components as shown on the drawings including steel frames, purlins, girts, metal siding, metal roofing, insulation bracing, gutters, trim flashing, etc. as required for complete installation.

13-02

DESIGN LOAD-- The metal building shall be designed to 25 pounds per square foot roof live load on a horizontal projection plus 20 pounds per square foot wind load applied to the primary framing plus dead loads, plus concentrated loads.

NO REDUCTIONS IN THESE LOADS ARE PERMITTED. In addition to above loading, metal building shall be designed to meet SEISMIC ZONE 3 loading. Maximum deflection all structural members and roof and wall panels to be length/240. Horizontal wall displacement is to be height/240.

13-03

SHOP DRAWINGS --The building manufacturing, company shall furnish detailed shop drawings for architect's approval prior to fabrication, of steel building. The building manufacturing company shall furnish detailed anchor bolt setting plan showing size, location, spacing, etc. for contractor's use and for architect's approval.

13-04

ANCHOR BOLTS--The Metal Building Contractor shall furnish and set all anchor bolts of size shown on building manufacturer's shop drawings.

13-05

STRUCTURAL STEEL DESIGN --All structural mill sections or welded-up plate sections shall be designed in accordance with the 1978 edition of AISC "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings." All cold-formed steel structural members shall be designed in accordance with the 1977 Edition of AISI "Specifications for the Design of Cold-Formed Steel Structural Members".

13-06

PRIMARY FRAMING

A. RIGID FRAMES

1. Frames shall consist of welded-up plate section columns and roof beams complete; with necessary splice plates for bolted field assembly.
  - a. All base plated cap plates, compression splice, plates and stiffener plates shall be factory welded into place and have the connection holes shop fabricated.
  - b. Columns and Roof Beams -- shall be fabricated complete with holes in webs and flanges for the attachment of secondary structural members and bracing except for field work as noted on manufacturer's erection drawing.
2. All bolts for field assembly of frame members shall be high strength bolts as indicated on erection drawings.

B. ENDWALL STRUCTURALS

1. Beam and Post Endwall--The endwall structurals shall be cold formed channel members designed in accordance with the- 1977 edition of AISI "Specifications for the Design of Cold Formed Steel Structural Members."
2. Endwall Frames--Shall consist of endwall corner posts, endwall roof beams, and endwall posts as required by design criteria.

- a. All splice plates and base clips - Shall be shop fabricated, complete with bolt connection, holes.
- b. Beams and posts - shall be shop fabricated complete with holes for the attachment of secondary structural members except for field work as noted on^ manufacturer's erection drawings.
3. . Intermediate frames--Shall be substituted for endwall roof beams when specified. Necessary endwall posts and holes for connection to the intermediate frame used in the endwall shall be shop fabricated.

13-07

#### SECONDARY STRUCTURAL MEMBERS

##### A. PURLINS AND GIRTS

1. Purlins and Girts --Shall be "Z" shaped and precision roll formed.
2. Girts--Shall be 8" deep "Z" sections.
1. Purlins --Shall be 12" or 10" deep "Z" sections- depending on structural computation by building fabricator's registered structural engineer.
- 2.
3. Outer Flange of all girts --Shall contain factory-punched holes for panel connections.

##### B. EAVE STRUTS

1. Eave struts --Shall be 12" or 10" deep "C" section- depending on structural computation by building fabricator's registered structural engineer.
- 2.

##### C. BRACING

1. Bracing shall be located as indicated on drawings or as required.
2. Diagonal bracing - Shall be hot-rolled of size indicated' on drawings and attached to columns and roof beams, where and as indicated on drawings.
3. Sag rods-- When required, shall be hot-rolled and installed as indicated on drawing.
4. Flange braces, purlin braces, etc. – when required, shall be cold-formed and installed as indicated on drawings.

13-08 WELDING

- A. WELDING 'PROCEDURE AND OPERATOR QUALIFICATIONS AND WELDING QUALITY STANDARDS --Shall be in accordance with the American Welding Society Structural Welding code.

13-09 STRUCTURAL PAINTING

- A. PRIOR TO PAINTING - The fabricator shall clean the steel of loose rust, loose mill scale, dirt, and other foreign material. Unless otherwise specified, the fabricator SHALL NOT sandblast, flame clean, or pickle prior to painting. The fabricator shall then factory coat all steel with one coat of primer paint formulated to equal or exceed the performance requirements of Federal Specification TT-P-636.

13-10

METAL ROOF --Shall be MBCI or equal Ultra-Deck-124panels. Panels may be other manufacturer's product such as Varco, Crown, Bayou, Star, Vic West, etc. Roof shall be a color as selected by owner from the manufacturer's standard colors.

##### A. GENERAL

1. Roof shall be constructed with precision roll-formed Ultra-Deck, 24 gauge colored panels or equal.

PREFABRICATED METAL BUILDING

SECTION 13122-2

2. Details - shall be in accordance with the manufacturer's Specifications.
  - B. PANEL DESCRIPTION - Panels shall be 24" wide with 3" high rib, with 2 major corrugations and 2 minor corrugations at 6" o. c. Panel shall be made from Galvalume steel sheet, 0.5 ounces per square foot with minimum yield of 50,000 p. s. i., 24 gauge UL-90 rated. Panels shall have Pittsburgh seam, utilizing male and female rib configurations, with factory applied hot melt mastic in female rib.
- Finish shall be of color as selected by owner from standard color selections. Panels shall be designed in accordance with AISI Specifications of light gauge cold-formed steel structural members and in accordance with sound engineering methods.
- C. PANEL APPLICATION --All panels shall be positioned and aligned by use of articulating clips, providing thermal expansion or contraction, correcting for out of plane subframing alignment. Panel laps to be at least 6" sealed with sealant and fastened together by clamping plates.
  - D. ENERGY- CONSERVATION '
    1. Purlins --Shall be insulated so as to eliminate "thermal short circuits" between purlins and roof panels. The heat loss (thermal short circuit), caused by compression of the blanket insulation between structural and panel, is eliminated by the use of a spacer block at each purlin location.
  - E. ACCESSORIES
    1. Accessories--i.e., ventilators, sky lights, gutter, fascia shall be as standard with MBC 1 manufacturing Co., or equal, unless otherwise noted and furnished as specified.
    2. Location of standard accessories --shall be as shown on erection drawings as furnished by manufacturing company.

13-11

#### INSULATION SYSTEM FOR PRE-ENGINEERED METAL BUILDINGS ROOFS AND WALLS

- A. Insulation systems under metal roofs and metal building walls to be:
- B. 8" THICK SIMPLE SAVER SYSTEM as manufactured by Thermal Design Company of 601 N. Main St., Madison, Nebraska 68748; tel: 800-255-0776. OR EQUAL
- C. ROOF INSULATION UNDER METAL ROOF
  1. Shall consist of a grid of steel straps 1" wide, 100 KSI with white finish - straps attached to bottom of roof purlins at approximately 2'6" on center each way.
  2. Over top of steel grid install a membrane water vapor SYSEAL 9801 sheet which covers from rigid frame to rigid frame and across entire building (custom sized)
  3. Over top of membrane and between roof purlins install a 6" layer of unfaced fiber glass insulation
  4. Over top of 8" insulation install a 3" thick unfaced fiberglass insulation which also goes over top of purlins
  5. Install Snap R Thermal blocks over top of purlins or adhesive foam tape thermal break adhesive on top of roof purlins
  6. Install standing seam metal roofs. Detailed installations may be obtained from Thermal Design company for insulation system
- D. METAL BUILDING WALL INSULATION
  1. Fasten FAST-R Metal strips pre-cut with barbed arrows into them every 8" oc. These metal strips are to run vertically between girts on outside face.
  2. Install 8" thick unfaced fiberglass between girts
  3. Cover insulation with water vapor membrane SYSEAL 9801 sheet from base girt to eave purlin
  4. Install white metal straps over vapor barrier from base girt (vertically) to eave strut.

13-12

EXTERIOR METAL WALLS --Furnish and install where shown on the plans, 2.6 gauge exterior wall panels of color as selected by owner from standard colors available. Panels shall be precision roll formed panels as manufactured by MBCI Manufacturing Co. or equal, and installed in accordance with the manufacturer's instructions.

A. PANEL DESCRIPTION

1. Panels--Shall be 36" wide, with 4 major corrugations 1-1/2" high, 12" on center, with 2 minor corrugations between each of the major corrugations the entire length of the panel
2. Panels--Shall be one piece from base to building eave.

B. PANEL DESIGN--Shall be in accordance with AISI "Specification for the Design of Light-Gauge, Cold-formed Steel Structural Members," and in accordance with sound engineering methods and practices.

C. PANEL MATERIAL --As specified, shall be 26 gauge galvanized steel (42000 psi yield) 1.25 ounce coating (G90) conforming to ASTM Galvanized Specification A525 (latest issue).

D. PANEL FINISH--To baked enamel finish of color to match existing.

E. PANEL APPLICATION

1. Structural System-- shall be plumb before wall panels are attached.
2. Panels --Shall be aligned and attached in accordance with erection drawings furnished by manufacturing company.
3. All Side Laps -- Shall be at least one full corrugation.

F. FASTENERS

1. Wall panel-to-structural connections --Shall be made with hex washer head Scrubolts. Panel-to-panel connections shall be made with No. 14, type A-B self - tapping screws. (Lock-Rivets are optional for panel-to-panel structural and/or panel-to-panel connections)
2. Lock-rivets (optional) -- Shall be as set by a special lock-rivet tool.
3. Fastener locations --Shall be as shown on erection drawings as furnished by manufacturing company.
4. Plastic color caps to match wall color -- Shall be furnished for all exposed locations of fasteners.

3-13

ACCESSORIES--Furnish and install all accessory items as shown on Plans including gutters, downspouts, rake trims, fascias, closures, etc. as required. Gutters, downspouts, and fascias to be of color to match existing

3-14

METAL ROOF WARRANTY--THE CONTRACTOR AND METAL ROOF INSTALLER SHALL GIVE A 20-YEAR JOINT WRITTEN WATER TIGHT WARRANTY FOR MAINTENANCE AGAINST DEFECTS DUE TO MATERIAL AND WORKMANSHIP.

## **SECTION 15010 - BASIC MECHANICAL REQUIREMENTS**

### **PART 1 - GENERAL**

#### **1.1 REQUIREMENTS**

- A. The Conditions of the Contract, including the General Conditions and Supplementary Conditions, and Division One, apply to the work of this Division.

#### **1.2 WORK INCLUDED**

- A. Provide all plant, labor, equipment, appliances, and material, in strict accordance with Project Manual and the applicable drawings and subject to the terms and conditions of the contract. Include all appurtenances necessary to the proper operation of the systems and equipment specified.

#### **1.3 RELATED WORK**

- A. All Division One sections.

#### **1.4 COORDINATION**

- A. Coordinate work with the Owner and all other contractors.

#### **1.5 SUBMITTALS**

- A. Refer to Drawings.

#### **1.6 CODES, ORDINANCES, INSPECTIONS, PERMITS AND FEES**

- A. Refer to the General Conditions of the Contract for construction.
- B. Deliver to the Owner a copy of each certificate of approval from each inspection agency.
- C. Should the Contractor perform any work that does not comply with the requirements of the applicable building codes, state laws, local ordinances, industry standards and utility company regulations, he shall bear all costs arising in correcting the deficiencies.
- D. The Contractor shall obtain any and all required permits in connection with his work under the Contract and shall pay any and all fees in connection therewith. Contractor shall arrange with the Owner for the connections to all utilities and shall be responsible for all charges for same, including inspection fees if required.

#### **1.7 DELIVERY, STORAGE, AND HANDLING**

- A. Protect all materials and equipment from moisture and dust in a manner to prevent any damage. Do not store outside or expose to elements except with permission of the Owner.

#### **1.8 GUARANTEE**

- A. The Contractor shall furnish a written certificate, guarantying all materials, equipment, and labor furnished by him to be free of all defects for a period of one year from and after the date of final acceptance of the work by the Owner. The Contractor shall further guarantee that if any defects appear within the stipulated guaranty period, such work shall be replaced without charges.

## **1.9 DRAWINGS**

- A. The Drawings show the general arrangement of all piping, equipment, and appurtenances and shall be followed as closely as actual building construction and the work of other trades will permit.
- B. The Contractor shall investigate the structural and finish conditions affecting the work and shall arrange his work accordingly, providing such fittings, valves and accessories as may be required to meet such conditions.

## **1.10 INSPECTION OF PREMISES**

- A. Before submitting his bid, the Contractor shall visit the site of the proposed job and satisfy himself as to the conditions under which he would operate relating to his work.

## **1.11 CODES AND STANDARDS**

- A. All materials and workmanship shall comply with all applicable codes, specifications, local ordinances, industry standards, and utility company regulations.
- B. In case of differences between building codes, specifications, state laws, local ordinances, industry standards, and utility company regulations, and the Contract Documents, the most stringent shall govern. The Contractor shall promptly notify the Architect in writing of any such differences.
- C. Non-Compliance: Should the Contractor perform any work that does not comply with the requirements of applicable building codes, state laws, local ordinances, industry standards, and utility company regulations, he shall bear all costs arising in correcting the deficiencies.
- D. The following specifications and standards form a part of these specifications:
  - 1. National Electrical Code;
  - 2. National Fire Protection Association's Recommended Practices;
  - 3. Local, City and State Codes and Ordinances;
  - 4. National Building Code Congress International (S.B.C.C.I.), International Mechanical Code
  - 5. Underwriters' Laboratories;
  - 6. (STATE) State Plumbing/Gas Codes;
  - 7. American National Standards Association (ANSI);
  - 8. American Society for Testing Materials;
  - 9. (STATE) State Fire Prevention Code;
  - 10. Occupational Health Safety Act.

The latest specifications and standards available shall be used for the above.

## **PART 2 - PRODUCTS**

### **2.1 MATERIAL AND EQUIPMENT**

- A. General: Refer to Section 01600.
- B. Each major component of equipment shall have a nameplate listing the manufacturer's name, address, catalog, and serial number. The nameplate shall be brass, aluminum, or other durable material attached to the equipment in a conspicuous location.

### **2.2 FLASHINGS**

- A. Unless otherwise indicated, for riser or other roof penetrations complete as per roofing manufacturer's recommendations.

## **2.3 EQUIPMENT CONNECTIONS**

- A. Rough-in and make final connection to all equipment furnished under other Divisions of the specifications or by the Owner.
- B. Provide unions or flanges at all connections to equipment to aid in equipment removal and maintenance.

## **2.4 ACCESS PANELS**

- A. Provide access panels as required to service valves in piping, controls, items in duct, etc.
- B. Access doors shall be equal to the following MILCOR types:
  - 1. Style A Door for Acoustical Tile
  - 2. Style B Door for Acoustical Plaster
  - 3. Style K Door for Plastered Surfaces
  - 4. Style M Door for Masonry, Wallboard, etc.
  - 5. Fire-rated Door where required.
- C. Furnish size and type as required for proper service or as shown on Drawings for specific locations.

# **PART 3 - EXECUTION**

## **3.1 CUTTING AND PATCHING**

- A. Provide all cutting and patching required to perform the mechanical work.
- B. Do not cut structural members except through explicit instructions of the Owner.
- C. Accomplish patching work with workmen skilled in the trade required.
- D. Perform all cutting and fitting in rough construction phases of the work.

## **3.2 INSTALLATION**

- A. The Contractor shall support plumb, rigid, and true to line all work and equipment furnished. The mechanical contractor shall study thoroughly all general, structural, electrical and mechanical drawings, shop drawings, and catalog data to determine how equipment, fixtures, piping, ductwork, etc., are to be supported, mounted, or suspended and shall provide extra steel bolts, inserts, pipe stands, brackets, and accessories for proper support whether or not shown on the Drawings.

## **3.3 EXCAVATION, TRENCHING AND BACKFILLING**

- A. Excavate banks of trenches nearly vertical or as shown on the Drawings.
- B. Excavate width of trench to approximately 6" on each side of pipe bell. Round bottom of trench for sewers and culverts so that outside diameter of pipe rest on undisturbed soil wherever practicable. Excavate bell holes accurately to size by hand. In rock, excavations 8" below bottom of pipe. Use loose earth or gravel for backfill and tamp thoroughly.
- C. Perform bracing and shoring as necessary to complete and protect excavation indicated on the Drawings as required for safety or to conform to governing laws.
- D. After piping, conduit, ducts, etc., have been installed, inspected, tested, and approved by Architect/Engineer, backfill trenches with clean, stable soil free from large stones, or as detailed on the Drawings. Place backfill

in layers, tamped under/around pipe and conduit to height of at least two feet above pipe. Perform tamping in such a manner as not to disturb underlying work. Backfill remainder of trenches and excavations with clean, stable earth. Deposit in 6" layers and bring up to rough grade, compacting each layer to density of surrounding soil. Remove bracing and shoring as backfill is placed and fill space with dry sand.

- E. Install sewer, gas, electrical, and water lines in separate trenches, except where otherwise noted on the Drawings.
- F. Replace existing appurtenances removed or damaged in connection with work. Restore to original conditions, unless otherwise directed.

### **3.4 CLEAN UP**

- A. Do not allow waste material or rubbish to accumulate in or about the job site.
- B. At completion of work, remove all rubbish, tools, scaffolding, and surplus materials from and about building, leaving work clean and ready for use.
- C. Clean all equipment, piping, valves, fixtures, and fittings of grease, metal cuttings, insulation cement, dust, dirt, paper labels, etc.
- D. Repair any discoloration or other damage to parts of building, its finish or furnishings due to failure to properly clean or keep clean, mechanical systems.

### **3.5 WORK SCHEDULING AND SYSTEM SHUT-DOWNS**

- A. All work shall be scheduled one week in advance with the Owner.

**END OF SECTION**



## **SECTION 15060 - PIPE AND PIPE FITTINGS**

### **PART 1 - GENERAL**

#### **1.1 WORK INCLUDED**

- A. Pipe, fittings, and connections.

#### **1.2 RELATED WORK**

- A. Section 15010 - Basic Mechanical Requirements.
- B. Section 15090 - Mechanical Supporting Systems.
- C. Section 15120 - Valves.
- D. Section 15190 - Mechanical Identification.
- E. Section 15350 - Natural Gas Piping System
- F. Section 15401 - Domestic Water System.
- G. Section 15405 - Drainage, Sanitary Waste & Vent System

#### **1.3 QUALITY ASSURANCE**

- A. Welding Materials and Procedures: Conform to ASME Code and applicable State labor regulations.
- B. Employ certified welders in accordance with ASME Section 9.
- C. Replace pipe, fittings, or equipment broken or leaking during warranty period.

#### **1.4 REFERENCES**

- A. ANSI/ASME B16.3 - Malleable-Iron Threaded Fittings.
- B. ANSI/ASME B16.22 - Wrought Copper and Bronze Solder-Joint Pressure Fittings.
- C. ANSI/ASTM - Pipe, Steel, Black, and Hot-Dipped Zinc-Coated, Welded and Seamless.
- D. ANSI/A120 - Pipe, Steel, Black, and Hot-Dipped Zinc-Coated (galvanized), Welded and Seamless.
- E. ANSI/ASTM A126 - Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
- F. ANSI/ASTM B43 - Seamless Red Brass Pipe, standard sizes.
- G. ANSI/AWS D.1.1 - Structural Welding Code.
- H. ASTM B88 - Seamless Copper Water Tube.
- I. FS WW-P-521 - Pipe Fittings, Flange Fittings, and Flanges: Steel and Malleable Iron (Threaded and Butt Welding) Class 150.
- J. ANSI/AWWA-C151/A21.51 - Ductile Iron Pipe, Centrifugal Cast in Metal Molds or Sand-Lined Molds for Water of Other Liquids.

- K. ANSI/ASTM A716 Standard Specification for Ductile Iron Culvert Pipe.
- L. ANSI/ASTM A746 Standard Specification or Ductile Iron Gravity Sewer Pipe.
- M. CISPI Standard 301 for hubless cast iron sanitary systems.
- N. ASTM C-564 Specification for compression-type Gasket Joints used in Case Iron Soil Pipe and Fittings with hubs and plain-end spigots.
- O. ASTM A\_74, ANSI A112.5-1, Federal Specification WW-P-401 for SV cast iron soil pipe and fittings.
- P. ASTM D1784, ASTM D2241, D3137, F477, AWWA C-900 and NSF-14-PVC Water Pressure Pipe.
- Q. ASTM D2665 and D3371, NSF approved, PVC DWV fittings.

## **PART 2 - PRODUCTS**

### **2.1 PIPE AND TUBE**

- A. Steel Pipe: ANSI/ASTM A53 or A120 Black, Schedule 40 weight or as scheduled.
- B. Copper Water Tube: ASTM B88, type and temper as scheduled; seamless.
- C. Cast Iron.
- D. Ductile Iron.
- E. PVC.

### **2.2 PIPE AND TUBE JOINTS AND FITTINGS**

- A. Steel Pipe Fittings: ANSI/ASME B16.3; ANSI/ASTM A126; FS WW-P-521, Class 150.
- B. Copper and Brass Pipe Fittings: ANSI/ASME B16.22, pressure fittings, ANSI/AWWA C111, rubber gasket joints.
- C. Cast Iron: ASTM C-564 for hub/spigot fittings. C.I.S.P.I. Standard 301 for hubless, clamp fittings.
- D. Ductile Iron: ANSI/AWWA-C110/A21.10 and C111/A21.11 for push on fittings and mechanical joint fittings.
- E. PVC: ASTM D2665 and D3311 solvent weld for DWV, ASTM D3139 for push on joints and ASTM F466 for gaskets on pressure pipe.

### **2.3 UNIONS AND COUPLINGS**

- A. Pipe Size 2" and Under: 150 psi malleable iron for threaded ferrous piping; bronze for copper or brass pipe soldered joints.
- B. Pipe Size Over 2": 150 psi forged steel slip-on flanges for ferrous piping; bronze flanges for copper or brass piping; synthetic rubber gaskets for gas service; preformed synthetic rubber elsewhere.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Route pipes parallel with, or perpendicular to, building lines. Wherever possible, group together for easier service and identification.

- B. Lines requiring a definite grade for drainage shall have precedence in routing over all other lines.
- C. Wherever possible, hold horizontal and vertical lines as close as possible to walls, ceilings, struts, and members so as to occupy minimum space consistent with the proper requirements for insulation, expansion, removal of pipe and access to valves.
- D. Arrange for concealment of all piping in finished area of buildings unless otherwise noted.
- E. Work piping shall be placed without springing and/or forcing. Arrange all piping so as not to interfere with removal of other equipment or devices, nor to block access to doors, windows, manholes, or other access openings.
- F. Install all piping so as to avoid liquid or air pockets throughout the work. Erect and pitch piping to ensure proper draining.

### **3.2 ASSEMBLY**

- A. Cut all pipes square and remove burr and cutting slag by reaming or other cleaning methods.
- B. Use unions or flanges at all connections to all equipment to facilitate dismantling, and elsewhere as required, in the erection of pipe or installation of valves.
- C. Make all joints and changes of direction with standard fittings. Bending of pipe will be permitted, providing a hydraulic bender is used. Use reducers at pipe size changes.
- D. Install an insulating coupling between dissimilar metal fittings and/or pipe.
- E. Use nipples or same material and composition as pipe on which they are installed. Use extra heavy type when un-threaded shoulder is less than 1-1/2". Do not use running thread nipples.
- F. Make joints between steel or copper pipe and cast iron with caulking ferrules.
- G. Assemble galvanized steel pipe with galvanized screwed fittings.
- H. Assemble black steel pipe with screwed or welded fittings. Use Weld-O-Lets or Thread-O-Let fittings where branch outlet is at least one pipe size smaller than the main.
- I. Assemble copper pipe with wrought copper fittings. Above grade, use 95-5 solder. Below grade, make joints with "SIL-FOS". Do not install joints in below slab copper pipe.

### **3.3 SLEEVES AND PLATES**

- A. Use sleeves where piping passes through exterior walls, floors, or roofs; where required for sealing to meet any sanitation codes, ordinances or laws, and areas where water may accumulate.
- B. Use Schedule 40 pipe sleeves in concrete or masonry construction and where collapse is possible. Use minimum 22-gage sheet metal for other sleeves.
- C. Use sleeves accommodating insulated pipe of sufficient diameter to pass piping and full size of insulation.
- D. In toilets, kitchen, equipment rooms and other areas where water may accumulate on the floor, extend sleeves 1/2" above the finished floor. Install other sleeves flush with finished floor.
- E. After all piping has been inserted in sleeves, fill voids between pipe or insulation and sleeve with a suitable non-run, non-stain mastic.
- F. Use spring clamp or set screw plates (escutcheons) where pipe are exposed in occupied rooms and where walls, floors or ceilings are finished. Use chrome-plated metal for exposed portion of plates.

G. In fire barrier penetrations fire stopping shall be applied. See Division 7.

### **3.4 THERMAL EXPANSION**

A. Use swing joints, turns, expansion loops or long off-sets where necessary to allow for expansion and contraction.

### **3.5 OPEN ENDS**

A. Cap open ends of pipe, including vents, drains, equipment connections, and fixture connections to keep building material from entering the pipe and traps during construction.

### **3.6 NOISE CONTROL**

A. Install piping free of any objectionable self-generated noise.

B. Isolate piping from building where required to prevent transmission of noise.

### **3.7 CROSS CONNECTIONS**

A. Do not make a cross-connection between potable water system and a polluted system.

### **3.8 TESTING**

A. Test all piping systems provided under this contract and obtain approval of the engineer before acceptance.

B. Test and inspect piping located underground before backfilling.

C. Furnish equipment and personnel required for these tests without additional cost. Use testing equipment as required for each particular test, with all equipment and gages accurate and in good working order.

D. Remove equipment subject to damage at given test pressure before pressure is applied. Use proper plugs or caps.

E. Refer to specific piping system specification for test pressure, duration and medium.

F. Perform all testing in accordance with the local and state plumbing codes.

G. Do not pressure test existing piping unless otherwise indicated.

**END OF SECTION**

## **SECTION 15090 - MECHANICAL SUPPORTING SYSTEMS**

### **PART 1 - GENERAL**

#### **1.1 WORK INCLUDED**

- A. Pipe hangers and supports.
- B. Duct hangers and supports.
- C. Equipment foundation supports.

#### **1.2 RELATED WORK**

- A. Section 15010 - Basic Mechanical Requirements
- B. Section 15350 - Natural Gas Piping Systems
- C. Section 15401 - Domestic Water System
- D. Section 15405 - Drainage, Sanitary Waste & Vent Systems
- E. Section 15603 - Split Air Conditioning and Heating Equipment
- F. Section 15604 - Exhaust Fans
- G. Section 15800 - Air Distribution

#### **1.3 QUALITY ASSURANCE**

- A. Pipe Hangers and Supports: ASA Code for Pressure Piping, ANSI B31.1, and Manufacturer's Standardization Society Documents MSS-SP-58 AND MSS-SP-69.
- B. Auxiliary Steel: Design in accordance with AISC Handbook.

#### **1.4 SYSTEM DESCRIPTION**

- A. Provide adequate pipe, duct, stack and equipment foundation and suspension system in accordance with recognized engineering practices, using, where possible, standard commercial hangers and accessories.
- B. Where thermal movement will occur, provide pipe hanger assembly capable of supporting the pipe hanger throughout the range of operating temperature. Perform weight balance calculations to determine the force at each hanger to prevent over stressing the pipe or connected equipment.

### **PART 2 - PRODUCTS**

#### **2.1 ACCEPTABLE MANUFACTURERS**

- A. Empire Tool and Manufacturing Co., Manchester, Connecticut.
- B. ITT Grinnell, Providence, Rhode Island.
- C. Approved equal.

#### **2.2 MATERIALS**

- A. Pipe Hangers and Supports:
  - 1. Pipe 2" and larger shall be furnished with means of adjustment.
  - 2. Uninsulated Steel Pipe:
    - a. 2" and smaller: Grinnell Figures 97, 70, 138, or 260.
    - b. 2" and larger: 2" and larger: Grinnell Figures 104, 108 or 212.
    - c. Riser Clamp: Grinnell Figure 261.
  - 3. Insulated stationary steel pipe: Grinnell Figures 295 and 300.
  - 4. Insulated steel pipe subject to longitudinal movement: Grinnell Figures 171, 177, 181, 174, 175. Use Figure 178 spring cushion hanger where pipe subject to vertical movement. Furnish pipe covering protection saddle at each support point.
  - 5. Uninsulated Copper Tubing 2" and Under: Copper finished, two hole tubing strap (Empire Figure 231 CT), copper finished wire tubing hook (Empire Figure 235 CT), or copper finished.
  - 6. Insulated Copper Tubing 2" and Under: Empire Figure 11, Figure 110, Figure 310, or Figure 31, sized for O.D. of pipe insulation. Provide pipe covering protection shield (Empire Figure 167) at each hanger.
  - 7. Refrigerant Lines: Grinnell Figure 260 clevis hanger. On insulated lines, provide Empire Figure 167 protection shield at each hanger.
  - 8. Cast Iron Pipe: Grinnell Figure 590 clevis hanger. On insulated pipes, provide Empire Figure 167 protection shield at each hanger.
- B. Brackets and Racks: For welded steel brackets, furnish Grinnell Figures 194, 195, and 199. Fabricate pipe racks and trapeze hangers from adequately sized Unistrut channel clamps and accessories.
- C. Rods:
  - 1. Hanger Rods: Grinnell Figures 140 and 146.
  - 2. Eye Rods: Grinnell Figures 248 and 278WL.
- D. Attachments:
  - 1. Concrete Inserts: Empire Figure 81 or Figure 2500.
  - 2. Beam Clamps: Grinnell Figures 218, 229, 131, 292, 228, 224 and 228; or Figure 87 "C" clamp with locknut and retaining strap.
  - 3. Welded Beam Attachments: Grinnell Figures 66.

## **PART 3 - EXECUTION**

### **3.1 GENERAL**

- A. All pipes, both horizontal and vertical, shall be adequately supported from the building structural members. Each hanger shall be properly sized to fit supported pipe.
- B. Install hangers, inserts and supports as indicated, in accordance with manufacturer's written instructions and in compliance with recognized industry practices.
- C. Coordinate installation of supporting devices with other work. Arrange for grouping of parallel runs of horizontal pipes to be supported together on trapeze type hangers where possible.
- D. Where small pipes are supported under bar joists, hanger rods may be extended through the space between the bottom angles and secured with a washer and two nuts.
- E. Where larger pipes are supported beneath bar joist, hanger rods shall be secured to angle irons of adequate size. Each angle iron shall span across two or more joists, as required, to distribute the weight effectively. Anchor these angle irons to the joist.
- F. Where pipes are supported under exposed steel beams, approved type beam clamps shall be used.
- G. Unless otherwise indicated perforated strap or wire will not be acceptable as hanger or fastening.

- H. Do not support piping or equipment from ceilings or ceiling support systems.

### **3.2 ATTACHING TO STRUCTURE**

- A. Where equipment or piping is supported from building steel beam, use clamps or welded beam attachments. Do not drill holes in building steel for hanger support rods.
- B. Anchor mechanical supports to wood structural beams and truss with lag screws, wood screws, nails or other appropriately sized fasteners complying with industry standard.

### **3.3 HANGER RODS AND SPACING**

- A. Where hanger rod sizes are catalog-listed for a specified hanger, this size shall govern. Where hanger rod sizes are not catalog-listed, the load on the hanger shall be the determining factor and the maximum recommended hanger rod load as catalog-listed, shall govern.
- B. Pipe hanger spacing shall not exceed:

<u>Pipe Size</u>	<u>Steel Pipe</u>	<u>Copper Pipe</u>	<u>PVC</u>
to 3/4"	7'	5'	3'
1" to 2"	10'	8'	4'
2-1/2" to 4"	12'	10'	6'

### **3.4 AUXILIARY STEEL**

- A. Furnish all miscellaneous structural members necessary to hang or support pipe or mechanical equipment. Material members shall be consistent with that of the main structural system.
- B. Furnish all auxiliary steel with one shop coat of primer paint.
- C. Arrange for any adjustment necessary in main structural system for proper support of major equipment.

### **3.5 CONCRETE PADS**

- A. Where shown on the Drawings, provide concrete pads under all floor-mounted equipment and apparatus. Reinforce pads with 6 x 6 x W1.4 x W1.4 W.W.F.
- B. Construct pads nominal 4" thick, unless indicated otherwise on Drawings.
- C. Concrete to be 3000 psi.

### **3.6 CONCRETE INSERTS**

- A. Provide concrete inserts where mechanical equipment, pipes and pipe racks are supported from concrete. Install concrete inserts during placing of concrete at appropriate intervals and location.
- B. Drilling and anchoring systems such as by Ramset may be used for support of miscellaneous pipe and duct work in existing concrete.

**END OF SECTION**





## **SECTION 15120 - VALVES**

### **PART 1 - GENERAL**

#### **1.1 WORK INCLUDED**

- A. Providing valves, cocks, and safety relief valves.

#### **1.2 RELATED WORK**

- A. Section 15010 - Basic Mechanical Requirements
- B. Section 15060 - Pipe and Pipe Fittings
- C. Section 15190 - Mechanical Identification
- D. Section 15350 - Natural Gas Piping Systems
- E. Section 15401 - Domestic Water System

### **PART 2 - PRODUCTS**

#### **2.1 GENERAL**

- A. Manufacturer: Nibco, Crane or Milwaukee.

#### **2.2 GATE VALVES**

- A. Gate valves are strictly prohibited without prior approval by Engineer.

#### **2.3 BALL VALVES**

- A. Nibco T or S-580-70, 600 pound, WOG, 150 pound SWP. Teflon seats, 2 piece red bronze body, adjustable Teflon packing lever. Federal Specification WW-V-35.

#### **2.4 GAS STOP COCKS**

- A. Nibco T-580-70 UL, or approved equal, 125 pound. WOG, bronze body, ball valve.

#### **2.5 SAFETY RELIEF VALVES**

- A. Safety relief valves shall conform to ASME-UV code and be National Board tested and rated. Valves shall have bronze seating surfaces and guides and stainless stem. Valves shall have top guiding with self-aligning disc and open test lever construction.

#### **2.6 SWING CHECK VALVES**

- A. For 1/4" to 2" sizes: Nibco T or S-413, 125 pound. SWP, 200 pounds. WOG, bronze, teflon disc, for water or air. MSS-SP80.

- B. For 2-1/2" and larger sizes: Nibco F-918, flanged, 125 SWP, 200 WOG, bolted bonnet. MSS-SP71.

## **2.7 BALANCING COCK**

- A. Resun Figure R-1431 lubricated plug valve, 200 psi WOG, 125 psi SWP, flanged semi-steel body, cylindrical plug, wrench operated.

## **PART 3 - EXECUTION**

### **3.1 ARRANGEMENT OR LOCATION**

- A. Locate valves in an accessible position or make accessible through access panel.
- B. Where several valves are related as to function, group valves in a battery.
- C. Do not install a valve with stem below horizontal position.
- D. In copper pipe lines, install valves with threaded ends; use copper to MPT adapters.

### **3.2 VALVE BOXES**

- A. House all valves located below slabs or grade in cast iron boxes and covers. Use properly marked colors.
- B. Furnish the Owner proper key or valve-operator extension.

### **3.3 SAFETY RELIEF VALVES**

- A. Equip all equipment and/or piping systems containing fluid and subject to heat input, or a fluid input of over 212 degrees F (or the atmospheric boiling temperature of any fluid other than water), with an ASME Code safety pressure relief valve.

**END OF SECTION**

## **SECTION 15170 - MOTORS**

### **PART 1 - GENERAL**

#### **1.1 WORK INCLUDED**

- A. Providing electric motors.

#### **1.2 STANDARDS COMPLIANCE**

- A. Comply with NFPA 70, "National Electrical Code."
- B. NRTL Listing: Provide NRTL listed motors. The term "Listed" shall be as defined in "National Electrical Code," Article 100. Listing agency (NRTL) shall be a "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.
- C. Comply with NEMA MG 1, "Motors and Generators" requirements.

#### **1.3 RELATED WORK**

- A. Section 15900 - Electric Controls
- B. Section 16010 - Basic Electrical Requirements

### **PART 2 - PRODUCTS**

#### **2.1 All motors shall conform to the requirements shown below except as otherwise indicated.**

- A. Motors 1 HP and Larger: Polyphase.
- B. Motors Smaller Than 3/4 HP & smaller: Single-phase, with internal thermal overload protection.
- C. Frequency Rating: 60 Hz.
- D. Voltage Rating: Determined by voltage of circuit to which motor is connected for the following motor voltage ratings (utilization voltages):
  - 1. 120 V Circuit: 115 V - motor rating.
  - 2. 208 V Circuit: 200 V - motor rating.
  - 3. 240 V Circuit: 230 V - motor rating.
  - 4. 480 V Circuit: 460 V - motor rating.
- E. Service factors indicated for motors are minimum values and apply at frequency and utilization voltage at which motor is connected. Provide motors that will not operate in service factor range when supply voltage is within 10 percent of motor voltage rating.
- F. Capacity: Sufficient to start and operate connected loads at designated speeds in indicated environment, and with indicated operating sequence, without exceeding nameplate ratings. Provide motors rated for continuous duty at 100 percent of rated capacity.
- G. Temperature Rise: Based on 40 deg C ambient except as otherwise indicated.
- H. Enclosure: Open dripproof.

**2.2 Polyphase Motors shall be squirrel-cage induction-type conforming to the following requirements except as otherwise indicated.**

- A. NEMA Design Letter Designation: "B."
- B. Multi-Speed Motors: Separate winding for each speed.
- C. Energy Efficient Motors: Nominal efficiency equal to or greater than that stated in NEMA MG 1, table 12-6B for that type and rating of motor.
- D. Variable Speed Motors for Use With Solid-State Drives: Energy efficient, squirrel-cage induction, design B units with ratings, characteristics, and features coordinated with and approved by drive manufacturer.
- E. Internal Thermal Overload Protection For Motors: For motors so indicated, protection automatically opens control circuit arranged for external connection. Protection operates when winding temperature exceeds safe value calibrated to the temperature rating of the motor insulation.
- F. Bearings: Double-shielded, prelubricated ball bearings suitable for radial and thrust loading of the application.
- G. Rugged Duty Motors: Totally enclosed with 1.25 minimum service factor. Provide motors with regreasable bearings and equipped with capped relief vents. Insulate windings with nonhygroscopic material. External finish shall be chemical resistant paint over corrosion resistant primer. Provide integral condensate drains.
- H. Motors for Reduced Inrush Starting: Coordinate with indicated reduced inrush controller type and with characteristics of driven equipment load. Provide required wiring leads in motor terminal box to suit control method.

**2.3 Single-Phase Motors shall conform to the following requirements except as otherwise indicated.**

- A. Energy Efficient Motors: One of the following types as selected to suit the starting torque and other requirements of the specific motor application.
  - 1. Permanent Split Capacitor.
- B. Overload Protection for Motors: Protection automatically opens the power supply circuit to the motor, or a control circuit arranged for external connection. Protection operates when winding temperature exceeds a safe value calibrated to the temperature rating of the motor insulation. Provide device that automatically resets when motor temperature returns to normal range except as otherwise indicated.
- C. Bearings, belt connected motors and other motors with high radial forces on motor shaft shall be ball bearing type. Sealed, prelubricated sleeve bearings may be used for other single phase motors.

**PART 3 - EXECUTION**

**3.1 Install field-installed motors in accordance with manufacturer's published instructions and the following:**

- A. Direct Connected Motors: Mount securely in accurate alignment.
- B. Belt Drive Motors: Use adjustable motor mounting bases. Align pulleys and install belts. Use belts with correct cross section matching sheaves installed. Provide and install new adjustable drive sheave at each new motor. On multiple belt drives furnish and install matched belts. Adjust drives for belt tension in accordance with manufacturer's recommendations.

**END OF SECTION**

## **SECTION 15190 - MECHANICAL IDENTIFICATION**

### **PART 1 - GENERAL**

#### **1.1 WORK INCLUDED**

- A. Identification of piping in mechanical spaces, unfinished spaces, and above lift out ceiling.
- B. Tagging and scheduling of valves.
- C. Labeling HVAC equipment and control system enclosures.

#### **1.2 RELATED WORK**

- A. Section 15010 - Basic Mechanical Requirements
- B. Section 15060 - Pipe and Pipe Fittings
- C. Section 15350 - Natural Gas Piping System
- D. Section 15401 - Domestic Water System
- E. Section 15603 - Split Air Conditioning and Heating Equipment
- F. Section 15604 - Exhaust Fans

#### **1.3 SUBMITTALS**

- A. Submit one (1) sample of each pipe marker, nameplate and valve tag.
- B. Submit typewritten valve schedule for approval.

### **PART 2 - PRODUCTS**

#### **2.1 MATERIALS**

- A. Pipe markers: Provide markers with printed words to include identification shown on legend on Drawings and described in these specifications. Markers shall be manufactured by *Seton* Company.
- B. Valve tags: 1-1/2" diameter, 19-gage polished brass with stamp-engraved lettering in 1/4" high letters. Engraved letters to be filled with black enamel.
- C. Valve tag fastener: Manufacturer's standard solid brass S-hooks or brass chain.
- D. Valve schedule frame: For each page of valve schedule, provide glazed display frame with appropriate fasteners for mounting on wall. Provide frames of finished hardwood or extruded aluminum. Glazing to be sheet glass.
- E. Nameplates:
  - 1. Provide laminated plastic nameplates.
  - 2. Nameplates to be white in color engraved with 1/4" (approximately) high upper case letters. Letters to be black in color.

### **PART 3 - EXECUTION**

#### **3.1 PIPE MARKERS**

- A. Place markers so as to be easily read. Install arrows to indicate direction of flow. Clean pipe insulation surface before installation.
- B. Apply markers to piping at following locations:
  - 1. Adjacent to each valve.
  - 2. At each branch and riser take-off.
  - 3. At each pipe passage through wall, floor, and ceiling construction.
  - 4. At passage to underground.
  - 5. At not more than 20 feet spacing on straight pipe run.
- C. Mark pipe as follows:

Wording or Legend	Color Background	Letters	Seton Marker Style
CITY WATER	Green	White	<i>Snap on or Strap on</i>
HOT WATER	Yellow	Black	<i>Snap on or Strap on</i>
FIRE PROTECTION	White	Red	<i>Snap on or Strap on</i>
NATURAL GAS	Yellow	Black	<i>Snap on or Strap on</i>
COMPRESSED AIR	Yellow	Black	<i>Snap on or Strap on</i>

### 3.2 VALVE TAGS AND VALVE SCHEDULE

- A. Provide valve tags and schedule.
- B. Locate framed valve schedule on wall of each building near the domestic water riser.
- C. List each tagged valve in schedule. Assign a marking. Describe function of each valve on the schedule.

### 3.3 NAMEPLATES

- A. Install nameplates on each enclosure related to the temperature control system. This includes enclosures for sensors, terminals, devices, control panel, time clock, etc.
- B. Install nameplates on each piece of HVAC equipment including A/C units, heaters, fans, etc. Wording shall match the designation shown on the drawings unless otherwise directed.
- C. Attach nameplates to enclosures with self-tapping sheet metal screws.

**END OF SECTION**

## **SECTION 15250 - MECHANICAL INSULATION SYSTEMS**

### **PART 1 - GENERAL**

#### **1.1 WORK INCLUDES**

- A. Providing insulation systems for refrigerant piping, domestic water piping, storm drainage piping and HVAC ductwork/air devices.

#### **1.2 RELATED WORK**

- A. Section 15010 - Basic Mechanical Requirements
- B. Section 15401 - Domestic Water System
- C. Section 15405 - Drainage, Sanitary Waste and Vent Systems
- D. Section 15651 - Refrigerant Piping
- E. Section 15800 - Air Distribution

#### **1.3 JOB CONDITIONS**

- A. Deliver materials to job site in original non-broken factory packaging, labeled with manufacturer's density and thickness.
- B. Perform work at ambient and equivalent temperatures as recommend by the adhesive manufacturer.

#### **1.4 SUBMITTALS**

- A. Submit product data for the items listed below. Submittals shall consist of descriptive literature indicating performances, physical size features, options and other certified information indicating compliance with the specifications and drawings.
- B. Submit manufacturer's installation instructions.

#### **1.5 REFERENCES**

- A. ASTM E84.
- B. ASTM E96.
- C. ASTM B209.

### **PART 2 - PRODUCTS**

#### **2.1 GENERAL**

- A. Fire Ratings:
  - 1. All Insulation, Coverings, Lining, Adhesives, and Accessories: Non-combustible as per NFPA National Fire Code, Section 200.
  - 2. Ratings determined by Underwriter's Laboratories, Incorporated, Method of Surface Burning Characteristics of Building Materials.
  - 3. Ductwork in air distribution systems shall further conform to NFPA Standard 90A.
  - 4. Flame Spread Rating: 25 or less, ASTM E84.
  - 5. Smoke Developed: 50 or less, ASTM E84.

6. Furnish mastics, coatings, and adhesives certified by the manufacturer as being non-flammable as received and fire-resistive when dry.
- B. Mildew Resistance: Furnish mildew-proof insulation, coverings, and coatings.
- C. Vapor Transmission: 0.20 perm inches, ASTM E96.

## **2.2 DUCTWORK - INTERNAL INSULATION**

- A. Internal rectangular duct insulation: Flexible, resilient duct liner manufactured from long glass fibers with black, fire-resistant coating on surface fibers, 1" thick, 1.5 pounds per cubic feet density, as manufactured by "Knauf" or equal.

## **2.4 DUCTWORK AND AIR DEVICES - EXTERNAL INSULATION**

- A. 2" thick (R-5) fiberglass blanket with Kraft-Foil-Scrim Vapor Barrier, Knauf Duct Wrap or equal.

## **2.5 REFRIGERANT PIPING INSULATION - FLEXIBLE ELASTOMERIC CELLULAR**

- A. Material: Flexible expanded closed-cell structure with smooth skin on both sides.
  1. Tubular Materials: ASTM C 534, Type I.
  2. Sheet Materials: ASTM C 534, Type II.
- B. Thermal Conductivity: 0.30 average maximum at 75 deg F.
- C. Coating: Water based latex enamel coating recommended by insulation manufacturer.
- D. 1/2" thick unless otherwise indicated.

## **2.6 FIBERGLASS PIPING INSULATION, ABOVE GROUND INTERIOR**

- A. Insulate above ground interior piping with Owens-Corning Fiberglass Corporations' heavy density sectional fiberglass pipe insulation, with a white fire retardant embossed vapor barrier laminate ASJ (all service jacket). Thickness of insulation shall be as follows:
  1. Domestic Cold Water, Roof Drains and Miscellaneous Drains:
    - a. All sizes: 1/2" thick.
  2. Domestic Hot Water:
    - a. 2" and larger: 1-1/2" thick.
    - b. 2" to 1-1/2": 1" thick.
    - c. 1-1/4" and smaller: 1/2" thick.
  3. Pipe Runouts (12' in length or less), to individual coils, terminal units, etc., may be insulated with material 1/2" less thickness than that listed above. Note: Minimum insulation thickness; 1/2".

## **2.7 COVER AND ACCESSORIES**

- A. Aluminum Jacket:
  1. ASTM B209.
  2. Thickness: 0.016 inch, sheet material.
  3. Finish: Smooth.
  4. Joining: Longitudinal slip joints and 2 inch laps.
  5. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
  6. Metal Jacket Bands: 3/8 inch wide, 0.015 inch thick aluminum.
- B. PVC Insulation Cover
  1. Thickness: .020 inches.
  2. Finish: Smooth.
  3. Color: White.
  4. Fittings: Pre-molded PVC.



- 5. Joints: Solvent weld.
- C. Canvas Cover
  - 1. Weight: 8-ounce.
  - 2. Finish: Apply a smooth coat of Foster 82-42W lagging adhesive. Paint as specified under Division 9 section.
  - 3. Color: White.
  - 4. Fittings: Canvas

## **2.8 INSULATING CEMENTS**

- A. Mineral Fiber: ASTM C 195.
  - 1. Thermal Conductivity: 1.0 average maximum at 500 deg F mean temperature.
  - 2. Compressive Strength: 10 psi at 5 percent deformation.
- B. Expanded or Exfoliated Vermiculite: ASTM C 196.
  - 1. Thermal Conductivity: 1.10 average maximum at 500 deg F mean temperature.
  - 2. Compressive Strength: 5 psi at 5 percent deformation.
- C. Mineral Fiber, Hydraulic-Setting Insulating and Finishing Cement: ASTM C 449.
  - 1. Thermal Conductivity: 1.2 average maximum at 400 deg F mean temperature.
  - 2. Compressive Strength: 100 psi at 5 percent deformation.

## **2.9 ADHESIVES**

- A. Flexible Elastomeric Cellular Insulation Adhesive: Solvent-based, contact adhesive recommended by insulation manufacturer.
- B. Lagging Adhesive: MIL-A-3316C, non-flammable adhesive in the following Classes and Grades:
  - 1. Class 1, Grade A for bonding glass cloth and tape to unfaced glass fiber insulation, sealing edges of glass fiber insulation, and bonding lagging cloth to unfaced glass fiber insulation.
  - 2. Class 2, Grade A for bonding glass fiber insulation for metal surfaces.

## **PART 3 - EXECUTION**

### **3.1 GENERAL**

- A. Apply all insulation using experienced mechanics, regularly employed in the trade. Unless otherwise specified, apply insulation in accordance with the manufacturer's recommendations.
- B. Install insulation through all structural members.
- C. Test and clean systems before insulation is applied.
- D. Insulate the backside of supply air devices unless factory insulated.

### **3.2 PIPING - INDOOR**

- A. Adhere jacket, horizontal jacket and end joint laps with white vapor adhesive (field and/or factory applied) and further secure with outward clinching type staples. On all cold insulation, coat the staples with white colored Foster 85-75 vapor barrier mastic to maintain the vapor seal. Insulate fittings with factory and/or field fabricated fittings with vapor barrier mastic and glass fabric reinforcement finished smooth and uniform. Adhere ends and butt joint strips over end joints with Foster 30-35 coating. Also, where factory adhesive system is used, apply a Foster 30-35 coating on all joints and seams.
- B. Provide semi-circular protection saddles of #16 gage galvanized steel, twelve inches long for insulated piping where hanger occur. On pipe sizes two inches and over, provide twelve inches length of high density insulation at hangers. Secure saddles to insulation with tape or plastic ties.

- C. Neatly point up all exposed ends of pipe insulation with appropriate insulating cement.
- D. Insulate fittings (ells, tees), valves, strainers, and generally all piping components. Do not insulate interior pumps and expansion tanks.
- E. Insulate bowl of roof drains and connected drain piping.

### **3.3 ADDITIONAL COVER**

- A. All piping (including valves and fittings) and equipment located in mechanical rooms or exposed spaces (such as the shop) shall receive an additional cover. Piping in crawl spaces or chases is not considered exposed. At Contractor's option, this additional cover shall be PVC or canvas.

### **3.4 DUCTWORK - GENERAL**

- A. Unless indicated otherwise, externally insulate ductwork.
- B. Insulate supply, return and outside air ductwork.
- C. Insulate the backside of supply air devices unless factory insulated.

### **3.5 DUCTWORK - INTERNAL INSULATED**

- A. Install duct liner by cutting side pieces of insulation to lap both top and bottom sections for maximum support.
- B. Attach side pieces and bottom piece with adhesive. Provide 100% adhesive coverage.
- C. After applying adhesive further secure insulation with Stic-Klip fasteners. Space one fastener per two square feet of insulation.
- D. Batt edges of insulation with adhesive to insure a tight joint and provide a smooth surface. No "raw" edges of insulation are allowed.

### **3.6 DUCTWORK AND AIR DEVICES - EXTERNAL INSULATED**

- A. Butt tightly at joints. Overlap vapor barrier facing a minimum of two inches.
- B. Remove insulation from overlaps.
- C. Staple all vapor barrier seams six inches on center with outward clinching staples. Then seal with SMACNA Foil Vapor Barrier Tape or Vapor Barrier Mastic.

### **3.7 FLEXIBLE ELASTOMERIC CELLULAR PIPE INSULATION INSTALLATION**

- A. Slip insulation on the pipe before making connections wherever possible. Seal joints with adhesive. Where the slip-on technique is not possible, cut one side longitudinally and apply to the pipe. Seal seams and joints with adhesive.
- B. Valves, Fittings, and Flanges: Cut insulation segments from pipe or sheet insulation. Bond to valve, fitting, and flange and seal joints with adhesive.
  - 1. Miter cut materials to cover soldered elbows and tees.
  - 2. Fabricate sleeve fitting covers from flexible elastomeric cellular insulation for screwed valves, fittings, and specialties. Miter cut materials. Overlap adjoining pipe insulation.
  - 3. Coating shall be applied to exterior insulation. Apply 2 coats.
- C. Apply 2 coats of coating on exterior portions of the insulation.

**END OF SECTION**



## **SECTION 15350 - NATURAL GAS PIPING SYSTEM**

### **PART 1 - GENERAL**

#### **1.1 WORK INCLUDED**

- A. System of natural gas piping as shown on the Drawings, including distribution and connection to every appliance to be furnished, installed or connected.

#### **1.2 RELATED WORK**

- A. Section 15010 - Basic Mechanical Requirements
- B. Section 15060 - Pipe and Pipe Fittings
- C. Section 15090 - Mechanical Supporting Systems
- D. Section 15190 - Mechanical Identification

#### **1.3 SYSTEM DESCRIPTION**

- A. Provide a complete and properly operating natural gas distribution system, including all valves, meter, piping, regulators, and other appurtenances.

#### **1.4 SUBMITTALS**

- A. Make submittals in accordance with Section 01300.
- B. Submit for approval manufacturer's product data for the following:
  - 1. Pressure Regulators
  - 2. Valves
  - 3. Meter Risers
- C. Submittals shall consist of descriptive literature indicating performances, physical size, features, options and other certified information indicating compliance with the specifications and drawings.

#### **1.5 QUALITY ASSURANCE**

- A. Perform work in full compliance with the State Plumbing/Gas Code, NFPA Pamphlet #54, the requirements of the local gas utility company, and the local plumbing authorities.

### **PART 2 - PRODUCTS**

#### **2.1 PIPING MATERIAL**

- A. Above Grade Pipe: Schedule 40 black steel assembled with malleable iron or welding fittings.
- B. Pipe Below Grade: Plastic pipe conforming to ASTM D2513 or PE 2306. Plastic pipe to have compression or fusion weld pipe fittings.

#### **2.2 ABOVE GRADE VALVES**

- A. 1-1/4" and less: Crane Number 324 or equal, 125" iron body, brass plug, square head, screwed pattern, lockable.

- B. 1-1/2" and larger: Lubricated plug valve, Resun figure R-1430, 200 psi WOG, 125 psi SWP. API pipeline valve standard 6-D. Semi-steel, threaded construction. Provide with standard wrench and locking sealing device.

### **2.3 METER RISERS**

- A. Factory fabricated meter and/or regulator entrance loop by Central Plastic Company or equal.
- B. Anodeless, pigtail fusion type complying with local code and utility regulations.

### **2.4 GAS PRESSURE REGULATORS**

- A. Gas pressure regulators shall be diaphragm actuated with cast iron body; aluminum diaphragm chamber, and all internal parts designed for use with natural gas.
- B. Regulators shall be adjustable, with automated loading and full internal relief.
- C. The regulators shall be adjusted for outlet pressure indicated on the drawings. The outlet pressure shall not vary more than one inch w.c. from the set point at specified capacity.
- D. The regulator shall be capable of complete shut-off in the event the supply pressure is interrupted or the gas demand exceeds the regulator capacity and shall remain off until the regulator is manually reset.
- E. The regulator shall have a weatherproof, bug proof, screened vent cap installed in the vent tapping.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Provide a drip leg, union, and stop cock at each gas fired appliance.
- B. Provide gas pressure regulator, or gas pressure regulator stations if so shown or required for proper regulation, in the gas service connections to each and every pipe of gas burning equipment furnished. Provide these regulators in addition to those furnished as pressure controls for the basic service to the building, and gas distribution system with its various points of pressure control within the building.
- C. Vent all regulators outside the building, and install in full accordance with the NFPA Code, and all applicable state and local laws.
- D. Provide cathodic protection through installation of anode to the underground portion of a coated steel riser attached to an underground plastic line where the coated steel pipe is less than 10' long.
- E. Where possible, maintain a minimum of 10 feet separation between buried gas piping and other new or existing underground utilities.

### **3.2 PAINTING**

- A. All pound pressure, above grade pipe, will be painted yellow.

### **3.3 TESTING**

- A. After completion of work, test the entire system to an air pressure of 50 psi for a period of two hours in presence of the local gas utility company or other local authority.
- B. After installation of gas cocks and appliances, fill piping with gas at ounce operating pressure and test all connections including regulator and service line valve for leaks with soapy water.

### **3.4 START-UP AND INSPECTION OF GAS APPLIANCES**

- A. Make necessary adjustments to the appliance to assure safe, effective, and reliable operation.
- B. Unsafe and operational problems of appliances shall be brought to the attention of the Owner.
- C. The appliances in question shall not be put in operation until the unsafe or operation problem has been resolved.
- D. At completion of cleaning, inspection and repairing of and deficiencies, light the pilot, and adjust the thermostat to 70 degrees, leaving the appliance in operation.

**END OF SECTION**





## **SECTION 15401 - DOMESTIC WATER SYSTEM**

### **PART 1 - GENERAL**

#### **1.1 WORK INCLUDED**

- A. A system of domestic water pipe as shown on the Drawings including distribution and connection to fixtures and equipment.

#### **1.2 RELATED WORK**

- A. Section 15010 - Basic Mechanical Requirements
- B. Section 15060 - Pipe and Pipe Fittings
- C. Section 15090 - Mechanical Supporting System
- D. Section 15120 - Valves
- E. Section 15190 - Mechanical Identification
- F. Section 15250 - Mechanical Insulation Systems
- G. Section 15450 - Plumbing Fixtures and Equipment

#### **1.3 SYSTEM DESCRIPTION**

- A. Provide domestic water system consisting of hot and cold water piping and required for each fixture or equipment item.
- B. Provide domestic water piping system buried beyond the building, through meter and connection to city system.

#### **1.4 QUALITY ASSURANCE**

- A. Install system in accordance with National and State Codes regardless of possible conflicts in these specifications or the Drawings.

### **PART 2 - PRODUCTS**

#### **2.1 PIPE**

- A. Above Ground: ASTM B88, Type L copper, hard-drawn.
- B. Buried Under Building: ASTM B88, Type K copper, soft-drawn without fittings.
- C. Buried Beyond Building: ASTM B88, Type K copper, soft-drawn or hard drawn.

#### **2.2 FITTINGS**

- A. Above ground: Wrought copper assembled with lead free solder. Use ASTM B 32 95/5 TIN-ANTIMONY.
- B. Buried below slab: Wrought copper assembled with lead free solder. Use AWS A 5.8, BCUP series brazing (silver solder).

#### **2.3 SPECIALTIES**

- A. Impact Arrestor: SHOCK STOP by *Wade*.

## **PART 3 - EXECUTION**

### **3.1 GENERAL**

- A. Install service valves in the hot and cold water at each fixture group, major equipment, and water heaters.
- B. Install insulating connection or union between copper and iron pipe.
- C. Conceal domestic water pipes in plumbing chases, in heated ceiling spaces or in partitions.
- D. Disinfect potable water piping by filling with a solution containing 50 parts per million of available chlorine. Allow this solution to stand six hours. Flush all piping and equipment. A negative bacteria test must result.
- E. Install impact arrestor on hot and cold water lines, including one set (one for hot and one for cold) for each bathroom group, one set at each washing machine, one set at each kitchen sink and one at each ice machine.
- F. Do not install pipe below grade or concrete slab unless indicated on the drawings. Do not install fittings below concrete slabs. Sleeve continuous, with 3/8" thick *Armstrong Armaflex II* or *Rubatex R-180-FS* (slip-on type) insulation or polyethylene sleeve material, all buried interior underslab pipes.
- G. Care must be exercised to insure that copper piping will not come into direct contact with any fire treated lumber. Provide pipe insulation as a protective sleeve (against copper deterioration resulting from fire treatment salts) completely thru any lumber penetration incurred by copper piping. Insulation shall be 3/8" thick *Armstrong Armaflex II* or *Rubatex R-180-FS* (slip-on type).
- H. Test water system with air to a pressure of 125 psi for a period of two hours. Prove tight by maintaining pressure without adding air.
- I. Provide drains at low points in the system.

### **3.2 SERVICE CONNECTION**

- A. Provide water service complete with water meter. Provide pressure reducing valve if water pressure exceeds 80 psi.

**END OF SECTION**

## **SECTION 15405 - DRAINAGE, SANITARY WASTE AND VENT SYSTEMS**

### **PART 1 - GENERAL**

#### **1.1 SYSTEM DESCRIPTION**

- A. Provide soil and waste system consisting of all sanitary waste and vent piping required for each fixture, drain, or equipment item.
- B. Provide storm drainage system consisting of interior piping required for each roof drain or other miscellaneous drain.
- C. Provide system in accordance with local and state codes regardless of possible conflicts in the Specifications or Drawings. Advise Architect of any changes required by codes that will change the design of the building.

#### **1.2 RELATED WORK**

- A. Section 15010 - Basic Mechanical Requirements
- B. Section 15060 - Pipe and Pipe Fittings
- C. Section 15090 - Mechanical Supporting Systems
- D. Section 15450 - Plumbing Fixtures and Equipment

### **PART 2 - PRODUCTS**

#### **2.1 DRAINAGE, SANITARY WASTE AND VENT**

- A. Cast Iron
  - 1. General: **All cast iron soil pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute (CISPI) and be listed by NSF International.** System shall conform to the ASTM "Standard Specifications for Cast Iron Soil Pipe and Fittings".
  - 2. Above Slab Pipe: No-hub service weight cast iron with approved gasket and clamp.
  - 3. Below slab and outside building (Beyond 5 feet): Cast iron, service weight, gasketed bell and spigot. System shall conform to the ASTM "Standard Specifications for Cast Iron Soil Pipe and Fittings".
  - 4. Couplings to be flexible, chemical resistant rubber type by *Fernco*. Couplings to have two stainless steel clamping bands.
  - 5. **All standard duty couplings for Hubless cast iron soil pipe and fittings shall conform to CISPI 310 and be certified by NSF International.**
- B. Plastic
  - 1. Plastic pipe may be substituted for cast iron. Plastic shall be schedule 40 solvent weld, DWV, PVC, as per ASTM D 2665 which is approved for use by the State plumbing code and acceptable to the local plumbing inspection authority.
- C. Copper, Brass
  - 1. General: DWV copper with sweat or threaded fittings.
  - 2. Exposed Fixture Branch Arms, Traps, Etc.: Chrome plate brass or copper.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Locate cleanouts as required by state and local codes and as shown on the Drawings. Place cleanouts at intervals of not more than 50 feet 0 inches. Bring cleanouts to an accessible location, flush with grade or floor, and terminate with cleanout as scheduled elsewhere.
- B. Accomplish horizontal offsets in all sanitary and waste pipe with 1/16, 18, or 1/6 bends, with preference given in the order named. Accomplish horizontal intersections with 45 degree or 60 degree "Y" branches, or combination "Y" and 1/8 bends with preference to the order named.
- C. Use sanitary tees or crosses on vertical lines for fixture connection and intersection between vertical and horizontal lines, except the longsweep quarter bends will be permitted.
- D. Install horizontal runs of all sanitary and waste and vent lines at an even grade of at least 1/8 inch per foot without sag or pockets, unless otherwise shown.
- E. Vent every fixture and/or trap. Vent as close as possible to the trap, and on the sewer side.
- F. Secure stacks at base and branches at close intervals to keep system in alignment and to adequately support system.
- G. Install couplings where transition to different pipe materials in necessary. The installed coupling shall fit the outside diameter of the pipes with pipe flowlines matched.
- H. Stop soil and waste system 5 feet outside of building line, unless otherwise shown.

### **3.2 TESTING**

- A. Test entire waste and vent system to a minimum of ten feet. Maintain this pressure a minimum of three hours.

**END OF SECTION**

## **SECTION 15450 - PLUMBING FIXTURES AND EQUIPMENT**

### **PART 1 - GENERAL**

#### **1.1 WORK INCLUDED**

- A. Providing plumbing fixtures, equipment, and specialties.
- B. Providing necessary support, trim, chairs, bolts, anchors, brackets, and accessories required.

#### **1.2 RELATED WORK**

- A. Section 15010 - Basic Mechanical Requirements.
- B. Section 15401 - Domestic Water System.
- C. Section 15405 - Drainage, Sanitary Waste & Vent Systems.

#### **1.3 SUBMITTALS**

- A. Make submittals in accordance with Section 01300.
- B. Submit product data on fixtures, equipment, and specialties.

### **PART 2 - PRODUCTS**

#### **2.1 MANUFACTURERS**

- A. Available Manufacturers: Subject to compliance meeting “as equal” requirements to those as scheduled on the drawing by manufacturers offering products that may be incorporated in the work. Manufacturers include, but are not limited to the following:
  - 1. Water Closets:
    - a. American Standard, Inc.
    - b. Briggs Div., Brigs Industries, Inc.
    - c. Toto
    - d. Eljer; A Household International Co.
    - e. Kohler Co.
  - 2. Lavatories:
    - a. American Standard, Inc.
    - b. Briggs Div., Brigs Industries, Inc.
    - c. Toto
    - d. Columbia Products
    - e. Kohler Co.
  - 3. Sinks:
    - a. Elkay Manufacturing.
    - b. Just Manufacturing.
    - c. Kohler Co.
  - 4. Mop Basins:
    - a. Fiat
    - b. Crane Plumbing/Fiat Products.
    - c. Stern-Williams Co., Inc.
  - 5. Water Cooler:
    - a. Elkay Manufacturing.
    - b. Halsey Taylor; A Household International Co.
    - c. Oasis.
  - 6. Toilet Seats:

- a. Bemis Mfg. Co.
  - b. Centoco
- 7. Flushometers:
  - a. Sloan Valve Co.
  - b. Zurn Industries, Inc.; Flush Valve Operations.
  - c. Toto
- 8. Commercial/Industrial Cast-Brass Faucets:
  - a. American Standard, Inc.
  - b. Delta
  - c. Chicago Faucets.
  - d. T&S Brass
  - e. Kohler Co.
- 9. Miscellaneous Fittings (Except Faucets):
  - a. Crane Plumbing/Fiat Products.
  - b. Eljer; A Household International Co.
  - c. Kohler Co.
  - d. McGuire Manufacturing Co., Inc.
- 10. Supports:
  - a. Wade Div.; Tyler Pipe.
  - b. Zurn Industries, Inc.; Hydromechanics Div.
- 11. Disposers:
  - a. General Electric Co.
  - b. Hotpoint; General Electric Co.
  - c. In-Sink-Erator Div.; Emerson Electric Co.
  - d. KitchenAid, Inc.

## **2.2 PLUMBING FIXTURES AND EQUIPMENT**

- A. Furnish plumbing fixtures and equipment in accordance with the schedule at the end of this Section or on the drawings. Include all necessary chairs, bolts, anchors, and brackets.
- B. Fixtures shall be non-absorbent throughout and free from waves, kiln marks, or discoloration.
- C. All surfaces coming in contact with walls, floors or other flat surfaces shall be flat.
- D. All enameled iron ware shall be acid-resistant.

## **2.3 FIXTURE TRIM**

- A. All exposed finished metal parts shall be chromium plated; except rough-bodied parts shall be nickel-plated.
- B. All supplies shall be I.P.S. brass; except where otherwise specified.
- C. All fixtures will be provided with supply stop or shut-off valve with metal stems. Plastic valve stems shall not be used.
- D. Traps for lavatories and sinks shall be chrome-plated cast brass P-traps with cleanout plugs.
- E. Provide cast brass, chrome-plated, set screw type escutcheons on supply and waste piping at all floor and wall penetrations.
- F. Chair carriers shall be approved models of Wade, or approved equal.

## **PART 3 - EXECUTION**

### **3.1 FIXTURES INSTALLATION**

- A. Properly connect plumbing fixtures to waste, vent, and supplies in a rigid and substantial manner without damage to any adjoining work or finish.
- B. Rigidly support wall hung fixtures with approved metal hangers, chairs, back up plate, threaded rod or other supports. Secure floor outlet fixtures to floor with approved floor flanges.
- C. Provide connections of size listed on plumbing fixture schedule for connecting all new and relocated plumbing fixtures. Refer to drawings.
- D. Provide above sizes for short branches only. Provide main lines of sizes shown on Drawings.
- E. Protect all fixtures subject to damage prior to completion of building in an approved manner. Turn job over to Owner with all fixtures clean and free from damage.
- F. Bed fixtures mounted on uneven surfaces in an approved manner.

### **3.2 FIXTURE AND EQUIPMENT SCHEDULE**

- A. Fixtures color is to be white unless otherwise indicated. Refer to drawings for fixture schedule.
- B. Clean Out Plug: Brass plug.
- C. Floor Clean Out (FCO): Wade W-6030 Cast Iron Floor Clean Out with appropriate outlet. Clean out to be two piece construction with double drainage flange, weep holes, reversible clamping collar, bronze plug round adjustable satin nickel bronze secured scoriated cover.
- D. Wall Clean Out (WCO): Wade 8450-R cast iron body and round brass plug and round stainless steel access cover secured with machine screw.
- E. Clean Out To Grade (COTG): Clean out plug inside Tyler Pipe cast iron box with secured cast iron cover.

**END OF SECTION**





## **SECTION 15460 - BACKFLOW PREVENTER**

### **PART 1 - GENERAL**

#### **1.1 WORK INCLUDED**

- A. Providing reduced pressure backflow preventers.

#### **1.2 RELATED WORK**

- A. Section 15010 - Basic Mechanical Requirements
- B. Section 15120 - Valves
- C. Section 15401 - Domestic Water System

#### **1.3 SYSTEM DESCRIPTION**

- A. Provide a complete reduced pressure backflow prevention system to prevent backsiphonage and back-pressure backflow of contaminated water into the potable (domestic) water supply.

#### **1.4 QUALITY ASSURANCE**

- A. Install system in accordance with state codes regardless of possible conflicts in these specifications or the drawings. Advise Engineer of any changes required by codes that will change the design of the system.
- B. Installation of system shall be completed by state-licensed master plumber or state-licensed journeyman Plumber working under the supervision of a master plumber.

#### **1.5 REFERENCES**

- A. Tested and certified under the following standards for reduced pressure backflow preventers: ASSE Number 1013, AWWA C506, CSA B64.4.
- B. Accepted by Uniform Plumbing Code: SBCCI (Basic Plumbing Code, IAPMO (UPC)).

#### **1.6 SUBMITTALS**

- A. Submit product data for approval.
- B. Submittals shall consist of descriptive literature indicating performances, physical size, features, options, and other certified information indicating compliance with the Specifications and Drawings.

### **PART 2 - PRODUCTS**

#### **2.1 GENERAL**

- A. Manufacturer: Watts Regulator Model 909 or approved equal.
- B. Performances: GPM flow rate as indicated on Drawings. Pressure drop at indicated flow to be 15 PSIG maximum.
- C. Size as indicated on the drawings.
- D. The assembly shall fit in the space indicated on the Drawings with adequate clearance for service, removal, and pipe attachment.

## **2.2 MATERIALS AND CONSTRUCTION**

- A. Bronze body construction.
- B. **Celcon** check seats.
- C. Stainless steel relief valve seats, shafts, and flange bolts.
- D. Tight seating, rubber check valve, and relief valve assemblies.
- E. Bronze body ball valve test cocks.
- F. N. P. T. connections.
- G. Cleanable bronze wye type strainer with blow off cock.
- H. Full port bronze ball valves or bronze gate valves.
- I. Bronze body unions.
- J. Air Gap/Elbow assembly.

## **2.2 PRESSURE-TEMPERATURE RATINGS**

- A. 175 psi supply pressure.
- B. 140 degrees F water temperature.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Install as per manufacturer's instructions.
- B. Provide a drain of insulated type M or L rigid copper with wrought copper fittings. Extend drain from the air gap/elbow assembly to a floor drain or as indicated on the Drawings. Drain size shall be full sized to match air gap connection size.

**END OF SECTION**

## **SECTION 15603 - SPLIT AIR CONDITIONING AND HEATING EQUIPMENT**

### **PART 1 - GENERAL**

#### **1.1 WORK INCLUDED**

- A. Providing air cooled condensing units.
- B. Provide gas furnaces and encased D/X cooling coil.
- C. Provide equipment vibration isolation.

#### **1.2 RELATED WORK**

- A. Section 15010 - Basic Mechanical Requirements
- B. Section 15090 - Mechanical Supporting Systems
- C. Section 15190 - Mechanical Identification
- D. Section 15651 - Refrigerant Piping
- E. Section 15800 - Air Distribution
- F. Section 15900 - Controls

#### **1.3 QUALITY CONTROL**

- A. Testing Requirements: The following factory tests are required for fans:
  - 1. Sound Power Level Ratings: Comply with AMCA Standard 301 "Method for Calculating Fan Sound Ratings From Laboratory Test Data." Test fans in accordance with AMCA Standard 300 "Test Code for Sound Rating." Fans shall be licensed to bear the AMCA Certified Sound Ratings Seal.
  - 2. Fan Performance Ratings: Establish flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests and ratings in accordance with AMCA Standard 210/ASHRAE Standard 51 - Laboratory Methods of Testing Fans for Rating.

#### **1.4 SUBMITTALS**

- A. Provide product data for the items listed below. Include descriptive literature indicating performances, physical size, features, options, and other certified data indicating compliance with the specifications:
  - 1. Condensing units
  - 2. Gas furnaces
  - 3. D/X coils

### **PART 2 - PRODUCTS**

#### **2.1 APPROVED MANUFACTURERS**

- A. Trane
- B. Lennox
- C. Carrier

## **2.3 OUTDOOR AIR COOLED CONDENSING UNITS, 5 TON AND LESS**

- A. General:
  - 1. Provide where indicated on plans, an air-cooled condensing unit. The unit shall contain sufficient refrigerant (R-22) for complete system and be equipped with refrigerant line fittings which permit mechanical or sweat connection.
  - 2. Brass service valves with fittings and gage ports shall be located on exterior of unit.
  - 3. Refer to schedule on drawings for minimum performances.
  - 4. The unit shall fit in the space indicated on the drawings with adequate clearance for service and airflow.
- B. Compressor:
  - 1. Compressor shall be of the welded hermetic type with internal vibration isolation and be located in an isolated section of unit.
  - 2. Compressor to have a 5 year warranty.
  - 3. Compressor shall be equipped with a crankcase heater and have internal high pressure relief.
- C. Condenser coil shall be constructed with aluminum fins mechanically bonded to seamless copper tubing. Condenser fan shall be propeller type, direct driven, and arranged for vertical air discharge. Fan motor shall be factory lubricated, totally enclosed, and inherently protected.
- D. Controls shall be factory wired and placed in a location readily accessible. Compressor motor shall have both thermal and current sensitive overload devices.
- E. Casing:
  - 1. Casing shall make unit full weatherproof of outdoor installation. Casing shall be of galvanized steel, zinc phosphate and finished with baked enamel.
  - 2. Openings shall be provided for power and refrigerant connections.
  - 3. A panel shall be removable to provide access for servicing.
  - 4. A guard shall be provided for the condenser coil.
- F. Connections: Only one liquid line, one suction line, and one power supply connection shall be required for each unit.
- G. Accessories:
  - 1. Provide start capacitor and relay on single phase units.
  - 2. Provide liquid line filter dryer.
  - 3. Refer to drawings for additional accessories.
  - 4. Provide indoor fan relay, and low voltage control transformer.

## **2.6 GAS FIRED FURNACE**

- A. General:
  - 1. Provide up-flow 95% gas-fired warm air furnace for use with natural gas.
  - 2. Refer to drawings for minimum performances.
  - 3. The unit shall fit in the space indicated on the drawings with adequate clearance for service, coil removal, ductwork attachment, and pipe attachment.
- B. Casing: 20 gauge steel with baked enamel finish. Casing to be insulated.
- C. Heat Exchanger and Burner:
  - 1. Multi-pass heat exchanger with induced combustion air and monoport inshot burners.
  - 2. Heat exchanger to have a 10 year non-prorated manufacturer's warranty.
- D. Blower and Motor:
  - 1. Centrifugal fan factory balanced.
  - 2. Factory lubricated bearings.
  - 3. Multi-speed, direct drive, permanent split capacitor motor.

- E. Controls and Safety Features:
  - 1. Gas valve which regulates gas flow and provides manual main burner and pilot shutoff.
  - 2. Printed circuit board.
  - 3. Pre-wired indoor fan relay with transformer.
  - 4. Solid state blower control.
  - 5. Combustion draft and pressure safety switches.

F. Accessories: Refer to Drawings.

## **2.7 D/X COIL**

- A. General:
  - 1. Provide direct expansion encased coils in the location and manner shown on the Drawings.
  - 2. Refer to Drawings for minimum capacity and performance.
  - 3. The component shall fit in the space indicated on the Drawings with adequate clearance for service, removal, ductwork attachment, and pipe attachment.
  - 4. The encased coil shall be matched and rated with the attached furnace and condensing unit.
- B. Coil shall operate properly in vertical arrangement.
- C. Coil shall be 3 rows minimum deep and have a face velocity of not more than 400 feet per minute.
- D. The coil shall have factory installed refrigerant metering device (unless indicated otherwise); refrigerant line fittings which permit mechanical connections; and condensate pan with primary and auxiliary drain connections on each.
- E. Casing: Provide coil in a painted steel, insulated casing.

## **2.10 MOTORS**

- A. Motors required in connection with equipment shall be of sufficient size and speed for duty to be performed, not exceeding their full-rated load when drive equipment is operated at specified capacity under most severe conditions likely to be encountered.
- B. Motors 3/4 HP and smaller shall have integral, internal thermal protection.

## **2.11 DRIVES**

- A. All equipment drives shall be direct drives unless scheduled otherwise.

## **2.12 GUARDS**

- A. Equip all exposed rotating machinery with guards.

## **2.13 VIBRATION PADS**

- A. Oil-resistant neoprene sheets, of manufacturer's standard hardness and cross-ribbed or waffled pattern as manufactured by the Amber/Booth Co.

# **PART 3 - EXECUTION**

## **3.1 VIBRATION ISOLATION**

- A. Mount all equipment subject to vibration on vibration elimination neoprene pads or spring isolators. Comply with minimum static deflections recommended by ASHRAE, for selection and application of vibration isolation materials and units as indicated.

- B. Except as otherwise indicated, comply with manufacturer's instructions for installation and load application to vibration control materials and units. Adjust to ensure that units have equal deflection, do not bottom out under loading, and are not short-circuited by other contacts or bearing points. Remove space blocks and similar devices intended for temporary support during installation.
- C. Except as otherwise indicated, select vibration control products in accordance with ASHRAE Handbook, 1980 Systems Volume, Chapter 35 "Sound and Vibration Control", Table 27. Also, comply with manufacturer's recommendations for selection and application of vibration isolation materials and units. Where more than one type of product is offered, selection is Installer's option.

### **3.2 INSTALLATION**

- A. Make pipe connections to all equipment with unions or flanged connections to allow for removal or service.
- B. Provide a condensate drain of insulated Type M copper with wrought copper fittings from each D/X coil to floor drain or as shown on the Drawings.
- C. Arrange installation of units to provide access space around equipment for service and maintenance.
- D. Duct installations and connections are specified in other Division 15 sections. Make final duct connections with flexible connections.

**END OF SECTION**

## **SECTION 15604 - EXHAUST FANS**

### **PART 1 - GENERAL**

#### **1.1 WORK INCLUDED**

- A. Exhaust fans.

#### **1.2 RELATED WORK**

- A. Section 15010 - Basic Mechanical Requirements
- B. Section 15090 - Mechanical Supporting Systems
- C. Section 15190 - Mechanical Identification
- D. Section 15800 - Air Distribution
- E. Section 15900 - Controls

#### **1.3 QUALITY CONTROL**

- A. Testing Requirements: The following factory tests are required for fans:
  - 1. Sound Power Level Ratings: Comply with AMCA Standard 301 "Method for Calculating Fan Sound Ratings From Laboratory Test Data." Test fans in accordance with AMCA Standard 300 "Test Code for Sound Rating." Fans shall be licensed to bear the AMCA Certified Sound Ratings Seal.
  - 2. Fan Performance Ratings: Establish flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests and ratings in accordance with AMCA Standard 210/ASHRAE Standard 51 - Laboratory Methods of Testing Fans for Rating.

#### **1.4 SUBMITTALS**

- A. Provide product data for the items listed below. Include descriptive literature indicating performances, physical size, features, options, and other certified data indicating compliance with the specifications.
  - 1. Exhaust Fans.

### **PART 2 - PRODUCTS**

#### **2.1 APPROVED MANUFACTURERS**

- A. Loren Cook.
- B. Greenheck.
- C. Acme.
- D. Penn Barry.

#### **2.2 CEILING EXHAUST FANS**

- A. Provide bathroom exhaust fans as indicated on the drawings:
  - 1. Fans to be UL listed and certified by AMCA.
  - 2. Minimum sizes and capacities: Refer to HVAC schedule on drawings.
  - 3. Lubricated fan motor to be cushioned with vibration isolators.
  - 4. Blower wheel to be balanced.
  - 5. Housing to be of painted steel or silver anodized aluminum.
  - 6. Provide decorative ceiling grille.

## **2.4 MOTORS**

- A. Motors required in connection with equipment shall be of sufficient size and speed for duty to be performed, not exceeding their full-rated load when drive equipment is operated at specified capacity under most severe conditions likely to be encountered.
- B. Motors 3/4 HP and smaller shall have integral, internal thermal protection.

## **2.5 DRIVES**

- A. All equipment drives shall be direct drives unless scheduled otherwise.

## **2.6 GUARDS**

- A. Equip all exposed rotating machinery with guards.

# **PART 3 - EXECUTION**

## **3.1 VIBRATION ISOLATION**

- A. Mount all equipment subject to vibration on vibration elimination neoprene pads or spring isolators. Comply with minimum static deflections recommended by ASHRAE, for selection and application of vibration isolation materials and units as indicated.
- B. Except as otherwise indicated, comply with manufacturer's instructions for installation and load application to vibration control materials and units. Adjust to ensure that units have equal deflection, do not bottom out under loading, and are not short-circuited by other contacts or bearing points. Remove space blocks and similar devices intended for temporary support during installation.
- C. Except as otherwise indicated, select vibration control products in accordance with ASHRAE Handbook, 1980 Systems Volume, Chapter 35 "Sound and Vibration Control", Table 27. Also, comply with manufacturer's recommendations for selection and application of vibration isolation materials and units. Where more than one type of product is offered, selection is Installer's option.

## **3.2 INSTALLATION**

- A. Secure roof-mounted fans to roof curbs with cadmium-plated hardware.
- B. Arrange installation of units to provide access space around equipment for service and maintenance.
- C. Duct installations and connections are specified in other Division 15 sections.

**END OF SECTION**



## **SECTION 15651 - REFRIGERANT PIPING**

### **PART 1 - GENERAL**

#### **1.1 WORK INCLUDED**

- A. System consisting of a complete refrigerant piping system for each split D/X air conditioning system.

#### **1.2 RELATED WORK**

- A. Section 15010 -Basic Mechanical Requirements
- B. Section 15060 - Pipe and Pipe Fittings
- C. Section 15090 - Mechanical Supporting Systems
- D. Section 15250 - Mechanical Insulation Systems
- E. Section 15603 - Split Air Conditioning and Heating Equipment
- F. Section 15738 – Ductless Split System Units

### **PART 2 - PRODUCTS**

#### **2.1 MATERIALS**

- A. Freon piping, including liquid, suction, and hot gas lines:
  - 1. 3/4" and Less: Soft temper, 50 feet refrigeration copper, dehydrated and capped.
  - 2. Above 3/4": Hard temper, Type L or K, dehydrated and capped.
  - 3. All copper to be CERRO copper of equal.
- B. Joints: Wrought copper fittings and silfos. Silfos to be lead free with 12% to 15% silver content.
- C. Freon Valves: Diaphragm packless bellows by Mueller, Brass, Kartest Manufacturing or equal.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION**

- A. Install a liquid line filter dryer as per manufacturer's instructions. Size the filter-dryer as per manufacturer's recommendations.
- B. Size and install liquid and suction refrigerant lines as per equipment manufacturer's recommendations.

#### **3.2 EVACUATION AND CHARGING**

- A. Evacuate non-precharged refrigerant systems only.
- B. Use a two stage rotary vane gas ballast vacuum pump and an electronic (thermocouple) vacuum gauge.
- C. The pipe size between the piping system and the pump shall be 1/2" minimum.
- D. Before charging with freon the following evacuation procedure shall be accomplished:
  - 1. 30 minutes or more at 1500 microns vacuum.
  - 2. Fill to zero gauge pressure with dry nitrogen for 10 minutes.
  - 3. 15 minutes or more at 1500 microns vacuum.

4. Fill to zero gauge pressure with dry nitrogen.
  5. 30 minutes or more at 1500 microns vacuum.
- E. After completion of the above evacuation procedure, and testing, charge the system with R-22 as per manufacturer's recommendations.

### **3.3 TESTING**

- A. Test during progress of work or at completion to ensure tight system. Use Nitrogen for testing. Soap test Freon 22 system at 245 psi. Allow system to stand for 24 hours under pressure and if no change is pressure, system may be considered tight.

**END OF SECTION**

## **SECTION 15738 – SPLIT SYSTEM AIR-CONDITIONING UNITS**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. This Section includes split-system air-conditioning units consisting of separate evaporator-fan and compressor-condenser components. Units are designed for exposed mounting.

#### **1.3 DEFINITIONS**

- A. Evaporator-Fan Unit: The part of the split-system air-conditioning unit that contains a coil for cooling and a fan to circulate air to conditioned space.
- B. Compressor-Condenser Unit: The part of the split-system air-conditioning unit that contains a refrigerant compressor and a coil for condensing refrigerant.

#### **1.4 SUBMITTALS**

- A. Product Data: Include rated capacities; shipping, installed, and operating weights; furnished specialties; and accessories for each type of product indicated. Include performance data in terms of capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.
- B. Shop Drawings: Diagram power, signal, and control wiring and differentiate between manufacturer-installed and field-installed wiring.
- C. Maintenance Data: For split-system air-conditioning units to include in maintenance manuals specified in Division 1.
- D. Warranties: Special warranties specified in this Section.

#### **1.5 QUALITY ASSURANCE**

- A. Product Options: Drawings indicate size, profiles, and dimensional requirements of split-system units and are based on the specific system indicated. Other manufacturers' systems with equal performance characteristics may be considered. Refer to Division 1 Section "Substitutions."
- B. 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.

#### **1.6 COORDINATION**

- A. Coordinate size, location, and connection details with roof curbs, equipment supports, and roof penetrations specified in Division 7 Section "Roof Accessories."

#### **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 Warranty: Written warranty, executed by manufacturer agreeing to repair or replace components of split-system air-conditioning units that fail in materials or workmanship within specified warranty period.

- C. Warranty Period: Five years from date of substantial completion.

## **1.8 EXTRA MATERIALS**

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Filters: One set of filters for each unit.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Friedrich Air Conditioning Company.
  2. Carrier Air Conditioning; Div. of Carrier Corp.
  3. Lennox Industries Inc.
  4. Mitsubishi Electronics America, Inc.; HVAC Division.
  5. Sanyo HVAC.
  6. Tadiran Electronic Industries Inc.; Appliance Division.
  7. Trane Co. (The); Unitary Products Group.
  8. York International Corp.

### **2.2 WALL-MOUNTED, EVAPORATOR-FAN COMPONENTS**

- A. Cabinet: Enameled steel with removable panels on front and ends, and discharge drain pans with drain connection.
- B. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with thermal-expansion valve.
- C. Fan and Motor: Centrifugal fan, directly driven by multispeed, electric motor with integral overload protection; resiliently mounted.
- D. Filters: Permanent, cleanable.

### **2.3 AIR-COOLED, COMPRESSOR-CONDENSER COMPONENTS**

- A. Casing: Steel, finished with baked enamel, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.
- B. Compressor: Hermetically sealed with crankcase heater and mounted on vibration isolation. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.
- C. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with liquid subcooler.
- D. Fan: Aluminum-propeller type, directly connected to motor.
- E. Motor: Permanently lubricated, with integral thermal-overload protection.
- F. Mounting Base: Polyethylene.

### **2.4 ACCESSORIES**

- A. Thermostat: Low voltage with subbase to control compressor and evaporator fan.
1. Compressor time delay.
  2. 24-hour time control of system stop and start.
  3. Liquid-crystal display indicating temperature, set-point temperature, time setting, operating mode, and fan speed.

4. Fan-speed selection, including auto setting.
- B. Refrigerant Line Kits: Soft-annealed copper suction and liquid lines factory cleaned, dried, pressurized, and sealed; factory-insulated suction line with flared fittings at both ends.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Install units level and plumb.
- B. Install evaporator-fan components using manufacturer's standard mounting devices securely fastened to building structure.
- C. Install roof-mounted compressor-condenser components on equipment supports specified in Division 7 Section "Roof Accessories." Anchor units to supports with removable, cadmium-plated fasteners.
- D. Connect pre-charged refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.

### **3.2 CONNECTIONS**

- A. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to unit to allow service and maintenance.
- C. Unless otherwise indicated, connect piping with unions and shutoff valves to allow units to be disconnected without draining piping. Refer to piping system Sections for specific valve and specialty arrangements.
- D. Ground equipment.
  1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

### **3.3 FIELD QUALITY CONTROL**

- A. Installation Inspection: Engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including piping and electrical connections, and to prepare a written report of inspection.
- B. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
- C. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation. Remove malfunctioning units, replace with new components, and retest.
- D. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

### **3.4 COMMISSIONING**

- A. Engage a factory-authorized service representative to perform startup service.
- B. Verify that units are installed and connected according to the Contract Documents.
- C. Lubricate bearings, adjust belt tension, and change filters.
- D. Perform startup checks according to manufacturer's written instructions and do the following:
  1. Fill out manufacturer's checklists.
  2. Check for unobstructed airflow over coils.
  3. Check operation of condenser capacity-control device.
  4. Verify that vibration isolation devices and flexible connectors dampen vibration transmission to structure.

### **3.5 DEMONSTRATION**

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain units.
  - 1. Train Owner's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining units.
  - 2. Review data in maintenance manuals. Refer to Division 1 Section "Contract Closeout."
  - 3. Review data in maintenance manuals. Refer to Division 1 Section "Operation and Maintenance Data."
  - 4. Schedule training with Owner, through Architect, with at least seven days' advance notice.

**END OF SECTION**

## **SECTION 15800 - AIR DISTRIBUTION**

### **PART 1 - GENERAL**

#### **1.1 WORK INCLUDED**

- A. Supply, return, outside and exhaust air ductwork.
- B. Grilles, registers, dampers, and air terminals devices.
- C. Ductwork accessories.

#### **1.2 RELATED WORK**

- A. Section 15010 - Basic Mechanical Requirements
- B. Section 15090 - Mechanical Supporting Systems
- C. Section 15250 - Mechanical Insulation Systems
- D. Section 15990 - Testing, Adjusting and Balancing

#### **1.3 REFERENCED**

- A. SMACNA Low Velocity Duct Construction Standards; latest edition.
- B. ASHRAE Fundamentals Journal; latest edition.
- C. Underwriter's Laboratory, Incorporated.

#### **1.4 SUBMITTALS**

- A. Provide product data for the items listed below. Include descriptive literature indicating performances, physical size, features, options, and other certified data indicating compliance with the specifications:
  - 1. Grilles, diffusers, registers;
  - 2. Ductwork accessories.
  - 3. Louvers, fire dampers, roof hoods.

### **PART 2 - PRODUCTS**

#### **2.1 LOW PRESSURE DUCTWORK**

- A. Construct low pressure ductwork to withstand 2" positive and 2" negative static pressures.
- B. Fabricate ductwork of galvanized steel sheets unless otherwise noted on plans or specified. Galvanized steel shall be of lock forming quality (LFQ) and shall have a galvanized coating of 1-1/2 ounces total for both sides of one square feet of a sheet.
- C. Round ductwork shall be galvanized sheet metal.
- D. All duct joints shall be sealed air tight (SMACNA Class B) under operating pressures. Seal metal duct before application of duct insulation.
- E. Minimum duct sheet metal gauges shall be:

0" thru 30"	- 24 gauge
31" thru 54"	- 22 gauge

55" thru 84"	- 20 gauge
85" thru 120"	- 18 gauge

## 2.2 GRILLES, REGISTERS, DIFFUSERS

- A. Titus, Metal Aire or Tuttle-Bailey as scheduled on Drawings. Prime coat all wall-mounted outlets, unless otherwise specified on Drawings.
- B. Furnish opposed blade volume controls to provide control of the air flow of all supply diffusers. Operation shall be from face of the grille with a lever operator.
- C. The backside of supply air devices shall have a factory fabricated, molded, insulation blanket installed. Field installed blanket insulation shall not be installed on the backside of supply air grilles.
- D. All required above ceiling return air runs shall be installed using sheet metal ductwork; space above ceiling shall not be used as a return air plenum. Ducted return air grilles installed in all lay-in ceiling locations shall include filter assembly, using readily available filter size & positioned for ease of maintenance.

## 2.3 DUCTWORK ACCESSORIES

- A. Turning Vanes: Barber-Colman "Airtur".
- B. Round Tap: ACME or equal. Provide with bell mouth transition. Do not provide air scoop. Damper to have  $\pm 2$ " spacer at operator to compensate for thickness of insulation.
- C. Operator handle to be locking quadrant type.
- D. Extractors: Metalaire Model 101-1, 1" on center blades, aluminum, with accessible push-pull adjusting arm.
- E. Opposed Blade Induct Manual Damper: Ruskin CD-50 opposed blade type with locking quadrant operator outside of duct. Damper to have  $\pm 2$ " spacer at operator to compensate for thickness of insulation.
- F. Flexible Connector: Duro-Dyne Junior reinforced neoprene fabric, UL listed.
- G. Access Doors:
  - 1. Ruskin Model ADC2 removable door type.
  - 2. Door to be unhinged, with frame, interior and exterior panel, 1" insulation, cam latches.
  - 3. Frame to have foam gasket seal.
  - 4. Door and frame to be 24 gage galvanized steel.

## 2.4 DUCT SEALANT

- A. Hardcast Iron Grip 601, or approved equal.

## 2.5 FIRE DAMPERS

- A. Manufacturers: Ruskin or approved equal.
- B. Fabricate in accordance with NFPA 90A and UL 555, and as indicated.
- C. Fabricate curtain type dampers with blades out of air stream.

## 2.6 LOUVERS

- A. 6 inches (100 mm) deep with blades on 45 degree slope, heavy channel frame, birdscreen with 1/4 inch (13 mm) square mesh.
  - 1. Material: 12 gage (2.50 mm) thick extruded aluminum.
  - 2. Finish: Factory baked enamel finish. Color to be selected.



3. Installation: Frame and installation detail as prescribed by the architect..

## **2.7 ROOF HOODS**

- A. Fabricate air inlet or exhaust hoods in accordance with SMACNA HVAC Duct Construction Standards of aluminum, with removable hood; birdscreen with 1/4 inch mesh. Provide with factory mill finish.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION - GENERAL**

- A. Adhere to Drawings as closely as possible. Where required to meet structural or other interferences, vary run and shape of ducts and made offsets during progress of work. Establish duct routes and take field measurements before ductwork is fabricated.
- B. Install ductwork free of any objectionable self-generating noise or rattles.
- C. Construct and install all dampers so that there shall be no vibration to air flow over damper.
- D. Construct T's, bends, and elbows with radius of 1-1/2 times width of duct on center line. Where not possible provide turning vanes.
- E. Increase duct sizes gradually, not exceeding 30 degrees divergence and 45 degrees convergence.
- F. Fabricate splitter dampers of material same gage as duct to 24 inches (600 mm) size in either direction, and two gages heavier for larger sizes. Secure with continuous hinge or rod. Operate with minimum 1/4 inch (6 mm) diameter rod.
- G. Connect diffusers or troffer boots to low pressure ducts with 5 feet (1.5 m) maximum length of flexible duct. Hold in place with strap or clamp.
- H. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- I. Provide fire dampers at penetrations of fire rated walls. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.
- J. Provide flexible connections immediately adjacent to equipment in ducts associated with fans and motorized equipment.
- K. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, regardless of whether dampers are specified as part of the diffuser, or grille and register assembly.
- L. Cross-break duct surfaces 19" thru 60". Use angle reinforcing for duct sizes over 60".
- M. All metal longitudinal seams shall be Pittsburgh Lock or other SMACNA listed seams. Button punch snaplock not acceptable.
- N. Turning vanes shall be riveted into place for square elbows. Use SMACNA large single vane design spaced 3-1/4" apart on the diagonal of the elbow. Continuous vane (full length of elbow) required where elbow centerline radius is less than 1-1/2 times duct width.

### **3.2 ACCESS DOORS**

- A. Install access doors in ductwork where provided to service concealed equipment.

- B. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, and elsewhere as indicated. Provide minimum 8 x 8 inch size for hand access, 24 x 24 inch size where feasible.

### **3.3 CENTERING OF AIR DEVICES**

- A. Install grilles, registers and outlets centered and/or spaced equally along walls, floors, or ceilings. Coordinate with Architectural Drawings.

### **3.4 AIRTIGHTNESS**

- A. Install the ductwork system airtight and lightproof.
- B. Connect round duct with sheet metal screws. Seal all joints.
- C. Clean all dirt, oil, and moisture before applying "Hardcast" duct sealant.
- D. Duct tape, caulk or glazing compounds are not acceptable.

### **3.5 DUCT SUPPORT**

- A. Rigidly support ductwork by metal straps from structural members of the building. Do not use furring members, plastered partitions, or other finished materials for support.
- B. Support as per SMACNA guidelines for ductwork low pressure standard.
- C. Suspend metal duct work, not exceeding 30" longest, side, at every joint, (not to exceed 10') using 1" x 18 gauge galvanized straps attached to bottom and side of duct. Support duct work, exceeding 30" longest side, at maximum 8' intervals using angles and rods.

### **3.6 PAINTING**

- A. In finished areas, paint flat black, visible sheetmetal surfaces behind grilles, registers, and diffusers.

**END OF SECTION**

## **SECTION 15900 - ELECTRIC CONTROLS**

### **PART 1 - GENERAL**

#### **1.1 WORK INCLUDED**

- A. Providing a complete system of gas heating and electric cooling controls for split air conditioning systems, heating systems and ventilation systems.
- B. Providing training and instruction to Owner.

#### **1.2 RELATED WORK**

- A. Section 15603 - Split Air Conditioning and Heating Equipment
- B. Section 15604 - Exhaust Fans
- C. Section 15738 – Ductless Split System Units

#### **1.3 QUALITY ASSURANCE**

- A. The control system shall be installed by experienced personnel regularly engaged in control system installation.
- B. Furnish control wiring diagrams, sequences of operation and submittal data on control devices.

### **PART 2 - PRODUCTS**

#### **2.1 EQUIPMENT - GENERAL**

- A. Voltage: Provide low voltage control components and system unless otherwise indicated.
- B. 115 V Wire: 12 gauge.
- C. 24 V Wire: 18 gauge or 16 gauge.
- D. Conduit: EMT.

#### **2.2 WALL MOUNTED THERMOSTATS**

- A. General:
  - 1. Refer to Sections 15603, 15604, 15605, 15782 and 15843.

#### **2.3 CONTROL SEQUENCES**

- A. Manufacturers standard unless otherwise indicated on the drawings.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION**

- A. Thermostats shall be located where shown on Drawings unless otherwise instructed by the Owner. Locate thermostat 48" above floor or as otherwise indicated.
- B. At completion of installation, regulate and adjust all thermostats and equipment specified in this Section.

- C. Provide the owner two sets of thermostat enclosure keys.

### **3.2 CONTROL WIRING**

- A. Route all line voltage control wire in conduit.
- B. Low Voltage (48 volt or less) control wiring.
  - 1. Route in conduit in exposed installations such as mechanical/electrical rooms and other unfinished installations.
  - 2. Route in conduit in walls, partitions, above plaster and gypboard ceilings and other inaccessible areas.
  - 3. Route in conduit where routed outdoors or other areas subject to damage.
  - 4. Route in conduit in ceiling spaces used as supply or return air plenums.
  - 5. Conduit is optional in above lay-in ceiling installations unless space is used as a supply or return air plenum.
- C. Refer to electrical specification for wiring requirements.
- D. Conduit and wire by controls contractor. Work to be completed by master electrician in the direct employ of the contractor.

### **3.3 TRAINING**

- A. Provide heating and cooling system training presentation for the Building Owner or someone designated by the Building Owner.
- B. Provide the Owner two sets of bound control system description wiring schematics.

**END OF SECTION**

## **SECTION 15990 - SYSTEM TESTING AND BALANCING**

### **PART 1 - GENERAL**

#### **1.1 WORK INCLUDED**

- A. Air systems.

#### **1.2 RELATED WORK**

- A. Section 15010 - Basic Mechanical Requirements
- B. Section 15603 - Split Air Conditioning and Heating Equipment
- C. Section 15604 - Exhaust Fans
- D. Section 15738 – Ductless Split System Units
- E. Section 15800 - Air Distribution

#### **1.3 QUALITY ASSURANCE**

- A. Tester's Qualifications: NEBB or AABC Certified or Registered Professional Engineer.
- B. Codes and Standards: NEBB Compliance.

#### **1.4 SUBMITTALS**

- A. Submit certified test reports:
  - 1. Air flow test and balance report to be provided and signed by individual conducting that test.
  - 2. System operating test to be provided and signed by the installing contractor.
- B. Include identification and types of instruments used, and their most recent calibration date with submission of final test report.
- C. Report format: Provide in soft cover, letter size, 3-ring binder, with index page and tabs, and cover identification. Include reduced scale drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.
- D. Report Forms: AABC National Standards for Total System Balance forms, forms prepared following ASHRAE 111 or NEBB forms.

### **PART 2 - PRODUCTS**

#### **NOT REQUIRED**

### **PART 3 - EXECUTION**

#### **3.1 GENERAL**

- A. Before commencing work, verify that systems are complete and operable.
- B. Report any defects, deficiencies, or abnormal conditions in mechanical systems which prevent system balance.
- C. Beginning of work means acceptance of existing conditions.

- D. Recorded data shall represent actually measured or observed condition.
- E. Permanently mark settings of valves, dampers, and other adjustment devices. Set and lock memory stops.
- F. Patch holes in insulation and housing that have been cut or drilled for test purposes, in manner recommended by original installer.
- G. Retest, adjust, and balance systems subsequent to significant system modifications, and resubmit test results.
- H. Prepare report of test results, including instrumentation calibration reports, in format recommended by applicable standards.

### **3.2 TEST OBJECTIVE**

- A. Test, adjust, and balance environmental systems and components, as indicated, in accordance with procedures outlined in applicable standards as described:
  - 1. Air measurements and balancing for air handlers, exhaust fans, air devices, air terminal boxes to obtain design flow.

### **3.3 TOLERANCES**

- A. Air Handling Systems: Adjust airflow to within plus or minus 5 percent of design.
- B. Air Outlets and Inlets: Adjust to within plus or minus 10 percent of design.

### **3.4 PROCEDURE**

- A. Adjust air handling and distribution systems to provide required or design supply, return, outside air and exhaust air quantities.
- B. Measure air quantities at air inlets and outlets.
- C. Use volume control devices to regulate air quantities only to extent that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers.
- D. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.
- E. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Allow for 50 percent loading of filters.
- F. Adjust automatic outside air, return air, and exhaust air dampers for design conditions.
- G. Measure temperature conditions across outside air, return air, and exhaust air dampers to check leakage.

**END OF SECTION**

I hereby certify that the mechanical portions of the work indicated in Division 15 of these plans and specifications, except as otherwise indicated by other registered professionals, have been prepared by me or under my direct supervision. I further certify that to the best of my knowledge this portion of the plans and specifications are as required by law and in compliance with the *Arkansas Fire Prevention Code* for the State of Arkansas and with the *Arkansas Code for Energy Conservation*.

---

James Primm P.E.

Date

Architectural Engineering Consultants LLC  
P.O. Box 94798  
North Little Rock, Arkansas 72190







**SLOAN HENDRIX SCHOOL CAMPUS**  
**A NEW K-4 CLASSROOM BUILDING**  
**IMBODEN, ARKANSAS**  
**MECHANICAL SPECIFICATIONS**  
**AEC Project #: 0803.16.002**

DECEMBER 09, 2016

15010 - BASIC MECHANICAL REQUIREMENTS  
15060 - PIPE AND PIPE FITTINGS  
15090 - MECHANICAL SUPPORTING SYSTEMS  
15120 - VALVES  
15170 - MOTORS  
15190 - MECHANICAL IDENTIFICATION  
15250 - MECHANICAL INSULATION SYSTEMS  
15350 – NATURAL GAS PIPING SYSTEM  
15401 - DOMESTIC WATER SYSTEM  
15405 - DRAINAGE, SANITARY WASTE AND VENT SYSTEMS  
15450 - PLUMBING FIXTURES AND EQUIPMENT  
15460 - BACKFLOW PREVENTER  
15603 - SPLIT AIR CONDITIONING AND HEATING EQUIPMENT  
15604 - EXHAUST FANS  
15651 - REFRIGERANT PIPING  
15738 – DUCTLESS SPLIT SYSTEM UNITS  
15800 - AIR DISTRIBUTION  
15900 - ELECTRIC CONTROLS  
15990 - TESTING, ADJUSTING, AND BALANCING



## SECTION 16050

### ELECTRICAL GENERAL PROVISIONS

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Except as modified in this section, General Conditions, Supplementary Conditions, applicable provisions of Division 1, General Requirements, and other provisions and requirements of the Contract Documents apply to work of Division 16.
- B. Each section included in Division 16 is incomplete without the provisions stated herein.

##### 1.02 RELATED SECTIONS

- A. Section 09910 - Paints.
- B. Section 16080 - Electrical Testing.

##### 1.03 SYSTEM DESCRIPTION

- A. Provide a complete operational electrical system. Route conduit and install equipment to avoid conflicts with other trades and to enhance maintainability of system.

##### 1.04 REFERENCES

- A. ASTM D 698 - Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/cu. ft. (600kN-m/cu. m.)).
- B. ASTM E 814 - Fire Tests of Through-Penetration Fire Stops.
- C. IEEE C2 - National Electrical Safety Code.
- D. NFPA 70 - National Electrical Code.
- E. UL 1479 - Fire Tests of Through-Penetration Firestops.

##### 1.05 DEFINITIONS

- A. Provide: Where the word "provide" is used, the word is understood to mean "the Contractor shall furnish and install" the equipment, tests, inspections, etc. referenced.
- B. Related Work: The sections referenced under RELATED SECTIONS shall be understood to include provisions which directly affect the work being specified in the section where RELATED SECTIONS occurs.
- C. Concealed: Where the word "concealed" is used in conjunction with raceways, equipment, and the like, the word shall be understood to mean hidden from sight as in chases, furred spaces, or suspended ceilings.
- D. Exposed: Where the word "exposed" is used, the word shall be understood to mean open to view.

## 1.06 REGULATORY REQUIREMENTS

- A. Perform work in accordance with NFPA 70 and the editions, revisions, amendments, or supplements of applicable statutes, ordinances, codes, or regulations of Federal, State, and Local Authorities having jurisdiction in effect on the date bids are received.
- B. Where approval standards have been established by OSHA, UL, ASME, AGA, AMCA, ANSI, ARI, NFPA, State Fire Insurance Regulatory Body, and Insurer, follow these standards whether or not indicated on the Drawings and Specifications. Include cost of work required to comply with requirements of these authorities in the original proposal. Comply with IEEE C2 where applicable.
- C. Requirements in reference specifications and standards are minimum for equipment, material, and work. In instances where capacities, size, or other features of equipment, devices, or materials exceed these minimums, meet specified or scheduled capacities.
- D. Resolve code interpretations discovered in Contract Documents with A/E prior to Contract award. After Contract award, make corrections or additions necessary for compliance with applicable codes.
- E. Arrange with local and state authorities and utility companies for permits, fees, and service connections, verifying locations and arrangement, and pay charges including inspections.

## 1.07 CONTRACT DRAWINGS

- A. Drawings are generally diagrammatic and are intended to encompass a system that will not interfere with the structural and architectural design of the building. Coordinate work to avoid interferences between conduit, equipment, architectural, and structural work.
- B. Coordinate with architectural features, trim and millwork details, and install equipment in cabinets or other special areas as directed by A/E.
- C. Drawings are based on equipment specified. Make adjustments, modifications, or changes required, due to use of other equipment.

## 1.08 PROJECT/SITE CONDITIONS

- A. Site Visitation: Visit the site of the proposed construction to become thoroughly familiar with details of work and working conditions, verify dimensions in the field, and advise A/E of discrepancies before performing work.
- B. Space Requirements:
  - 1. Consider space limitations imposed by contiguous work in selection and location of equipment and material. Do not provide equipment or material which is not suitable in this respect.
  - 2. Make changes in equipment location of up to 5 feet, to allow for field conditions prior to actual installation, and as directed by A/E.
  - 3. Conceal conduit in finished areas. Conduit may be exposed in mechanical rooms, electrical rooms and where specifically allowed on Drawings. Route conduit through the building without interfering with other contractors' equipment or construction.
  - 4. Provide maximum possible clear height underneath conduit. Install conduit as high as possible.
  - 5. Install equipment requiring service so that it is easily accessible.

6. Compare the equipment sizes with the space allotted for installation before installation and make written notice of possible conflict. Disassemble large equipment to permit installation through normal room openings when required. Should written notice not be made in a timely manner, make adjustments and modifications necessary without additional compensation.
7. Timely place equipment too large to fit through finished openings, and stairways.

C. Site Obstructions:

1. Drawings indicate certain information pertaining to surface and subsurface obstructions which has been taken from available drawings. Such information is not guaranteed as to accuracy of location or completeness of information.
2. Verify with A/E, utility companies, municipalities, and other interested parties that available information has been provided before cutting or trenching operations are begun. Verify locations given.
3. Alter routing of new work should obstruction be encountered, whether or not shown on Drawings. Reroute existing lines, remove obstruction where permitted, or otherwise perform whatever work is necessary to satisfy the purpose of the new work and leave existing services and structures in a satisfactory and serviceable condition.
4. Assume total responsibility for and repair damage to existing utilities or construction, whether or not such existing facilities are shown. Repair the lines, if damaged.

D. Cutting and Patching:

1. Submit written request to A/E in advance of cutting or alterations.
2. Execute cutting and demolition by methods which will prevent damages to other work and will provide proper surfaces to receive installation of repairs.
3. Restore work which has been cut or removed; install new products complying with specified products, functions, tolerances and finishes as specified.
4. Escutcheon Plates:
  - a. Heavy chrome-plated or nickel-plated escutcheon plates for penetrations of finished surface.
  - b. Product: B&C No. 10 with concealed hinges.
5. Fit work airtight to conduit, sleeves, and other penetrations through surfaces. For fire-rated penetrations, provide assemblies in accordance with UL 1479 and ASTM E 814 utilizing products and materials equal to rating of surfaces penetrated.

## 1.09 MATERIALS AND WORKMANSHIP

- A. Provide new materials and equipment of a domestic manufacturer by those regularly engaged in the production and manufacture of specified materials and equipment. Where UL or other agency has established standards for materials, provide materials which are listed and labeled accordingly. The commercially standard items of equipment and the specific names mentioned herein are intended to identify standards of quality and performance necessary for the proper functioning of the work.
- B. Work shall be performed by workmen skilled in the trade required for the work. Install materials and equipment to present a neat appearance when completed and in accordance with the approved recommendations of the manufacturer and in accordance with Contract Documents.
- C. Provide labor, materials, apparatus, and appliances essential to the complete functioning of the systems described or indicated herein, or which may be reasonably implied as essential whether mentioned in the Contract Documents or not.
- D. Make written request to A/E for supplementary instructions in cases of doubt as to Work intended or in event of need for explanation thereof.

- E. Performance and material requirements scheduled or specified are minimum standards acceptable. The right to judge the quality of equipment that deviates from the Contract Documents remains solely with A/E.

#### 1.10 DELIVERY, STORAGE AND HANDLING

- A. Follow the manufacturer's directions completely in the delivery, storage, and handling of equipment and materials.
- B. Store equipment in a clean, dry place, protected from other construction. While stored, maintain factory wrappings or tightly cover and protect equipment against dirt, water, construction debris, chemical, physical or weather damage, traffic and theft.
- C. Adequately brace and package equipment to prevent breakage and distortion while in transit.

#### 1.11 EXCAVATION

- A. Trenching:
  - 1. Perform excavation of every description and of whatever substance encountered to depths indicated or specified. Pile materials suitable for backfilling a sufficient distance from banks of trenches to prevent slides or cave-ins. Comply with OSHA requirements for excavation, trenching, and shoring. Keep surface drainage of adjoining areas unobstructed. Waste excavated materials not required or satisfactory for backfill. Remove water by pumping or other approved methods, discharge at a safe distance from the excavation.
  - 2. Provide trenches of necessary width for proper laying of conduit and comply with latest publication of OSHA 2226 Excavating and Trenching Operations. Coordinate trench excavation with pipe installation to avoid open trenches for prolonged periods. Accurately grade to bottoms of trenches to provide uniform bearing and support for each section of conduit on undisturbed soil or the required thickness of bedding material at every point along its entire length.
  - 3. Provide minimum 12 inches between outer surfaces and embankment or shoring which may be used, when excavating for manholes, pull boxes, and similar structures. Remove unstable soil that is incapable of supporting the structure in the bottom of the excavation to the depth necessary to obtain design bearing.
  - 4. Material to be excavated is "unclassified." No adjustment in the contract price will be made on account of the presence or absence of rock, shale, masonry, or other materials.
  - 5. Protect existing utility lines that are indicated or the locations of which are made known prior to excavating and trenching and that are to be retained. Protect utility lines constructed during excavating and trenching operations, from damage during excavating, trenching and backfilling; if damaged, repair lines as directed by utilities, Owner, and A/E. Issue notices when utility lines that are to be removed are encountered within the area of operations in ample time for the necessary measures to be taken to prevent interruption of the service.
  - 6. Provide trenches for utilities of a depth that will provide the following minimum depths of cover from existing grade or from indicated finish grades, whichever is lower:
    - a. 2-Foot Minimum Cover: Raceways for secondary conductors.
- B. Backfilling:
  - 1. Backfill trenches after conduit, fittings, and joints have been tested and approved.

2. Backfill trenches with sand to provide 6 inches sand below conduit and 12 inches sand cover. Backfill remainder of trenches with satisfactory materials consisting of earth, loam, sandy clay, sand, and gravel, or soft shale, free from large clods of earth and stones not over 1-1/2 inch in size, and deposit in 9-inch maximum layers, loose depth as indicated or specified. Take care not to damage utility lines. Deposit the remainder of backfill materials in the trench in 1 foot maximum layers, and compact by mechanical means. Re-open trenches and excavation pits improperly backfilled or where settlement occurs to the depth required to obtain the specified compaction, then refill and compact with the surface restored to the required grade and compaction.
3. Where trenches cross streets, driveways, building slabs, or other pavements, backfill trench utility line with sand backfill material in 6 inch layers. Moisten each layer and compact to 95 percent of the maximum soil density as determined by ASTM D 698. Accomplish backfilling in such a manner as to permit the rolling and compaction of the filled trench with the adjoining material to provide the required bearing value so that paving of the area can proceed immediately after backfilling is complete.

#### 1.12 PAINTING

- A. Comply with Section 09910 for painting.
- B. Properly prepare surfaces to receive paint. Prime prepared surfaces and finish with two coats of exterior oil base paint. Verify primer and paint are rated for application.
- C. Repair damage to factory painted finishes.
- D. Remove splattered and incidental paint from electrical equipment.

#### 1.13 NOISE AND VIBRATION

- A. Provide the entire operating system and its component items of equipment free of objectionable vibration or noises. Statically and dynamically balance rotating equipment, and mount or fasten so that no equipment vibration will be transmitted to the building. If objectionable noise or vibration is produced or transmitted to or through the building structure by equipment, ballasts, or other parts of the work, rectify such condition at no additional compensation.

#### 1.14 OPERATING INSTRUCTIONS

- A. Provide services of authorized representatives of manufacturer to ensure that the equipment is installed according to the manufacturer's recommendations, is operating properly, and to instruct Owner's operating personnel during start-up and operating tests of complete electrical system. Notify A/E seven days prior to beginning equipment start-up.
- B. Certify in writing that these services have been performed.
- C. Perform tests as specified in Section 16080.

#### 1.15 SERVICE

- A. Inspect, clean, and service light fixtures; replace incandescent lamps; and replace fluorescent or HID lamps if utilized for construction lighting immediately prior to final acceptance of project.

- B. Clean and polish fixtures, equipment, and materials thoroughly, and return to "as new" condition.
- C. Remove excess material and debris. Place electrical systems in complete working order before request for final review. Broom clean areas.

#### 1.16 PROJECT RECORD DOCUMENTS

- A. Maintain a set of Contract Documents at the job site for the purpose of recording final size, location, and interrelation of work under this Division. Mark this set of drawings as the job progresses to indicate "as-built" location of equipment, including concealed conduit and equipment.
- B. Obtain mylar Drawings from A/E, at Contractor's expense, and record as-built conditions.
- C. Clearly and accurately delineate the work by dimensions on the mylar record drawings as installed, with equipment locations identified by at least two dimensions to permanent structures.
- D. final mylar record drawings shall be marked "AS-BUILT," and signed and dated by Contractor.
- E. Provide certified "AS-BUILT" drawings at the conclusion of project.

#### 1.17 FINAL REVIEW

- A. Obtain necessary Certificates of Occupancy from local authorities.
- B. Submit final approved operation and maintenance manuals including approved submittals, test reports, and "AS-BUILT" drawings prior to requesting final payment. Delivery of operation and maintenance manuals is a condition of final acceptance.

#### 1.18 GUARANTEE

- A. Guarantee materials, parts and labor for Work for one year from the date of issuance of occupancy permit. During that period make good faults or imperfections that may arise due to defects or omissions in materials or workmanship with no additional compensation and as directed by A/E.

### PART 2 PRODUCTS

Not used.

### PART 3 EXECUTION

Not used.

END OF SECTION



## SECTION 16060

### GROUNDING AND BONDING SYSTEMS

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Grounding electrodes and conductors; equipment grounding conductors; bonding methods and materials, including:
  - 1. Power system grounding.
  - 2. Communication system grounding.
  - 3. Electrical equipment and raceway grounding and bonding.
  - 4. Structural steel grounding.
  - 5. Miscellaneous system grounding.

##### 1.02 RELATED SECTIONS

- A. Section 16120 - Wire and Cable.
- B. Section 16132 - Conduit.

##### 1.03 REFERENCES

- A. NECA - Standard of Installation.
- B. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- C. NFPA 70 - National Electrical Code.

##### 1.04 SYSTEM DESCRIPTION

- A. Utilize existing grounding system to derive project equipment grounding requirements.

##### 1.05 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

#### PART 2 PRODUCTS

##### 2.01 MATERIALS

- A. Rod Electrodes: Copper-encased steel, 3/4-inch diameter, minimum length 10 feet.
- B. Mechanical Connectors:
  - 1. Manufacturers:
    - a. Burndy.
    - b. O.Z. Gedney.
  - 2. Heavy-duty, bolt-type, copper alloy or bronze for grounding and bonding applications, in configurations required for particular installation.
- C. Exothermic Connections:
  - 1. Type for underground and structural steel; Cadweld.
  - 2. Exothermic materials, accessories, and tools for preparing and making permanent field connections between grounding system components.

- D. Wire:
  - 1. Stranded, copper cable.
  - 2. Foundation Electrodes: 2/0 AWG.
  - 3. Grounding Electrode Conductor: Size to meet NFPA 70 requirements.

## PART 3 EXECUTION

### 3.01 GROUNDING AND BONDING INSTALLATION

- A. Provide bonding to meet Regulatory Requirements.
- B. Locate and install anchors, fasteners, and supports in accordance with NECA "Standard of Installation".
- C. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.
- D. Do not use spring steel clips and clamps.
- E. Do not use powder-actuated anchors.
- F. Do not drill or cut structural members.

### 3.02 EQUIPMENT GROUND

- A. Use existing ground system to derive equipment grounding conductors.
- B. Provide a separate, insulated equipment grounding conductor from the main service ground to each main switchboard and in all feeders and branch circuits. Terminate each end on a grounding lug, bus, or bushing. Do not use conduit as grounding conductor.
- C. Provide OZ Type "BJ" bonding jumper at all expansion joints, points of electrical discontinuity or connections in conduit where firm mechanical bond is not possible, such as flexible connections, insulating couplings, etc.
- D. Ground each lighting and power panelboard by connecting the grounding conductor to the grounding stud.
- E. Ground each secondary dry-type transformer to the ground bus of the primary side panelboard. Provide a bonding jumper between the ground stud and the neutral. Ground transformer ground stud to ground loop if a ground loop is installed or the nearest structural steel member.
- F. Bond every item of equipment served by the electrical system to the building equipment ground system. This includes switchboards, panelboards, disconnect switches, receptacles, controls, fans, air handling units, pumps, and flexible duct connections.

### 3.03 COMMUNICATIONS GROUND

- A. Provide communications system grounding conductor at point of service entrance and connect to ground loop.
- B. Use minimum No. 6 AWG copper conductor for communications service grounding conductor. Leave 10-foot slack conductor at terminal board.

3.04 FIELD QUALITY CONTROL

- A. Inspect and test in accordance with NETA ATS, except Section 4.
- B. Grounding and Bonding: Perform inspections and tests listed in NETA ATS, Section 7.13.

END OF SECTION



**SECTION 16070**  
**SUPPORTING DEVICES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Supporting devices, including:
  - 1. Conduit and equipment supports.
  - 2. Fastening hardware.

**1.02 COORDINATION**

- A. Coordinate size, shape and location of concrete pads with section on cast-in-place concrete.

**1.03 QUALITY ASSURANCE**

- A. Provide support systems adequate for weight of equipment and conduit, including wiring which they carry.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. B-Line.
- B. Kindorf.
- C. Unistrut.

**2.02 MATERIAL**

- A. Support Channel: Galvanized or painted steel.
- B. Hardware: Galvanized or painted steel.
- C. Spring steel clips.

**PART 3 EXECUTION**

**3.01 INSTALLATION**

- A. Fasten hanger rods, conduit clamps, and outlet and junction boxes to building structure using expansion anchors, beam clamps or bolts.
- B. Use toggle bolts or hollow wall fasteners in hollow masonry, plaster, or gypsum board partitions and walls; expansion anchors or preset inserts in solid masonry walls; sheet metal screws in sheet metal studs and wood screws in wood construction.
- C. Do not fasten supports to piping, ductwork, mechanical equipment, or conduit.
- D. Do not use powder-actuated anchors on new concrete structure.
- E. Do not drill structural steel members.

- F. Fabricate supports from structural steel or steel channel, rigidly welded or bolted to present a neat appearance. Use hexagon head bolts with spring lock washers under all nuts.
- G. Provide concrete pads and equipment bases for all outdoor equipment on grade, floor mounted equipment, areas with floors below grade, penthouse equipment rooms and where shown on Drawings.
- H. Install surface-mounted cabinets and panelboards with minimum of four anchors.
- I. Bridge studs top and bottom with channels to support flush-mounted cabinets and panelboards in stud walls.
- J. Do not support conduit from ceiling wire supports.
- K. Do not use spring steel clips and clamps or support conduits by individual hanger wires.
- L. Where multiple runs of conduit can be run grouped together, run conduit in racks supported from the building structure. Provide for future use of rack by properly planning routing of conduits in and through restricted areas such as through walls and around mechanical and electrical equipment.
- M. Use spring steel clips with EMT for individual branch circuits and device boxes in drywall construction.

END OF SECTION

## SECTION 16075

### ELECTRICAL IDENTIFICATION

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Items for identification of electrical products installed under Division 16.

##### 1.02 SUBMITTALS

- A. Submit product data.

#### PART 2 PRODUCTS

##### 2.01 MANUFACTURERS

- A. W.H. Brady Co.
- B. Carlton Industries, Inc.
- C. Seton Nameplate Co.

##### 2.02 MATERIALS

- A. Nameplates: Provide engraved three-layer laminated plastic nameplates with white letters on a black background.
- B. Wire and Cable Markers: Provide vinyl cloth markers with split sleeve or tubing type, except in manholes provide stainless steel with plastic ties.
- C. Underground Warning Tape:
  - 1. Manufactured polyethylene material and unaffected by acids and alkalies.
  - 2. 3.5 mils thick and 6 inches wide.
  - 3. Tensile strength of 1,750 pounds per square inch lengthwise.
  - 4. Printing on tape shall include an identification note BURIED ELECTRIC LINE, and a caution note CAUTION. Repeat identification and caution notes over full length of tape. Provide with black letters on a red background conforming to APWA recommendations.
- D. Panelboard Directories: Provide typed circuit directory for each panelboard. Mount circuit directory in a permanent, clear Lexan card holder located on inside of door on panelboard.
- E. Conduit Markers: Flexible vinyl film with pressure sensitive adhesive backing and printed markings.
  - 1. Include following identifying tiles on orange background except as noted.
    - a. Typical:
    - b. Type: Example - AC 60 hertz.
    - c. Load: Example - Lighting and power.
    - d. Voltage: Example - 480 VAC/3 phase.
    - e. As Noted:
    - f. If more than one type of power is available in a conduit, mark with title "Electrical" on orange background.

- g. Limit switch controls, air conditioning controls and diffuser controls with title "Control" on orange background.
- 2. Conduit that Contains Protective Communication Systems: Provide exact content and title on blue background; install and locate as specified for conduit.
  - a. Conduit Markers and Letter Size:

Outside Diameter of Conduit (inches)	Width of Color Band	Size of Letter and Numerals
1/2 to 1-1/4	8	1/2
1-1/2 to 2	8	3/4
2-1/4 to 3-1/4	10	1
3-1/2 & Larger	12	1-1/4

### PART 3 EXECUTION

#### 3.01 INSTALLATION

- A. Degrease and clean surfaces to receive nameplates.
- B. Install nameplates parallel to equipment lines.
- C. Secure nameplates to equipment fronts using screws or rivets. Secure nameplate to inside face of recessed panelboard doors in finished locations.
- D. Embossed tape will not be acceptable.
- E. Provide underground tape at electrical installations.

#### 3.02 WIRE AND CABLE LABELING

- A. Provide wire markers on each conductor in splice boxes, pull boxes, and at first load connection on homerun. Identify with branch circuit or feeder number for power and lighting circuits, and with control wire number as indicated on equipment manufacturer's shop drawings for control wiring.
- B. Identify branch circuit or feeder number for power and lighting circuits on cover of pull and junction boxes with indelible marker.

#### 3.03 EQUIPMENT LABELING

- A. Provide nameplates to identify all electrical distribution and control equipment.
- B. Engraved, Laminated Plastic Nameplates: 1/4-inch letters, equipment designation; 1/8-inch letters, source circuit number. Provide for:
  - 1. Panelboards.
  - 2. Enclosed switches, starters, circuit breakers and contactors. Provide neatly typed label inside each motor starter enclosure door identifying motor served, nameplate horsepower, full load amperes, design letter, service factor, and voltage/phase rating. Provide phenolic nameplate on cover exterior to indicate motor served.



3. Transformers if identified on Drawings.
4. Identify junction boxes by circuit number with legible permanent ink marker.

#### PART 4 BOX AND COVER COLOR CODING

##### 4.01 FIRE ALARM WIRING: RED.

- A. Emergency System Wiring: Yellow enamel.

##### 4.02 CONDUIT MARKERS

- A. Location of Identifying Markers: At each end of conduit run and at intermediate points 50 feet maximum on center.

END OF SECTION



**SECTION 16120**  
**WIRE AND CABLE**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Wire and cable, including:
  - 1. Building wire.
  - 2. Cable.
  - 3. Wiring connections and terminations.

**1.02 RELATED SECTIONS**

- A. Section 16060 - Grounding and Bonding Systems.
- B. Section 16130 - Boxes.
- C. Section 16132 - Conduit.
- D. Section 16140 - Wiring Devices.

**1.03 REFERENCES**

- A. NEMA WC 3 - Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
- B. NEMA WC 5 - Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Wire and Cable:
  - 1. Westpenn
  - 2. Belden.
  - 3. Southwire.
  - 4. Triangle PWC, Inc.
- B. Connectors:
  - 1. Burndy.
  - 2. T & B.
  - 3. 3M.
- C. Power Distribution Blocks:
  - 1. IlSCO.
  - 2. Square D.

**PART 3 BUILDING WIRE**

**3.01 THERMOPLASTIC-INSULATED BUILDING WIRE: NEMA WC 5.**

- A. Rubber-Insulated Building Wire: NEMA WC 3.

- B. Feeders and Branch Circuits Larger Than No. 6 AWG: Copper, stranded conductor, 600 volt insulation, THW, THHN/THWN, XHHW, RHW.
- C. Feeders and Branch Circuits No. 6 AWG and Smaller: Copper conductor, 600 volt insulation, THW, THHN/THWN; smaller than No. 8 AWG, solid conductor.
- D. Control Circuits: Copper, stranded conductor 600 volt insulation, THW, THHN/THWN.
- E. Plenum Rated Cable: Provide plenum rated cable where cable is installed exposed in plenums.
- F. Wiring types BX will not be acceptable for use on this project.
- G. MC cable may be used for fixture whips and short runs between devices mounted in walls. MC Cable may not be used for homeruns.

#### PART 4 WIRING CONNECTIONS AND SPLICES

##### 4.01 CONNECT AND SPLICE WIRE NO. 8 AWG AND SMALLER WITH SELF-INSULATING, WIRE NUT CONNECTORS.

- A. Terminate and splice all No. 6 AWG and larger copper conductors, except for load side lugs on Class I and II switchboards, panelboards, motor control centers, fusible switches, circuit breakers, transformers and individual motor controllers with high conductivity, wrought copper, color-keyed compression connector similar to T & B Series 54100 for terminal connection; Series 54500 for two-way copper-to-copper splices; and Series 54700 for tapping and pigtail copper conductors.
- B. Motor Connections: 3M Series 5300-5304.
- C. Set screw type connectors are only acceptable on the load side lugs of Class I and II switchboards, panelboards, circuit breakers, fusible switches and on individual motor controllers.
- D. Where three or more conductors larger than No. 8 AWG are installed in wiring gutter, utilize a screw-type power distribution block. Utilize split-bolt mechanical connector, filled and taped for smooth joint, only where specifically requested by Contractor and approved by A/E.

#### PART 5 EXECUTION

##### 5.01 GENERAL WIRING METHODS

- A. Use no wire smaller than No. 12 AWG for power and lighting circuits, and no smaller than No. 14 AWG for control wiring. Provide minimum of No. 12 AWG for all switch legs. Provide neutral conductor of the same size as the phase conductors to which it is associated.
- B. Use No. 10 AWG conductor minimum for 20 ampere, 120 volt branch circuits longer than 100 feet, and for 20 ampere, 277 volt branch circuits longer than 200 feet.
- C. Provide homerun conductors of continuous length without joint or splice from overcurrent device to first outlet.
- D. Provide main service and feeder conductors of continuous length without joint or splice for their entire length.

- E. Install wiring in conduit, unless indicated otherwise.
- F. Neatly train and lace wiring inside boxes, panelboards, switchgear, motor control centers, wiring gutters, and other equipment using Thomas & Betts "Ty-Wraps."
- G. Provide equal conductor lengths for all parallel circuits.
- H. Provide individual neutral for all branch circuits.
- I. Drawings indicate proposed circuiting only, and do not indicate every conductor unless intent is unclear and further clarification is required. Provide the necessary travelers for all three-way and four-way switches.
- J. Tag each circuit in an outlet box where two or more circuits run to a single outlet as a guide for the fixture hanger in making connections.

#### 5.02 WIRING INSTALLATION IN RACEWAYS

- A. Pull conductors into raceway at the same time. Use UL listed wire pulling lubricant. Do not exceed manufacturer's recommended tension.
- B. Install wire in raceway after interior of building has been physically protected from the weather and all mechanical work likely to injure conductors has been completed.
- C. Completely and thoroughly swab raceway system before installing conductors.
- D. Remove and discard conductors cut too short or installed in wrong raceway. Do not install conductors which have been removed from a raceway.
- E. Do not install conductors in conduit which contains wires already in place.

#### 5.03 WIRING CONNECTIONS AND TERMINATIONS

- A. Make taps and splices in accessible junction or outlet boxes only.
- B. Thoroughly clean wires before installing lugs and connectors.
- C. Make splices, taps and terminations to carry full ampacity of conductors without perceptible temperature rise.
- D. Provide joints in branch circuits only where such circuits divide. Where circuits divide, provide one through circuit to which the branch is spliced from the circuit. Do not leave joints in branch circuits for fixture hanger to make. Make all taps and splices with approved type compression connector.
- E. Terminate spare conductors with electrical tape.
- F. Identify and label all conductor terminations as specified in electrical identification.
- G. Properly terminate indicated conductors in equipment furnished and provide properly sized lugs.
- H. See plans for additional information and requirements.

#### 5.04 COLOR CODING

- A. Color code distribution systems as follows:

1. 120/208V System:

Phase	Color
A	Black
B	Red
C	Blue
N	White
G	Green

1. 277/480V System:

Phase	Color
A	Brown
B	Orange
C	Yellow
N	Gray/White
G	Green

- B. For areas where local authority color coding differs from that specified, contact A/E for instructions.
- C. Provide color coding throughout the full length of all wire No. 6 and smaller. Identification by permanent paint bands or tags at the outlets will be acceptable for wire sizes larger than No. 6. Provide the same color and shade of color throughout the project.

5.05 FIELD QUALITY CONTROL

- A. Inspect wire and cable for physical damage and proper connection.
- B. Torque test conductor connections and terminations to manufacturer's recommended values.
- C. Provide insulation tests for all conductors size #2 AWG or larger.

END OF SECTION

## **SECTION 16130**

### **BOXES**

#### **PART 1 - GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Wall and ceiling outlet boxes, floor boxes, and pull and junction boxes.

##### **1.02 RELATED SECTIONS**

- A. Section 16070 - Supporting Devices.
- B. Section 16075 - Electrical Identification.
- C. Section 16120 - Wire and Cable.
- D. Section 16132 - Conduit.
- E. Section 16140 - Wiring Devices.

##### **1.03 REFERENCES**

- A. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.
- B. NEMA 250 - Enclosures for Electrical Equipment (1,000 Volts Maximum).
- C. NFPA 70 - National Electrical Code.

##### **1.04 PRODUCTS**

###### **A. OUTLET BOXES**

1. Provide galvanized or cadmium-plated pressed steel outlet boxes suitable for the conditions of each outlet. Provide multi-gang outlets of single box design; sectional boxes will not be acceptable.
2. Provide deep type cast metal outlet boxes located in damp locations exposed to weather or exposed areas subject to damage, complete with gasketed cover and threaded hubs.
3. Provide outlet boxes of sufficient volume to accommodate the number of conductors entering the box in accordance with the requirements of NFPA 70, and not less than 1-1/2 inch deep unless shallower boxes are required by structural conditions and are especially approved by A/E.
4. Provide PVC type outlet boxes only in corrosive areas rated as NEMA 13X.
5. Provide 4-inch octagonal ceiling outlet boxes.

##### **1.05 FLOOR BOXES**

- A. Provide floor boxes in accordance with Section 16141 . Floor Boxes.

##### **1.06 PULL AND JUNCTION BOXES**

- A. Provide galvanized sheet metal boxes conforming to NEMA OS 1. Provide hinged enclosures for any box larger than 12 inches in any dimension.
- B. Provide cast metal boxes for outdoor and wet locations conforming to NEMA 250; Type 4 and Type 6, flat-flanged, surface-mounted junction box, UL listed as raintight with cover and ground flange, neoprene gasket, and stainless steel cover screws.

- C. Provide separate pull boxes and junction boxes for electric power, control, and communication systems.

## PART 2 EXECUTION

### 2.01 COORDINATION OF BOX LOCATIONS

- A. Provide electrical boxes as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections, and code compliance.
- B. Electrical box locations shown on Drawings are approximate unless dimensioned. Verify with A/E the location of floor boxes and outlets in offices and work areas prior to rough-in.
- C. Locate and install boxes to allow access. Provide access doors where installation is inaccessible. Coordinate locations and sizes of required access doors with those specified in Division 15 - Mechanical.
- D. Locate and install to maintain headroom and to present a neat appearance.

### 2.02 OUTLET BOX INSTALLATION

- A. Do not install boxes back-to-back in walls. Provide minimum 6-inch separation, except provide minimum 24-inch separation in acoustic-rated walls.
- B. Locate boxes in masonry walls to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat openings for boxes.
- C. Provide knockout closures for unused openings. Provide blank plates for all junction boxes.
- D. Securely fasten boxes to the building structure, independent of the conduit, except for splice boxes that are connected to two metal conduits, both supported within 12 inches of box.
- E. Provide access to all boxes.
- F. Use multiple-gang boxes where more than one device are mounted together; do not use sectional boxes. Provide barriers to separate wiring of different voltage systems.
- G. Install boxes in walls without damaging wall insulation.
- H. Coordinate with A/E for mounting heights and locations of outlets mounted above counters, benches, and backsplashes.
- I. Set boxes installed in concealed locations flush with the finish surfaces, and provide with the proper type extension rings and/or covers where required.
- J. Position outlets to locate luminaires as shown on reflected ceiling plans.
- K. In inaccessible ceiling areas, do not install junction boxes which are accessible only through luminaire ceiling opening.
- L. Provide recessed outlet boxes in finished areas; secure boxes to interior wall and partition studs, accurately positioning to allow for surface finish thickness. Use adjustable steel channel fasteners for flush ceiling outlet boxes.



- M. Align wall-mounted outlet boxes for switches, thermostats, and similar devices. Install all grouped device locations neat and symmetrical. Coordinate with A/E before rough-in.

## 2.03 FLOOR BOX INSTALLATION

- A. Install floor boxes in accordance with Section 16141 . Floor Boxes.

## 2.04 PULL AND JUNCTION BOX INSTALLATION

- A. Locate pull boxes and junction boxes above accessible ceilings or in unfinished areas.
- B. Support pull and junction boxes independent of conduit.
- C. Provide pull boxes in feeder circuits as required but at least every 150 feet in straight runs.
- D. Identify all junction boxes by circuit number on cover with legible permanent ink marker.
- E. Provide weatherproof pull boxes or junction boxes where installed outdoors with watertight gasketed covers fastened by means of corrosion resistant screws.

END OF SECTION



## **SECTION 16132**

### **CONDUIT**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Raceway systems, including:
  - 1. Rigid metal conduit and fittings.
  - 2. Intermediate metal conduit and fittings.
  - 3. Electrical metallic tubing and fittings.
  - 4. Flexible metal conduit and fittings.
  - 5. Liquidtight flexible metal conduit and fittings.
  - 6. Nonmetallic conduit and fittings.

##### **1.02 RELATED SECTIONS**

- A. Section 03300 - Cast-in-Place Concrete.
- B. Section 16070 - Supporting Devices.
- C. Section 16120 - Wire and Cable.
- D. Section 16130 - Boxes.

##### **1.03 REFERENCES**

- A. ANSI C80.1 - Rigid Steel Conduit, Zinc-Coated.
- B. ANSI C80.3 - Electrical Metallic Tubing, Zinc-Coated.
- C. NEMA FB 1 - Fittings and Supports for Conduit and Cable Assemblies.
- D. NEMA RN 1 - PVC Externally-Coated Galvanized Rigid Steel Conduit and Electrical Metallic Tubing.
- E. NEMA TC 2 - Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80).
- F. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing.

#### **PART 2 PRODUCTS**

##### **2.01 MANUFACTURERS**

- A. Rigid Metal Conduit, Intermediate Metal Conduit, Electrical Metallic Tubing and Fittings:
  - 1. Allied Tube and Conduit Corporation.
  - 2. Triangle PWC, Inc.
  - 3. Wheatland Tube Co.
- B. Flexible Conduit and Fittings:
  - 1. Anamet, Inc.
  - 2. Electri-Flex Co.
  - 3. Triangle PWC, Inc.
- C. Nonmetallic Conduit and Fittings:

1. Can-Tex Industries.
2. Carlon.
3. Certain-Teed.

## 2.02 MATERIALS

- A. Rigid Metal Conduit and Fittings:
  1. Rigid Steel Conduit: ANSI C80.1; hot-dip galvanized.
  2. PVC Externally Coated Conduit: NEMA RN 1, ETL verified; rigid steel conduit with external PVC coating and internal galvanized surface. Use Perma-Cote, Plasti-bond or KorKap brands only. Ocal is not acceptable.
  3. Fittings and Conduit Bodies: NEMA FB 1; threaded type, material to match conduit.
- B. Intermediate Metal Conduit (IMC) and Fittings:
  1. Conduit: Hot-dipped galvanized steel.
  2. Fittings and Conduit Bodies: NEMA FB 1; use fittings and conduit bodies specified above for rigid steel conduit.
  3. Conduit bodies shall be constructed of Rigid Metal Steel.
- C. Electrical Metallic Tubing (EMT) and Fittings:
  1. EMT: ANSI C80.3; hot-dipped galvanized tubing.
  2. Fittings and Conduit Bodies: NEMA FB 1; steel compression type.
- D. Flexible Metal Conduit and Fittings:
  1. Conduit: Galvanized steel strips, spirally wound.
  2. Fittings and Conduit Bodies: NEMA FB 1.
- E. Liquidtight Flexible Conduit and Fittings:
  1. Conduit: Flexible metal conduit with PVC jacket and integral grounding conductor.
  2. Fittings and Conduit Bodies: NEMA FB 1; liquidtight, zinc coated steel.
- F. Nonmetallic Conduit and Fittings:
  1. Conduit: NEMA TC 2; Schedule 40 PVC.
  2. Fittings and Conduit Bodies: NEMA TC 3.

## PART 3 EXECUTION

### 3.01 CONDUIT SIZING, ARRANGEMENT AND SUPPORT

- A. Minimum size of conduit is 1/2-inch. Indicated sizes are minimum based on THHN/THWN copper wire and larger sizes may be used for convenience of wire pulling.
- B. Arrange conduit to maintain headroom and present a neat appearance.
- C. Conceal conduit in ceiling of all finished areas and in walls of all areas of the building. In unfinished areas without ceilings, conduit may be run exposed overhead. Install all conduit, including conduit above accessible ceiling, parallel or perpendicular to walls and adjacent piping. Neatly route conduit in a common rack where possible.
- D. Maintain minimum 6-inch clearance between conduit and piping. Maintain 12 inch clearance between conduit and heat sources such as flues, steam pipes, and heating appliances.

- E. Arrange conduit supports to prevent distortion of alignment by wire pulling operations. Fasten conduit securely to building structure using clamps, hangers and threaded rod.
- F. Refer to Section 16070 for support of conduit.

#### PART 4 GENERAL CONDUIT INSTALLATION

##### 4.01 CUT CONDUIT SQUARE USING A SAW OR PIPECUTTER; DE-BURR CUT ENDS BEFORE JOINING.

- A. Bring conduit to the shoulder of fittings and couplings and fasten securely.
- B. Install no more than the equivalent of three 90-degree bends between boxes.
- C. Use conduit bodies to make sharp changes in direction, as around beams.
- D. Avoid moisture traps where possible; where unavoidable, provide junction box with drain fitting at conduit low point. Seal conduit which crosses a boundary between areas of extreme temperature difference.
- E. Use suitable conduit caps to protect installed conduit against entrance of dirt and moisture.
- F. Drawings indicate intended circuiting and are not intended to be scaled for exact conduit location.
- G. Install conduit such that it does not interfere with fire-proofing of steel.
- H. Do not install conduit in floor slab of ground floor of building.

##### 4.02 NONMETALLIC CONDUIT INSTALLATION

- A. Wipe nonmetallic conduit clean and dry before joining. Apply full even coat of cement to entire area that will be inserted into fitting. Let joint cure for 20 minutes minimum.

##### 4.03 METALLIC CONDUIT INSTALLATION

- A. Make joints mechanically tight and all conduit electrically continuous.
- B. Use conduit hubs for fastening conduit to sheet metal boxes in damp or wet locations. Use sealing locknuts and other approved techniques for moisture proofing raceway in wet areas.
- C. Use hydraulic one-shot conduit bender or factory elbows for bends in conduit larger than 2-inch size.
- D. Install expansion joints where conduit crosses building expansion joints and at 150 foot intervals in straight runs.
- E. Provide fire-stop compound at all penetrations of floor slabs or fire walls such that fire rating integrity of barrier is not lessened.

##### 4.04 UNDERGROUND RACEWAY INSTALLATION

- A. Install top of raceway minimum 24 inches below finished grade, unless indicated otherwise.

- B. Slope raceways, that extend beyond the building outside walls, downward 4 inches per 100 feet from point of origin inside of building to junction boxes or equipment outside the building.
- C. Stagger conduit joints.
- D. Use suitable separators and chairs installed 5 feet on centers. Band conduit together with suitable banding devices. Securely anchor conduit to prevent movement during concrete placement.
- E. Concrete encasement is required for all PVC service entrance feeders.

#### 4.05 CONDUIT INSTALLATION SCHEDULE

- A. Exterior:
  - 1. Exposed:
    - a. Rigid metal conduit or Intermediate metal conduit.
    - b. PVC coated rigid metal conduit at all concrete slab penetrations.
    - c. Liquidtight flexible metal conduit for connection to vibrating equipment including motors, transformers and control devices.
    - d. Rigid metal conduit bodies required.
  - 2. Underground:
    - a. Rigid nonmetallic conduit for all branch circuits.
    - b. Rigid nonmetallic conduit for all feeders with concrete encasement as specified.
    - c. PVC coated rigid metal factory elbows for all bends and for concrete slab penetrations.
- B. Interior:
  - 1. Exposed:
    - a. Rigid metal conduit in areas subject to moisture, corrosive agents, physical abuse or in unconditioned spaces.
    - b. Electrical metallic tubing in areas not subject to moisture, corrosive agents or physical abuse.
  - 2. Concealed:
    - a. Rigid metal conduit in areas subject to moisture or corrosive agents.
    - b. Electrical metallic tubing in areas not subject to moisture or corrosive agents.
  - 3. Connections to Equipment:
    - a. Liquidtight flexible metal conduit in areas subject to vibration, moisture, high humidity, or corrosive agents.
    - b. Flexible metal conduit in dry, noncorrosive areas.
- C. BX will not be acceptable for use on this project.

END OF SECTION

## **SECTION 16140**

### **WIRING DEVICES**

#### **PART 1 GENERAL**

##### **1.1 SECTION INCLUDES**

- A. Specification grade wiring devices, including:
  - 1. Wall switches.
  - 2. Wall dimmers.
  - 3. Receptacles.
  - 4. Floor mounted service fittings.
  - 5. Device plates and box covers.

##### **1.02 RELATED SECTIONS**

- A. Section 16130 - Boxes.
- B. Section 16141 . Floor Boxes.

##### **1.03 REFERENCES**

- A. NEMA WD 2 - Semiconductor Dimmers for Incandescent Lamps.

##### **1.04 SUBMITTALS**

- A. Furnish samples upon request of A/E.

#### **PART 2 PRODUCTS**

##### **2.01 MANUFACTURERS**

- A. Switches and Receptacles:
  - 1. Hubbell.
  - 2. Lutron
- B. Dimmers:
  - 1. Crestron.
  - 2. Lutron.
- C. Cover Plates: Match device manufacturer.
- D. Floor Mounted Service Fittings:
  - 1. Hubbell.
  - 2. Square D..
- E. Occupant Sensors:
  - 1. Hubbell Wiring Devices
  - 2. Lutron

##### **2.02 DEVICE COLOR**

- A. Provide colored switches, dimmers, and receptacles; as selected by A/E.

## 2.03 SWITCHES

- A. 20A, 120-277V Single Pole: "1221", Hubbell.
- B. 20A, 120-277V Three Way: "1223", Hubbell.
- C. 20A, 120-277V Single Pole, locking type: "1221L", Hubbell.

## 2.04 DIMMERS . TRACK LIGHTS

- A. NEMA WD 2; slide type, solid-state, positive off, Lutron "Nova" series.
- B. 1,500-watt minimum rating; larger size as necessary to accommodate load shown on contract drawings. Fully rated, gangable without breaking off cooling fins.
- C. Rated for quartz tungsten halogen lamps.

## 2.05 DIMMERS . COMPACT FLOURESCENT

- A. Single Slide Switch: Match control with electronic dimming ballast provided with fixture.

## 2.06 RECEPTACLES

- A. 15A, 125V, 2P3W Clock: NEMA 5-15R; See plans.
- B. 20A, 125V, 2P3W Duplex: NEMA 5-20R; See plans.
- C. 20A, 125V, 2P3W Duplex Hospital Grade, Ground Fault Interrupting: NEMA 5-20R; See plans
- D. 30A, 250V, 2P3W Simplex: NEMA 6-30R; "9330", Hubbell.
- E. 50A, 250V, 2P3W Simplex: NEMA 6-50R; "9367", Hubbell.
- F. Heat trace or other loads continuously plugged in outdoors. Provide Crouse-Hinds WRLD-1 cover. Install round plug on cord supplied with heat trace or other equipment to match weatherproof bushing on receptacle cover.

## 2.07 COVER PLATES

- A. Provide 302/304 satin smooth, stainless steel.
- B. Weatherproof Cover Plate: Gasketed cast metal ~~to~~ use+type.
- C. Exposed Box Cover Plate: Stamped steel handy box covers.

# PART 3 EXECUTION

## 3.01 INSTALLATION

- A. Install receptacles and switches only in electrical boxes which are clean and free from excess building materials, debris, etc.
- B. Install wall switches with OFF position down.



- C. Where switches and other devices are mounted at one location, provide single coverplate to cover all devices. Where switches are located with dimmers, switches shall match dimmers.
- D. Align the tops of all group mounted devices. Install plumb and aligned in the plane of the wall.
- E. Derate ganged dimmers as instructed by manufacturer; do not use common neutral. Provide dedicated neutral for each dimming circuit.
- F. Install convenience receptacles in vertical position with grounding pole on bottom unless otherwise noted.
- G. Provide ground fault circuit interrupting type devices in all locations requiring weatherproof devices.
- H. Do not use feed through feature for ground fault interrupting devices. Install GFI device at each location. GFI circuit breaker will not be acceptable.
- I. Install plates on all devices and blank outlets in finished areas. Use jumbo size plates for outlets installed in masonry walls.
- J. Install galvanized steel plates on outlets in unfinished areas.
- K. Install galvanized steel plates on outlet boxes and junction boxes above accessible ceilings.
- L. Mounting Heights:
  - 1. Refer to drawing cover sheet or contact A/E.
  - 2. Convenience Receptacles Above Counter or Backsplash: 6 inches above counter or backsplash in horizontal position.
  - 3. Receptacles for Water Coolers: Mount directly behind water cooler to eliminate visibility of cord and attachment plug. Coordinate elevation with the cooler to be installed prior to installation of box.
  - 4. Install devices in mill work as shown in details and elevations or as directed by A/E.
- M. Drill opening for poke-through fitting installation in accordance with manufacturer's instructions.

END OF SECTION



## **SECTION 16220**

### **MOTORS AND CONTROLLERS**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Electric motors and controllers required for equipment furnished.

##### **1.02 RELATED SECTIONS**

- A. Division 15

##### **1.03 REFERENCES**

- A. IEEE Std. 519 - Harmonic Control in Electric Power Systems.
- B. NEMA AB 1 - Molded Case Circuit Breakers and Molded Case Switches.
- C. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors, and Overload Relays Rated Not More Than 2,000 Volts AC or 750 Volts DC.
- D. NEMA ICS 6 - Industrial Control and Systems: Enclosures.

##### **1.04 SUBMITTALS**

- A. Include product data on motors, motor starters, combination motor starters, relays, pilot devices, and switching and overcurrent protective devices. Include trip ratings, size and UL listing.
- B. Where similar items of equipment are utilized, include separate data sheet for each item, individually identified as to function.
- C. Provide operation and maintenance manual.

##### **1.05 QUALITY ASSURANCE**

- A. Provide motor starters under this division by same manufacturer where possible.
- B. Provide motors used in conjunction with variable speed drives from same manufacturer as VFD or provide certified letter from VFD manufacturer assuming total motor warrantee.

#### **PART 2 PRODUCTS**

##### **2.01 MANUFACTURERS**

- A. Motors:
  - 1. Century/Gould/Reliance.
  - 2. Cutler-Hammer.
  - 3. General Electric.
  - 4. Magnatek.
  - 5. Toshiba.
- B. Motor Starters:
  - 1. Cutler-Hammer.

2. General Electric.
3. Siemens.
4. Square D.

## 2.02 MOTORS

- A. Provide motor voltages as follows unless specified or indicated otherwise:
  1. 3/4 horsepower and Larger: 460 volt, 3 phase, 60 hertz.
  2. Smaller than 3/4 horsepower: 120 volt, single phase, 60 hertz.
- B. Unless otherwise specified, provide motors that are single speed, 1,750 rotations per minute with standard drip-proof enclosure for indoor service.
- C. Provide motors exposed to the weather that are totally enclosed fan-cooled.
- D. Provide all three-phase motors with at least 1.15 service factor. Provide motors in explosion-proof applications with a service factor of 1.00, Class B insulation and specifically selected for the application.
- E. Select motors to operate at design conditions without exceeding nameplate ratings if 1.00 service factor is assumed.
- F. Provide motors with sealed or field-lubricated type ball bearings unless otherwise noted. Provide grease fittings for field-lubricated motors.
- G. Provide motors with copper windings.
- H. Select motors for low starting current, designed for continuous duty to provide the running torque and pull-in torque required to start the load.
- I. Select motors for quiet operation. Provide motor manufacturer's premium efficiency design that exceed full load NEMA minimum efficiencies defined by MG1-12.54. Label each motor with NEMA nominal and guaranteed efficiencies IAW MG1 12.54.2.
- J. Provide capacitor start type single-phase motors with starting, pull-in and running characteristics to match the load. Limit temperature rise to 60 degrees C.
- K. Refer to various sections of the specifications for special requirements of specific items of equipment requiring motors. Select motors for variable speed operation (i.e., for air handling units) specifically for quiet operation.
- L. Provide manufacturer correction capacitors on motors 10 horsepower and above except for motors controlled by UFDS, correct to 0.95 power factor.

## 2.03 MOTOR STARTERS

- A. Manual Motor Starters:
  1. Fractional Horsepower Manual Starter: NEMA ICS 2; AC general-purpose Class A manually operated, full-voltage controller for fractional horsepower induction motors, with thermal overload unit, pilot light and toggle operator.
  2. Motor Starting Switch: NEMA ICS 2; AC general-purpose, Class A, manually operated, full-voltage controller for fractional horsepower induction motors, without thermal overload unit, red pilot light, no auxiliary contact, and toggle operator.
  3. Enclosure: NEMA ICS 6; Type 1.
- B. Magnetic Motor Starters:

1. Magnetic Motor Starters: NEMA ICS 2; AC general-purpose, Class A magnetic controller for induction motors rated in horsepower as indicated.
2. Provide accessible terminals for wiring directly from the front of the starter.
3. Contacts: Provide silver, cadmium oxide alloy, double break, non-welding contacts which will not require filing, dressing or cleaning throughout the life of the control equipment.
4. Provide starter types as scheduled:
  - a. Full Voltage Starting: Non-reversing type.
5. Coils: Pressure molded, 120 volts, 60 hertz. Provide integral control transformer.
6. Overload and Phase Protection Relay:
  - a. Provide solid state voltage and overload sensing in all three phases for three-phase full voltage starters, in ungrounded phases for single-phase full voltage starters, and in all six legs for two-speed full voltage starters.
  - b. Overload relay shall be self powered solid state type with selectable Class 10 or 20 overload, phase loss and phase current unbalance protection, plus or minus 2 percent repeatability, thermal memory, trip test and indication, and FLA adjustment without the use of heaters.
  - c. Overload relay shall be insensitive to ambient temperature within a range of minus 20 to 70 degrees C.
  - d. Nonadjustable phase failure relay shall be integral with overload relay and have under voltage trip point set at 80 percent for dropout and 90 percent for pickup.
  - e. Relay shall operate at 6 percent phase unbalance and 6 percent phase voltage loss.
  - f. Single reset button on the door shall permit external reset.
7. Enclosure: NEMA ICS 6; Type 1.
8. Auxiliary Contacts: Provide each starter with the required auxiliary contacts for the control functions indicated and required, including the holding interlock and pilot light interlocks, plus two additional contacts, field convertible to normally open or normally closed, NEMA ICS 2 controls. Provide capability to add auxiliary contacts without removing existing wiring or removing the controller from its enclosure.
9. Push Buttons: NEMA ICS 2; START/STOP or HAND/OFF/AUTO in front cover as required by temperature controls.
10. Indicating Lights: NEMA ICS 2; RUN; red pilot light (push to test type) in front cover. Operate pilot lights from separate interlock not placed across the holding coil.
11. Control Power Transformers: Provide integral 120-volt secondary control transformer with both primary and secondary control power fuses.

C. Combination Motor Starter:

1. Combine starter with disconnect in common enclosure as scheduled.
  - a. Molded Case Thermal-Magnetic Circuit Breakers: NEMA AB 1; circuit breakers with integral thermal and instantaneous magnetic trip in each pole.
  - b. Motor Circuit Protector: NEMA AB 1; circuit breakers with integral instantaneous magnetic trip in each pole.
2. Provide combination starters with an IER of at least 22,000 A (RMS).

## 2.04 VARIABLE FREQUENCY MOTOR CONTROLLERS

- A. Refer to Division 15 specification for variable frequency motor controllers

## PART 3 EXECUTION

### 3.01 INSTALLATION

- A. Install motor control equipment in accordance with manufacturers' instructions.
- B. Select and install heater elements in motor starters to match installed motor characteristics.
- C. Motor Data: Provide neatly typed label inside each motor starter enclosure door identifying motor served, nameplate horsepower, full load amperes, code letter, service factor and voltage/phase rating. Provide phenolic nameplate on cover exterior to indicate motor served.
- D. Mount on housekeeping pad for floor mounted equipment.
- E. Mount in accessible location to allow sufficient room for maintenance on itself and adjacent items.
- F. Mount with operating handle at 5'-6" above finish floor. Align tops of all grouped starters. Install plumb and aligned in plane of wall in which installed.
- G. Provide galvanized angle supports where mounting motor starters on wall or other rigid surface is impractical. Do not support starters from conduit alone. Locate motor starters that are mounted on equipment served so that starter will not inhibit removal of service panel or interfere with required access.

END OF SECTION

## **SECTION 16411**

### **DISCONNECT SWITCHES**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Disconnect switches, including:
  - 1. Fuses.
  - 2. Enclosures.

##### **1.02 RELATED SECTIONS**

- A. Section 16070 - Supporting Devices.
- B. Section 16075 - Electrical Identification.

##### **1.03 REFERENCES**

- A. NFPA 70 - National Electrical Code.
- B. UL 198E - Class R Fuses.

##### **1.04 SUBMITTALS**

- A. Furnish dimensions and ratings for voltage, ampacity, horsepower and short circuit.
- B. Indicate enclosure material finish and NEMA classification type.

#### **PART 2 PRODUCTS**

##### **2.01 MANUFACTURERS**

- A. Disconnect Switches:
  - 1. Cutler-Hammer.
  - 2. General Electric.
  - 3. Siemens.
  - 4. Square D.
- B. Fuses:
  - 1. Bussman.
  - 2. Gould-Shawmut.
  - 3. Littelfuse.

##### **2.02 DISCONNECT SWITCHES**

- A. Fusible Switch Assemblies: Heavy duty; quick-make, quick-break, load interrupter enclosed switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Handle lockable in OFF position. Fuse Clips: Designed to accommodate Class J.
- B. Nonfusible Switch Assemblies: Heavy duty; quick-make, quick-break, load interrupter enclosed switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Handle lockable in OFF position.

- C. Enclosures: Unless indicated otherwise, provide general purpose, NEMA 1 for indoor locations; and weatherproof, NEMA 3R for outdoor locations.
- D. General-Use Snap Switch: Motors of one horsepower or less as allowed by code.
- E. Construct all current carrying parts of high conductivity copper with silver-plated switch contacts.
- F. Provide solid copper neutral bar where a neutral is present in the circuit.

## 2.03 FUSES

- A. Fuses 600 Amperes and Less: UL 198E, Class J or RK1; as indicated on drawings; time delay, dual element, current limiting, 600 volt.
- B. Interrupting Rating: 200,000 rms symmetrical amperes.
- C. Provide all fuses of the same manufacturer.
- D. Install fuses in motor circuits in accordance with motor manufacturer's recommendations.

## PART 3 EXECUTION

### 3.01 INSTALLATION

- A. Provide disconnect switches, where required by NFPA 70, where indicated on drawings, and where required by equipment manufacturer, in a location convenient for maintenance on each switch and adjacent equipment.
- B. Provide fused disconnect switches when required to maintain equipment manufacturer's warranty. Coordinate with Division 15 for warranty requirements of equipment approved by submittal.
- C. Install fuses in fusible disconnect switches. Provide permanent marking inside switch enclosure for fuse type.
- D. Wall mount switches, where possible, or mount on Uni-Strut supports.
- E. Provide spare fuse cabinet in main electrical room complete with three spare fuses for each rating installed for fuse sizes over 600 amperes, and ten percent spare fuses (minimum of three) of each type and rating installed for 600 amperes or less.
- F. Provide fuse identification label showing type and size inside door of each switch.

END OF SECTION



## **SECTION 16442**

### **PANELBOARDS**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Distribution, lighting, and appliance branch circuit panelboards.

##### **1.02 RELATED SECTIONS**

- A. Section 16070 - Supporting Devices.
- B. Section 16075 - Electrical Identification.

##### **1.03 REFERENCES**

- A. NEMA PB 1.1 - Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.
- B. UL 198E - Class R Fuses.

##### **1.04 SUBMITTALS**

- A. Include outline and support point dimensions, NEMA enclosure type, voltage, main bus ampacity and material, integrated short circuit ampere rating, circuit breaker and fusible switch arrangement and sizes.

##### **1.05 SPARE PARTS**

- A. Keys: Furnish two keys to Owner for each panelboard, all keyed alike.

#### **PART 2 PRODUCTS**

##### **2.01 MANUFACTURERS**

- A. Cutler-Hammer.
- B. General Electric.
- C. Siemens.
- D. Square D.

##### **2.02 GENERAL**

- A. Conform to UL standards and bear UL label. Form cabinets from code gage galvanized steel. Form fronts of code gage cold rolled steel bonderized after fabrication.
- B. Provide cabinet fronts with concealed hinges, concealed adjustment means and master keyed flush lock. Finish front in manufacturer's standard gray enamel.
- C. Provide with main lugs and breakers or fuses as scheduled on the drawings. Provide main lug connection to accommodate T & B compression connector on end of cable.

Attach connector to panel bus with two bolts per lug. Provide captive type bolts or studs to facilitate reinstallation of the lugs with the wire attached.

- D. Provide all panelboards with copper bus of the ratings scheduled and designed for all indicated devices and spaces, complete with taps and trim.
- E. Minimum integrated short circuit rating 10,000 amps RMS symmetrical for 120/208 volt panelboards; 14,000 amperes RMS symmetrical for 480/277 volt panelboards or as shown on the drawings. Integrated ratings may not be based on tested series ratings in conjunction with feeder breaker actually used.
- F. Size bus bars to limit the temperature rise within the panelboard to 50 degrees C over a 40 degrees C ambient temperature.
- G. Provide adequate space and provisions for wire No. 6 AWG and larger conductors to terminate with compression type connector to main lugs.
- H. Connect all two-section panelboards with copper cable of an ampacity greater than the main bus ampacity.

#### 2.03 DISTRIBUTION PANELBOARDS (1,200 AMPS AND SMALLER)

- A. Enclosure: Type 1, unless scheduled otherwise.
- B. Molded Case Circuit Breakers: Bolt-on type thermal magnetic trip circuit breakers, with common trip handle for all poles. Provide circuit breakers UL listed as Type SWD for lighting circuits. Provide UL Class A ground fault interrupter circuit breakers where scheduled.

#### 2.04 BRANCH CIRCUIT PANELBOARDS

- A. Lighting and Appliance Branch Circuit Panelboards: Circuit breaker type.
- B. Enclosure: Type 1; unless indicated otherwise.
- C. Provide insulated neutral bus and separate copper grounding bus bonded to enclosure.
- D. Molded Case Circuit Breakers: Bolt-on type thermal magnetic trip circuit breakers, with common trip handle for all poles. Provide circuit breakers UL listed as Type SWD for lighting circuits. Provide UL Class A ground fault interrupter circuit breakers where scheduled.
- E. Sequence phase all adjacent breakers. All circuit breaker connection straps shall be rated at 100 amperes minimum.

### PART 3 EXECUTION

#### 3.01 INSTALLATION

- A. Install panelboards plumb and flush with wall finishes, in conformance with NEMA PB 1.1. Mount securely to walls or structural spaces. Mount floor mounted panelboards on 4-inch housekeeping pads.
- B. Height: Install wall mounted panelboards at 6 feet to the top of the enclosure.

- C. Provide filler plates for unused spaces in panelboards.
- D. Provide typewritten circuit directory for each branch circuit panelboard mounted in permanent, clear Lexan card holder located on inside of door. Prepare directories only after permanent room numbers have been assigned. Do not use room numbers shown on construction drawings.
- E. Stub three empty 1-inch conduits to accessible location above ceiling out of each recessed panelboard.
- F. Arrange branch circuit connections in 3 phase lighting and appliance panelboards such that when 2 or 3 circuits are run with a common neutral, each circuit is connected to a different phase.
- G. Distribute loading on circuits in panelboards to balance the load as evenly as possible in each phase.
- H. Terminate only one conductor under each lug of branch circuit breakers.
- I. Do not make splices or taps in panelboard gutters.

### 3.02 FIELD QUALITY CONTROL

- A. Inspect for physical damage, proper alignment, anchorage, and grounding. Check proper installation and tightness of connections for circuit breakers.

END OF SECTION



## **SECTION 16510**

### **LIGHTING FIXTURES - BUILDING**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Light fixtures associated with building, including:
  - 1. Interior luminaires and accessories.
  - 2. Lamps.
  - 3. Ballasts.

##### **1.02 RELATED SECTIONS**

- A. Section 16050 - Electrical General Provisions.
- B. Section 16120 - Wire and Cable.
- C. Section 16132 - Conduit.
- D. Section 16423 - Contactors.

##### **1.03 SUBMITTALS**

- A. Product Data: Include product data for fixtures, including photometric data, reflectance, lens, lamps, ballasts, poles and lighting control.
- B. Samples: Furnish samples upon request.
- C. Operation and Maintenance Manual: Provide operation and maintenance manual.

#### **PART 2 PRODUCTS**

##### **2.01 MANUFACTURERS**

- A. Lighting Fixtures:
  - 1. Manufacturers of individual lighting fixtures shall be as scheduled on Drawings, and indicate quality and design features required.
  - 2. Products of other manufacturers will be considered upon submittal of proper data.
- B. Lamps:
  - 1. General Electric.
  - 2. Philips.
  - 3. Sylvania.
  - 4. Venture.
- C. Ballasts:
  - 1. Advance.
  - 2. Universal.
  - 3. Valmont.

##### **2.02 GENERAL**

- A. Provide lighting fixtures of the size, type and rating indicated, complete with lamps, lampholders, reflectors, ballasts, starters, wiring and accessories.

- B. Where fixtures are recessed mounted in ceiling system, provide trim and accessories required for installation in the ceiling system installed.
- C. It is the intent of the Drawings and Specifications to indicate the type of fixture for each intended use. It is generally intended that rooms of similar usage and configuration will have similar fixture types. Where fixture type is not indicated, it is the duty of the Contractor to request clarification prior to proceeding with the work.

## 2.03 INTERIOR LUMINAIRES AND ACCESSORIES

- A. Fluorescent Luminaires:
  - 1. Provide fixtures of code gage steel, painted after fabrication. Fixtures using pre-painted steel will not be acceptable.
  - 2. Provide lensed fixtures with 0.125 inch minimum thick, 9 ounces per square foot, virgin acrylic, KSH-12 lens unless otherwise indicated. Brightness not to exceed 600 foot lamberts at 75 degrees and 85 degrees.
  - 3. Provide corrosion resistant fixtures as scheduled.
  - 4. Provide fixtures in architectural furring to fit space. Leave no more than 4 inches blank space at each end.
- B. Low Bay, HID Fixtures:
  - 1. Where enclosed and gasketed type fixtures are specified, provide designed for continuous operation in 55 degree C ambient temperature.
  - 2. Provide cast aluminum ballast housing with baked electrocoat paint finish. Provide separate mounting components for mounting to structure prior to assembly of remainder of fixture.
  - 3. Enclose and gasket optical assembly. Hinge and provide captive stainless spring steel door latches. Provide ultraviolet stabilized, injection-molded, prismatic, heat-resistant, acrylic refractors for low brightness.
  - 4. Provide optical assembly with separate safety chain.

## 2.04 LAMPS

- A. F32T8 Fluorescent Lamps: 32 watts, nominally rated, 3,000 lumens, 3500 K, energy efficient type.
- B. Compact Fluorescent Lamps:
  - 1. 18 watts, nominally rated 1,200 lumens, 3,500 K, triple tube.
  - 2. 26 watts, nominally rated 1,800 lumens, 3,500 K, triple tube.
  - 3. 32 watts, nominally rated 2,400 lumens, 3,500 K, triple tube.
- C. High Intensity Discharge (HID) Lamps:
  - 1. Metal Halide:
    - a. Clear, 4,000 K, high output.
    - b. Phosphor coated, 3,200 K, standard output.
  - 2. High Pressure Sodium:
    - a. Phosphor coated, 3,000 K, standard output.

## 2.05 FLUORESCENT BALLASTS

- A. Fluorescent Ballasts: Premium electronic; one, two, three, or four lamp, ballast factor not less than 0.9. Total harmonic distortion not greater than 10 percent.
- B. 430 ma Lamp Ballasts: Rapid start, premium type.
- C. Minus 20 degrees F rating when used in exterior or unheated areas.

## 2.06 HID BALLASTS

- A. High power factor type and potted for low noise level.

## PART 3 EXECUTION

### 3.01 INSTALLATION

- A. Support surface-mounted luminaires to ceiling using bolts, screws, or approved clips.
- B. Install recessed luminaires with proper frames in accordance with manufacturer's recommendations.
- C. Locate recessed luminaires as indicated on reflected ceiling plan.
- D. Support pendant or bracket fixtures as indicated and as recommended by manufacturer for job conditions encountered.
- E. Wall mount exit fixtures where shown above doors. Coordinate fixture location with actual door arrangement as indicated. Connect exit fixtures to unswitched power source as indicated.
- F. Connect fixtures designated as night lights to unswitched circuit and burn continuously.
- G. Connect photocell into system to signal darkness and timeclock to de-energize system at a preset time.
- H. Install lamps in luminaires and lampholders.

### 3.02 FIELD QUALITY CONTROL

- A. Coordinate receipt and installation of all fixtures with regard to the overall schedule of the project.
- B. Align luminaires and clean lenses and diffusers at completion of work. Clean paint splatters, dirt and debris from installed luminaires.
- C. Demonstrate proper operation of all luminaires and controls.
- D. Refer to Section 16050 regarding lamp replacement prior to final acceptance.

END OF SECTION





## **SECTION 16720**

### **FIRE DETECTION AND ALARM SYSTEM**

#### **PART 1 GENERAL**

##### **1.1 SECTION INCLUDES**

- A. 24 VDC, analog/addressable, multiprocessor-based, fire alarm system.
  - 1. System shall include, but not be limited to:
    - a. Control equipment.
    - b. Control panel.
    - c. Analog addressable sensors.
    - d. Addressable modules.
    - e. Audible and visual notification appliances.
    - f. Accessories necessary to provide complete and operable system.
    - g. Conduit, wiring, and fittings.

##### **1.2 RELATED SECTIONS**

- A. Section 13800 - Building Automation and Control.
- B. Section 13900 (21 00 00) - Fire Suppression.

##### **1.3 REFERENCES**

- A. National Fire Protection Association (NFPA):
  - 1. NFPA 12 - Standard on Carbon Dioxide Extinguishing Systems.
  - 2. NFPA 12A - Standard on Halon 1301 Fire Extinguishing Systems.
  - 3. NFPA 13 - Installation of Sprinkler Systems.
  - 4. NFPA 15 - Standard for Water Spray Fixed Systems for Fire Protection.
  - 5. NFPA 16 - Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems.
  - 6. NFPA 16A - Standard for the Installation of Closed Head Foam-Water Sprinkler Systems.
  - 7. NFPA 17 - Standard for Dry Chemical Extinguishing Systems.
  - 8. NFPA 17A - Standard for Wet Chemical Extinguishing Systems.
  - 9. NFPA 70 - National Electrical Code.
  - 10. NFPA 72 - National Fire Alarm Code.
  - 11. NFPA 90A - Standard for the Installation of Air Conditioning and Ventilating Systems.
  - 12. NFPA 101 - Life Safety Code.
  - 13. NFPA 750 - Standard on Water Mist Fire Protection Systems.
  - 14. NFPA 2001 - Clean Agent Fire Extinguishing Systems.
- B. Underwriters Laboratories (UL):

1. UL 268A - Standard for Smoke Detectors for Duct Application.
2. UL 864 9<sup>th</sup> Edition- Standard for Control Units and Accessories for Fire Alarm Systems.

#### **1.4 CODES AND STANDARDS**

- A. Equipment shall be listed by Underwriters Laboratories, Inc., approved by Factory Mutual Research, or as accepted by the Authority Having Jurisdiction (AHJ).
- B. Codes: The fire alarm system in its entirety shall be in compliance with all applicable fire and electrical codes and comply with requirements of the local Authority Having Jurisdiction over said systems.
- C. UL Standards: System shall comply with applicable provisions of the following UL standards and classifications:
  1. UL 864 9<sup>th</sup> Edition.
  2. UOJZ, Control Units, System.
  3. SYZV Control Units, Releasing Device.
  4. UOXX, Control Unit Accessories, System.
  5. SYSW Accessories, Releasing Device Service.
- D. NFPA Standards: System shall comply with applicable provisions of the following NFPA standards:
  1. NFPA 72.
    - a. Central Station Fire Alarm Systems.
    - b. Local Fire Alarm Systems.
    - c. Auxiliary Fire Alarm Systems.
    - d. Remote Station Fire Alarm Systems.
    - e. Proprietary Fire Alarm Systems.
  2. NFPA 90A.
  3. NFPA 101.

#### **1.5 SYSTEM DESCRIPTION**

- A. Multiprocessor-Based:
  1. The system shall be of multiprocessor design to allow maximum flexibility of capabilities and operation.
- B. Field Programmable:
  1. The system shall be capable of being front-panel programmed or by means of Field Configuration Program (FCP) allowing programming to be downloaded via portable computer.
- C. RS-232C Serial Output:
  1. A supervised RS-232C serial port shall be provided to operate remote printers and/or video terminals, accept downloaded program from portable computer, or provide 80-character readout of alarms, troubles, location descriptions, time, and date.
  2. Communication shall be the standard ASCII code operating at 9600-baud rate.
- D. Control-by-Event (CBE) Program:

1. Operation of manual station or automatic activation of any smoke sensor, heat sensor, or waterflow zone shall activate system control-by-event program to cause:
  - a. All notification appliances to sound in continuous pattern and strobes to flash.
  - b. Shut down all air-handling units as specified herein.
  - c. "SYSTEM ALARM" LED shall flash and panel sounder shall pulse.
  - d. Indicate on the 80-character alphanumeric panel display description of specific analog/addressable device in alarm. Display shall be of the liquid crystal type (LCD), clearly visible in the dark or in poor light conditions.
  - e. Close all magnetically held doors automatically.
  - f. Energize programmed solenoids for activating deluge or preaction systems.
  - g. Perform additional functions as specified herein or as indicated on the drawings.
  - h. Notify the Fire Department.

E. General System Operation:

1. When an alarm occurs, the control panel shall indicate alarm condition until manually reset.
2. Alarm may be acknowledged by pressing "ALARM ACKNOWLEDGE" switch.
3. This shall silence the panel sounder and change the "ALARM" LED from flashing to steadily lit.
4. All notification appliances may be silenced by operating the "SIGNAL SILENCE" switch.
5. This shall steadily light the "SYSTEM SILENCED" LED.
6. If a subsequent alarm is activated, notification appliances shall "resound" until again silenced.
7. Once silenced, all notification appliances may be restored by operating the "SIGNAL SILENCE" switch.
8. Waterflow zones shall be non-silenceable.

F. Alarm Verification:

1. Smoke detector alarm verification shall be a standard option on all zones, while allowing any dry contact device, such as manual stations and heat detectors, to create immediate alarm.
2. This feature shall allow smoke sensors that are installed in environments prone to nuisance or unwanted alarms to operate according to following sequence:
  - a. System Ready: Prior to smoke sensor alarm.
  - b. Smoke Sensor Alarm: At time = 0.
  - c. Pre-alarm Window: 15 seconds. A distinctive pre-alarm indication shall be displayed.
  - d. Zone Reset: 5 seconds. Occurs at end of pre-alarm window.
  - e. Alarm Verification Window: 90 seconds. The system shall respond to a second alarm from same smoke sensor as a system alarm.
  - f. System Ready: No alarm verification.
  - g. The verification sequence is suspended once the system alarm is activated.

G. Alarm Signals:

1. All alarm signals shall automatically latch or "lock in" at the control panel until the operated device is returned to normal and the control panel is manually reset.

2. Alarm signals shall be programmable for non-latching operation when required by the Authority Having Jurisdiction. When used for waterflow, the "SIGNAL SILENCE" switch shall be bypassed.

H. Electrically Supervised:

1. Each signaling line circuit and notification appliance circuit shall be electrically supervised for opens, shorts, and ground faults.
2. Occurrence of a fault shall activate the system trouble circuitry, but shall not interfere with proper operation of the circuit that does not have a fault condition.
3. The yellow "SYSTEM TROUBLE" LED shall light and the system audible sounder shall steadily sound when trouble is detected in the system. Failure of power, opens, or short circuits on notification appliance or signaling line circuits, disarrangement in system wiring, failure of microprocessor or identification module, or system ground faults shall activate this trouble circuit.
4. Trouble signal may be acknowledged by operating the "ALARM ACKNOWLEDGE" switch. This shall silence the sounder. If subsequent trouble conditions occur, trouble circuitry shall resound.
5. During alarm, all trouble signals shall be suppressed with the exception of lighting the yellow "SYSTEM TROUBLE" LED.

I. Drift Compensation, Analog Smoke Sensors:

1. System software shall automatically adjust each analog smoke sensor approximately once each week for changes in sensitivity due to effects of component aging or environment (i.e.: dust).
2. Each sensor shall maintain its actual sensitivity under adverse conditions to respond to actual alarm conditions, while ignoring factors that generally contribute to nuisance alarms.
3. System trouble circuitry shall activate, display "DIRTY DETECTOR" and "VERY DIRTY DETECTOR" indications and identify the individual unit that has been compensated beyond its acceptable limits.

J. Analog Smoke Sensor Test:

1. System software shall automatically test each analog smoke sensor a minimum of 3 times daily.
2. Test shall be a recognized functional test of each ionization chamber (analog ionization sensors) and photocell (analog photoelectronic sensors) as required annually by NFPA 72.
3. Failure of a sensor shall activate the system trouble circuitry, display a "Test Failed" indication, and identify individual unit.

K. Dual-Mode Walk Test:

1. The control unit shall provide a Dual-Mode Zoned Walk Test Program that shall enable an individual to test the Alarm/Supervision status of each sensor or module connected to the system.
2. During walk test, the control unit shall automatically reset after an alarm condition enabling the technician to continue testing the system without requiring a return to control panel.
3. During an Audible walk test, placing a device in alarm shall cause 4 pulses on the notification appliance circuits. Operation of a supervisory switch shall cause 3 pulses,

while removal or disconnection of an initiating device shall cause 2 pulses. All tests shall be recorded by printer for reference.

4. The Silent walk test shall record all tests by printer for reference, while not activating notification appliance circuit(s).

L. Printed Circuit Boards, Control Panel Components:

1. The control unit shall be contained in steel cabinet.
2. All groups of circuits or common equipment shall be clearly marked.
3. The control unit shall be red in color and shall include the following features:
  - a. Auxiliary SPDT alarm and trouble dry contacts.
  - b. A solid-state power transfer circuit that shall switch to standby power automatically and instantaneously if normal power fails or falls below 15 percent of normal ("brown out" conditions). This circuit shall allow batteries to be effectively "floated" on the operating system to avoid upsetting normal microprocessor operation and minimize resultant nuisance troubles and/or alarms. This circuit shall be physically isolated from the power supply to facilitate service.
  - c. A Ground Fault detector to detect positive or negative grounds on signaling line circuits, notification appliance circuits, and power circuits. Ground fault indication shall occur on display and general trouble devices and shall operate as specified herein, but shall not cause alarm.
  - d. Lightning protection shall be a standard feature of the fire alarm control panel and shall be incorporated in the power supply circuit, common control circuits, and notification appliance circuits. Systems that require an optional module to provide this protection shall not be considered equal.
  - e. Individual overcurrent protection shall be provided for the following: smoke detector (resettable) power, main power supply, battery standby power, and auxiliary (non-resettable) output.
  - f. A common reset and lamp test switch, labeled "SYSTEM RESET/LAMP TEST" shall be provided on panel.

M. City Connection:

1. The fire alarm system shall be connected via Digital Alarm Communicator Transmitter (DACT) over telephone lines to a central station or remote station.

N. Central Station Option:

1. The fire alarm control panel shall provide an integral Digital Alarm Communicator Transmitter (DACT) for signaling to Central Station. The DACT shall contain a %Dialer-Runaway+feature preventing unnecessary transmissions as the result of intermittent faults in the system and shall be Carrier Access Code (CAC) compliant, accepting up to 20-digit central station telephone numbers.
2. The fire department shall be consulted as to authorized central station companies serving municipality.
3. The fire alarm system shall transmit both alarm and trouble signals with alarm having priority over trouble signal.
4. The contractor shall be responsible for installation charges, while the owner shall be responsible for line lease charges.

## 1.6 SUBMITTALS

- A. Comply with Section 01330 (01 33 00) - Submittal Procedures.

- B. Equipment Other Than That Specified:
1. Submit to the Engineer appropriate documentation in writing 10 days before the Bid Date, if equipment other than that specified is to be supplied.
    - a. Complete lists, descriptions, and drawings of materials.
    - b. A complete list of current drain requirements during normal supervisory condition, trouble, and alarm conditions.
    - c. Battery standby calculations showing total standby power needed to meet system requirements as specified.
- C. Product Data:
1. Submit manufacturers original catalog data and descriptive information for major components of equipment.
  2. Submit pertinent information regarding reliability and operation of equipment.
  3. Submit sufficient information so the exact function of each installed device is known.
- D. Shop Drawings:
1. The submittal of shop drawings shall contain at least 1 booklet of original manufacturer specification and installation instruction sheets. Subsequent booklets may be copies.
  2. All equipment and devices on the shop drawings shall be clearly marked in the specification sheets.
- E. Scheduling:
1. Submit delivery dates, installation dates, and final test/acceptance dates of equipment.
- F. Suppliers Qualifications:
1. Submit suppliers qualifications.
  2. Indicate years in business, service policies, warranty definitions, and list of similar installations.
- G. Installers Qualifications:
1. Submit installers qualifications.
  2. Indicate years in business and prior experience with installations that include type of equipment that is to be supplied.
- H. Project Record Drawings:
1. Complete set of reproducible project record drawings showing installed wiring, color coding, and wire tag notations for exact locations of all installed equipment, specific interconnections between all equipment, and internal wiring of equipment.
  2. Deliver to the Owner after completion of system.
- I. Operating and Instruction Manuals:
1. Submit before testing of system.
  2. Deliver 4 complete sets of operating and instruction manuals to the Owner after completion of testing.
- J. Maintenance Instructions:
1. Shall be complete, easy to read, and understandable.
  2. Provide instructions for replacing components of system, including internal parts.

3. Provide instructions for periodic cleaning and adjustment of equipment with a schedule of these functions.
4. Provide a complete list of all equipment and components with information as to address and telephone number of both manufacturer and local supplier of each item.
5. Provide user Operating Instructions: Prominently display these on a separate sheet located next to the control unit in accordance with UL 864.

K. Testing Instructions:

1. Complete, accurate, step-by-step testing instructions giving recommended and required testing frequency of all equipment, and methods for testing each individual piece of equipment.
2. Deliver to the Owner after completion of system.

## **1.7 QUALITY ASSURANCE**

- A. Catalog Numbers: Catalog numbers specified are those of Gamewell-FCI, and are indicative of the quality and type of equipment to be furnished.
- B. Accessory Components: Accessory components as required shall be catalogued by the manufacturer and Listed to operate with the manufacturer's control panel.

## **1.8 DELIVERY, STORAGE, AND HANDLING**

- A. Delivery: Deliver materials to the site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B. Storage: Store materials in a clean, dry area indoors in accordance with manufacturer's instructions.
- C. Handling: Protect materials from damage during handling and installation.

## **1.9 WARRANTY**

- A. The contractor shall warrant all equipment and wiring free from inherent mechanical and electrical defects for 1 year (365 days) from date of final acceptance.

# **PART 2 PRODUCTS**

## **2.1 MANUFACTURER**

- A. Gamewell-FCI, 12 Clintonville Road, Northford, Connecticut 06427 . Toll Free (800) 633-1311. Phone (203) 484-7161. Fax (203) 484-7118. Website [www.gamewell-fci.com](http://www.gamewell-fci.com).
- B. Hybridized Systems: "Hybridized" systems (containing equipment from several different manufacturers) shall not be considered acceptable.
- C. Labeling: Label equipment with manufacturer's name and logotype to assure integrity of complete system.

## **2.2 FIRE DETECTION AND ALARM SYSTEM**

- A. Fire Detection and Alarm System: Shall be an FCI 7100 Series, 24 VDC, analog/addressable, multiprocessor-based, fire alarm system.

## **2.3 WIRING**

- A. Wire and Cable: Shall be UL Listed for fire alarm use and be a minimum of 18 AWG or as required by local codes and the Authority Having Jurisdiction.
- B. Wire Used on Fire Alarm System: Shall be UL Listed as fire alarm protection signaling circuit cable in accordance with the National Electrical Code, Article 760.
- C. Raceways containing conductors identified as "Fire Alarm+conductors shall not contain other conductors.
- D. No AC current carrying conductors shall be allowed in the same raceway with fire alarm conductors.

## **2.4 SYSTEM COMPONENTS**

- A. System Cabinet:
  - 1. Surface mounted with texture finish.
  - 2. Houses: 7100 Micro microprocessor and related system circuitry.
  - 3. Wiring Gutter Space: Minimum of 1-inch wiring gutter space shall be provided behind mounting plate.
  - 4. Wiring: Terminated on removable terminal blocks to allow field servicing of all modules without disrupting system wiring.
- B. LED Indicator and Outputs:
  - 1. A green "AC ON" LED on lamp cluster shall indicate presence of primary power.
  - 2. Power Supply Outputs: Maximum combined output for both shall be 1 ampere.
    - a. 24 VDC non-resettable, 1 amp. maximum, power limited.
    - b. 24 VDC resettable, 1 amp. maximum, power limited.
- C. Battery Charger:
  - 1. Power Supply: Contains battery charger with maximum average charging current of 1 ampere.
  - 2. If the system loses AC power, a System Trouble shall occur.
  - 3. Output: Supervised and overcurrent protected.
  - 4. Charger: Shall be capable of maintaining sealed lead-acid batteries up to 31-ampere/hour capacity.
- D. Batteries:
  - 1. Shall be of sufficient capacity to provide power for the entire system upon loss of normal AC power for a period of 60 hours with 5 minutes of alarm signaling at end of this 60-hour period, as required by NFPA 72, Auxiliary Systems.
- E. Connections and Circuits:



1. Connections to Light and Power Service: Shall be on a dedicated branch circuit in accordance with the NEC.
2. Circuit and Connections: Shall be mechanically protected.
3. Circuit Disconnecting Means: Shall be accessible only to authorized personnel and clearly marked "FIRE ALARM CIRCUIT CONTROL."

F. Basic System Module:

1. Enclosed within system cabinet, the basic system module shall contain a power supply, microprocessor, memory, system operating software stored on non-volatile EPROM, system configuration memory stored on non-volatile EEPROM, and circuits necessary to support a fire alarm system.
2. Volatile Memory: Not acceptable.
3. Module: Shall function as system control center, processing all messages from field devices supervisory, trouble, alarm.

G. Microprocessor:

1. Microprocessor: Shall execute all supervisory programming to detect and report failure or disconnection of any module or peripheral device.
2. Isolated "Watchdog" Circuit: Shall monitor the microprocessor and upon failure activate system trouble circuits on display.
3. Control-By-Event Functions: The microprocessor shall access the system program, for all control-by-event (CBE) functions.
4. System Program: Shall not be lost upon failure of both primary and secondary power.

H. Signaling Line Circuits:

1. Basic System Module: Shall provide communication with all analog/addressable devices (initiation/control) connected to the 7100 via 2 signaling line circuits.
2. Each Signaling Line Circuit: Shall be capable of being wired Class B, Style 4.
3. Class A, Style 6 Operation Shall be possible with installation of the optional Class A Operating Module (CAOM).
4. Circuits: Shall be capable of operating in NFPA Style 7 mode when equipped with the CAOM module and isolator modules or sensor bases.
5. Each Circuit: Shall communicate with a maximum of 99 analog sensors and 98 addressable monitor/control devices.
6. First 99 Device Addresses (1-99) on Each Circuit: Dedicated to analog sensors.
7. Addresses 101-198: Reserved for monitor/control devices.

I. Real-Time Clock:

1. Basic System Module: Shall contain a real-time clock capable of monitoring all real-time programming and all time-control functions.

J. Notification Appliance Circuits:

1. Two Independent Notification Appliance Circuits: Provided on basic module, polarized and rated at 1.5 amperes DC per circuit, individually overcurrent protected and supervised for opens, grounds, and short circuits.
  - a. Shall be capable of being wired Class B, Style Y.
  - b. With installation of optional Class A Option Module (CAOM), Shall be capable of being wired Class A, Style Z.
2. Power Output: Shall be regulated so that UL Listed notification appliances with an operating voltage range of 17-26 VDC may be installed on the circuits.

- a. Voltage: 24 VDC regulated.
  - b. Current: 1.5 amps, maximum alarm.
- K. Trouble Dry Contacts:
  - 1. Trouble Dry Contacts (Form C): Shall be rated 2 amps at 30 VDC (resistive) and transfer whenever system trouble occurs.
- L. Alarm Dry Contacts:
  - 1. Alarm Dry Contacts (Form C): Shall be rated 2 amps at 30 VDC (resistive) and transfer whenever system alarm occurs.
- M. Gamewell-FCI Approved Sensors:
  - 1. Use only Gamewell-FCI approved compatible sensors, UL Listed or FM Approved for use with 7100 system.
  - 2. The following identifies by model number those approved, acceptable models.
    - a. Analog Ionization Sensor: Model ASD-IL2, IL2F.
    - b. Analog Photoelectronic Sensor: Model ASD-PL2, ASD-PL2F.
    - c. Analog Photoelectronic Sensor with 135-Degree F Thermal Unit: Model ASD-PTL2, ASD-PTL2F.
    - d. Addressable Thermal Sensor, Fixed Temperature: Model ATD-L2, ATD-L2F.
    - e. Addressable Thermal Sensor, Rate of Rise: Model ATD-RL2, ATD-RL2F.
    - f. Standard Analog Plug-in Base: Model ADB-FL, ADB-FLF.
    - g. Base/Sounder Assembly: Model B501BH,/BHT.
    - h. Analog Duct Sensor, with Relay: Model ADP, ADPF, ADPR, ADPRF.
    - i. Isolator Module: Model M500X.
    - j. Isolator Base: Model B224BI.
    - k. Multi-Criteria Sensor: Model MCS-Acclimate2, MCS-Acclimate2F
    - l. Beam Detector: Model ABD-2F, ABD-RT2F.
    - m. Laser Sensor: Model ASD-LS.
- N. Display:
  - 1. System Display: Furnishes audible and visual annunciation of all alarms and trouble signals.
  - 2. Provide dedicated LEDs for the following functions:
    - a. AC Power On: Green.
    - b. Alarm: Red.
    - c. Supervisory: Yellow.
    - d. System Trouble: Yellow.
    - e. Power Fault: Yellow.
    - f. Ground Fault: Yellow.
    - g. NAC 1 Silenced: Yellow.
    - h. NAC 2 Silenced: Yellow.
    - i. System Silenced: Yellow.
  - 3. Eighty-Character Alphanumeric Display: Provides status of all analog/addressable sensors, monitor, and control points. Contains a 12-key keypad which shall permit selection of functions.
  - 4. Type: Liquid crystal type (LCD), clearly visible in the dark and under all light conditions.
  - 5. Panel: Contains 4 functional keys and 3 programming buttons:
    - a. Functional Keys:
      - 1) Alarm Acknowledge.

- 2) Trouble Acknowledge.
- 3) Signal Silence.
- 4) System Reset/Lamp Test.
- b. Programming Buttons:
  - 1) Menu/Back.
  - 2) Back Space/Edit.
  - 3) OK.

## 2.5 PERIPHERAL DEVICES

Specifier Notes: Specify peripheral devices as required. Delete devices not required. Consult Gamewell-FCI for more information.

Specify **one** of the following **two** paragraphs describing Analog Smoke Sensors.

- A. Analog Photoelectronic Smoke Sensors, Model ASD-PL2, ASD-PL2F:
  - 1. Analog Photoelectronic Sensors: Low profile and capable of being set at 4 sensitivity settings of "LOW, LOW MEDIUM, MEDIUM, MEDIUM HIGH, and HIGH" levels.
  - 2. Automatic and Manual Functional Sensitivity and Performance Tests: Shall be possible without necessity of generating smoke. The test method shall test all sensor circuitry. "Failed Test" indication shall display for failed test.
  - 3. LEDs: Two LEDs providing 360-degree visibility of operating status and alarm indication shall be provided on each sensor. LEDs shall pulse periodically indicating that the sensor is receiving power and communication is taking place. This feature shall be field programmable. Upon alarm, these LEDs shall light continuously. Alarm output shall be available for remote annunciation.
  - 4. Sensitivity: The system shall check sensitivity of each sensor periodically. If a sensor alarm threshold sensitivity has changed due to aging and/or dust accumulation, the system shall automatically compensate for this change (drift compensation).
  - 5. Sensitivity Levels: Each sensor shall allow for setting of 2 sensitivity levels. Levels may be programmed so when building is occupied, a sensor shall be less sensitive than when building is unoccupied. This feature permits sensors to be more reliable and at same time reduces/minimizes unwanted alarms. This feature shall also incorporate programmable weekend days, where the sensor shall remain at the unoccupied sensitivity level.
  - 6. Sensor Screen and Cover Assembly: Shall be removable for field cleaning.
  - 7. Interchangeable Sensors: Each sensor shall be interchangeable with Models ASD-IL2, ASD-IL2F; ATD-L2/RL2, ATD-L2F/RL2F sensors via adapter and twistlock mounting base, to ensure matching the proper sensor to potential hazards of the areas being protected. In all cases, the system shall recognize when improper sensor type has been installed in previously programmed sensor type location.
  - 8. Thermal Sensor: Model ASD-PTL2, ASD-PTL2F sensor shall contain, in addition to above, a 135-degree FT thermal sensor.
- B. Analog Ionization Smoke Sensors, Model ASD-IL2, ASD-IL2F:
  - 1. Analog Ionization Sensors: Low profile and contain dual-chamber ionization sensors. Each sensor shall be capable of being set at 7 sensitivity settings ranging from 3.0 to 1.0 percent/ft equivalent obscuration, with a predefined setting of 3.0 percent.

2. Automatic and Manual Functional Sensitivity and Performance Tests: Shall be possible on all sensors without necessity of generating smoke. The test method shall test all sensor circuitry. "Failed Test" indication shall display for failed test.
3. LEDs: Two LEDs providing 360-degree visibility of operating status and alarm indication shall be provided on each sensor. LEDs shall pulse periodically indicating that the sensor is receiving power and communication is taking place. This feature shall be field programmable. Upon alarm, these LEDs shall light continuously. Alarm output shall be available for remote annunciation.
4. Sensitivity: The system shall check the sensitivity of each sensor periodically. If a sensor alarm threshold sensitivity has changed due to aging and/or dust accumulation, the system shall automatically compensate for this change (drift compensation).
5. Sensitivity Levels: Each sensor shall allow for setting of 2 sensitivity levels. Levels may be programmed so that when building is occupied, a sensor shall be less sensitive than when building is unoccupied. This feature permits sensors to be more reliable and at the same time reduce/minimize unwanted alarms. This feature shall also incorporate programmable weekend days, where the sensor shall remain at the unoccupied sensitivity level.
6. Sensor Screen and Cover Assembly: Shall be removable for field cleaning.
7. Interchangeable Sensors: Each sensor shall be interchangeable with Models ASD-PL2/PTL2 , ASD-PL2F/PTL2F and ATD-L2, ATD-L2F Series sensors via adapters and twistlock mounting base, to ensure matching the proper sensor to potential hazards of the areas being protected. In all cases, system shall recognize when improper sensor type has been installed in previously programmed sensor type location.

C. Addressable Thermal Sensors, Model ATD-L2, ATD-L2F; ATD-RL2, ATD-RL2F Series:

Specifier Notes: Specify **one** of the following first **two** paragraphs describing Addressable Thermal Sensors.

1. Addressable Thermal Sensors: Shall be low profile and operate on combination "rate-of-rise" and "fixed temperature" principles with the fixed temperature set point at 135 degrees F, Model ATD-RL2, ATD-RL2F. The sensor shall contain dual thermistor sensing circuitry for fast response.
2. Addressable Thermal Sensors: Shall operate on the "fixed temperature" principle with the sensor having a set point of 135 degrees F, Model ATD-L2, ATD-L2F. The sensor shall contain dual thermistor sensing circuitry for fast response.
3. LEDs: Two LEDs providing 360-degree visibility of operating status and alarm indication shall be provided on each sensor. LEDs shall pulse periodically indicating that the sensor is receiving power and communication is being supplied. This feature shall be field programmable. Upon alarm, these LEDs shall light continuously. Alarm output shall be available for remote annunciation.
4. Interchangeable Sensors: Each sensor shall be interchangeable with Models ADS-PL2, ADS-PL2F and ASD-IL2, ASD-IL2F sensors via twistlock mounting base, to ensure matching proper sensor to potential hazards of areas being protected. In all cases, the system shall recognize when an improper sensor type has been installed in a previously programmed sensor type location.

D. Addressable Monitor Module, Model AMM-2, AMM-2F:

1. An addressable monitor module with initiating circuit wired Class B, Style B shall be furnished to provide an address for individual, normally open (N.O.) contact devices.
- E. Addressable Dual Monitor Module, Model AMM-2I, AMM-2IF:
1. An addressable monitor module with 2 initiating circuits wired Class B, Style B shall be furnished to provide 2 addresses for individual, normally open (N.O.) contact devices.
- F. Addressable Monitor Module, Model AMM-4, AMM-4F:
1. An addressable monitor module with initiating circuit capable of being configured either Class A, Style D or Class B, Style B shall be furnished to provide an address for an individual, normally open (N.O.) contact device, or collective address for group of such devices.
  2. LED: The AMM-4, AMM-4F module shall contain a yellow status LED that shall flash when in quiescent mode and light continuously when in alarm. The LED shall be field programmable not to provide quiescent status indication, if so desired.
- G. Addressable Sub-loop Monitor Module, Model AMM-4S, AMM-4SF:
1. An addressable monitor module with initiating circuit capable of being configured Class B, Style B shall be furnished to provide a collective address for up to ten (10) Model 1151, 2151, 1451, or 1400, conventional 2-wire smoke detectors.
  2. LED: The Model AMM-4S, AMM-4SF module shall contain a yellow status LED that shall flash when in quiescent mode and light continuously when in alarm. The LED shall be field programmable not to provide quiescent status indication, if so desired.
- H. Addressable Sub-loop Monitor Module, Model MMI-6S, MMI-6SF:
1. An addressable monitor module with 6 initiating device circuits, each capable of being configured for six Class B, Style B, or three Class A, Style A circuits, shall be furnished to provide a collective address for up to ten (10) Model 1151, 2151, 1451, or 1400 conventional 2-wire smoke detectors installed in each circuit.
  2. LED: Each circuit shall contain a yellow status LED that shall flash when in quiescent mode and light continuously when in alarm. The LED shall be field programmable not to provide quiescent status indication, if so desired.
- I. Addressable Monitor Module, Model MMI-10, MMI-10F:
1. An addressable monitor module with 10 initiating device circuits, each capable of being configured Class B, Style B, or 5 circuits each capable of being configured Class A, Style D, shall be furnished to provide an address for an individual, normally open (N.O.) contact device, or collective address for group of such devices.
  2. LED: Each circuit shall contain a yellow status LED that shall flash when in quiescent mode and light continuously when in alarm. The LED shall be field programmable not to provide quiescent status indication, if so desired.
- J. Addressable Output Module, Model AOM-2R, AOM-2RF:
1. An addressable Output Module: Connected to the same signaling line circuit as analog/addressable monitor devices and Shall provide relay output (Form "C" 2 amp at 24 VDC, resistive only).
- K. Addressable Output Module, Model AOM-2S, AOM-2SF:

1. An addressable Output Module: Connected to the same signaling line circuit as analog/addressable monitor devices and Shall be capable of switching an external power supply or audio amplifier (up to 80 VRMS) to notification appliances.
  2. Notification Appliance Circuit: Shall be capable of being wired Class A (Style Z) or Class B (Style Y).
  3. The module shall supervise wiring to connected loads and report their status as Normal, Open, or Short Circuit.
- L. Addressable Output Module, Model MMO-6R, MMO-6RF:
1. An addressable Output Module: Connected to the same signaling line circuit as analog/addressable monitor devices and Shall Provide 6 relay outputs, each with Form "C" 2 amp at 24 VDC, (resistive only) contacts.
- M. Addressable Output Module, Model MMO-6S, MMO-6SF:
1. An addressable Output Module: Connected to same signaling line circuit as analog/addressable monitor devices and Shall Provide 6 outputs, each capable of switching an external power supply or audio amplifier (up to 80 VRMS) to notification appliances.
  2. Notification Appliance Circuit: Shall be capable of being wired Class A (Style Z) or Class B (Style Y).
  3. The module shall supervise wiring to connected loads and report their status as Normal, Open, or Short Circuit.
- N. Fault Isolator Module, Model M500X:
1. This module enables part of signaling line circuit to continue operating when a short circuit occurs on a section of it.
  2. The LED flashes in normal condition and lights during a short circuit condition.
  3. The module automatically restores the entire circuit to normal condition when the short circuit is removed.
  4. The module may be used in multiple, in any combination with other modules, providing circuit operation similar to that of NFPA Style 7, and does not require an address on the signaling line circuit.
- O. Addressable Manual Fire Alarm Station, Model MS-7A, MS-7AF:
1. Each Station: Shall be the non-coded double-action type, designed for installation in the signaling line circuit of the FCI analog addressable control panel.
  2. Activation of Station: Shall cause its assigned address to register at the control panel.
  3. LED: The door shall contain an LED which flashes red in normal condition and lights steadily when the station has been activated.
  4. The station Shall contain screw terminals.
- P. Manual Fire Alarm Stations Suitable for Use with Addressable Monitor Modules:

Specifier Notes: Specify **one** of the following **five** paragraphs describing Manual Fire Alarm Stations.

1. Double-Action Manual Station, Model MS-2:
  - a. Each Station: Non-coded double-action type, requiring the outer door to be lifted to expose actuator door. Upon pulling forward of door, the unit shall lock into a readily observable "alarm" position.

- b. The station shall be constructed of aluminum Type 6063/T5, equipped with a break glass rod feature, and require a key to reset.
  - c. Key: Shall be keyed alike with the control cabinet.
  - d. Alarm Activation: The station Shall have a highly reliable action to activate an alarm and have exceptionally high resistance to accidental operation.
- 2. Single-Action Manual Station, Model MS-6:
  - a. Each Station: Non-coded single-action type, requiring pulling forward of the actuator door to activate the alarm switch. Upon pulling forward of the door, the unit shall lock into a readily observable "alarm" position.
  - b. The station shall be constructed of aluminum Type 6065/T5, equipped with a break glass rod feature, and require a key to reset.
  - c. Key: Shall be keyed alike with the control cabinet.
  - d. Alarm Activation: The station Shall have a highly reliable action to activate an alarm and have exceptionally high resistance to accidental operation.
- 3. Presignal Manual Station, Model MS-2P:
  - a. Each Station: Non-coded double-action type, requiring the outer door to be lifted to expose the actuator door. Upon pulling forward of the door, the unit shall lock into a readily observable "alarm" position.
  - b. The station shall be constructed of aluminum Type 6065/T5, equipped with break glass rod feature, and require a key to reset.
  - c. Key: Shall be keyed alike with the control cabinet.
  - d. Alarm Activation: An additional key-operated switch (keyed differently) Shall be mounted on the front of the lower door for "general alarm" signaling.
- 4. Institutional Manual Station, Model MS-2L:
  - a. Each Station: Shall require a special key to release the outer door before it can be activated. After unlocking the actuator door and pulling it forward, the unit shall lock into a readily observable "alarm" position.
  - b. The station shall be constructed of aluminum Type 6063/T5, equipped with a break glass rod feature, and require the same key to reset.
- 5. Multiple-Contact Manual Station, Model MS-2D:
  - a. Each Station: Non-coded double-action type, requiring the outer door to be lifted to expose the actuator door. Upon pulling forward of the door, the unit shall lock into a readily observable "alarm" position.
  - b. The station shall be constructed of aluminum Type 6063/T5, equipped with a break glass rod feature, and require a key to reset.
  - c. Key: Shall be keyed alike with the control cabinet.
  - d. Upon operation of the station, a contact shall be available for remote control or annunciation. Contact rating shall be 6 amperes at 30 VDC.

Q. Automatic Initiating Devices: Two-wire smoke detectors approved for use with AMM-4SF Addressable Sub-loop Monitor Module. Maximum of 20 detectors per module.

Specifier Notes: Specify **one** of the following **three** paragraphs describing Photoelectric Area Smoke Detectors.

- 1. Photoelectric Area Smoke Detectors,
  - a. Type: Photoelectric.
  - b. Designed for 2-wire installations.
  - c. Factory set to detect smoke at nominal 3.0 percent light obscuration per foot.

- d. Sensitivity Tester: Allows direct readout of actual detector sensitivity in percent obscuration per foot using standard digital voltmeter.
  - e. To minimize nuisance alarms, detectors shall contain screen protecting the sensing chamber from dust and insects, and equipped with self-compensating circuitry to provide maximum stability against effects of aging, dust, and film accumulation.
  - f. Detectors shall be equipped with pulsed LED power supervisory indicator and full functional test feature.
  - g. Alarm Output: Available for remote annunciation.
2. Photoelectronic Area Smoke Detectors,
- a. Type: Photoelectronic.
  - b. Nominal Sensitivity: 3.0 percent/ft.
  - c. Signal-to-Noise Ratio: 2.0 nominal.
  - d. Perform functional sensitivity and performance test on these detectors without need for generating smoke. Test method shall test all detector circuits.
  - e. Alarm Indication: Provided by latching LED, which shall pulse periodically indicating power is being supplied to detector. Alarm output shall be available for remote annunciation.
  - f. Detectors shall not alarm when exposed to wind gusts up to 2500 feet per minute.
  - g. Detector Screen and Cover Assembly: Removable for field cleaning.
  - h. Wire Connections: Made by clamping plate and screw.

Specifier Notes: Specify **one** of the following **three** paragraphs describing Ionization Area Smoke Detectors

5. Ionization Area Smoke Detectors, System Sensor
- a. Type: Dual-chamber, ionization.
  - b. Nominal Sensitivity: 1.5 percent/ft.
  - c. Perform calibrated sensitivity and performance test on detectors without need for generating smoke. Test method shall test all detector circuits.
  - d. Test Meter: Available to check sensitivity of detectors. Metering points shall be accessible on exterior of detectors.
  - e. Alarm Indication: Provided by latching LED, which shall pulse periodically indicating power is being supplied to detector. Alarm output shall be available for remote annunciation.
  - f. Capable of operation in air velocities up to 2,500 feet per minute and at altitudes up to 10,000 feet without adjustments.
  - g. Detector Screen and Cover Assembly: Removable for field cleaning.
  - h. Wire Connections: Made by clamping plate and screw.

Specifier Notes: Specify **one** of the following **two** paragraphs describing Duct Smoke Detectors.

7. Duct Smoke Detectors:
- a. Type: Photoelectric or ionization duct smoke detectors wired in 2 or 4-wire configuration.
  - b. UL Listed under UL 268A for duct smoke detectors.
  - c. Allows remote functional testing without generating smoke.
8. Four-Wire Duct Smoke Detectors,



- a. Type: Ionization or photoelectronic duct smoke detectors wired in 4-wire configuration.
- b. UL Listed under UL 268A for duct smoke detectors.
- c. Allow remote functional testing without generating smoke.

Specifier Notes: Specify **one** of the following **five** paragraphs describing Heat Detectors.

- 9. Rate of Rise Heat Detectors, :
  - a. Function on both "rate of rise" and "fixed temperature" principles of operation.
  - b. Low profile design, white in color.
  - c. Locking base for mounting on standard electrical box.
- 10. Rate of Rise Heat Detectors,
  - a. Function on both "rate of rise" and "fixed temperature" principles of operation.
  - b. Also available in explosion-proof and combined weather/moisture-proof versions.
  - c. Explosion-Proof Models: UL and FM approved/listed for Class I, Groups C and D, and Class II, Groups E, F, and G.
- 11. Fixed Temperature Heat Detectors,
  - a. Function on the "fixed temperature" principle of operation.
  - b. Contact Arrangements: SPST or DPST.
  - c. Temperature Set Points: 135 degrees F or 200 degrees F.
  - d. Low profile design, white in color.
  - e. Locking base for mounting on standard electrical box.
- 12. Fixed Temperature Heat Detectors,
  - a. Function on the "fixed temperature" principle of operation.
  - b. Temperature Set Points: 136 degrees F or 190 degrees F.
  - c. Also available in explosion-proof and combined weather/moisture-proof versions.
  - d. Explosion-Proof Models: UL and FM approved/listed for Class I, Groups C and D, and Class II, Groups E, F, and G.
- 13. Fixed Temperature Heat Detectors,
  - a. Function on the "fixed temperature" principle of operation.
  - b. Temperature Set Points: 135 degrees F or 200 degrees F.
  - c. Replaceable plug-in detecting element.

R. Optional Remote Serial Annunciator, Model LCD-7100:

- 1. Display: 80-character display. Duplicates all information on basic system display, with exception of menus.
- 2. Function Keys: Alarm Acknowledge, Trouble Acknowledge, Signal Silence, System Reset/Lamp Test, and System Drill Test.
- 3. Keylock: A keylock which shall enable switches only when placed in the ~~ON~~+position, with exception of the Trouble Acknowledge key which is used to silence the local trouble audible sounder.
- 4. Contains the following LEDs: Alarm, Supervisory, System Trouble, Power Fault, System Silenced, NAC #1 Silenced, NAC #2 Silenced.
- 5. Mounting: Mounts on standard 3-gang surface or flush electrical box.
- 6. 7100 Series Control Panel: Accommodates up to 5 remote Model LCD-7100 annunciators, which can be located up to 4,000 feet from control panel.

S. Optional Serial LED Driver Module, Model LDM-7100:

- 1. Capable of driving up to 33 remote LEDs.

2. As many as 3 modules may be installed inside a remote, Listed annunciator allowing annunciation of up to 99 points per annunciator.
3. Operation up to 4,000 feet from control panel.
4. Control Panel: Capable of accommodating up to 5 such annunciators.

## 2.6 AUXILIARY FUNCTIONS

### A. HVAC Control:

Specifier Notes: Specify **one** of the following **four** paragraphs describing Designated HVAC Units.

1. Designated HVAC Units: Controlled through auxiliary contacts of heat detectors or 4-wire duct-type smoke detectors.
2. Designated HVAC Units: Controlled through auxiliary contacts of control panel after an alarm has been initiated from any zone.
3. Designated HVAC Units: Controlled through auxiliary zone contacts of control panel after alarm has been initiated from particular zone that is designated to control HVAC units. Disconnect switch shall be supervised.
4. Designated HVAC Units: Controlled by addressable output modules programmed to activate according to areas to be covered.

### B. Electromagnetic Door Holders, Model FM-900 Series:

1. Hold fire and smoke barrier doors open until released by alarm.
2. Holding Power: Approximately 35 pounds (15.9-kg).
3. Offer fail-safe operation.
4. Capable of operation on 12 VDC, 24 VAC, 24 VDC, or 120 VAC interchangeably without need of configuration.
5. Holders: Release through contacts of control panel after alarm has been initiated from any zone.
6. Circuits: Separately fused.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Install the fire alarm system in accordance with manufacturer's instructions.
- B. Coordinate the installation of fire alarm equipment with the manufacturer or authorized distributor.
- C. Install conductors and wiring according to the manufacturer's recommendations.
- D. Coordinate with the supplier regarding correct wiring procedures before installing conduits or conductors.
- E. Install system components in accordance with appropriate NFPA Standards, specified requirements, National Electrical Code, local and state regulations, requirements of fire department, and other applicable authorities having jurisdiction (AHJ).

### **3.2 FIELD QUALITY CONTROL**

- A. Final Test: Perform the following before the installation shall be considered completed and acceptable by awarding authority:
1. Operate by the Contractor's job foreman, in presence of a representative of the manufacturer, a representative of the Owner, and fire department, every installed device to verify proper operation and correct annunciation at control panel.
  2. Perform at least one half of all tests on battery standby power.
  3. Where application of heat would destroy any detector, it may be manually activated.
  4. Open signaling line circuits and notification appliance circuits in at least 2 locations to verify the presence of supervision.
  5. When testing has been completed to satisfaction of both Contractor's job foreman and representatives of the manufacturer and the Owner, a notarized letter co-signed by each attesting to the satisfactory completion of said testing shall be forwarded to the Owner and fire department.
  6. Leave the fire alarm system in proper working order, and, without additional expense to the Owner, replace defective materials and equipment provided under this contract within 1 year (365 days) from date of final acceptance by awarding authority.
  7. Notify the fire department before the final test in accordance with local requirements.

**END OF SECTION**



## **SECTION 16725**

### **PAGING SYSTEM**

#### **PART 1 GENERAL**

##### **1.01 GENERAL REQUIREMENTS**

- A. The conditions of the General Contract (General, Supplementary, and other Conditions) and the General Requirements are hereby made a part of this Section.
- B. All bids shall be based on the equipment as specified herein and field verified to be compatible with the existing campus system. The contractor shall verify the make and model of the existing campus intercom system and provide all necessary expansion modules and accessories as necessary to accommodate the new addition.
- C. The contractor shall be responsible for providing a complete functional system including all necessary components whether included in this specification or not.
- D. In preparing the bid, the contractor should consider that no claim will be made against the owner for any costs incurred by the contractor for any equipment demonstrations which the owner requests.

##### **1.02 SCOPE OF WORK**

- A. Furnish and install all equipment, accessories, and materials in accordance with these specifications and drawings to provide a complete and operating school communications system including but not limited to:
  - 1. Classroom speaker(s), ceiling- or wall-mounted
  - 2. Call initiation switches capable of placing normal, urgent or emergency calls
  - 3. Wall-mounted paging horns

##### **1.03 SUBMITTALS**

- A. Specification Sheets shall be submitted on all items including cable types.
- B. Submit outline drawing of system control cabinet showing relative position of all major components.
- C. Shop drawings, detailing integrated electronic communications network system including, but not limited to, the following:
  - 1. Station wiring arrangement
  - 2. Equipment cabinet detail drawing
- D. Submit wiring diagrams showing typical connections for all equipment.
  - 1. Submit a numbered Certificate of Completion for installation, programming, and service training, which identifies the installing technician(s) as having successfully completed the technical training course(s) provided by the system manufacturer.

#### 1.04 QUALITY ASSURANCE

- A. All items of equipment shall be designed by the manufacturer to function as a complete system and shall be accompanied by the manufacturer's complete service notes and drawings detailing all interconnections.
- B. The contractor shall be an established communications and electronics contractor that has had and currently maintains a locally run and operated business for at least 5 years. The contractor shall be a duly authorized distributor of the equipment supplied with full manufacturer's warranty privileges.
- C. The contractor shall show satisfactory evidence, upon request, that he or she maintains a fully equipped service organization capable of furnishing adequate inspection and service to the system. The contractor shall maintain at his or her facility the necessary spare parts in the proper proportion as recommended by the manufacturer to maintain and service the equipment being supplied.

#### 1.05 SINGLE SOURCE RESPONSIBILITY

- A. Except where specifically noted otherwise, all equipment supplied shall be the standard product of a single manufacturer of known reputation and minimum of 10 years experience in the industry. The supplying contractor shall have attended the manufacturer's installation and service school. A certificate of this training shall be provided with the contractor's submittal.

#### 1.06 SAFETY / COMPLIANCE TESTING

- A. The communications system shall bear the label of a Nationally Recognized Testing Laboratory (NRTL) such as ETL, and be listed by their re-examination service. All work must be completed in strict accordance with all applicable electrical codes, under direction of a qualified and factory approved distributor, to the approval of the owner.
- B. The system is to be designed and configured for maximum ease of service and repair. All major components of the system shall be designed as a standard component of one type of card cage. All internal connections of the system shall be with factory-keyed plugs designed for fault-free connection.
- C. The printed circuit card of the card cage shall be silk-screened to indicate the location of each connection.

#### 1.07 IN-SERVICE TRAINING

- A. The contractor shall provide a minimum of eight hours of in-service training with this system. These sessions shall be broken into segments, which will facilitate the training of individuals in the operation of this system. Operators Manuals and Users Guides shall be provided at the time of this training.

#### 1.08 WIRING

- A. System wiring and equipment installation shall be in accordance with good engineering practices as established by the EIA and the NEC. Wiring shall meet all state and local electrical codes. All wiring shall test free from all grounds and shorts.

- B. All communication system wiring shall be labeled at both ends of the cable. All labeling shall be based on the room numbers as indicated in the architectural graphics package.

#### 1.09 PROTECTION

- A. The contractor shall provide all necessary transient protection on the AC power feed and on all station lines leaving or entering the building.
- B. The contractor shall note in his system drawings, the type and location of these protection devices as well as all wiring information. Such devices are not to be installed above the ceiling.

#### 1.10 SERVICE AND MAINTENANCE

- A. The contractor shall provide a five year equipment warranty of the installed system against defects in material and workmanship. All materials shall be provided at no expense to the owner during normal working hours. The warranty period shall begin on the date of acceptance by the owner/engineer.
- B. The contractor shall, at the owner's request, make available a service contract offering continuing factory authorized service of this system after the initial warranty period.
- C. The system manufacturer shall maintain engineering and service departments capable of rendering advice regarding installation and final adjustment of the system.

### PART 2 EQUIPMENT SPECIFICATION

#### 2.01 MANUFACTURERS

- A. Equipment shall be as manufactured by the existing campus system.

#### 2.02 COMPONENTS AND DESCRIPTIONS

- A. The system must be capable of supporting the existing system hardware and functions .
- B. Classroom Call Staff Stations
  1. Normal/Urgent Call involves pressing the Call Switch once or lifting the Telephone Handset. The Call is then switched to the Administrative Display Phone. This requires the display of the architectural number on the Administrative Display Phone and/or Wall Display.
  2. Emergency Call involves pressing the emergency call switch; flash hook the switch at least 4 times in a non-dial analog handset with Call Level Normal or Urgent; pressing the call switch or hook switch one time in a non-dial analog handset with Call Level Emergency only. The Call is then switched to the Administrative Display Phone. This requires the display of the architectural number on the Administrative Display Phone and/or Wall Display.
  3. Emergency Link Transfer - If the emergency call is unanswered by the Administrative Display Phone and the emergency link transfer is provisioned and programmed; the emergency call will be forwarded to the loudspeaker associated with that station. Any station/admin phone with speaker can be programmed for the Emergency Link Transfer except the Administrative VoIP Phone. Systems that do not provide Emergency Link Transfer will not be considered equal.

## 2.03 SPEAKERS

- A. Classroom speakers and grilles (ceiling-mounted, flush) shall be similar to Bogen CSD2X2 Drop-In Ceiling Speakers.
- B. Wiring shall be done per manufacturer's recommendation. All terminal connections to be on barrier strips. All cables to be labeled by room.
- C. Outdoor horns shall be Bogen similar to FMH15T .

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Examine conditions, with the installer present, for compliance with requirements and other conditions affecting the performance of the Integrated Telecommunications/Time/Audio/Media System.
- B. Do not proceed until unsatisfactory conditions have been corrected.

### 3.02 INSTALLATION

- A. The installation, adjustment, testing and final connection of all conduit, wiring, boxes, cabinets, etc., shall conform to local electrical requirements and shall be sized and installed in accordance with manufacturer's approved shop drawings.
- B. Low-voltage wiring may be run exposed above ceiling areas where they are easily accessible.
- C. Contractor shall install new rack console at location shown on plans.
  - 1. Solder each speaker line splice and tape each individual wire.
  - 2. Connect remote slave clocks to master clock in console.
- D. All classroom phones shall be wall-mounted.
  - 1. Mount at 54" AFF.
  - 2. All wiring should be concealed.
  - 3. Verify exact location with Architect.
- E. Speaker and telephone lines run above ceiling and not in conduit shall be tie-wrapped to ceiling joist with a maximum spacing of 8' between supports. No wires shall be laid on top of ceiling tile.
- F. Connect field cable to each speaker transformer using UL butt splices for 22 AWG wire.
- G. Terminate field wiring on wall adjacent to rack using Telco 66 type blocks. Provide neat cross connect system for wiring. Wiring to be labeled to indicate final architectural room number that it services on the Telco block.
- H. Rack shall be labeled in numerical order with speaker/phone combinations first, speaker/outside horn combinations last. Labeling and order shall reflect final Architectural room numbers posted outside the rooms. Use three- (3), four- (4), five- (5), or six- (6) digit dialing extensions.



- I. Contractor shall provide a minimum of eight (4) hours of operational and programming instruction to school personnel.
- J. On the first school day following installation of the System, the Contractor shall provide a technician to standby and assist in system operation.
- K. Mark and label all telephone outlets and/or sets with the graphic room numbers. Label all demarks IDF and MDF points with destination point numbers. Rooms with more than one outlet shall be marked XXX-1, XXX-2, XXX-3, etc. where XXX is the room number.
- L. No graphic room number shall exceed the sequence from 000001 through 899999.
  - 1. All outside speakers shall be on a separate page zone and time zone.
  - 2. All zones shall be laid out not to exceed 10 watts maximum audio power zone.
  - 3. All hallway speakers shall be tapped at 1 watt maximum.
  - 4. All outside horns shall be tapped at 7.5 watts maximum.
  - 5. All classroom speakers shall be tapped at ½ watt maximum.
  - 6. Large rooms, such as cafeterias, shall be tapped at 2 watts maximum.

### 3.03 GROUNDING

- A. Provide equipment grounding connections for Integrated Telecommunications/Time/Audio/Media System as indicated. Tighten connections to comply with tightening torques specified in UL Standard 486A to assure permanent and effective grounds.
- B. Ground equipment, conductor, and cable shields to eliminate shock hazard and to minimize the greatest extent possible, ground loops, common mode returns, noise pickup, cross talk, and other impairments.
- C. The contractor shall provide all necessary transient protection on the AC power feed and on all station lines leaving or entering the building.
- D. The contractor shall note in his drawing, the type and locations of these protection devices as well as all wiring information.
- E. The contractor shall furnish and install a dedicated, isolated earth ground from the central equipment rack and bond to the incoming electrical service ground buss bar.

## PART 4 EXECUTION

### 4.01 DIVISION OF WORK

- A. While all work included under this specification is the complete responsibility of the contractor, the following division of actual work listed shall occur.
  - 1. The conduit, outlets, terminal cabinets, etc., which form part of the rough-in work shall be furnished and installed completely by the electrical contractor. The balance of the system, including installation of speakers and equipment, making all connections, etc., shall be performed by the manufacturer's authorized representative. The entire responsibility of the system, its operation, function, testing and complete maintenance for one (1) year after final acceptance of the project by the owner, shall also be the responsibility of the manufacturer's authorized representative.

### 4.02 EQUIPMENT MANUFACTURER'S REPRESENTATIVE

- A. All work described herein to be done by the manufacturer's authorized representative shall be provided by a documented factory authorized representative of the basic line of equipment to be utilized.
- B. As further qualification for bidding and participating in the work under this specification, the manufacturer's representative shall hold a valid C-10 Contractor's License issued by the Contractor's State License Board of [ARKANSAS]. The manufacturer's representative shall have completed at least ten (10) projects of equal scope, giving satisfactory performance and have been in the business of furnishing and installing sound systems of this type for at least five (5) years. The manufacturer's representative shall be capable of being bonded to assure the owner of performance and satisfactory service during the guarantee period.
- C. The manufacturer's representative shall provide a letter with submittals from the manufacturer of all major equipment stating that the manufacturer's representative is an authorized distributor. This letter shall also state the manufacturer guarantees service performance for the life of the equipment, and that there will always be an authorized distributor assigned to service the area in which the system has been installed.
- D. The contractor shall furnish a letter from the manufacturer of the equipment, which certifies that the equipment has been installed according to factory intended practices, that all the components used in the system are compatible and that all new portions of the systems are operating satisfactorily. Further, the contractor shall furnish a written unconditional guarantee, guaranteeing all parts and all labor for a period of five (5) years after final acceptance of the project by the owner.

### 4.03 INSTALLATION

- A. Plug disconnect: All major equipment components shall be fully pluggable by means of multi-pin receptacles and matching plugs to provide for ease of maintenance and service.
- B. Protection of cables: Cables within terminal cabinets, equipment racks, etc., shall be grouped and bundled (harnessed) as to type and laced with No. 12 cord waxed linen lacing twine or T & B "Ty-Rap" cable. Edge protection material shall be installed on edges of holes, lips of ducts or any other point where cables or harnesses cross metallic edge.

- C. Cable identification: Cable conductors shall be color-coded and individual cables shall be individually identified. Each cable identification shall have a unique number located approximately 1-1/2" from cable connection at both ends of cable. Numbers shall be approximately 1/4" in height. These unique numbers shall appear on the As-Built Drawings.
- D. Shielding: Cable shielding shall be capable of being connected to common ground at point of lowest audio level and shall be free from ground at any other point. Cable shields shall be terminated in same manner as conductors.
- E. Provide complete "in service" instructions of system operation to school personnel. Assist in programming of telephone system.

#### 4.04 DOCUMENTATION

- A. Provide the following directly to the Supervisor of Technology Service.
  - 1. Provide a printed copy of all field programming for all components in system.
  - 2. Provide one copy of all diagnostic software with copy of field program for each unit.
  - 3. Provide one copy of all service manuals, parts list, and internal wiring diagrams of each component of system.
  - 4. Provide one copy of all field wiring runs, location and end designation of system.

END OF SECTION





